RRIS

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Autumn 1974
Volume 1 Number 2

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Federal Railroad Administration

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16. Abstract
This publication contains 1,647 abstracts of journal articles and research reports selected by RRIS from current railroad literature and 160 summaries of ongoing research activities in the railroad field. The material covers the entire range of railroading from technology to operations, management, economics and government involvement. Literature sources are worldwide. The material is arranged according to the RRIS classification scheme in two separate sections, one for abstracts and one for summaries. The book also contains subject term, author and source indexes.

The publication is available on a regular subscription basis from Railroad Research Information Service, Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

For more detailed reviews of specific subject areas, File Searches are also available directly from RRIS.

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RAILROAD RESEARCH BULLETIN

SUBSCRIPTIONS

This issue of the Bulletin is the first not to be provided free of charge. The previous editions were funded by the Federal Railroad Administration so that they could be supplied at no cost to the users. All subscribers to this edition will receive a $15.00 subscription renewal notice from the Transportation Research Board for the Spring and Autumn 1975 Bulletins. For others wishing to subscribe to the two 1975 Bulletins, the forms below may be used.

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Railroad Research Information Service

The Railroad Research Information Service (RRIS) has been developed within the Division of Engineering of the National Research Council under contract to the Federal Railroad Administration of the U.S. Department of Transportation.

The RRIS computerized data system incorporates information on the planning, building, managing, operation, and regulation of rail transportation systems. A primary objective is to acquire and select information that will be timely and useful.

The scope of RRIS includes rail rapid transit. All items in the RRIS file are classified according to the basic system and there is no separate classification for transit material. Items pertaining to rail transit can be identified under the term "Rapid Transit Systems" in the Subject Term Index, where the accession numbers for such items are listed.

Two types of data are stored in the RRIS system—abstracts of articles and reports that are within the RRIS scope and summaries of ongoing and recently completed research projects. The abstracts and the summaries are arranged in separate sections, as indicated in the table of contents. In addition to acquisition and selection, RRIS work includes the classification, indexing, storage, retrieval, and dissemination of abstracts and summaries. Concepts and procedures are similar to those of the other transportation research information services within the National Research Council—the Highway Research Information Service (HRIS) and the Maritime Research Information Service (MRIS).

The Railroad Research Bulletin, published semiannually, contains abstracts and summaries added to the RRIS file during the preceding six months. While RRIS publications are not themselves copyrighted, many of the abstracts in them are and are used with the permission of the copyright holder. In the Railroad Research Bulletin, any abstract followed by an "Acknowledgement" should be considered as possibly subject to copyright, and anyone wishing to reproduce abstracts from RRIS publications should secure permission from the holder of the copyright.

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RAILROAD RESEARCH BULLETIN

Autumn 1974
Volume 1 Number 2
Publication 7402

This Bulletin, containing 1,647 abstracts of journal articles and research reports and 171 summaries of ongoing research activities in the railroad field, is produced by the Railroad Research Information Service. Financial support for the operation of RRIS within the Transportation Research Board is provided by the Federal Railroad Administration of the U.S. Department of Transportation.

Railroad Research Information Service
Transportation Research Board
Commission on Sociotechnical Systems • National Research Council
National Academy of Sciences • National Academy of Engineering

Table of Contents

Using the Railroad Research Bulletin

This volume is divided into three major sections—abstracts of documents; summaries of ongoing research; and indexes by subject, author, and source.

If you are interested in reviewing reports of completed research and other published documents, turn to the Abstracts section, which begins on page 1. The material in this section is arranged by RRIS subject categories according to the numbered subject areas indicated in the table of contents. The category with its corresponding code number appears at the top of each page.

If you are interested in summaries of ongoing research projects, turn to the Ongoing Research section, which begins on page 331. These summaries are also arranged by subject areas, with each category appearing at the top of the page, along with the corresponding code number followed by an "A" (for active) to indicate that this is an ongoing project.

If you can identify your interest by subject, turn to the Subject Term Index starting on page 379. Each term in this index is followed by the accession number(s) of applicable abstracts or summaries. Each accession number consists of two digits that identify the subject area and six digits that identify the individual document under that subject area. Again, if an A follows the subject category digits, this indicates that the particular item is a summary of an ongoing research report. The items are arranged in order of ascending accession numbers in their respective sections.

If you are looking for abstracts of articles or reports written by a particular author or summaries of projects being conducted by a particular investigator, turn to the Author Index on page 405. Look for the individual's last name in the alphabetized listing. Again note the accession numbers and turn to the abstracts or summaries section.

If you are interested in abstracts of articles or reports that appeared in a particular publication or were the work of a specific publisher, or if you are interested in summaries of research projects being conducted by a specific performing organization, turn to the Source Index on page 419. Again note the accession numbers and turn to the proper abstracts or summaries section.

While the Subject Term Index will give a general idea of the scope of the RRIS classification system, there are many other terms that do not happen to appear in this issue but for which there is information available.

Definitions and Abbreviations

AAR*	Association of American Railroads
AREA*	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
DOT	U.S. Department of Transportation
ECMT	European Conference of Ministers of Transport
EI	Engineering Index
ESL*	Engineering Societies Library
Fig	Figures
FRA	Federal Railroad Administration
FY	Fiscal year
IEEE	Institute of Electrical and Electronics Engineers
IPC*	IPC Transport Press, Ltd.
IRCA	International Railway Congress Association
IRF	International Road Federation
IRRD	International Road Research Documentation
NAE	National Academy of Engineering
NAS	National Academy of Sciences
NRC	National Research Council
NTIS*	National Technical Information Service
OECD	Organization for Economic Cooperation and Development
ORE	Office for Research and Experiment of UIC
PB	Prefix identifying an NTIS accession number
Phot	Photographs
Ref	References
Repr PC	Request paper copy of original document
RPI	Railway Progress Institute
Rpt	Report
Req Price	Price on request
RTAC	Roads and Transport Association of Canada
Tab	Tables
TRRL	Transport and Road Research Laboratory
TSC	Transportation Systems Center
UIC	International Union of Railways
UITP	International Union of Transport
UMTA	Urban Mass Transportation Administration
V	Volume
XUM*	Xerox University Microfilms

* See Page ix for availability of papers and research reports.

Sample Abstract

Abstracts are classified according to an eight-digit code. The first two digits are used to place the abstracts in the proper subject areas according to the RRIS classification scheme (page v). The first two digits appear at the top of the pages in the Abstracts section of this publication along with the category designation. The final six digits are used to arrange the abstracts within a subject area; these are shown as the reference number at the top of the sample abstract. Generally in such listings the abstract numbers will not be consecutive.

Reference number → 046222

Title → VEHICLE-TUNNEL ENTRY AT SUBSONIC SPEEDS

Author → Swarden, MC

Publication source → Massachusetts Institute of Technology, Engineering Projects Laboratory, Cambridge, Massachusetts

Publication data → DSR-76111-4, Final Rpt, Jan. 1973, 67 pp

Supplementary notes → Contract DOT-C-85-65

Abstract →

Experimental results on vehicle-tunnel interactions during the entering period of the vehicle include measurements of pressure on the tunnel and on the vehicle itself. The measurements were made for various Mach number conditions, vehicle-head shapes, tunnel positions, and for various positions on the surface of the vehicle. These results are of direct interest and use in the design of a vehicle. The direct implication of the pressure state during entry is that for Mach numbers presently contemplated (equivalent to 300+ mph) all ports must be sealed as the train enters the tunnel. The differential pressure level and the rates of change of pressure to be sealed against can be found from the information given in the report.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-218840/7

Availability →

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PB-218840/7

Sample Summary of Ongoing Research

The ongoing project summaries in the section beginning on page 331 describe research activities currently in progress or recently completed. Each record describes who is performing the project, who is funding it, and how the research goal is to be attained. A project summary is not a document surrogate; that is, there is not necessarily a full report published on the project. The summaries use the following format, although it should be noted that each record may or may not contain all the elements described below.

Accession number →	**045172**
Project title →	**STUDY AND DEVELOPMENT OF PLANS AND RECOMMENDATIONS FOR THE CONSOLIDATION AND RELOCATION OF THE RAILROAD FACILITIES**
Agency performing the work →	PERFORMING AGENCY: Metropolitan Area Planning Agency
Project investigators →	INVESTIGATORS: Pendergrass, B.P., Tel. 402-3462112
Project sponsors →	SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590
Contract monitor →	RESPONSIBLE INDIVIDUAL: Crisafulli, R.J., Tel. 202-4261677
Project data →	STATUS: Active START DATE: June 1973 COMPL. DATE: Feb. 1974 TOTAL FUNDS: $70000 FUND TYPE: Contract-CONTR. NO. : DOT-FR-30076 CONTR. TYPE: FFP
Supplementary note →	The University will investigate and test new concepts in rational tunnel design, new materials and techniques for shotcrete support of tunnels and new materials and improved structural design for segmented tunnel linings.
Project summary →	The Contractor shall furnish all necessary qualified personnel, facilities, materials and such other services necessary to perform a "Rail Transportation Study". It shall provide for the study and development of plans and recommendations for the consolidation and relocation of railroad facilities associated with the Missouri Riverfront Developemnt Program.
Source of this summary →	ACKNOWLEDGEMENT: Federal Railroad Administration, PR# 3061

Availability of Research Reports and Journal Articles

An availability statement is included with each abstract, usually giving the address from which copies of the document may be obtained. Copies of research reports and journal articles referred to in this publication are not available from the Railroad Research Information Service. When ordering from any source, give full information on the item wanted. When ordering from the National Technical Information Service, be sure to give the NTIS accession number (PB plus six digits) as well as the title and other information. When no availability is specified with an abstract, it is suggested that the user consult an established transportation library. Because a large number of documents are available from a few sources, space and printing costs have been reduced by abbreviating these sources as follows:

AAR	Association of American Railroads Phone: 202-293-4000	1920 L Street, N.W. Washington, DC 20036
AREA	American Railway Engineering Association Phone: 312-939-0780	59 East Van Buren Street Chicago, IL 60605
ESL	Engineering Societies Library Phone: 212-752-6800	United Engineering Center 345 East 47th Street New York, NY 10017
IPC	IPC Transport Press Ltd.	Dorset House, Stamford Street London SE1 9LU, England
NTIS	National Technical Information Service Phone: 703-321-8543	5285 Port Royal Road Springfield, VA 22151
Simmons-Boardman	This publisher has informed RRIS that all requests for back issues of journal articles should be directed to Xerox University Microfilms (XUM).	
XUM	Xerox University Microfilms Phone: 313-761-4700	300 North Zeeb Road Ann Arbor, MI 48106

Because of changing prices, the costs of each of these services have not been included. It is suggested that each be contacted when photoprint or microfilm is desired. Please note that all NTIS mocrofiche prices cited in this issue have been raised, as follows: Domestic–from $1.45 to $2.25; Outside United States–from $2.95 to $3.75.

RRIS File Searches

The RRIS primary file is maintained on magnetic computer tape. A secondary file is kept in the form of a computer printout of entries. Either file may be searched for specific information. The key to searching either file is the use of appropriate subject terms. The primary (computer) file is searched by the computer; the secondary (printed) file is searched manually.

The RRIS file contains summaries of research projects in progress and abstracts of published works, together with the appropriate documentation and bibliographic data. The output from the file search is in the form of a computer-printed list from a search of the magnetic tape file and as photocopies of listings in the case of a manual file search. Such computer-generated lists are similar in format to those used in this publication.

The fee schedules for RRIS file searches reflect the primary support for the service from the Federal Railroad Administration and the nonprofit nature of all National Research Council information services:

Manual Retrieval	$20 per request plus 20 cents per page photocopy
Computer Retrieval ...	$50 per request plus 25 cents per printout page after screening

Whether computer retrieval or manual retrieval is used is generally decided by mutual agreement between the RRIS staff and the requester after consultation. A written authorization or purchase order is required before the retrieval is actually made.

Availability of RRIS Publications

Previous issues of the Railroad Research Information Service publications are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. Order by title and NTIS Accession Number (PB plus six digits).

Title	Special Bibliography: Safety-Related Technology	Railroad Research Bulletin, Developmental Issue	Railroad Research Bulletin, Vol. 1, No. 1
Date	March 1973	Autumn 1973	Spring 1974
RRIS Number	73S1	7301	7401
NTIS Accession Number	PB 220 220	PB 226 784	PB 233 880
NTIS Prices:			
Domestic			
Papercopy	$9.00	$8.00	$9.25
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Outside United States			
Papercopy	$11.50	$10.50	$11.75
Microfiche	$3.75	$3.75	$3.75

051272
SLURRY WALL TECHNIQUE EXPEDITES SUBWAY CONSTRUCTION

Galler, S, Transportation Administration

Public Works (Public Works Journal Corporation, 200 South Broad Street, Ridgewood, New Jersey, 07451)

Vol. 104, No. 8, Aug. 1973

The slurry wall method provides control of seepage and percolation into open cuts and permits construction of deep concrete retaining walls before excavation of basement or subway areas is started. In the case of the Archer Street subway, the soil is predominantly sand, which is difficult to excavate between neat lines. The slurry wall was selected to contain the sand, which otherwise might slide, and to provide needed support of buildings abutting the street.

ACKNOWLEDGEMENT:
Engineering Index, EIX731103156

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051273
SPECIAL FORMWORK CASTS TWO-LEVEL ARCH STATION UNDER STREET

Engineering News-Record (McGraw-Hill, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020)

Vol. 191, No. 4, July 1973

Construction of the downtown sections of the area's 98-mile regional rail transit system in Washington DC is dealt with. Working 75 ft below the surface, special piggyback formwork was used to construct the 600-ft-long, two-level coffered arch station. Before any of the construction could begin, the contractors had to underpin any building that might be affected.

ACKNOWLEDGEMENT:
Engineering Index, EIX731003591

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051286
SOFT GROUND TUNNELS FOR THE BART PROJECT

Kuesel, TR, Parsons, Brinckerhoff, Quade and Douglas, Engrs

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

Vol. 2, Proceeding, 1972, pp 287-313, 24 Fig

North American Rapid Excavation and Tunneling Conference Proceedings, Chicago, Illinois, 5-7 June 1972.

This paper presents the principal results obtained from measurements made during construction of the soft ground tunnels for the San Francisco Bay Area Rapid Transit System. Covered are soil conditions, tunnel lining design, tunnel lining performance, use of tunneling machines, and control of settlement.

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051287
PERFORMANCE OF A SOFT GROUND TUNNEL ON THE WASHINGTON METRO

Hansmire, WH, Illinois University, Urbana
Cording, EJ, Illinois University, Urbana

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

Vol. 2, 1972, pp 271-289, 13 Fig, 2 Ref

North American Rapid Excavation and Tunneling Conference Proceedings, Chicago, Illinois, 5-7 June 1972.

Construction of the Metro by the Washington Metropolitan Area Transit Authority involves a large amount of cut and cover, soil tunnel, and rock tunnel construction. To aid initial construction and improve future design, performance observations were undertaken on tunnels in the initial construction phase. One part of the program was on the first soft ground tunnel constructed in the system. The tunnel is a 2200-ft (670 m) twin-bore section, designated Contract A-2, in downtown Washington. Two objectives of this program were to determine the relationship of construction procedure to settlements and to observe the pattern of soil movement around the tunnel as an aid in evaluating underpinning criteria for nearby structures. A test section, consisting of three instrument lines located across the tunnel path, was established prior to mining in Lafayette Park to measure in detail both vertical and lateral soil displacements as the tunnel was mined through the section. Load and distortion measurements on the lining were also made within the test section; observations of construction procedure were maintained throughout construction.

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051288
DESIGN CONSIDERATIONS FOR UNDERGROUND STRUCTURES IN ROCK

Bawa, KS, De Leuw, Cather and Company
Bumani, A, De Leuw, Cather and Company

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

Vol. 2, 1972, pp 393-417, 11 Fig., 1 Tab., 7 Ref.

North American Rapid Excavation and Tunneling Conference Proceedings, Chicago, Illinois, 5-7 June 1972.

A rail rapid transit system called the "Metro" system is presently under construction in the Nation's Capital area. The Metro system will involve nearly all types of construction generally used for rapid rail transit projects. About half of the mileage will be underground, comprising approximately 16 miles of rock tunnels, 10 miles of earth tunnels, and nearly 21 miles of cut-and-cover construction in earth. Thus, about one-fifth of the system will be designed as underground structures, namely tunnels and stations, in rock. The paper covers subsurface investigations, ground water conditions, rock characteristics, and design criteria.

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051289
THE THRESHOLD OF THE SEVENTIES. THE EAST 63RD STREET TUNNEL

Casey, EF, New York City Transit Authority

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

Vol. 2, 1972, pp 419-437, 2 Fig, 2 Phot

North American Rapid Excavation and Tunneling Conference Proceedings, Chicago, Illinois, 5-7 June 1972.

This article discusses the tunnel construction program of the New York City Transit Authority. Details of the East 63rd Street tunnel are given, including bidding results, the alternate proposals, the geology of the site, the sequence of construction operations, tunnel and station area excavation.

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051290
PRECAST SEGMENTED TUNNEL LINING FOR THE MEXICO CITY SUBWAY

Chase, AP, Mathews (AA) Incorporated

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

Vol. 2, 1972, pp 439-467, 16 Fig, 5 Tab, 8 Ref

North American Rapid Excavation and Tunneling Conference Proceedings, Chicago, Illinois, 5-7 June 1972.

The Tacubaya subway tunnels form a link in the Mass Transit System of the Federal District of Mexico. The designers of the tunnel lining and tunnel driving equipment were faced with the problem of driving two subway tunnels 9.0 m outside diameter through water-bearing soil, directly beneath a high speed limited access highway, a main drainage sewer, structures including residences and office buildings, on an alignment curved for 67 per cent of tunnel length, and on grades as high as 7 percent, within a limited budget, with minimum damage to property and disruption to the community.

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051291
OBSERVATIONS DURING CONSTRUCTION OF ROCK TUNNELS FOR THE WASHINGTON, D.C. SUBWAY

Mahar, JW, Illinois University, Urbana
Gau, FL, Illinois University, Urbana
Cording, EJ, Illinois University, Urbana

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

Vol. 2, 1972, pp 659-681, 12 Fig

North American Rapid Excavation and Tunneling Conference Proceedings, Chicago, Illinois, 5-7 June 1972.

The Washington, D.C. rapid transit system (METRO) when completed will consist of 98 miles of double track rail. Fifteen miles will be tunneled in rock and 12 large underground rock chambers will be constructed at station locations. The University of Illinois is under contract to Metro to provide observations and instrumentation services in the initial phase of construction. The program is designed to monitor construction conditions as well as to provide information useful for the design of future rock tunnels and rock chambers in the Metro system. This paper presents the results of observations in the rock tunnels constructed to date. One of the major objectives of the observational program was to determine the orientation and character of joints and shear zones and to evaluate their effect on support requirements for various tunnel orientations and configurations.

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051292
PROTECTION OF PARIS-ROME LINE AGAINST FALLING ROCKS

Lazerges, J Cabrol, E

Travaux (Federation Nationale des Trav Publ & des Synd Aff, 6 Avenue Pierre Premier de Serbie, Paris 16e, France)

No. 463, Oct. 1973, pp 25-29

A cliffside of 10/1 200 cubic metres overhanging the Paris-Rome railway in the neighborhood of Aix-les-Bains was found to be so dangerous that it was decided to destroy it, with the interruption of traffic. Owing to the continued falling of rocks and in order to shorten the interruption of traffic, it was necessary to build a covered tunnel of 75 m in the area of the scree cone. Safety factors called for the prefabrication of seven elements of 0.70 built under shelter of the falling rocks and set up by shifting on a straight track. After the concreting of a raft, anchoring by means of pre-stressed ties in the solid rock, the railway traffic was re-established after 4 months of interruption. A slab covering the tunnel and extending on the side of the Lac du Bourget by means of an overhang will protect the national highway RN 491 which runs along the railway.

ACKNOWLEDGEMENT:
Travaux

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051293
INNOVATIONS IN CONSTRUCTION METHODS FOR NEW JUNCTIONS OF MILAN METRO

Salvini, A

Travaux (Federation Nationale des Trav Publ & des Synd Aff, 6 Avenue Pierre Premier de Serbie, Paris 16e, France)

No. 463, Oct. 1973, pp 41-45

After having indicated the present make-up of the underground network of Milan and its extensions being constructed at the present time, the author describes the methods used by the new manufacturers, in highly urbanized areas: 1) Earthwork under a cover supported by metallic beams in three parts making it possible to reduce the disturbance caused to automobile traffic. The cover was even built by means of prefabricated slabs in concrete constituting a built-in framework. 2) Previous consolidation of low coherency lands by means of injections of cement mixes, and then of sodium silicate and a catalyst. 3) Covering of dug walls by means of air projected concrete.

ACKNOWLEDGEMENT:
Travaux

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051420
ON THE ALLOCATION OF LAND TO URBAN TRANSPORTATION

Borukhov, E, Ohio State University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-97, Paper, Sept. 1973, 12 pp, 4 Tab, 10 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Land is one of the more important inputs in urban transportation. The purposes of this paper are: (a) to present a theoretical model of a city that will explain the amount of land devoted to transportation in various parts of a city, and in cities of different sizes; (b) to try and examine whether the available data on the

amount of land used for transportation in various cities, and in various parts of the same city conform to what is expected according to the model. The model that is presented is a fixed coefficients model. The main feature of the model is that it allows explicitly for the use of land in transportation.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051427
COFFERDAM FOR BART EMBARCADERO SUBWAY STATION

Armento, WJ

ASCE Journal of Soil Mechanics & Foundations Div (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. SM10, Paper 10075, Proceeding, Oct. 1973, pp 727-744

Inward deformations of cofferdam walls during deep excavation in soft soils are inevitable but steps can be taken to minimize these movements. An excavation 1,160 ft (354-m) long by 55 ft (17 m) wide by 70 ft (21 m) deep in a busy downtown San Francisco street, flanked by major buildings, was performed for the BART Embarcadero station successfully in soil strata that contained varying depths of soft clay locally known as "recent Bay mud." To provide an impervious rigid cofferdam wall of adequate strength and reasonable thickness a soldier-pile and tremie concrete (SPTC) system of sheeting was selected. Successive excavation cuts below prescribed bracing levels were held to a practical minimum. Struts were preloaded to reduce compression deformations. Inclinometers recorded deflections of the walls while strain gages enabled determination of strut loads. The thicker the layer of soft clay the greater the inward movements of the walls notwithstanding the corresponding increases in wall sizes.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051428
TUNNEL SURVEY AND TUNNELLING MACHINE CONTROL

Peterson, EW   Frobenius, P

ASCE Journal of Surveying and Mapping Division (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. SU1, Paper #10008, Proceeding, Sept. 1973, pp 21-37

An outline of the survey work necessary for the construction of a large tunnel project such as the San Francisco Bay Area Rapid Transit System is presented. In the second part of the paper, a method for shield or tunneling machine control by laser and double target is described. This method has proven successful during the driving of the tunnels of the BART system both by hand and machine methods.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051433
THE FICKLE MISSISSIPPI

Fairweather, V

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Dec. 1973, pp 60-62

The Mississippi River has flooded and changed course many times over the years. The U.S. Army Corps of Engineers has undertaken a long-range Flood Control program that has four elements: levees; floodways; channel improvement and stabilization; and tributary basin improvements. The channel improvement and stabilization program is aimed at retaining the present course of the river as well as at controlling floods. Great economic loss would be incurred as a result of major river course diversion. In the 1950's, the river threatened to change course and divert into the Atchafalaya River, cutting off Baton Rouge and New Orleans. Control structures are described. The channel stabilization program includes dredging dikes, cutoffs and revetments. The revetment program involves the laying of concrete mattresses to prevent the river from wearing away banks. The impact of the spring 1973 floods on the program is assessed.

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051434
INTERIM COMMITTEE ON LIFELINE EARTHQUAKE ENGINEERING

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Dec. 1973, pp 65-67

ASCE has undertaken the role of elevating the State of the Art of lifeline engineering by establishing an interim Committee on Lifeline Engineering (CLEE). Lifelines are defined as utilities and transportation systems. The present technology in the field is dangerously underdeveloped and no major organization has been committed to the problems. The Society's goals and structure correspond uniquely with the dimensions of the problem. Lifelines represent approximately half of the economic value vulnerable to earthquakes and they have implications of public health and welfare in the aftermath of earthquakes.

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051450
FROST HEAVE AND THE RAPID HEAVE TEST

Zoller, JH

Fernmelde-Ingenieur (Verlag fuer Wissenschaft und Leben, Georg Heidecker, Kulshemerstrasse 11, D-8532 Badwindskeim, West Germany)

Vol. 37, No. 6, Sept. 1973, pp 211-220, 39 Ref

A rapid test to measure the frost susceptibility of materials for use in sub-base and base courses of pavements is described. A frost susceptibility classification, based on the heave rate of the tested materials, is presented. The mechanics of frost heave and parameters affecting frost heave of soil materials are discussed. Use of the test to select nonfrost-susceptible materials for sub-base and base courses should reduce pavement maintenance costs.

ACKNOWLEDGEMENT:

Engineering Index, EI 74 05791

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051928
EXPLOSIVE EXCAVATION RESEARCH

Gates, RH, Waterways Experiment Station

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

1972, 10 Fig, 1 Ref

Appeared in the proceedings of the North American Rapid Excavation and Tunneling Conference 1972, Vol. 2. Conference was held by the Society of Mining Engineers the American Institute of Mining, Metallurgy and Petroleum Engineers.

The U. S. Army Corps of Engineers is developing chemical explosive excavation as a construction technique for use on Civil Works projects. Large chemical charges are being used in multiple charge arrays in a variety of media and topographic situations to achieve actual construction projects. The target is the development of chemical and nuclear explosive excavation as an accepted cost-competitive construction technique.

ACKNOWLEDGEMENT:
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051929
GROUTING COHESIONLESS WATER-BEARING SOILS IN CITY TUNNELS

Haffen, M, Soletanche Enterprise
Janin, J, Soletanche Enterprise

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

1972, 10 Fig., 1 Ref.

Appeared in the proceedings of the North American Rapid Excavation and Tunneling Conference 1972, Vol. 2. Conference was held by the Society of Mining Engineers and the American Institute of Mining, Metallurgy and Petroleum Engineers.

The purpose of grouting is to modify the permeability and strength characteristics of the subsoil in such a way that the planned structure can be efficiently constructed at a given location. This technique, which originally underwent considerable development in the field of dam construction is constantly evolving and it becomes more and more important in urban zones of intensive underground development for projects such as transport tunnels, stations, car parks, etc.

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051930
WATER JETS AND ROCK HAMMERS FOR TUNNELING IN THE U.S. AND U.S.S.R.

Cooley, WC, Terraspace Incorporated

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

1972, 23 Fig, 1 Tab, 27 Ref

Appeared in the proceedings of the North American Rapid Excavation and Tunneling Conference 1972, Vol. 2. Conference was held by the Society of Mining Engineers and the American Institute of Mining, Metallurgy and Petroleum Engineers.

A review is presented of the state of development of high pressure water jet equipment and of large impact hammers for rock tunneling. Information from the U.S.S.R. is based on published literature and three personal visits. Applicable papers which were presented at the International Symposium on Jet Cutting Technology in Coventry, England in April 1972 are reviewed. Data are presented on continuous jet systems, pulsed water cannons, and hydraulic-powered impact hammers with respect to the specific energy of rock breakage and potential application in tunneling machines.

ACKNOWLEDGEMENT:
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051931
TUNNELING TORONTO CANADA 1970

Jenkins, GF, McNally (S) and Sons Limited
Hobden, PS, McNally (S) and Sons Limited

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

1972, 5 Phot

Appeared in the proceedings of the North American Rapid Excavation and Tunneling Conference 1972, Vol. 2. Conference was held by the Society of Mining Engineers and the American Institute of Mining, Metallurgy and Petroleum Engineers.

Toronto as a geographical area provides an exceptionally wide variety of subsoil stratification. Tunneling consequently required a very wide range of adaptabilities to meet its changing conditions. This discussion will provide a summary of work performed in both earth and rock formation using three of our recent works to describe a Contractor ' s experience.

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051932
STILLWATER TUNNEL PROJECT

Arthur, HG, Bureau of Reclamation

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

1972, 6 Fig, 4 Ref

Appeared in the proceedings of the North American Rapid Excavation and Tunneling Conference 1972, Vol. 2. Conference was held by the Society of Mining Engineers and the American Institute of Mining, Metallurgy and Petroleum Engineers.

Stillwater Tunnel construction is scheduled to start in the spring of 1973. The tunnel will be the site of an extensive program in rapid excavation research. This paper presents a progress report regarding our plans and relates the tentative decisions which have been made on how to carry out the research effort. The details are subject to revision as more input is obtained from other Government agencies interested in tunnel construction and from experts in industry and educational institutions. The objective of the research program is to bring about faster, less costly tunnel contstruction. This objective will be pursued through the development, improvement, and evaluation of various construction systems and investigative techniques.

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051933
CONTROLLED FREEZING FOR TEMPORARY GROUND SUPPORT

Shuster, J A, Woodward-Lundgren and Associates

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

1972, 13 Fig, 1 Tab, 31 Ref

Appeared in the proceedings of the North American Rapid Excavation and Tunneling Conference 1972, Vol. 2. Conference was held by the Society of Mining Engineers and the American Institute of Mining, Metallurgy and Petroleum Engineers.

Controlled ground freezing for mining and construction applications has been in use for over a century. Despite the great technological evolution which has occurred during this period, ground freezing is still used on projects today with much the same basic technology as that used originally over 100 years ago. Major developments have occurred in the separate fields of frozen soil mechanics, refrigeration, and heat transfer analysis. However, except for a few projects in Europe and Asia, these developments have not been combined to upgrade ground freezing techniques to their potential level. In view of this situation, it is believed desirable to examine the art of ground freezing in light of recent technical developments, together with highlights on some of the apparent advantages, disadvantages and economics of the various alternative approaches. The purpose of this paper is to attempt such an examination, with particular emphasis on the practical application of presently available technology.

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051941
HOW BN USES A NUMBERS SYSTEM TO CONTROL WEEDS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 3, Feb. 1973, 2 pp, 2 Phot

Following the creation of Burlington Northern, and because no one person was familiar with the procedures used by the various roads to control vegetation, it was determined that the first requirement would be an entirely new concept in planning and programming. The basis of that new concept which is presented here, is the use of numbers to designate the degree to which vegetation has infected the track section or right of way.

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052073
TRANSIT PLANTING: A MANUAL

American Horticultural Society, 2401 Calvert Street, NW, Washington, D.C., 20008 UMTA-VA-06-0006-73-1

June 1973, 68 pp

Public transportation environments in urban areas could look more attractive and function more efficiently by careful attention to ecological and horticultural factors. Various landscapes are introduced in which highly reliable, all-season plants would be a prime contributor to the design. The manual can strengthen citizen support and stimulate local action aimed at "greening up" urban environments. Judgments on the suitability of specific plants in specific environments are based on ecological adaptability, taking into account such factors as climate, the plant's ability to resist pollution, and the amount of care required to maintain the specific plant. Besides an analysis of national zones and alphabetical lists of plants according to scientific and common names, specific applications are discussed in relation to bus stops, suburban terminals, and downtown stations.

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052088
CHEMICAL VEGETATION CONTROL–DOLLARS AND SENSE. THE IMPORTANT ISSUES AS SEEN BY THE HERBICIDE MANUFACTURERS

Telge, DE, Velsicol Chemical Corporation
Vawter, JE, Ciba-Geigy Corporation
Cowart, LE, Du Pont de Nemours (EI) and Company, Incorporated
Kirch, JH, Amehem Products, Incorporated

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 2, Feb. 1974, 6 pp

At a recent meeting of the Maintenance of Way Club of Chicago its members were witness to an unusual program. A panel of four speakers representing the manufacturers of chemical herbicides spoke on aspects of the subject ranging from the legality of tank mixes to the safe use of herbicides. Moderator of the discussion was Max R. Brooks, engineer vegetation control, Burlington Northern. Besides the four speakers, representatives of five other herbicide manufacturers were seated at the speakers' table. The four talks are presented in full on these pages.

ACKNOWLEDGEMENT:
Railway Track and Structures

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052089
MOPAC ADOPTS PRESTRESSING OF CONCRETE PILES, GIRDER SPANS

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 2, Feb. 1974, 3 pp, Phots

Important savings in cost of both labor and material are expected. System installed for prestressing piles at road's casting yard at North Little Rock, Ark., is described. Figures shown in recent AFE's prepared by MoPac engineering indicate that the cost per foot for a concrete pile trestle is only slightly higher than for a creosoted timber pile trestle. The advantages of the concrete trestle are that it gives (1) longer spans for passage of drift; (2) complete protection from fires with attendant savings in annual elimination of vegetation; (3) very low annual maintenance costs as compared to a timber trestle; and (4) a ballast-deck structure that gives continuity to the track structure.

ACKNOWLEDGEMENT:
Railway Track and Structures

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052111
TWO ILLUSTRATIVE EXAMPLES OF THE STABILIZING OF RAILWAY EMBANKMENTS

Braulein, G Spang, J

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

Vol. 22, No. 10, Oct. 1973, pp 391-397

The occurrence of track subsidence and embankment slip, as well as their remedy by modern economical methods, is shown here in the description of two construction projects which could be regarded as models of their kind for the repair of railway embankments.

ACKNOWLEDGEMENT:
British Railways, 29877

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052117
PREVENTING SEEPAGE IN RAILWAY TUNNELS

International Construction (IPC Building Contract Journals Limited, Dorset House, Stamford Street, London SE2, England)

Vol. 11, No. 11, Nov. 1972

During excavation the amount of water seepage in some places amounted to as much as 325 liters/sec. At first, trials were carried out to fill in the rock fissures by means of silicate injection, but finally a decision was made in favor of a new method of protection, using prefabricated concrete sections to form a primary arch. These reinforced sections have a width of 1m and thicknesses of 20cm at the apex and 40cm at the base. Two sections form an arch.

ACKNOWLEDGEMENT:
Engineering Index, EIX731200342

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052121
FOR THESE WOOD PILES LIFE BEGINS AT 58 YEARS

Railway Track and Structures (Simmons-Boardman Publishing Corporation, 350 Broadway, New York, New York, 10013)

Vol. 69, No. 9, Sept. 1973

It is reported that piling in south approach to Black Warrier River bridge near Tuscaloosa, Ala., were originally driven in 1914 and about 70% of these are still in place. The unusually long life for these piles has been attained even though the bridge is located in a temperate and humid climate where decay fungi remain active 12 months of the year. Southern yellow pine members in Illinois Central Gulf bridge have been given in-place treatment for the second time, with 20 years more service the objective.

ACKNOWLEDGEMENT:
Engineering Index, EIX731203568

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052255
COMPILATION OF THE RAILROAD CLEARANCE REQUIREMENTS OF THE VARIOUS STATES

Erhardt, RD

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 636, Proceeding, Feb. 1972, p 492, 1 Tab

A comprehensive tabulation of railroad legal clearance requirements for all states, Canada and the District of Columbia is presented. Track centers include main tracks, subsidiary tracks, ladder tracks, lead, repair and caboose tracks, and unloading tracks at platforms. Vertical clearance includes thru bridges, highway bridges, tunnels and building drops. Horizontal clearances include platforms and signals.

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Association of American Railroads

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052269
REPEATED LOADING OF TIMBER STRUCTURES

Lund, CV

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 611, Proceeding, Jan. 1968, pp 391-392

The fourth report on tests conducted on full size bridge stringers in repeated loading is discussed. The present test series is 24 solid-sawn southern pine stringers. Repeated loading and static tests were performed, and results are discussed. Correlary tests were made, showing that 12 of the 24 stringers failed to meet specifications when they were treated.

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Association of American Railroads

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052271
LIME-SOIL STABILIZATION INVESTIGATION FOR RAILROAD CONSTRUCTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 612, Proceeding, Feb. 1968, pp 516-527, 8 Tab

The use of lime to stabilize soil for railroad roadbed construction was investigated. Three types of soil were subjected to grain analysis, pH tests, unconfined compression tests, and Atterburg Limit tests. Soil number 1 and soil number 3 can be satisfactorily stabilized by the use of lime. Soil number 2 does not yield to stabilization with lime, and is not suitable for this purpose.

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Association of American Railroads

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052276
FIELD INVESTIGATION OF LONGITUDINAL FORCES IN A CONCRETE TRESTLE ON THE SANTA FE RAILWAY

Ekrem, NE

AREA Bulletin (American Railway Engineering Association, 59

East Van Buren Street, Chicago, Illinois, 60605)

Vol. 68 N, 601, ER-67, Proceeding, Oct. 1966, pp 37-102, 46 Fig, 5 Tab, 1 Phot

Description and analysis of test data obtained on a 660-ft long concrete trestle on the Atchinson, Topeka & Santa Fe Railway near Dallas, Texas, designated as Bridge No. 50.9, is presented. Purpose of the investigation is to determine the effect on the trestle of braking and traction as developed by a 278-ft long test train. Direct and bending stresses are obtained in the bents and axial stresses obtained in the rails at each abutment. Runs are made with both tight and loosened rail joints. Normal-speed runs are also made to determine stresses in the box beams and columns. It is noted that braking to a stop on the bridge produces considerable higher stresses in the columns and in the rails than starting on the bridge and accelerating off. Braking across the bridge and stopping beyond it produces negligible bending stresses in the columns, no higher than those resulting from eccentricity of the vertical loads.

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052277
LABORATORY INVESTIGATION OF PRESTRESSED LIGHTWEIGHT CONCRETE BOX BEAMS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 68 N, 604, Proceeding, Jan. 1967, pp 315-335, 8 Fig, 10 Phot

Description and analysis is presented of a laboratory investigation of the static, repeated-loading and sustained loading behavior of full-size prestressed concrete box beams cast with lightweight aggregates. Five through-voided box beams are used in the investigation. Beams are designed for a live load of E 72 plus full impact, and test loads are applied in increments of of this design load. It is noted that, in static loading, one beam, loaded to static ultimate,failed; in repeated loading, two beams sustained, one beam failed; in sustained loading, the greatest rate of change in concrete strain took place during the first 84 days from detensioning, but, after 450 days, the rate of change was small and tended to level off. Change in camber followed a pattern similar to the concrete strains. Prediction of fatigue strength is also made.

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052281
SOIL PROBLEMS IN RAILWAY TRANSPORTATION ENGINEERING

Ireland, HO, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 594, Proceeding, Oct. 1965, pp 7-19, 6 Fig, 3 Phot, 5 Ref

Soil problems, not widely recognized, are discussed in an effort to improve roadbed stabilization. Attempt is made to present new ways to deal with old problems and to explore some usual problems. Due to slide expense, it is important that intelligent planning precede remedial construction. For careful engineering analysis, the topography and shape of the sliding mass, the strength and appearance of the various sub-soil strata, and the groundwater conditions must be known. Topics explored include soil problems associated with the daylighting of tunnels, the design of new cut slopes, the importance of fill in new construction, the natural water content of borrow materials, waste and waste areas, subsurface exploration programs, and analysis of probable foundation problems.

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052282
FIELD INVESTIGATION OF PRESTRESSED CONCRETE BEAMS AND PILES IN A BRIDGE ON THE WESTERN PACIFIC RAILROAD

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 594, ER-61, Proceeding, Oct. 1965, pp 21-42, 10 Fig, 5 Tab

Description and analysis are presented of a field investigation of prestressed concrete beams and piles on Western Pacific Bridge No. 62.63 near Tracy, California. Two spans include one consisting of 5 rectangular prestressed concrete beams 37 ft. 7 in. long, 2 ft. 4 in. wide and 3 ft. deep, each beam having a circular void 16 in. in diameter; the second span consists of 5 prestressed concrete beams of similar construction but 24 ft. 11 in. long and 2 ft. 4 in. deep. The prestressed concrete piles are octagonal in section, 20 in. thick, and have circular voids 11 in. in diameter. The investigation seeks to determine the stresses in the beams under a complete range of train speeds and the stresses in the piles resulting both from vertical loads and from bending due to the longitudinal forces set up by braking and traction. Loading is provided by a test train pulled by two diesel locomotive units. Tests results indicate that static stresses of beam spans were less than the the calculated values, maximum stresses were less than the calculated values, and all recorded maximum total impacts were less than those calculated by AREA specifications: Regarding piles, all recorded static stresses were less than the calculated values, maximum bending stress of 83 psi was recorded under the cars. Braking forces produced an average bending stress in the piles of 27 psi and traction forces produced an average stress of 26 psi, considerably less than stresses calculated from AREA specifications.

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052290
CONCRETE STRUCTURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 588, Proceeding, Nov. 1964, p 185

Results of field tests conducted by the AAR research staff on two Seaboard Air Line concrete slab bridges are discussed. The tests compared a 7-span, 134-ft-long, conventionally reinforced bridge with a 6-span, 148-ft long prestressed structure. Information was also obtained on the loading effects to concrete piling. It is noted that bridge behavior conformed to results of previous tests. Stresses were less than calculated; transverse load distribution was nearly uniform across decks; impact increased slightly with speed for conventionally reinforced spans; recorded impacts were considerably less in the prestressed span; maximum impacts occurred under the cars; and wheel irregularities caused high impacts of short duration; and a rail joint influenced total impact values on one span.

ACKNOWLEDGEMENT:
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052291
AAR LABORATORY INVESTIGATION OF PRESTRESSED CONCRETE BOX BEAMS AND EPOXY SHEAR KEYS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 590, Proceeding, Jan. 1965, pp 317-321, 3 Fig

Laboratory investigation is conducted on prestressed concrete box beams. The 1964 investigational work determines the static and repeated-load strength of box beams cast with regular mineral aggregate. Nine full-size beams are tested, some with a revised strand pattern, some without end blocks or a center diaphragm. Repeated and sustained loadings are conducted, and load ranges are measured. Conventional and through-voided beams are compared with the performance of lightweight beams, and ultimate and design loads are noted.

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052296
ASPHALT TREATMENT OF BALLAST AND BRIDGE DECKS-1964 INSPECTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 591, Proceeding, Feb. 1965, pp 569-575, 1 Tab, 2 Phot

The 1964 condition of the asphalt-treated ballast test sections and asphalt bridge-deck treatments applied in 1959 and 1960 are described. Maintenance cost records are also supplied. 1959 ballast treatments on specific sections of the Santa Fe Railroad are presented; 1960 ballast treatments are discussed on sections of the Norfolk and Western, Monon, Texas & Pacific, and Chicago and North Western Railways. 1959 and 1960 bridge deck treatments are examined on the Pittsburgh & West Virginia and Chicago Rock Island & Pacific Railroads. It is noted that little or no maintenance is required on test and control sections of both ballast and bridge deck treatments.

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052302
AAR LABORATORY INVESTIGATION OF PROPOSED AREA BOX BEAMS AND EPOXY RESIN SHEAR KEYS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 583, Proceeding, Jan. 1964, pp 375-376, 3 Tab

Report is made of an investigation on four full-size prestressed concrete box beams constructed according to proposed AREA specifications for use with concrete trestles. Purpose of the investigation is to study the performance of beams under static and repeated loading before recommending them for Manual material. Due to tensile cracking, the original test beams were considered objectionable for railroad use, and the beams were redesigned to eliminate the condition. Load tests are applied to the new beams, and repeated loads in excess of the cracking load are proposed.

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052303
STRESS DISTRIBUTION IN BRIDGE FRAMES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 583, Proceeding, Jan. 1964, pp 385-386

Stress distribution in bridge frames is measured in a series of tests on damaged end posts with angles turned out, solid cover plate on top and lacing on the bottom and on two other end posts with angles turned in, solid cover plate on top and perforated cover plate on the bottom. Each end post is loaded to failure at each increment of increase in damage, with damage varying from none at the first test to severely damaged condition for the final tests on an end post. It is concluded that the model bridge with damaged end posts has greater capacity than was expected by bridge engineers. Both types of end posts fail at the same load for straight, undamaged condition, although the latticed type suffers localized failure whereas the perforated cover plate type suffers integral-type failure.

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052311
NUCLEAR METHODS OF MEASURING MOISTURE AND DENSITY OF SOILS

Hinueber, GL, Association of American Railroads Research Center

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 586, Proceeding, July 1964, pp 838-850, 5 Fig, 3 Phot

Nuclear methods of measuring moisture and density of soils are presented, in an effort to determine probable stability and strength in terms of supporting power of subgrade soil. It is noted that the application of techniques using radioactive materials offers promise to the engineer in need of a simple device for quick, accurate measurement of moisture and the degree of compaction of subgrade soils during construction. Accomplishments of the radioactive equipment and precautions necessary when the equipment is used are cited. Advantages and disadvantages attributed to the nuclear method of surface soil moisture and density determination are enumerated. It is noted that presently equipment utilizing radioisotopes for determining soil moisture and density is being used by 25 state and county highway departments, 12 federal agencies and national associations, 4 soil testing laboratories, several universities, and organizations in 6 foreign countries.

ACKNOWLEDGEMENT:
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052314
APPLICATIONS OF SYNTHETIC RESINS AND ADHESIVES TO WOOD BRIDGES AND TRESTLES

AREA Bulletin (American Railway Engineering Association, 59

East Van Buren Street, Chicago, Illinois, 60605)

Vol. 64 N, 573, Proceeding, Oct. 1962, pp 1-17

Applications of synthetic resins and adhesives to wood bridges and trestles are discussed. Topics considered include the technology of epoxy resins, the railroad applications of epoxy resins, tentative formulations for epoxy resins, and general instructions for the use of epoxy resins. Characteristics of epoxy resins are presented, and curing agents, formulation, resin modifiers, reactive dilutents, fillers, and handling precautions are discussed. Applications of epoxy resins are considered for dry or damp surfaces, including wood bridges and trestles, masonry, and iron and steel structures. Instructions for the use of epoxy resins include discussion of surface preparation and mixing.

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052318
THE LATERAL AND LONGITUDINAL DISTRIBUTION OF LOADING IN STEEL RAILWAY BRIDGES

Sanders, WW, Jr., Illinois University, Urbana
Munse, WH, Illinois University, Urbana
Newmark, NM, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 566, Proceeding, Oct. 1961, pp 13-16

A summary of the results of the investigation of the lateral and longitudinal distribution of loading in steel railway bridges is presented. A review of the existing methods of analysis for bridge floor systems and related structures and the development of methods of analysis to determine the distribution of wheel loads to bridge floor systems is discussed. The object of the investigation was to obtain solutions of simulated bridge floors using these methods of analyses. Evaluations of two general types of bridges in use were compared with the results of a number of actual bridge tests. Two basic categories of bridge floor systems were studied. The first floor system consisted of a number of transverse floor-beams supported by heavy longitudinal edge girders and the second consisted of a number of longitudinal beams by a series of transverse diaphragms. Results indicated the effect on the behavior of the bridges of 1) size and spacing of stringers, 2) type of floor covering, 3) diaphragms, 4) ballast, and 5) number of tracks.

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052321
FIELD INVESTIGATION OF SANTA FE RAILWAY PRESTRESSED CONCRETE GIRDERS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 566, Proceeding, Oct. 1961, pp 79-97, 9 Fig, 2 Tab, 1 Phot

This report contains a description and analysis of a span consisting of four 71-ft 6-in post-tensioned, prestressed concrete girders tested under controlled operating conditions that include a range of train speeds between 5 and 55mph. Strains were measured on the top of curbs, bottom of the deck slab and the bottom of the four girders at the center line of span. Horizontal shearing strains were measured on both sides of one girder. Vertical accelerations were measured at the front and rear of the first unit of the test locomotive. All measurements were recorded under a test train consisting of four diesel locomotives. Recorded static flexural and horizontal shearing strains were less than the calculated values. There was little increase in recorded strains with increase in speed. The maximum recorded impact in flexure was 40 percent of that indicated by current specifications. All recorded impacts in horizontal shear were also less than specified, except for one value which was 56 percent greater. Composite action was attained between the curb and slab and between the slab and girders. The live load was distributed approximately equal to the girders.

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052322
TIMBER STRUCTURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 567, Proceeding, Nov. 1961, pp 164-166, 1 Fig, 1 Phot

This report compares actual with calculated stresses in flexure and in horizontal shear of four 60-ft glued laminated beams used in bridge construction. Information with respect to position of wheel loads for maximum shear is presented. The simultaneous recorded maximum static flexural strains in the beams average 13 percent less than calculated. Maximum live-load tensile stress was 1320 psi, and maximum live-load compression was 1350 psi. The simultaneous recorded maximum static horizontal shear stresses in the two beams measured varied considerably. Maximum live-load horizontal shear stress was 118 psi. Measurements of the shear stress indicated an effective transfer of stress across a glue line. Horizontal shear became a maximum when the first wheel of a truck was 1.7 to 2.0 times the depth of the beam from the bearing as the locomotive moved across the span. Impact tended to increase with speed, with the maximum recorded impact in flexure 12 1/2 percent at a speed of 34 miles per hour. Distribution of maximum simultaneous flexural stress to the four beams was reasonably consistant with the eccentricity of the track. Distribution of the maximum recorded shear stress to the two beams tested was unequal due to a difference in reaction to each beam.

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052328
LIME TREATMENT OF SUBGRADE

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 586-589, 6 Tab

In an effort to improve track drainage, subgrade soils were treated with lime. Two samples of heavy silt clay soil with three and five percent lime added were tested to check plasticity factors, maximum density, optimum moisture and increases of strength with the lime additive. Economics appeared to be in favor of lime stabilization. Test results were tabulated. A field installation, with pulverized hydrated material added was described. Complete pulverization required two to three days. After a hydration period additional water was required to bring the soil mixture to the optimum content for efficient compaction. It appeared that sub-ballast was not needed, and a top ballast of screenings with subgrade was sufficient to produce a stable track for the anticipated traffic. A hurricane in the area

resulted in water flow across the tracks where the current had removed the top ballast, but the supporting power of the subgrade appeared unaffected.

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052330
CHEMICAL CONTROL OF VEGETATION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 596-597

The application of granular and pelletized soil sterilants and the application of dormant sprays with hormone-type chemicals for brush control was investigated. Two methods of dry application were used, broadcast by hand or spray gun, and basal where the product was placed by hand around each stem. The broadcast method did not give satisfactory results. The basal application was effective but too expensive. The dormant spray procedure often proved superior to foliage application. No one spray system answered all brush problems. A full program should consist of both foliage and dormant applications followed by spot clean up with dry materials. New equipment developed includes an air blast outfit which propels the stream from spray nozzles at high velocity to increase coverage and an air ejector for granular or pelletized chemicals.

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052338
USE OF NUCLEAR SOIL MOISTURE AND DENSITY EQUIPMENT FOR DETERMINATION OF VOLUME CHANGE FROM CUT TO FILL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 563, Proceeding, Feb. 1961, pp 679-685, 1 Fig, 4 Phot

An investigation to estimate the volume change that could be expected in removing soil materials from cut areas and compacting them in fill was undertaken with the aid of nuclear soil moisture and density equipment. The procedure for boring holes for the casings was described. The first readings with the nuclear probes were taken at the 1-ft level because operation of this equipment is restricted to a minimum depth of 1-ft. In order to measure the moisture content and density of the top foot of soil it was necessary to use the surface nuclear soil and density probes. Since it was not possible to determine in advance of construction the exact average density of the soils that would be obtained in the field it was recommended that 95% of modified Proctor maximum density figure be used pursuant to field density measurements during construction. At the time of this report final results as to average compaction obtained and amount of volume change were not available. It had been estimated that a substantial saving was realized by altering the grades based on the computed volume change figure rather than using the original grades which were based on the premise of a 10% shrinkage.

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052339
CURRENT RESEARCH ON RIGHT-OF-WAY BRUSH CONTROL PROBLEMS

Chappell, WE, Virginia Polytechnic Institute & State University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62, No. 565, Proceeding, July 1961, pp 941-944, 1 Tab, 1 Phot

Experiments conducted at Virginia Polytechnic Institute designed to overcome many of the objections to current methods of brush control are discussed. Dormant season and summer applications of chemicals were made. The Dormant Cane Broadcast Method involves wetting all the above-ground portions of stems with a combination of chemicals and fuel oil. Advantages of this method are: 1) less likelihood of crop damage, 2) less volume of carrier is needed, 3) application can be made during slack seasons, and 4) much less brown out occurs. Usually 100-200 gallons of spray per acre is sufficient for adequate coverage. Dormant applications are more effective than foliage sprays on oaks, maples, conifers and most other species that do not send out root suckers. Summer applications of invert emulsion in low volume appear to be superior to conventional applications of 2, 4-D and 2, 4, 5T for controlling resistant species. For more effective brush control it is suggested that a summer spray be used after two dormant applications.

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052342
STATIC AND REPEATED-LOAD STRENGTH OF BOLTED TIMBER JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 79-134, 37 Fig, 10 Tab, 3 Phot

A description and the results of an investigation conducted to determine the relative static and repeated-load strength of bolted timber joints as ordinarily used to fasten the sway bracing to the piles or caps in timber pile trestle construction is given. Full-size timbers are included in the investigation. Test machines and test specimens are described. Results of static tests and repeated-load tests are tabulated. For each size of sway brace, each species and whether treated or untreated, the family of curves shown indicates that the repeated-load strength decreases as the number of load cycles increases. Higher repeated-load strengths are obtained with 4 inch sway braces than with 3 inch sway braces using the same size of bolts.

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052347
ULTIMATE STATIC STRENGTH OF A 52-FT GLUED LAMINATED TIMBER GIRDER

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 601-608, 4 Fig, 1 Tab, 6 Phot

Continuous oscillograph recordings of the extreme tensile and comprehensive fiber stresses at the center of a nine-inch by 36-inch by 52 foot laminated timber girder, the shears at one end of the span, and the deflection at the center of the span were discussed. The vertical deflection at the center of the span was determined by reading with a level a scale mounted on the beam. Four hydraulic jacks for applying the load and load measuring equipment were used. The ultimate load was 66,000 lb per jack, which is equivalant to a calculated flexural stress of 8510 psi. The measured deflection was 7.69 inches. Failure of this girder was associated with a rupture of the tensile fibers. There was also longitudinal cracking near the bottom of the girder with some of these cracks extending to one end.

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052348
PHYSICAL PROPERTIES OF EARTH MATERIALS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 652-658, 4 Phot

This report on the physical properties of earth materials is presented in two parts. Part one presents conclusions on the use of soil pressure cells for measurement of static soil pressure and changes in static pressures that may occur over relatively long periods of time under high embankments. Pressure readings were taken from the cells five times during construction and three times after completion. Seven of the eight cells functioned during construction. At the last reading five of the eight cells were inoperative. It was recommended that this investigation be discontinued because of lack of data. Part two deals with the use of nuclear-activated moisture and density probes for the rapid measurement of soil moisture content and density, both at and below the surface. The theory and a description of the equipment is presented. Calibration, operating procedures and the test program are discussed. It concludes that moisture contents and densities obtained with the nuclear probes agree with those obtained by conventional methods within reasonable enough limits to permit the use of this equipment for general engineering use and construction control.

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052350
RAILROAD WEED CONTROL, NORTH CAROLINA STATE COLLEGE

Klingman, GC, North Carolina State University, Raleigh

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 725-739, 3 Tab, 6 Phot

Bermuda grass, one of the most difficult plants in the southeast to control on the roadbeds, was chosen for special consideration in the railroad weed control program at North Carolina State College. Test plots four rail lengths long and 16 feet wide had chemical treatments applied by spraying three times. Mixtures containing a residual-type herbicide and most of those having growth-regulating type of herbicides gradually increased the degree of weed control through the three-year study. The effectiveness of residual materials such as simazin or diuron may not be entirely apparent until the second or third year of use. For the long growing season of this region there is advantage in two applications per year. Uniform distribution is more important than total gallonage for satisfactory results. It is concluded that a weed-control program can be planned to get effective control of a weedy track in one or two years time.

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052351
CHEMICAL CONTROL OF VEGETATION-1959 AAR REPORT

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 739-828, 1 Fig, 20 Tab, 17 Phot

The United States and Canada have been divided into seven general regions based on similar soil types, climatic conditions and vegetation to evaluate the results of yearly treatments of chemicals for weed control in roadbed and ballast. More than 80 types of chemicals and chemical combinations are available for vegetation control purposes. Combinations of these continue to be the most widely used for weed control on main lines and branches in all regions. Soil-sterilant type materials were used primarily in yard areas, around bridges and trestles, communication poles, signal stands, buildings, road crossings and as spot treatments. Among chemicals used for these purposes were sodium arsenate, Atlacide-2, 4-D, Baron, Benzabor, Simazine and Urox. These materials provided good results for one season in all regions when applied at recommended rates. In low rainfall areas it is possible to obtain two year control. Oils continue to be used primarily in the Midwest, South and Southeast. A single application provides fairly good control in the Midwest. Two and three treatments are necessary in the South and Southeast. Specifics for each of the seven regions are discussed.

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052357
CONSTRUCTION AND LOADING OF HALF-SCALE TEST BRIDGE AT NORTHWESTERN UNIVERSITY

Ward, GC

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, 4 pp, 3 Phot

In order to find out how various members of a structure act under destructive loads a test bridge has been constructed at Northwestern University. Construction and design of the bridge are described. The principal operations are the loading of the bridge, the observation and recording of data, the processing of data, theoretical studies arising therefrom, publication of results, and the planning of further research activities. Loads are applied by fourteen hydraulic jacks located in pairs. In developing the hydraulic system various load patterns were provided. Two completely different hydraulic circuits run around the entire structure. Each circuit is powered by an automatic air driven pump. Controlling the load is important to maintaining accuracy. The control system consists of two pneumatically operated control valves in each of the high-pressure jacking circuits.

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052358
CURRENT RESULTS AND RESEARCH PROGRAM OF THE TRUSS BRIDGE RESEARCH PROJECT AT NORTHWESTERN UNIVERSITY

Ely, JF

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, 7 pp, 5 Fig

The research program of the truss bridge project at Northwestern University is divided into three phases. Test program 1 has a two fold purpose: to perform preliminary, investigatory tests to establish successful methods of operation for the tests to follow, and to perform certain basic investigations which are important in themselves. Three series of tests were conducted in this program. Test program 2 is to establish a method of estimating the ultimate load of damaged end posts. Test program 3 is to determine the effects of the floor system in truss action and the stress introduced by the erection of the floor system. A general conclusion and general discussion are given for each of the tests. Future tentative plans on testing damaged end posts include a proposal as to how these tests should be conducted. It has been established through this program that now there is a facility to check new design concepts, to verify new analytical theories on a real bridge, not only in the elastic range, but up to and including ultimate loads.

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052363
CUMULATIVE DAMAGE IN STRUCTURAL JOINTS

Munse, WH, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 67-128, 26 Fig, 9 Tab, 5 Phot, 28 Ref

Cumulative damage in structural joints is determined, to assess the fatigue lives of members which are subjected to variable cycles of loading. Tests are made with cyclic stresses of the same frequency and magnitude as the actual service stresses, and a hypothesis is formulated to predict the fatigue life of a member or joint subjected to a variable loading cycle. It is concluded that the variations in a maximum cyclic stress obtained in railway bridges may provide a life markedly greater than expected on the basis of the maximum applied stresses. It is noted also that all the loading cycles affect the life of a member and must be considered in any evaluation of the member's fatigue resistance.

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052364
BRINE-RESISTANT BRIDGE PAINTS

Keane, JD, Steel Structures Painting Council
Bigos, J, United States Steel Corporation

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 509-527, 2 Fig, 2 Tab, 13 Phot, 3 Ref

Brine resistant bridge paints are investigated to solve the problem of corrosion caused by brine drippings on steel structures. Two bridges are cleaned and painted with various paint systems. It is noted that after five years of exposure, several systems afford excellent protection over sandblasted surfaces. It is also determined that a good job of bridge maintenance may be accomplished under severe brine conditions without sandblasting if surface is carefully prepared and if follow-up repairs are made as indicated by periodic inspections. It is noted that on sandblasted areas, a vinyl system, a chlorinated rubber, an alkyd, an asphalt mastic, and a phenolic remain in excellent condition. On the hand-cleaned bridge the low-cost rust-preventive greases deteriorate badly during the first year; the asphalt oil with bridge cement topcoat deteriorates badly the second year; most of the sections where brine splashed needed retouching, but this latter maintenance results in paint systems in excellent condition after two years and with prospects of continued good wear.

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052365
PROTECTING TOP FLANGES OF BRIDGES

Keane, JD, Steel Structures Painting Council

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 528-534, 2 Fig, 1 Tab

Protection of top flanges of bridges is discussed. Over 20 durable steel-protective systems are applied to portions of the top flanges of a 786-ft. bridge then exposed to severe attack from weathering, salt brine, abrasion and moisture. The protective systems are applied to both sand-blasted and hand-cleaned surfaces, including metallizing, vinyl tapes, coal tar coatings, rust preventives, tie pads, and paints based upon vinyl resins, epoxies, chlorinated rubber, zinc dust, Neoprene, inorganic zinc silicate, and various proprietary combinations. Field tests are also made of four of the best treatments previously found for painting over welds.

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052368
RAILROAD WEED CONTROL, NORTH CAROLINA STATE COLLEGE

Klingman, GC, North Carolina State University, Raleigh
Wilcox, M, North Carolina State University, Raleigh

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 723-732, 3 Tab, 6 Phot

A North Carolina State College research program to investigate roadbed weed control is discussed. Roadbed preparation is described, as spray chemical mixtures are applied intermittently. It is noted that most treatments result in considerably better weed control at the end of two years than had appeared at the end of one year, and improved weed control is anticipated for the third year of the study. The rate of chemical treatment is reduced the second year, reducing costs, and it should be reduced again the third year. It is concluded that the principal woody species remaining on the Holly Springs experimental area is cow-itch vine, a low broad-leaved weed rated low in control ratings. Each specific treatment is briefly outlined.

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052376
CLEARANCE ALLOWANCES FOR HORIZONTAL MOVEMENTS OF PASSENGER CARS DUE TO LATERAL PLAY, WEAR AND SPRING DEFLECTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 1109-14, 4 Fig., 2 Ref.

Calculations of clearance allowances for horizontal movements of passenger cars due to lateral play, wear, and spring deflection are reported. A method of determinating allowances for three significant factors is presented. Factors include lateral play between wheels and rail, roll of car body due to unequal spring deflections and play in side bearings, and displacement due to swing-hanger movements and lateral play and wear in truck parts. Recommended allowances for the effect of track irregularities and dynamic behavior of equipment are made.

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052381
FATIGUE RESISTANCE OF QUARTER-SCALE BRIDGE STRINGERS OF GREEN AND DRY SOUTHERN PINE

Lewis, WC, Forest Products Laboratory

AREA Bulletin (American Railway Engineering Association,. 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 363-390, 14 Fig, 12 Tab, 11 Phot

Prepared in cooperation with the Association of American Railroads.

Quarter-scale bridge stringers of green and dry southern pine were tested for fatigue due to stress. All test specimens were fabricated in pairs. One of each pair was used for a static control test and the other for a fatigue test. The green stringers had no checks. The dry stringers either had checks or were artificially checked. Both types were straight grained or had a 1:12 slope of grain. The specimens were tested by loading at third points of a 39-inch span. Fatigue tests were made by loading at 500 cycles per minute in an axial loading fatigue machine. Fatigue failures do not develop in the green specimens repeatedly stressed in bending unless actual stresses in compression are large enough to produce compression wrinkles. The indicated fatigue strength of green specimens for 10 million repetitions of stress is about 50 percent of the static strength for straight-grained specimens, and 60 percent for those with slope of grain. Fatigue strength is about 3000 psi for both straight-grained and slope-grained material. Fatigue stresses are more critical in shear in dry material than in bending, even though slope of grain is present. The static control specimens with both 1:12 slope of grain and checks failed in cross-grain tension, while all specimens tested by repeated loading failed in shear along the check regardless of the level of the repeated stress.

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052383
METHODS OF FIREPROOFING WOOD BRIDGES AND TRESTLES, INCLUDING FIRE-RETARDANT PAINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 762-795, 11 Fig, 3 Tab, 12 Phot

Specimens of southern yellow pine and Douglas fir were treated with creosote, a 60:40 mixture of creosote with coal tar, and a 50:50 mixture of creosote and petroleum in the continuing investigation of methods of fireproofing wood bridges and trestles. Laboratory burning and temperature measuring apparatus were described. Weight losses after burning, internal temperatures during burning, evaporation rates of the paints, ratio of burned oil to burned wood, toxicity studies of residual preservatives, and performance specifications were studied. Under standard fire testing conditions creosote-treated specimens loose more weight than creosote-tar or creosote-petroleum treated specimens at retentions of 30 and 20 lbs per cubic foot. Creosote-tar treated timber looses more weight than creosote-petroleum treated timber. At low retentions no significant difference is apparent. Protective coating integrity is a function of the insulation it confers to the surface so that internal temperatures do not reach the boiling range of the preservative oils. The same protective coating confers different degrees of protection placed on aged timber as opposed to freshly treated timber. Aging of timber or evaporation of low-boiling constituents in preservatives influence protective coating adhesion. Timbers with high preservative retentions require more time to reach the same conditions as adjacent timbers in structure with lower preservative retention.

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052384
SOIL PRESSURE CELLS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 799-806, 4 Fig, 1 Tab

Information on the development of stress and changes in stress was furnished by soil pressure cells installed in the fill over a concrete culvert. The soil pressure cells were calibrated before installation. Pressure-cell readings were taken at various times during and following completion of construction of the fill. Pressure from additional fill material is not always transmitted immediately to the pressure cells. It was more than six months from the time the maximum height of the fill was in place over the pressure cell before the full effect of the full pressure was noted at the pressure cell location. The AAR Type II pressure cells and the Waterways Experiment Station cells appear to be functioning very well. Pressure cell C-8, AAR Type I is inoperative at the height of the fill as is pressure cell C-9, also AAR Type I. With few exceptions there is generally good agreement between measured and theoretical pressures.

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052387
RAILROAD WEED CONTROL, NORTH CAROLINA STATE COLLEGE

Klingman, GC, North Carolina State University, Raleigh
Wilcox, M, North Carolina State University, Raleigh

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 843-850, 3 Tab, 3 Phot

Two roadbed areas at Holly Springs and Charlotte, North Carolina, heavily infested with Bermuda grass and woody plants were used to study weed control. Various chemicals and petroleum oil were applied to the areas in two application periods. Each treatment was discussed. All treatments which included dalapon with the "phenoxy" and benzoic acid type chemicals gave similar results. One half the total amount applied in two split applications was as effective as a single heavy application at Charlotte. At Holly Springs the effectiveness was probably reduced by rainfall immediately following both applications. Aminotriazole combinations proved effective on broad leafed woody plants, but gave little or no control of grasses. Aminotriazole combined with dalapon controlled the broad leafed plants and the grasses. Oils gave a quick kill of all above-ground growth, but soon new growth flourished. The addition of monuron-TCA to the oil gave quick kill followed by long residual activity.

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052396
HERBICIDAL TESTS ON RAILROAD RIGHT-OF-WAYS AT GAINESVILLE, FLORIDA

Rodgers, EG, Florida University, Gainesville

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 779-789, 2 Tab, 7 Phot

Herbicidal tests are reported on railroad right-of-ways at Gainesville, Florida, to find economical means of weed control. Chemical applications are described, and detailed findings from a 1956 study are presented, as well as brief summaries of research conducted during 1952-1955. Findings indicate that weeds can be controlled effectively with chemicals, but the major problem is doing it economically. It is concluded that residual in the soil of most herbicides is greatest when application is made during the initial plant growth period in the spring. A mixture of 10 lb per acre each of dalapon and diuron will effectively control most native vegetation for at least one growing season. Herbicidal oils provide only temporary weed control. Mixtures of TCA and sodium chlorate at rates of 40 and 80 lb give only temporary control of native vegetation. Diuron and monuron each in individual treatments of 30 lb per acre will satisfactorily control native vegetation for at least one growing season.

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052405
COMPARATIVE TEST OF A STRUCTURAL JOINT CONNECTED WITH HIGH-STRENGTH BOLTS AND A STRUCTURAL JOINT CONNECTED WITH RIVETS AND HIGH STRENGTH BOLTS

Carter, JW, Martin (Glenn L) Company
McCally, JC, Modjeski and Masters
Wyly, LT, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 56, Proceeding, 1955, pp 217-267, 38 Fig, 3 Phot

This research on stresses in bridge frames consists of the investigation of the causes and remedies for fatigue failures in floor-beam hangers in railway bridges and in the counterweight trussels of heel-trunnion bascule bridges. The test under static loads of two full-scale joints representing the connections of a floorbeam hanger to the upper chord gussets of a railway bridge was reported. One joint was connected by rivets, except that high-strength bolts were used in the two lowest lines of holes in the gussets. The other joint was connected entirely by high-strength bolts. The instrumentation set up and the loading sequence was given. Among the principal findings are: 1) Neither joint showed any significant slip for axial stresses below the design stresses. 2) The first major slip in both the bolted joint and the riveted and bolted joint occurred when the elastic limit of the main material had been reached in axial stress. 3) Rivets and high-strength bolts work together satisfactorily in a structural connection when arranged as in the riveted and bolted joint tested. 4) When high-strength bolts are used instead of rivets in a structural connection the high local stresses and strains at the sides of the holes due to rivet bearing, especially high in single lap joints, will be eliminated.

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052407
USE OF HIGH STRENGTH STRUCTURAL BOLTS IN STEEL RAILWAY BRIDGES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 56, Proceeding, 1955, pp 592-634, 17 Fig, 8 Tab, 3 Phot

This report is in three parts. Part one presents details of the inspection of experimental installations of high-strength structural bolts in various railroad bridges. A significant observation is that the bolted joints have proven superior to the riveted joints. Part two is a report on a method of tightening high-strength bolts in which bolt tension is correlated with turns of the nut from a "finger tight" position. Test equipment, wrenches, bolts, nuts and washers are described. Test procedure is presented. It is shown that at 1/2 turn of the nut the bolts develop minimum tension. Additional tightening into the plastic range will not damage the bolt, but will improve its performance. Part three presents revised Specifications for Assembly of Structural Joints Using High Tensile Steel Bolts in Steel Railway Bridges offered for adoption and inclusion in the manual. This specification covers recommended practice for the fabrication of steel forming rigid joints using high-strength steel bolts tightened to a high tension. Bolts, nuts and washers are described. Bolted parts, the assembly and field inspections are presented.

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052413
STATIC AND FATIGUE STRENGTH OF TIMBER JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 213-221, 4 Fig, 1 Tab, 2 Phot

This investigation was performed to determine the relative static and fatigue strength of bolted timber joints and bolted timber-grid joints used to fasten the sway bracing to the piles or caps in timber pile trestle construction. Full-sized untreated timbers were used. Holes were bored through the sway bracing and piles using the same diameters as the four sizes of fasteners to help eliminate the slip between the sway bracing and the pile. Additional testing was done with single-curve spike grids between the sway brace and the pile. Testing equipment was described. The average data obtained from three tests in the fatigue machine was taken as the static strength of the joint. Repeated-load tests were made on similar specimens. In order to compare the various types of joints under repeated loading, a total movement of 0.25 in between the sway bracing and the pile was arbitrarily selected as the failure point for all the joints. If the joints had not reached the failure point after 500,000 cycles of applied load the test was discontinued .It was indicated that an increase in the fatigue strength of the joints was related to an increase in the size of the fastener and the thickness of the sway brace. Moisture

content before and after testing was determined with a moisture meter.

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052414
LABORATORY INVESTIGATION OF REINFORCED CONCRETE CULVERT PIPE

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 245-342, 75 Fig, 4 Tab, 10 Phot

An analysis and description of tests made on 36 reinforced concrete culvert pipes varying in size from 24 in. to 84 in. in diameter and constructed in accordance with proposed specifications was presented. The purpose of the tests was to determine the acceptability of pipe manufactured and tested in accordance with the proposed specifications and to determine the strains in the concrete and reinforcement of this pipe. Full-size strength tests were made on 36 pipes and 36 concrete test cylinders using a 1,000,000-lb. testing machine. Tensile tests were made on samples of the reinforcing steel and absorption tests were conducted on pre-cast absorption specimens. Strains were measured at the vertical and horizontal diameters of the pipe and on the concrete test cylinders and the reinforcing bar samples. Among the conclusions are: 1) The pipes exceed the load requirements of the proposed specifications. 2) The ultimate load on the pipe was increased by an increase in concrete strength and by the additional reinforcement in the extra strength pipe. The concrete in the pipe at ultimate load usually failed by crushing or by shear after yielding of the steel took place. 3) In the larger size pipes there was a more complete interaction between the concrete and reinforcement tensile strains than in the smaller size pipes.

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052416
SIXTH PROGRESS REPORT ON SOIL PRESSURE CELLS-1954

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 610-615, 2 Fig, 1 Tab

The final report on the pressure cell installation under the New York Central tracks near Trenton, Michigan was presented. The test installation was described. The pressure cells were removed from the ground and were found to be in good condition. Comparison of the pressure cell data for three years was given. The cells were recalibrated. Changes appeared to be uniform for all the cells. The dynamic calibration changed, but little or no change took place in the static calibrations. It is indicated that greater effects of impact and vibration are noted under steam locomotives. Vibratory and impact forces account for a considerable amount of the total pressure transmitted by rail traffic to the roadbed. Results indicate that this type of pressure cell when installed in plastic soils works well for dynamic loads, and can be used satisfactorily for this type of installation where the pressure cells are balanced before each set of readings. This type of cell is not applicable to the problem of measuring changes in dead-load pressures over long periods of time. Results of this investigation are limited in scope because the data obtained are only reliable for the one set of conditions of soil, moisture, track and loading at the particular location of the installation.

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052420
RIGID FRAME ANALYSIS FOR MEMBERS OF VARIABLE MOMENT OF INERTIA, DIRECTED ESPECIALLY TOWARDS FLOORBEAM HANGER FRAMES AND COUNTERWEIGHT TRUSSES-ANALYTICAL AND EXPERIMENTAL STUDIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 1953, pp 1-73, 116 Fig, 1 Tab, 9 Phot, 8 Ref, 1 App

This five part report presented a general method of analysis of rigid frames composed of members having a variable section. The method was directed towards frames composed of floorbeams and their hangers, and towards the counterweight trusses of bascule bridges, but this could be applied to any type of rigid frame or truss. Results of laboratory studies on bridge frame models and of field studies on the counterweight trusses of heel-trunnion bascule bridges were presented. A comprehensive study of binding stresses of laboratory models and analytical treatment were reported. Floorbeam hanger bending depends upon rigid frame action between floorbeam and hangers, and additional rotation of the lower end of the hanger due to shear deformation in the hanger web opposite the floorbeam connection. An analytical study of heel-trunnion-type bascule bridges indicates that the only member subjected to high stresses is the member between the concrete counterweight and the counterweight trunnion pin. The results of the tests indicate that the stress in this member is appreciably greater than that indicated by the commonly accepted methods of analysis.

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052424
FIFTH PROGRESS REPORT ON SOIL PRESSURE CELLS-1953

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 15 pp

The measurement of subgrade soil pressures from rail traffic by means of pressure cells is discussed. Records of 31 runs were used in this report. Theoretical pressures determined by the elastic theory and recorded pressures were integrated graphically for the 16-ft width of the pressure cell installation, thus obtaining average values of the equivalent vertical pressure. Recorded vertical pressures are in close agreement with theoretical maximum shear values and recorded maximum shear values. The elastic theory can be used satisfactorily for computing vertical stresses of this installation, but it does not give sufficient accuracy for predicting lateral pressure intensities and shearing stresses in earth masses. Steam powered locomotives produce higher pressure intensities than diesel locomotives. This pressure increase is in greater proportion than the corresponding increase in axle loads. The pressure cells are registering pressures and variations in pressure faithfully.

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052425
ROADBED STABILIZATION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 1953, 25 pp, 12 Fig, 2 Tab, 3 Phot

This report on roadbed stabilization is in four parts. Part one presents discussion on the recommended practice for tie and pole driving as a method of roadbed stabilization. Part two describes investigations into extensive slides and possible corrective measures for each area. Part three contains a description of the provisions taken in new yard construction at two locations to increase stability and service behavior of the track structure. It is a record of preventive measures to eliminate the need for future stabilization. It is recommended that similar procedures be adopted for all new construction. Part four is a record of pressure grouting projects showing grout quantities, original costs and savings effected through reduced maintenance. This data is indicative of the benefits obtained through judicious stabilization.

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052427
STRESS CONCENTRATION IN BUILT-UP STRUCTURAL MEMBERS

Carter, JW, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 1-34, 20 Fig, 1 Tab, 9 Phot, 10 Ref, 1 App

This report covers a description and analysis of tests made to determine stress concentrations in plates in the vicinity of rivet or bolt holes under varying conditions of pitch, gage, edge distance, bearing and clamping force. Measurements of strains with SR-4 strain gages and the methods of photoelasicity were the two test procedures employed in the investigation. The items investigated by each of these methods and the results are as follows. Stress concentrations at the sides of open holes in plates will vary within relatively small limits if the conventional spacing of 3 hole diameters and edge distances of 1 1/2 diameters is maintained. Stress concentrations at the sides of holes with pins in bearing in double shear will be higher than for open holes. Plates connected by pins bearing in double shear will be higher than for open holes. Plates connected by pins bearing in single shear have stresses at the sides of the holes 20 to 40 or more times the average stress on the gross section of the plate when load is applied centrally with respect to width of plate. In joints connected by high clamping bolts, the stresses inside the hole produced by clamping applied through washer only are compressive. In correlating the magnitudes of stress concentrations with the results of fatigue tests on typical specimens it can be concluded that elastic stress concentration is a valid criterion for establishing the fatigue strength of fabricated structural members. Appendix I presents a qualitative explanation of stress concentration and change of direction of stress path or trajectory.

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052428
A FURTHER STUDY OF THE BEHAVIOR OF FLOORBEAM HANGERS

Scott, MB, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 35-63, 16 Fig, 2 Phot

A description and analysis of a static test made on a floorbeam hanger in a 124-ft. 2-in. pin-connected through truss span was reported. SR-4 electrical resistance strain gages were used to measure hanger stresses under static live load. No dynamic stresses were measured in this hanger. The tested hanger was composed of two channels tied together with lacing throughout most of their free length. A forked end was provided for the pin connection where the channel flanges were coped for clearance with the upper chord. Test procedure and an analysis of results was presented. Theoretical analysis and a comparison of this method with other analytical methods was made. The conclusions include the following points. The use of continuous and unbroken lacing appears adequate to tie the main components of the hanger together making them act together as a unit. The effect of stringer deflection was not significant on hanger bending in the plane of truss. Measured hanger stresses can be accounted for in a rational manner through a modified application of rigid-frame theory to the cross-frame composed of floorbeam and hangers. Concentrations of stress in the corners of hanger copes is very real. This concentration reduces the fatigue strength of the member. By replacing the sharp corner of a cope with a smooth, large radius curve such stress concentration can be relieved.

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052429
INVESTIGATION OF DISTRIBUTION OF PRESSURE UNDER BRIDGE ROCKER SHOE SLABS

Lagaard, MB, Northwestern University, Evanston

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 91-146, 46 Fig, 2 Phot

An investigation of bridge rocker shoe slab assemblies was reported. The purpose of these tests was to secure data regarding the pressure on the concrete under the base slab, the stresses in the slab and its deflection so that a modification of the present design specifications could be made. Eight slabs 36-in. wide, varying from 8 to 18 in. in width and from 3 to 4 1/2 in. in thickness were chosen. Two loads, equivalent to 600 psi and 900 psi computed on the basis of the area of the widest slab, were applied to all slabs. Steel pedestal blocks were used underneath the slabs as a means for measuring the pressure on the concrete. Electrical strain gages indicated the actual values of the strains. A dial deflectometer measured deflections. The readings on the pedestal blocks show that the pressure on the concrete is not uniform. It varies from a maximum along the centerline of the slab directly under the rocker to a minimum at the edges. Pressures on the concrete along the centerline of the rocker decreased as the width of the slab increased. The average stresses at the center of the slab increased as the width of the slab increased. The average pressures along the centerline of the rocker decreased as the base thickness of the slab increased. The stresses in the rocker shoe slab and the deflections increased as the width of the slab increased. The rubber-fabric pads reduced the average pressure on the concrete along the centerline of the rocker.

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052431
PHYSICAL PROPERTIES OF EARTH MATERIALS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 712-717, 3 Fig

A discussion of the physical properties of earth materials as they are related to track structure and roadbeds is presented. A general definition and classification of soils is discussed. Roadbed soils are defined and classified. The characteristics of sands, silts, and clays are presented. Foundation soils are discussed. They are considered as undisturbed soils that are required to support the loads superimposed upon them. Soils below original ground, under fills, and in cuts more than about 3 ft. below the ballast may be considered as foundation soils. Exploration and tests are discussed. The purpose of exploration is to determine the nature and extent of the various soil deposits and ground water conditions, and to obtain the required samples for testing. The two general steps for all soil investigations are consideration of the general geological features of the site, and exploratory borings to produce more specific information as to the extent of soil variations and moisture contents. Basic tests performed on samples are grain size analyses on granular samples, liquid-limit and plastic-limit. These are indicative of the compressibility of the soil. Field moisture contents should be determined. Penetration tests demonstrate the extent and type of required explorations. These exploratory procedures usually provide information and samples sufficient for most projects.

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052432
CHEMICAL BRUSH CONTROL ON THE WESTERN MARYLAND RAILWAY

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 751-754, 1 Fig, 1 Tab, 2 Phot

Chemical brush control operations on the Western Maryland Railway was reported. In preparation for the large scale spray operation a strip map of the area of treatment was prepared and made available to the spray car operator. The areas sprayed were noted on the map. Right-of-way widths of 60 to 100 ft. were sprayed. The equipment consisted of a converted freight car on top of which four turrets on swivels, each equiped with 6 nozzles, were mounted. Four turret men and a spray car operator, who had instant control to stop all spray, were required for operation. The chemical mixture was equal parts of 2, 4-D and 2,4,5, T using the low volatile esters of each. One gallon of this was mixed in 150 gallons of water. About 1 1/2 gallons of chemical per acre was used. A fall inspection of the June spraying showed a high percentage kill of weeds and brush. One of the characteristic results of the chemicals used is the rapid disintegration of the stem or stalk of the weeds or brush close to the ground which makes it possible to clear the dead brush readily. More definite assessment of the results would be available the following spring.

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052436
FATIGUE TESTS OF BEAMS IN FLEXURE

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 111-129, 7 Fig, 2 Tab

This report gave a description and summary of the results of fatigue tests on various types of beams similar to those used in actual structures and subjected to repeated cycles of loads. The tests consisted of subjecting the beams to repeated loads varying from a small load on the beam to the maximum in the cycle. This load cycle was repeated at about 150 cycles per minute until failure developed at some location in the beam. Fatigue data were obtained on 27 different types of beams and a total of 104 specimens were tested. A description of each series with the average fatigue strength obtained for each series at 100,000 cycles and 2,000,000 cycles was shown. The results indicate the following points: 1) The carrying capacity of a rolled beam is considerably higher than that with a fabricated beam of equivelant section modulus. 2) The carrying capacity of a beam with cover plates cannot be increased indefinitely with an increase on cover plate thickness. 3) The use of cover plates on rolled beams appears to be limited to reinforcement jobs where the beam is already in place. 4) Cover plates on beams should be full length or extended past the theoretical cut-off point, so that the stress in the beam at the end of the plate is only about 40 percent of the stress at the center. The stress-raising effect of welding across the ends of partial length cover plates is about the same as that of the longitudinal welds along the edges of the cover plates.

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052437
STEEL AND TIMBER PILE TESTS–WEST ATCHAFALAYA FLOODWAY–NEW ORLEANS, TEXAS AND MEXICO RAILWAY

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 149-202, 27 Fig, 11 Tab, 9 Phot

A description and analysis of tests made on hollow steel and timber bearing piles in the swamps of southern Louisana on the New Orleans, Texas and Mexico Railway. The tests were made during the driving of the piles, and under static loading of the piles to shear failure in some cases, and to the practical limit of the loading in others. Single hollow steel piles and a group of nine hollow steel piles were tested to failure or near failure by placing large concrete blocks on specially built loading platforms on the top of the piles. The stresses were measured and the strains were recorded. Single timber pile and two groups of nine timber piles each were tested to shear failure in the same manner as the steel piles, but no effort was made to record the dynamic strains or the strains along the length of the pile. Distribution of load to the various piles of the group was determined by strain gages. Soil test borings were tabulated. The results indicate how the load, both dynamic and static, was transferred from the pile to the penetrated material, and how the load was distributed to the individual piles of the various groups. Among the conclusions are: 1) The measured driving stresses in the top of the steel piles increased with an increase in pile penetration. 2) The tapered steel piles driven into clays with a high moisture content acted as friction piles. 3) The single tapered steel pile carried more load than the single straight pile. The load distribution was fairly uniform for both the groups of steel pipes and the groups of timber piles.

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052442
FATIGUE OF TIMBER STRINGERS

Leggett, JL, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 850-855, 2 Fig, 4 Tab

A laboratory investigation consisting of fatigue tests on four unseasoned, untreated stringers was reported. Two of the tests were on southern pine, and two were on Douglas fir. The test program and procedure were described. After the first stringer was tested, a program of surveying and mapping the checks in each beam, before and after testing, was instituted. In summarizing the tests the outstanding feature observed has been that all four stringers failed initially in horizontal shear. The first three failed between the loading point and that end of the stringer which was flush with the support. The fourth failed at the end with the 15-in. overhang. The technique of testing full-size timbers in fatigue is new, and consequently, many problems have arisen. It is hoped that some of the fatigue problems will be solved.

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052443
STRESS DISTRIBUTION IN BRIDGE FRAMES-FLOORBEAM HANGERS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 470-504, 26 Fig, 4 Tab, 1 Phot

The floorbeam hanger research project was an investigation of the causes and remedies for the failures in floorbeam hangers in railway bridges. The report is in four parts. A summary of the information submitted by various railroads concerning failures in floorbeam hangers of riveted truss spans and pin-connected truss spans was presented. It gave the results of a detailed stress analysis and classified the failures according to location. A summary of the results of exploratory laboratory tests made in an attempt to explain the failures was presented. It offered a hypothesis for causes and remedies of the failures and listed some of the unsolved problems. One field investigation made demonstrated the feasibility of reducing the stress concentrations at the copes of existing pin-connected hangers. The existing cope was filed to permit the installation of strain gages. Measurements taken indicated stress concentrations when the locomotive was placed to produce maximum load in the hanger. The average measured unit stress on the gross area of the hanger represented a local stress concentration of 3.67 times the average. The cope was altered and then produced a marked reduction in local stress concentrations. Other field investigations were summarized.

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052451
FIRST PROGRESS REPORT OF THE INVESTIGATION OF STABILITY OF COMPACTED EMBANKMENTS

Ireland, HO, Illinois University, Urbana
Rosenblueth, E, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 719-727, 5 Fig, 2 Phot, 1 App

An investigation to determine the significant factors involved in unsatisfactory behavior of compacted embankments was discussed. The description and field investigation of the Pottsboro-Sadler revision on the M-K-T was presented. The characteristics of borrow-pit material were described. Several laboratory tests were made to determine whether the observed strengths of the fill materials were in agreement with the results of the borrow-pit material. Results showed that the strength of the clay fill was not less than that predicted on the basis of the laboratory tests on the borrow-pit material. It is concluded that the instability of the fills on this revision appears to be primarily the result of volume changes of the materials within a few feet of the surface, where confining pressure is low. The volume changes can be attributed to the high percentage of the clay mineral nontronite. The unsatisfactory behavior of this mineral would not have been indicated by any of the standard soil tests made in connection with fill materials, but would have been suggested by routine mineralogical analyses and confirmed by swelling tests.

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052456
TESTS OF LATERAL BRACING OF DECK GIRDER SPANS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 134-141, 5 Fig

Tests of lateral bracing of deck girder spans are reported, in an effort to secure data on the stresses in the angles of the bracing members under actual operating conditions. Strain gages are placed on the bracing members of a girder span having ballasted concrete floor and also on a girder span having an open timber floor. Results of tests on the two bridges indicate that a poured-in-place concrete floor increases the rigidity of the span against lateral forces. The stress on one corner of an angle connected by one leg may be two or three times the average stress in the angle. The lateral bracing angles are usually subjected to a complete reversal of stress. The sign of the stresses in the angles of the top laterals and end cross frames indicates that these stresses are the result of transverse forces acting in either direction on the girders. The stresses in the center cross frames appear to be the result of unequal deflection of the girders resulting from the rolling of the locomotive about a longtitudinal axis.

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052457
TEST RESULTS ON RELATION OF IMPACT TO SPEED

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 432-443, 9 Fig, 1 Tab

Test results on relation of impact to speed are reported to support the proposed Article 107 of the Rules for Rating Existing Iron and Steel Bridges. It is noted that a study of short span steel bridges 20 to 40 ft. long and deck plate girder spans 40 to 130 ft. long subjected to live loads with or without hammer blow indicates that the reduction of impact as a result of speed should occur at 40 mph or less, rather than synchronous speed or less as was proposed in 1947 for spans longer than 50 ft. The value of 40 mph was selected as the maximum practical speed where allowable reduction in impact might be permitted since rolling equipment without hammer blow has no synchronous speed. It is noted that some values of total impact on truss spans approximately 120-150 ft. long, subjected to equipment with hammer blow, receive more impact than is provided by Article

206 of the Specifications for Steel Railway Bridges. The character of the reduction equation for truss spans subjected to rolling equipment with hammer blow is consistent with the data.

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052458
STRESS DISTRIBUTION IN BRIDGE FRAMES–FLOORBEAM HANGERS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 443-445, 2 Fig

Report is made on stress distribution in bridge frames and floorbeam hangers. A survey of floorbeam hanger failures is conducted, and field and laboratory studies of stress analysis are made. It is preliminarily concluded that the increase in stress concentration at the sides of the rivet holes due to rivet bearing is often quite large and may easily be the major factor in the fatigue failures at the gussets. Fatigue tests of plates connected by rivets to gussets on one side only produce progressive fracture through the plate at the rivet holes at relatively low unit stresses. Loss of clamping force in the rivets reduces the fatigue strength of such riveted joints. Due to the extensive hanger failures on some railroads, it is recommended that railroads keep close inspection of floorbeam hangers.

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052465
1949 REPORT OF THE INVESTIGATION OF ROADBED STABILIZATION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 657-683, 5 Fig, 2 Tab, 18 Phot

The 1949 report of the investigation of roadbed stabilization is presented. Topics discussed include field studies and results of roadbed stabilization grouting, cost data, fill grouting and reports of the Illinois Central, Missouri-Kansas, Texas, Santa-Fe, Burlington, Great Northern and Northern Pacific Railroads. Conclusion reveals that the greater proportion of subgrade instability has been produced by surface water rather than underground flow. The correction of the instability depends on the diversion of this water before it reaches that portion of the subgrade where instability has developed. It is noted that grout promotes stability, and the degree to which grouting does put a roof over the subgrade appears to be a direct measure of the success of the stabilization. There is no evidence that grouting can prevent the development of these pockets. Other topics considered include tie and pole driving, piling, sand filled blast holes, and sand-filled spud holes. Relationships are studied between water content of material and its action under load. Tests reveal that loading apparatus is satisfactory and may operate with only minor maintenance.

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052467
REPORT OF BRIDGE ROCKER SHOE ASSEMBLY TEST

Lagaard, MB, Northwestern University, Evanston

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1948, pp 214-230, 12 Fig, 5 Phot

The distribution of pressure exerted by a rocker shoe slab on a concrete pier is studied, and the corresponding stress and deflection in the slab is measured in an attempt to gain more information for design purposes. Test methods are presented, and loads and results are discussed. It is found that the bearing pressure of the rocker shoe slab on the concrete base is not uniformly distributed but varied from a slightly negative value at the corners to a maximum of about 2060 psi at the center. Stresses in the base slab cannot be accurately calculated on the assumption that the slab acts as a cantilever beam under uniform bearing pressure. The deflections of the base slab confirm the readings of bearing pressure on the concrete and strains or deformations in the slab. The strain gage readings on top of the slab for the tests with and without the loading blocks confirm the reliability of the loading block method of measuring pressure. Changes in the design of the slab by reduction in the bearing area and increase in the thickness should give lower maximum pressure on the concrete at no greater cost. It is recommended that additional tests be made to establish the proper relationship between these variables.

ACKNOWLEDGEMENT:
Association of American Railroads

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053728
BENTONITE TUNNELLING MACHINE

Bartlett, JV Biggart, AR Triggs, RL

Institution of Civil Engineers, 1-7 Great George Street, Westminster, London SW1P 3AA, England

Vol. 54, Pt1, Paper #7670, Proceeding, Nov. 1973, 21 pp

The paper describes a new method of driving tunnels through granular soils above or below the water table using a mechanical tunneling machine within which the face is supported by a thixotropic slurry. The devlopment of the system and the results of the experimental tunnel drive at New Cross are reported. This approach to the problem may be said to combine the techniques of clay and digger-shield tunneling, slurry-trench walling, and oil-well drilling. The machine used in the trials is readily covertible for use as a conventional tunneling machine for excavating in either consolidated gravels or in cohesive soils such as the London clay. Methods of organizing and financing development work of this nature are discussed.

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053736
INSPECTION OF EMBANKMENT SLOPE AGAINST FAILURE BY A SIMPLIFIED PORE-PRESSURE METER

Uezawa, H Yasuda, Y Menjo, S

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 2 pp

The process of designing a simple apparatus to inspect the disorder of slope by surveying the strength of slope, rising of pore-pressure, change in inclination of slope prior to failure is described. The pore-pressure rises high after each rainfall in a peculiar slope, the surface of which is loose and underlied by hard layer. Such a slope failed at the test embankment by artificial rainfall. The apparatus totalling 86 pieces had been driven into slopes at several places. Two slopes failed actually. These slopes have the typical feature above mentioned. The pore-pressure rose up to the slope surface and the inclination of the meters to their original position was 26 degrees. If a a number of meters are driven into slopes, some of them may work for inspecting the disorder of slopes.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053737
INVESTIGATION OF THE FUNCTION OF A SHIFTING SAND CONTROL FOREST BETWEEN KOYAMA AND SUETSUNE ON THE SAN-IN LINE

Imai, T Arai, H

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 4 pp, 8 Fig, 2 Tab

The report relates to the investigation of the function of a shifting sand control forest in JNR. As intensive changes have been observed of the environmental conditions along the railway lines, a windblown sand control forest must be maintained according to compromising variations. The investigation presented here was conducted to evaluate the efficiency of preventive function of the existing forest and to determine the width of forest which is proper for the actual environmental conditions by means of the climatic survey of the area concerned, calculated and observed quantity of sand blown from the windward, the wind control function of the forest, etc.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053745
INVESTIGATION OF PERMANENT TUNNEL WATER

Ishii, M Sakuma, F

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 2 pp, 4 Fig

A tunnel has the same function as a drain excavated underground, so that the gush of water always goes with the construction of the tunnel except in a few cases. The gush of water in the tunnel is mainly influenced by the topography, geology, geological structure, ground surface, length of tunnel, earth covering, hydrolic weather and so forth. This paper presents the investigation on the actual conditions of permanent water in the main tunnels and these data are offered to make clear the problems in the gush of water or its maintenance of the tunnel.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053859
PRECAST CONCRETE CAPS: PRACTICES, PROSPECTS AND PROBLEMS

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 11, Nov. 1973, 3 pp, Figs

The use of precast concrete caps in railroad bridges is a growing practice. This article, based on a committee report presented before the recent annual convention of the Bridge & Building Association, explores the situations in which such caps are used and discusses the considerations and procedures involved.

ACKNOWLEDGEMENT:
Railway Track and Structures

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053873
PREPARATION OF AXLE LOADS

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

D115/RP2, Report, Oct. 1972, 152 pp, 88 Fig, 8 Ref, 9 App

The above report contains details of a series of 13 experiments carried out on 4 sections of slabs having 2 incorporated girders, together with ballast, in order to ascertain the transversal distribution of the axle loads. The pressure of the ballast on the slab, as well as the alterations in the shape and the position of the supports used for the sections of slabs, having a width of 4.00 metres, and a length of 1.95 metres, were measured in the case of loads of 100 KN, 200 KN and 300 KN. The most important results obtained were as follows: (1) the pressure of the ballast distributed under the two halves of the sleeper in the form of a two-nipple curve, is concentrated in the area under the rail; (2) the centers of gravity of the two nipples move, when an increasing load is applied to the slab, as distinct from the latter's supports; (3) it is proposed to make use, as the equivalent load on the slab, of two rectangular loads, whose centers of gravity coincide with those of the measured curves of the pressure of the ballast; and (4) formulae and diagrams are shown to establish the position of the centres of gravity. Their application ensures values which are closer to the reality than the hypotheses adopted up to the present.

ACKNOWLEDGEMENT:
International Union of Railways, 1157

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53N3

054284
FS DIRETTISSIMA INSPECTED AFTER FLORENCE CONFERENCE ON UIC HIGH-SPEED MASTER PLAN FOR EUROPE

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 67-68, 2 Phot

Visits to major works of tunnelling and viaduct construction on the two sections under way of the Rome-Florence 250 km/h main line show very advanced techniques by highly-mechanized methods.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054308
THE CASE FOR BERNE GAUGE WAGONS IN BRITAIN

Gotch, J, Traffic Services Limited

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 3 pp, 2 Phot

Approval in principle of the new line to London from the Channel Tunnel will give Continental wagons access to the capital, but significant commercial advantages would accrue to shippers if they could reach provincial centres also. Jeremy Gotch looks at the structure gauge problem in more detail, and concludes that the work required to enlarge certain routes could be modest.

ACKNOWLEDGEMENT:
Railway Gazette International

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054325
EXPERIMENTAL OBSERVATIONS OF ROCK FAILURE DUE TO LASER RADIATION

Farra, G Nelson, CR Moavenzadeh, F

Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139 R69-16

Res Rpt, Apr. 1969, 13 pp

Contract C-85-65

Hard rock tunnelling is an expensive process due to the fact that tunnelling machines must be extremely rugged and powerful to overcome the high strength of intact hard rock. There has been a considerable amount of interest in assisting the progress of hard rock tunnelling machines by developing techniques to weaken the rock before it is mechanically broken. The report reviews the present state of knowledge about the interaction of laser radiation with solid materials such as rocks. It also presents experimental techniques used to cause various modes of failure in rock specimens by laser irradiation. The thermal and mechanical responses of laser irradiated specimens were observed and these phenomena were compared with the analytical data for the temperature and stress distributions in such specimens. (Author)

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National Technical Information Service, PB-187274

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054328
RESEARCH INVESTIGATION OF LASER ROCK KERFING

Carstens, JP
Banas, CM Biancardi, FR Melikian, G Peters, GT

United Aircraft Corporation, Research Laboratories, East Hartford, Connecticut UARL-L-911329-8

Final Rpt, 7203-7210, Nov. 1972, 254 pp

Contract DOT-FR-20021

A study was performed on a concept of using a focused high-power laser beam to cut a kerf at the gage of a hard-rock tunnel. Such a concept would eliminate mechanical gage cutters. Cutting tests were performed in a variety of hard rock types with a Contractor-owned five kilowatt CO2 laser. Test results were analyzed to allow approximation of power levels required for full-scale tunneling. A design and cost methodology was derived to allow estimation of laser costs in the size range of interest. Fenix and Scisson, Inc., acting as subcontractor to UARL, developed information on cost and performance of mechanical tunneling in hard rock, with emphasis on the gage cutting problem. It is concluded that this concept will work, and that cost benefits will be realized in large-size tunnels (20-ft-diameter of greater) in hard rock (30,000 psi or greater). Advances in laser technology will extend the economic desirability of this technique to smaller tunnels and softer rock. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-214439/2

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054329
ROCK FRACTURE RESEARCH SURFACTANTS

McGarry, FJ Moavenzadeh, F

Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts R72-53

FRA-RT-73-22, Final Rpt, Jan. 1973, 49 pp

Contract DOT-C-85-65

In order to reduce the resistance of hard rocks to excavation by available cutters, and in order to reduce wear on cutters and thus to increase the efficiency of conventional tunneling machines and thus improve their rate of advance in hard rocks, surface active agents have been studied in controlled laboratory environments and have been experimented with in the field in actual tunneling operations. The laboratory study utilized a notched beam test to measure the effectiveness of thirty different surface active agents on the amount of surface energy required to cause stable fracture in rock specimens. In addition to the type of rocks, geometry of the specimens, type of surface active agents, the effect of environment such as temperature and degree of saturations were studied.

ACKNOWLEDGEMENT:
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054330
THE EFFECT OF JOINT CONFIGURATIONS ON THE STRENGTH AND DEFORMABILITY OF MODEL ROCK MASSES

Motoyama, H Hirschfield, RC

Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139 R71-70

FRA-RT-73-25, Final Rpt, 6912-7106, June 1971, 189 pp

Contract DOT-C-85-65

The mechanical behavior of a jointed rock was investigated by means of triaxial test with gypsum plaster models. The effect of joint configuration (joint spacing and joint inclination) on the strength and deformability or rock mass was investigated by analyzing all the test results of the present investigation carried out earlier by others as part of a large program of model studies. This research led to the following conclusions. The strengths of any models, either jointed or intact, increased with confining stress within the range from 0 psi to 1850 psi. The plaster used to make the models is believed to have been transformed from a brittle to a ductile behaving material at a confining stress of about 1850 psi. The strengths of model jointed rock were smaller than that of intact model in the range of confining pressure at which tests were performed. The joint configurations had a great influence on the strength of a rock mass at low confining stresses, but little or no effect at high confining stresses. The strengths of specimens that failed by sliding along pre-existing joint planes appeared to be independent of joint spacing for a given joint inclination. Portions of this document are not fully legible.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-222878

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054553
PLANE STRAIN CONSOLIDATION BY FINITE ELEMENTS

Boehmer, JW Christian, JT

Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139

R69-60, Res Rpt, Aug. 1969, 183 pp

Contract DOT-C-85-65

Soil Mechanics Publication No. 243.

The report describes the application of the finite element technique to plane strain consolidation problems, dealing with primary consolidation only. A description is given of three-dimensional consolidation in order to explain three-dimensional effects in the consolidation process and to discuss similarities in the finite element formulation, Biot's and Terzaghi's formulation. The main points of a finite element formulation for the consolidation process are summarized, and the resulting computer program, CONSOL, is described. The complete element formulation is given in an appendix. An investigation is made on one—and two— dimensional problems, which show the effects discussed in the chapter on consolidation theory. A choice is made of problems which are of practical importance. (Author)

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National Technical Information Service, PB-188023

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054554
EXTERNALLY AUGMENTED HYPERVELOCITY JET PROGRAM

Bowles Engineering Corporation, 9347 Fraser Street, Silver Spring, Maryland, 20910

BEC-R-10-31-69, Final Rpt, Dec. 1969, 147 pp

Contract DOT-FR-9-0015

The external velocity augmentation concept was demonstrated by striking a flat plate with a flat-faced slug of water to create a jet with a velocity eight times that of the slug. A generator capable of providing flat-faced slugs at a velocity of 1000 ft/sec was designed, built, instrumented, and tested. Experimental studies were made of interface devices capable of maintaining a 1/2 inch vertical face of water at the end of a horizontal channel. Pressure pulse characteristics at various points in the generator and slug velocity and form were analyzed to optimize slug generation techniques. Results showed superiority of flat impingement plate concept to the two slug concept as a method of achieving external velocity augmentation. (Author)

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054556
PROGRAM FOR LARGE-SCALE TESTS ON PROTOTYPE TUNNEL SUPPORTS

Parker, HW Peck, RB Deere, DU Semple, RM Febres-Cordero, E

Illinois University, Urbana, Department of Civil Engineering, Urbana, Illinois, 61801

UILU-ENG-72-2004, Final Rpt, 7103-7110, Nov. 1971, 75 pp

Contract DOT-FR-00023

Programs for the development and testing of two promising innovative tunnel support systems are presented in this report. One new support system is a lining, capable of being slipformed, composed of wire fiber reinforced concrete made with high, very early strength regulated-set cement. Recommendations are given for: studies on mix design, practical pumping tests, analytical ground-structure interaction studies, and large-scale tests performed on prototype linings 10 ft in diameter. The results of tests on wire reinforced concrete are to be compared to the results of tests on conventional reinforced concrete. A program for analysis and testing of improved steel sets fabricated from tubular box sections is also presented. (Author)

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054617
SHEAR STRENGTH OF FINE-GRAINED SOILS

Highway Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 463, 62 pp

During the 1973 Annual Meeting of the Transportation Research Board (formerly Highway Research Board) participants in a symposium on shear strength of fine— grained soils during construction discussed the measurement of field strength and other indicative parameters, and how best to use these data to control construction. Four papers presented during this symposium and two additional papers on related subjects, have been published in this issue of the record.

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Transportation Research Record, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: $3.20

054675
CHEMICAL WEED CONTROL: A TOOL FOR ECONOMIC MAINTENANCE

Dick, MH

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 3, Feb. 1974, 3 pp

Good vegetation control is similar to a life insurance policy. If $16 of chemical weed control around a trestle will keep it free from combustible vegetation is this not cheaper than replacing the bridge if it burns? This type of reasoning should be used in deciding the cost of a weed control program. The safe use and application of chemicals is a highly technical field. For this reason, one person should be

placed in charge of administering a company's program.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054686
PROBLEMS ASSOCIATED WITH MASONRY BRIDGES AND SOME SUGGESTED SOLUTIONS

Ellis, IW

Permanent Way Institution, Journ & Rpt of Proceed (Derry and Sons, Limited, Canal Street, Nottingham, England)

Vol. 91, PtIII, 1973, pp 126-133, 5 Fig

The paper describes some of the problems associated with old brick and masonry bridges, the normal visible signs and some methods and techniques of restoration adopted by Fondedile Foundations Limited.

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054759
PRECAST PRESTRESSED SEGMENTAL RAILWAY BRIDGE IN AUSTRALIA

Prestressed Concrete Institute, Journal of (Prestressed Concrete Institute, 205 West Wacker Drive, Chicago, Illinois, 60606)

Vol. 18, No. 56, Sept. 1973, pp 105, 9 Fig, Apps

In the last decade most highway grade separation structures consisted of simple span I-beams with a cast-in-place deck slab. Typically, the spans were supported by two end abutments, a central pier, and a pair of intermediate shoulder piers. However, with the new emphasis on safety, the two intermediate piers are no longer permitted. This new regulation coupled with the need for longer spans, means that the standard AASHO-PCI types III and IV beams cannot be used. Nevertheless, it is still possible to use the AASHO-PCI beams on longer spans if the beams are used as segments to be spliced and post-tensioned together at the construction site. The author presents a design procedure for designing such long-span precast segmental bridges. Two fully-worked numerical examples are presented to show the application of the design method and several tables and charts are included to facilitate the design process. (Author)

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054765
RAILROAD TRACK RELOCATION SAVES TIME, MONEY

Fry, JG

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

May 1974, pp 86-87

A difficult problem in the operation of a railroad with sharp curves and steep grades through a mountain pass in California was improved by a physical realinement in both location and grade, together with changes in the method of disptaching system. The railroad improvements resulted in increased efficiency of operation as well as monetary savings which gave a significant annual return on the capital investment required.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054768
PROJECT TRINIDAD: EXPLOSIVE EXCAVATION OF RAILROAD CUTS 2 AND 3 BY MOUNDING AND DIRECTED BLASTING

Lattery, JE

Waterways Experiment Station, Explosive Excavation Research Laboratory, Livermore, California

EERL-TR-E-74-1, Final Rpt, Jan. 1974, 37 pp

The report summarizes the objectives, design, and results of two explosive excavation experiments performed as the final phase of project Trinidad, a comprehensive series of tests to determine the cratering properties of interbedded Sandstone and Shales. The experiments were performed in September 1971 by the U.S. Army Engineering Waterways Experiment Station Explosive Excavation Research Laboratory. These final experiments were designed to excavate through-cuts for relocation of the Colorado and Wyoming Railroad at the Trinidad dam and Lake Project. The first of the two experiments tested a charge array designed to break up material within a 19,000-cubic yards cut to facilitate later removal of the material by mechanical means. The concept tested was mounding, a blasting technique in which charges are positioned with respect to the horizontal ground surface rather than a vertical bench face. (Modified author abstract)

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Defense Documentation Center, AD-775824

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054774
A BALLASTLESS BRIDGE

UN PONTE SENZA MASSICCIATA
Angeleri, G

Ingegneria Ferroviaria (Collegio Ingegneri Ferroviari Italiani, Piazza Croce Rossa, Rome, Italy)

May 1973, 3 pp, 3 Fig

The article describes how rails are laid on a ballastless bridge formed by concrete structures with built-in steel girders. This new technique has proved most satisfactory. No rail movement was caused by the passage of 60 million tonnes of heavy traffic and fast trains, thereby rendering any maintenance measures unnecessary.

ACKNOWLEDGEMENT:
International Union of Railways, 56

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054775
BRIDGE OVER THE GREAT BELT (DENMARK)

PONTS SUR LE GRAND BELT (DANEMARK)
Gimsing, NJ

Travaux (Federation Nationale des Trav Publ & des Synd Aff, 6 Avenue Pierre Premier de Serbie, Paris 16e, France)

No. 463, Oct. 1973, 9 pp, 23 Fig

The author, who took part in the work of the Technical Committee investigating the projected crossing of the 12 km Great-Belt stretch, describes the various alternatives and gives details of the preliminary project selected: a combined rail/road bridge, made up of two sections using the islet of SPROGOE as an intermediate support point and with its main structure of the braced type. There is a draught of 68 m for 500 m lanes and the bridge has been designed to withstand impact from ships. The main piers should have their foundations laid up to 60 m below sea-level.

ACKNOWLEDGEMENT:
International Union of Railways, 72

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72

054776
A NEW TYPE OF PREFABRICATED HEAVY-DUTY LONG-SPAN BRIDGE

NOUVEAU TYPE DE PONTS LOURDS DEMONTABLES DE GRANDES PORTEES
Sedlacek, H

Acier/Stahl/Steel (Centre Belgo-Luxem d'Information de l'Acier, 47 rue Montoyer, B-1040 Brussels, Belgium)

No. 10, 1973, 8 pp, 13 Fig

After the SKR-6 bridge (Schaper-Krupp-Reichsbahn bridge, width of sections: 6 m), a new type of material, called SKB, has been designed to be used, first of all, for rail bridges, secondly, for road bridges, and lastly, for medium and long-span combined rail/road bridges. The author lists the many requirements with which this material must comply. With the help of diagrams, he gives details of the structure of SKB bridges in general, with special reference to the decks and flooring of rail or combined road-rail bridges; finally, he describes how these bridges are erected. The text is assorted with 10 diagrams and black and white photos; it also includes various bibliographical data.

ACKNOWLEDGEMENT:
International Union of Railways, 82

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82

054926
SUBTERRENE ROCK MELTING DEVICES

Altseimer, JH

Tunnels and Tunnelling (Morgan-Grampian Limited, 30 Calderwood Street, London SE18 6QH, England)

Vol. 6, No. 1, Jan. 1974, 5 pp, 11 Fig, 3 Tab, 12 Ref

The concept of rock penetration by melting was initiated at the Los Alamos Scientific Laboratory in the early 1960s. Research momentum began to develop in 1971 and today a substantial programme is under way. Test penetrators up to 114 mm diameter have been successfully used in many types of rocks. Plans are laid for a 300 mm diameter device called the Geoprospector which will produce 200 mm diameter cores encased in glass and a glass-lined hole. Looking further ahead, studies have indicated that substantial cost benefits are possible using nuclear powered Subterrene tunnelling machines in hard rock or unfavorable soft ground.

ACKNOWLEDGEMENT:
Tunnels and Tunnelling

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054927
UNDERGROUND FORECAST: HUMAN WAYS OUT OF AN URBANIZATION DILEMMA

Jansson, B

Tunnels and Tunnelling (Morgan-Grampian Limited, 30 Calderwood Street, London SE18 6QH, England)

Vol. 6, No. 1, Jan. 1974, 3 pp, 8 Fig

Tunnelling has obvious connections with the urbanization process in the world. Tunnels and other subsurface constructions play an important part in supply plants which provide power, water and communications. Increasing density in the more developed urban areas demand increasing subsurface space for these activites and for storage and certain industrial processes. Where the urbanization is far developed—that is in the central business districts of big cities—the subsurface space is the saving possibility to guarantee the functions in the metropolitan area. The intention of this article is to propose a hypothesis for the future development of tunnelling in the world as a whole.

ACKNOWLEDGEMENT:
Tunnels and Tunnelling

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054928
ROCK BOLTS AT CHURCHILL FALLS

Wood, VD, Jr van Ryswyk, R

Tunnels and Tunnelling (Morgan-Grampian Limited, 30 Calderwood Street, London SE18 6QH, England)

Vol. 6, No. 1, Jan. 1974, 3 pp, 2 Phot

Hollow grouted rock bolts had been developed by Williams and proved as a superior product for permanently reinforcing rock on previous projects, both surface and underground. This permitted designers to consider the economical construction of large underground power chambers without the use of heavy expensive reinforced concrete.

ACKNOWLEDGEMENT:
Tunnels and Tunnelling

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054930
VENTILATION FOR UNDERGROUND RAILWAYS AND MOUNTAIN TUNNELS

Fukuchi, G Saito, S

Permanent Way (Japan Railway Civil Engineering Association, Kyodo Bldg, 18-7 Hagashi-Uyeno 2-chome, Daito-ku, Tokyo 110, Japan)

Vol. 15, Dec. 1973, 13 pp

This report compares the temperature and humidity in underground railway tunnels and those in mountain tunnels, on the basis of information available to the JNR, for the purpose of furnishing data on which to base the choice of ventilators and air-conditioners to be used in underground railways to be constructed in future.

ACKNOWLEDGEMENT:
British Railways

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054943
THE APPLICATION OF THE COATING SYSTEM TOGETHER WITH THE ZINC COATING FOR THE PROTECTION OF STEEL BRIDGES

Sato, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 6 pp, 4 Fig, 3 Tab, 8 Ref

The coating system together with the zinc coating is resistant to the severe corrosive environment and highly durable. The zinc spray coating and the zinc-rich paint are used as the zinc coating. Kinds of the coatings, the surface preparation before painting, application of this coating system to steel bridges and the repainting are briefly reviewed in this paper.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056758
PERFORMANCE ANALYSIS OF NATURAL-DRAFT AIR-COOLERS FOR SUBWAY TUNNEL COOLING

Kamada, K, Hitachi Plant Engineering and Construction Company
Miki, H

Heat Transfer-Japanese Research (Society of Chemical Engineers of Japan, 1511 K Street, NW, Washington, D.C., 20005)

Vol. 2, No. 4, Dec. 1973, pp 101-117, 11 Ref.

Recently, the air temperature in subway tunnels has risen to more than 30 degrees C due to the heat of many electric cars, many passengers, etc. Then, the natural-draft type air-coolers have made it possible for use to cool the air in the subway tunnel as low as 20 degrees C. The authors believe that the method will be the first development in the field of subway tunnel cooling. In this paper, authors present a method of analysis for a natural-draft type air-cooler and delineate the performance of a natural-draft type air-cooler under various conditions obtained by use of a digital computer.

ACKNOWLEDGEMENT:
Engineering Index, EIX740505074

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056776
CONCRETE VS. STEEL AERIAL GUIDEWAY TRADEOFFS

Froid, SH, Tudor Engineering Company
Sacco, JJ

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

Preprint, Feb. 1974

The designer of an aerial guideway structure for new transit systems has a choice of two major construction materials concrete and steel. His selection will depend largely on four considerations: esthetic, structural, economic, and acoustical. Esthetic considerations cover such matters as configuration, compatibility of the structure with the environment, color, and surface texture. Structural considerations cover foundation requirements and size and shape of members to accommodate the design loads. Economic considerations include comparative costs of girders of various lengths, ease of installation in available right-of-way, comparison techniques possible through the use of one material or another, capability of local materials producers in terms of both technological expertise and plant capacity, and comparative cost of maintenance. Acoustical considerations include the ability of the material to minimize noise or to permit treatment which will absorb noise. Neither steel nor concrete offers all of the characteristics sought. By a process of both objective analysis and good taste, the designer selects one or the other, or produces a composite design to incorporate the better features of both.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504626

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056811
RAILWAY BRIDGE SPANNING THE GHOTOUR VALLEY (IRAN)

MacCartney, JE

Acier/Stahl/Steel (Centre Belgo-Luxembourgeois d'Info de l'Acier, 47 rue Montoyer, B-1040 Brussels, Belgium)

Vol. 38, No. 6, June 1973

A 800m long railway bridge spanning the rough terrain to provide a key link in the railway project which should connect Istanbul, Turkey, with Isfahan, Iran, is described. It was completed in less than one year. The single track railroad bridge was constructed nearly 120m above the valley floor at a remote location 29 km west of Khoi, Iran or about 800 km north of Teheran. The overall length of the bridge amounts to 442.50m, and consists of a girder and trussed arch.

ACKNOWLEDGEMENT:
Engineering Index, EIX740303049

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056813
TECHNIQUE FOR RAISING THE BEARING CLAYS FORMING THE SUBSTRUCTURE FOR RAILROAD TRACKS IN A SURFACE MINE

FAEHIGKEIT DER TONE IM UNTERBAU VON STATIONAEREN BAHNGLEISEN IN TAGEBAUEN

Draganow, L, Technische Hochschule, Sofia

Neue Bergbautechnik

Vol. 3, No. 8, Aug. 1973, pp 584-588, 3 Ref

The tracks at the Trojanowo surface mine in Bulgaria are laid on clay strata that, within about 6 mo. , reach a moisture content of 60 to 65%, causing a decrease in static bearing capacity below 1 kg/sq. cm. The electro-chemical consolidation technique that is described in the paper attacks two weak points in the dispersed (clay plus water) system, namely: contacts between the surface of solids and water and the density of water strata; as well as the contacts between the particles of the solid phase by creating coagulation and then crystallization nuclei. Increases of the bearing capacity of up to 400% by the treatment have been achieved.

ACKNOWLEDGEMENT:
Engineering Index, EIX740101280

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056819
VEHICULAR TUNNEL DESIGN THROUGH AREA WITH NUMEROUS MINING SHAFTS

VERKEHRSTUNNEL IN BERGSENKUNGSGEBIETEN

Spickernagel, H, Ruhr University
Duddeck, H
Hollmann, F
Kotulla, B
Meissner, H
Westhaus, KH
Zerna, W

Konstruktiver Ingenieurbau Berichte (Inst f Konst Ingen der Ruhruniversitaet Bochum, Haus de Technik, Postfach 7049, D43 Essen, West Germany)

No. 15, 1973, 114 Ref

Design aspects and calculation methods are shown of a project for an underground rapid transit system in the West German Ruhr mining area. The infuence of mine shafts is studied for stresses in tunnels and adequate design measures.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100884

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056822
TIMING CRITICAL IN BRIDGE RAISE

Western Construction and Industry (Mercury Publications Limited, 84 Isabel Street, Winnipeg 2, Manitoba, Canada)

Vol. 48, No. 12, Dec. 1973

The project of raising a railroad bridge while the line is still in service at Lewiston, Idaho was broken into five stages of construction. In addition to the raising of the bridge 9 ft 3 in., specifications include construction of two 11 41-ft concrete bridge piers and foundation reinforcement of one existing pier; replacement of two bridge spans, including one new lift span; and construction of an 8-ft wide 200-ft long shipping guide wall. Keys to the project are self-contained jacks.

ACKNOWLEDGEMENT:
Engineering Index, EIX740204826

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056849
EJ&E USES NEW TYPE WATERPROOFING MEMBRANE

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 10, Oct. 1973

Self-adhering sheeting is applied to concrete deck of six-track steel beam bridge and covered with Vibraflex protection course.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102480

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

056857
AERODYNAMIC TESTING TECHNIQUE FOR SCALE MODEL SUBWAY VENT SHAFTS AND STATIONS

Seeman, GR, Developmental Sciences, Incorporated
Krachman, HE
El Raheb, MS

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York

73-WA/Aut-10, Paper, Nov. 1973, 7 Ref

Describes a 1/16-scale model test (VST) facility designed, built and operated for the purpose of studying the aerodynamic characteristics of subway vent shafts and stations. The VST facility is a steady-state test facility, where geometrically realistic scale model subway components are tested and evaluated. The fluid mechanic behavior of the vent shafts and stations is characterized in terms of driving potential, impedances and geometry. A detailed description of the VST facility, a discussion of the measurements and an example of a vent shaft test are presented and compared to analytical predictions.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304681

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056865
EXPERIMENTAL STUDY OF EARTHQUAKE RESISTANCE OF EMBANKMENT BY A LARGE-SIZE VIBRATION STAND. EXPERIMENT FOR FAILURE MECHANISM

Uezawa, H Komine, T Nasu, M Yasuda, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 3, Quart Rpt, Sept. 1973

Major factors causing a failure of earth fills on weak ground vulnerable to earthquake were studied experimentally using a large-size vibration stand. Various anti-earthquake measures were tried on various modes of failure. Acceleration, subsidence, and pore water pressure were investigated and the construction method is quantitatively analyzed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740300277

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056871
RECONSTRUCTING LONDON'S UNDERGROUND

Follenfant, HG

London Transport, Griffith House, 280 Old Marylebone Road, London NW1 5RJ, England

Sections of London's Underground are a century old, and continuous reconstruction and improvement has been in progress for the last 50 years. LT's former Chief Civil Engineer gives a fascinating account of how this updating has been carried out while keeping traffic moving. While of great interest to the general reader, the specialist will find it a useful key to a complicated subject which, with its copious references, will lead him to more detailed accounts of unusual and difficult tasks faced in urban railway building. The subjects range from the enlargement of the City & South London tube tunnels in the 1920s to the very recent reconstruction of Moorgate station.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:

London Transport, Griffith House, 290 Old Marylebone Road, London NW1 5RJ, England, Repr PC: Req Price

056884
EXPERIENCES WITH LANDSLIDE INSTRUMENTATION IN THE SOUTHEAST

Tice, JA, Law Engineering Testing Company
Sams, CE, Law Engineering Testing Company

Transportation Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#482, 1974, pp 18-29, 8 Fig

This is one of five reports prepared for the 53rd Annual Meeting of the Highway Research Board and is contained in the Transportation Research Record entitled "Landslide Instrumentation" which sells for $1.80.

During the past 4 years, investigations were made of several large cut and fill landslides along Interstate highways in Tennessee and North Carolina. Instrumentation played an important role in all investigations, both in determining the nature of the earth movements and in determining in situ soil properties. The types of instrumentation installed or used included inclinometers, piezometers, surface survey grids, Menard Pressure-meters, and in situ shear test devices. This paper discusses some of the problems and the resulting solutions found relating to instrumentation installation, data collection and interpretation, and use of the data in analysis.

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Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

056885
LANDSLIDE INSTRUMENTATION FOR THE MINNEAPOLIS FREEWAY

Wilson, SD, California Department of Transportation

Transportation Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#482, 1974, pp 30-42, 9 Fig, 1 Tab

This is one of five reports prepared for the 53rd Annual Meeting of the Highway Research Board and is contained in the Transportation Research Record entitled "Landslide Instrumentation" which sells for $1.80.

In 1967 a landslide developed along a section of freeway under construction in Minneapolis. The following procedure was undertaken to ensure the stabilization of the landslide and completion of the project: Instruments were installed to detect the depth and rate of movement, and exploration was undertaken to determine the properties of the material in the failure zone; a temporary buttress was placed to control the movements while corrective treatment was being designed; additional instruments were installed to monitor movements during construction of the permanent treatment; after completion, all instruments were maintained and additional instruments were installed to monitor post-construction movements, if any. The corrective treatment consisted of a series of slit-trench concrete buttresses anchored into limestone below the failure plane. Details of exploration, instrumentation, testing, and design are included in the paper.

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056886
AN EMBANKMENT SAVED BY INSTRUMENTATION

Durr, DL, California Department of Transportation

Transportation Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#482, 1974, pp 43-50, 13 Fig, 1 Tab

This is one of five reports prepared for the 53rd Annual Meeting of the Highway Research Board and is contained in the Transportation Research Record entitled "Landslide Instrumentation" which sells for $1.80.

A case history of an incipient embankment failure that was averted is described. Plastic flow of a weak layer of soil in the lower portion of the embankment was responsible for the problems encountered. A soils investigation, slope indicators, and survey lines provided the information required to establish the movements taking place within the embankment. This information led to an understanding of the problem and design of proper corrective measures that allowed construction to proceed. After the movements were stabilized, the embankment functioned satisfactorily.

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Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

056887
UNCASED PIPELINE CROSSING TRANSPORTATION ARTERIES

White, JE, Colonial Pipeline Company
Saylors, WF, Colonial Pipeline Company

Transportation Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#483, 1974, pp 15-23, 11 Fig, 1 Tab, 3 Ref

This article is one of four reports prepared for the 53rd Annual Meeting of the Highway Research Board and is contained in the Transportation Research Record entitled "Accommodating Utilities in Transportation Rights-of-Way" which sells for $1.80.

The U.S. Department of Transportation now requires all new pipelines to be 100 percent cathodically protected. However, the use of casing pipe around carrier pipe obstructs the successful application of cathodic protection. Although once necessary because of materials and methods of construction, casing can now be eliminated because of better materials and manufacturing methods, welding procedures, and quality control and inspection methods. In 1971, 3 state highway departments allowed uncased pipes to be used at highway crossings. The following features were incorporated in this new design: Nominal pipe wall thickness increased by a minimum of 20 percent, heavier wall pipe extended 40 to 80 ft on either side of the highway right-of-way, complete X-ray examination of girth welds within right-of-way, pipe coated and wrapped to provide adequate protection and electrical insulation, 1-in. thick reinforced concrete jacket installed on the pipe to be pulled, cathodic protection of pipeline at all times, 3-ft minimum cover provided between pipe and ground surface within right-of-way, and hydrostatic pressure test at 125 percent of maximum operating pressure level for a 24-hour period.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

056888
PLANNING THE TELEPHONE HIGHWAYS

Peacock, JM, American Telephone and Telegraph Company

Transportation Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#483, 1974, pp 24-27, 1 Tab, 2 Ref

This article is one of four reports prepared for the 53rd Annual Meeting of the Highway Research Board and is contained in the Transportation Research Record entitled "Accommodating Utilities in Transportation Rights-of-Way" which sells for $1.80.

The millimeter waveguide system now under development at Bell Laboratories is expected to go in service in 1980 as the next stage of evolution beyond coaxial cable. It has a capacity of 1/4 million voice channels and will become the backbone of the long-distance network. Waveguide resembles a rugged steel pipe. Virtually all coaxial cable routes are on private right-of-way. Land use and environmental impact might be minimized if waveguide were located on freeway right-of-way where the routing is coincident and where the right-of-way is adequate to permit economic construction without disruption to highway usage or safety. A joint study is proposed to evaluate the feasibility of this alternative.

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Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

056905
INVESTIGATION OF TRANSPORTATION RIGHTS OF WAY AND THEIR DIRECTLY RELATED LAND USE

Beckley, RM Swenson, D

Wisconsin University, Milwaukee, School of Architecture, Milwaukee, Wisconsin

Oct. 1972, 50 p

Contract DOT-UT-254

The report proposes a methodology for evaluating the relationship of existing rights-of-way and their adjacent land uses. Primary steps include attempts at classification of typical public rights-of-way by type, adjacent land uses, and special features of urban landscape. The question initially confronted was; what makes one right-of-way different from another. Shadow determinance charts are presented. Right-of-way perspective is examined from vista view, traffic flow, right-of-way pattern, speed limit aspects. Adjacent land use discussion includes parking status, pedestrian traffic, access to right-of-way, road surface and traffic land constraints. Land use map and zoning map included, as well as traffic flow constraints. Authors conclude that systematic method of collecting and comparing data can be useful in defining type and character of right-of-way.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230692/6

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NTIS, Repr PC: $3.25, Microfiche: $1.45
PB-230692/6

057165
TUNNELING FOR TRANSPORTATION

Foster, EL, Department of Transportation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 143-152, 1 Fig, 6 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

This paper discusses the role of the transportation tunnel. The state-of-the-art is discussed for tunneling technology, and general areas needing research and development are identified. The problems to be solved are difficult ones; they will require a high degree of technical competence and innovation on the part of those who solve them. With a projected demand greater than $14 billion for the decades of the 70's and 80's, achievable technological improvements leading to 30 percent cost savings and 100-200 percent increases in construction rates will produce savings of over $2 billion for the Nation. Additional fringe benefits related to an improved environment and better energy utilization cause the transportation tunnel to be called an important tool for achieving national goals.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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057167
GLUED-LAMINATED BRIDGES GAIN IN CANADA

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 6, June 1974, pp 29-30, 2 Phot.

While glued-laminated timber construction is being used only to a relatively limited extent in railroad bridges in the United States, it has become an accepted form of construction on at least one railroad in Canada. British Columbia Railway now has 28 such structures in service, with spans ranging up to 100 ft. Spans consist of four I-beam-type deck girders. Tower bents are now being built with glulam legs.

ACKNOWLEDGEMENT:
Railway Track and Structures

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057180
PHOTOGRAPHIC RECORDING OF STRUCTURE GAUGE FOR OUT-OF-GAUGE LOADS

Dekker, HAL, Netherlands Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 169-172, Phots.

Checking for infringement of structure-gauge by out-of-gauge transports on Netherlands Railways using a track-mounted pointer and trace-board has given place to a camera recording technique whereby lineside structures are photographed and annotated with a grid carrying both the load and the structure profiles. Great speed of information collection and evaluation is thus achieved with consequent cut in track occupation time.

ACKNOWLEDGEMENT:
Rail Engineering International

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051346
M/W PROBE NUMBER 1–THE UNION PACIFIC

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 6, June 1973, 18 pp

Six related articles, all dealing with the Maintenance of Way Practices on the Union Pacific Railroad, are presented. Subjects covered included track standards, welded rail, organization of M/W gangs, the Track Recorder Car, and bridges.

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051367
SURFACE FINISHING ON RAIL HEADS ON THE GERMAN FEDERAL RAILWAY

Deckart, H

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

Vol. 22, No. 7/8, July 1973, 8 pp

The Author deals with the need for regular grinding of rail heads on railway tracks, for which purpose the German Federal Railway has employed the "Speno" rail-grinding train since 1968. Its design, use and results obtained are described here.

ACKNOWLEDGEMENT:
British Railways

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Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany, Repr PC: Req Price

051372
EXPERIENCE AND PROSPECTS WITH THE DB'S NEW BALLAST-FREE TRACK DESIGNS

Kaess, G

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

Vol. 22, No. 7/8, July 1973, 9 pp

The author describes the German Federal Railway's experiments in Rheda and Oelde with a new type of ballast-free track for high speeds and loadings. The first results are discussed, and recommendations made for future, more extensive tests.

ACKNOWLEDGEMENT:
British Railways

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051388
DB TESTS SLAB TRACK IN A 250 KM/H LINE

Birmann, F

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, pp 474-475, 3 Fig

Concrete slab track was laid by DB in its first 200 km/h section in 1967. Settlement averaged 6 mm, and after six years it has ceased. Prof. Dr.-Ing. F Birmann describes further tests with two types of slab track now being subjected to 250 km/h running.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051452
FIFTEEN YEARS OF OPERATION OF A NEW TYPE OF STRUCTURE FOR TRACK AND POINTS OF THE ITALIAN NATIONAL RAILROAD AND TRAMWAY ASSOCIATION

QUINDICI ANNI DI ESERCIZIO DI UN NUOVO DI STRUTTURA PER BINARI E SCAMBI DELLA SOCIETA NAZIONALE DI FERROVIE E TRANVIE
Zaquini, G

Ingegneria Ferroviaria (Collegio Ingegneri Ferroviari Italiani, Piazza Croce Rossa, Rome, Italy)

No. 3, Mar. 1973, pp 249-258

With the aim of reducing maintenance costs of track and points of traditional structure, and, in particular, abolishing expenditure connected with the renewal and maintenance of the ballast, since 1956 experiments have been made by the "Societa di Tranvie e Ferrovie" with a new type of track and points on certain bridges and approaches, on certain stations, yards, and siding tracks and points, on a gage line with 36 UNI 3141 rail. In summarizing the elements emerging from experience obtained, the first conclusions are given with regard to plant and maintenance costs.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 057048

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051462
CN TESTS CONCRETE TIES FOR MORE DURABLE TRACK

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 5, Mar. 1973, pp 22-24

Canadian National completed construction of a concrete-tie test track to test the over-all function of its components under heavy-train operation, rather than testing specific components. Some results are discussed.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 025367

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051535
A TRACK CURVATURE MEASURING SYSTEM AND ITS APPLICATION

MacIntyre, SA, ENSCO, Incorporated
May, JT, ENSCO, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-110, Paper, Sept. 1973, 8 pp, 11 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

A track curvature measuring system has been designed and installed in the Department of Transportation's rail test car by ENSCO, Inc. The system employs an inertial rate-of-turn gyroscope to measure the yaw rate of the car, an axle-driven tachometer to measure speed, and velocity transducers to measure the relative motions between the car and the trucks. An analog circuit receives these inputs and performs the curvature computation. The system is capable of making continuous curvature measurement at any speed greater than 3 mph at either direction of travel. The system performance and various applications of the data are demonstrated. Schemes for detecting undesirable superelevation and curvature mismatches are discussed.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051586
TEST TRAIN PROGRAM

May, J Kaufman, W Yang, TL Frankowski, D Holik, J

ENSCO, Incorporated, Springfield, Virginia

No. 4, Prog Rpt, 7107-7206, June 1972, 118 pp

Contract DOT-FR-00015

See also report dated Jun 71, PB-209 762.

The progress report covers a 12-month period of engineering, data management and analysis efforts related to the Rail Research Program. Subjects include operation of the DOT Rail Research Cars, associated testing programs, test car upgrading, expansion of the Rail Research Program, data management and data analysis tasks which have been undertaken to benefit the railroad technology. This research program is designed to provide high-speed measurement of railroad track characteristics, development of comprehensive instrumentation and measurement techniques, and data evaluation through analysis and electronic processing.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226048/7

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PB-226048/7

051589
RAIL GAGE APPARATUS

Wilmarth, RW

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590 DOT/Case-TSC-10041

PAT-APPL-378-510, Patent Apl, 10 pp

Government-owned invention available for licensing. Copy of application available NTIS.

The invention relates to apparatus for measuring the gage of any given track, and more particularly, to apparatus which can be affixed to revenue producing trains which pass over the tracks in question and provide electrical signals representative of the gage of the track while the train travels at high speeds.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224807/8

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PB-224807/8

051590
DE-ICING AND ICE PREVENTIVE COMPOSITION AND PROCESS

Litant, I

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590 DOT/Case-TSC-10051

PAT-APPL-412 263, Patent Apl, 14 pp

Government-owned invention available for licensing. Copy of application available NTIS.

The present invention relates to a de-icing and ice preventive composition in the form of a reversible gel-sol, for application to surfaces subjected to ice-forming conditions. More particularly, the present invention relates to a de-icing and ice preventive composition for application to metallic surfaces, especially horizontal and vertical electric power conducting rails used with any speed, rapid transit systems, 'people movers', or trains, exposed to climatic icing conditions without interfering with the sliding metal-to-metal or carbon-to-metal contact required between the track and power contact appliances, for example brushes, of high speed rapid transit vehicles.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225190/8

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PB-225190/8

051965
TRACK WITHOUT BALLAST

LA VOIE FERREE SANS BALLAST
Ronsse, A Swartele, L

Revue Belge du Transport (Brussels, Belgium)

No. 3, 1972, 5 pp, 1 Fig

Non-ballasted track is a necessity from the point of view of a reduction in the cost of maintenance on main lines, and particularly in tunnels, and on underground railways. The constitution of non-ballasted track, i.e. continuously welded rails on RS concrete sleepers on continuous reinforced concrete slabs, with resilient sleeper pads placed between, resolves the problems of the transmission of the pressures to the track formation, the damping of the vibrations, the permanency of the track geometry, and, therefore maintenance. It is of advantage to make use of lightweight aggregates for the continuous reinforced slab, principally because of the small modulus of elasticity of the lightweight concrete.

ACKNOWLEDGEMENT:
International Union of Railways, 1015

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req. Price
1015

051967
FORMATION OF FATIGUE CRACKS IN RAILS

ERMUEDUNGSBRUCHBILDUNG IN SCHIENEN
Beres, L

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

No. 3, Mar. 1973, 6 pp, Figs, Refs

The rates of unlimited fatigue strength resisting flexion, traction-compression, and shearing, are, in the case of a perfect steel, linear functions of the resistance to fracture caused by traction, in the author's view. He provides diagrams showing these rates, as well as their variation in relation to the rail surface. He makes brief reference to the distribution of pressures in the rail, and explains the manner in which the rates of unlimited fatigue strength can be exceeded when the rail contains inclusions of slag, segregations, or concentrations of ferrite. He explains, in detail, the mechanism of the propagation of the oval flaw and concludes with a number of observations concerning the means of improving the resistance of rails.

ACKNOWLEDGEMENT:
International Union of Railways, 1004

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052085
WOOD AND THE RAILROADS: CAN DEMAND BE TAILORED TO FIT SUPPLY?

Dick, MH

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 9, June 1973, 3 pp, Phots

Railroads are still almost completely dependent on the wood cross tie in track construction and maintenance. Actual needs are close to 30 million ties annually and there are still about 1,800 miles of timber trestles to maintain. Track men, tie producers and wood treaters are involved in various endeavors to enhance the performance of the wood tie because the time may come when there may not be enough wood to satisfy the demand for it. Bolstering of the standard tie, wide-dowelling, glue-lamination, veneer capping and reinforcing, particle board ties, glu-lam stringers, are discussed.

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052090
WHAT BENEFITS FROM BALLAST COMPACTION?

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 2, Feb. 1974, 5 pp, Figs, Phots

An answer is sought through a research program undertaken jointly by the Federal Railroad Administration and five large railroads. A factor behind the undertaking is the reasoning that the disturbance of the ballast that takes place during a track-surfacing operation has the effect of diminishing the restraint offered by the ballast to lateral and longitudinal movement of the track.

ACKNOWLEDGEMENT:
Railway Track and Structures

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052100
AUSTRALIA HOLDS AN INTERNATIONAL CONGRESS ON SLEEPERS

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 1, Jan. 1974, 10 pp, 8 Fig, 5 Phot

Thirty papers presented in Sydney in August cover fully technical matters relating to timber sleepers against an Australian background but concrete and steel tend to figure in the presentation as equipments still in the development stage and are little discussed. Nevertheless, if the balance between prime and labour costs changes and the long-life of concrete outweighs its cost disadvantage, timber will take second place in Australia and New Zealand.

ACKNOWLEDGEMENT:
Rail Engineering International

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052120
NEW YARD CLEANER TACKLES MISSISSIPPI MUCK

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 9, Sept. 1973

Features of machine described include rubber-tired mounting, the use of electric motors for powering rotative operations and a drag chain for distributing material in car in which it is loaded.

ACKNOWLEDGEMENT:
Engineering Index, EIX731203569

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052251
INVESTIGATION OF RAILS MADE FROM CONTINUOUSLY CAST BLOOMS BY ALGOMA STEEL CORPORATION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 634, R-104, Proceeding, Oct. 1971, pp 1-43, 6 Fig, 11 Tab, 29 Phot

Eight six-foot lengths of 115-pound RE section and three electric flash butt welded specimens of two strand continuously cast blooms rolled into rail by the Algoma Steel Corporation are investigated by the Association of American Railroads Research Center. Rolling-load tests show 2,000,000 cycles of repeated load without failure, and a cradle type rolling-load test ran to completion without developing a shell. The samples met the American Railroad Engineering Association requirements of withstanding one blow of the tup during the drop tests. In the slow bend tests the samples compare favorably with data obtained for standard carbon rail. A comparison of physical properties reveals that the specimens have a slightly higher ultimate tensile strength, yield strength, reduction of area elongation than rails rolled from ingots. The results of hardness surveys, Charpy Impact tests, chemical analysis, macroscopic examinations and microscopic examinations are shown in tables.

ACKNOWLEDGEMENT:
Association of American Railroads

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052252
RAILS PRODUCED FROM STRAND CAST STEEL AT THE ALGOMA STEEL CORPORATION LIMITED

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 634, Proceeding, Oct. 1971, pp 44-60, 2 Tab, 13 Phot

Four-strand machine cast blooms used to make rails are investigated. Microstructural studies are presented in depth. Much of the discussion is concerned with abnormalities in strand cast steel compared with rail processed from ingot steel. However, these conditions occur infrequently, and are presented to give a clearer understanding of conditions that can arise. Surface defects arising from steel-making practices are almost entirely eliminated in strand-cast steel.

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Association of American Railroads

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052253
JOINT BARS-DESIGN SPECIFICATIONS AND SERVICE TESTS INCLUDING INSULATED JOINTS AND COMPROMISE JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 636, Proceeding, Feb. 1972, pp 312-337, 2 Fig, 7 Tab, 22 Phot

Various tests and application procedures of joints are discussed. Insulated joints, glued joints, web-contact joint bars, Huck fasteners, and joints with structural adhesives are studied in service tests, both in the laboratory and in field installations. The field installations are varied in location. Static stresses in rail and dynamic stresses in rail joint are studied in connection with field installations Huck fasteners. Among the conclusions are: 1)service tests of redesigned vulcabond insulated joints showed much chipping and flaking off; 2) Huck fasteners on polyurethane insulated joints were in satisfactory condition after two to twelve months installation; 3) Huck fasteners in standard head-free toeless angle bars would not satisfactorily restrain rail movement.

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Association of American Railroads

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052254
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 636, Proceeding, Feb. 1972, pp 338-394, 16 Fig, 16 Tab, 31 Phot

Part one of this report discusses a laboratory investigation of 132-pound rail made from vacuum degassed steel. The purpose of this investigation is to determine whether rails made from vacuum degassed steel and air cooled are comparable in properties with rail steel produced by currently common practices. The manufacturing process and test specimens are described. Rolling load tests, drop tests, slow bend tests, Charpy impact tests, hardness tests, and chemical analysis are performed. Macroscopic and microscopic examinations and physical property determinations are examined. The properties of vacuum degassed steel rails without controlled cooling were comparable to those manufactured by conventional techniques. Part two is a report on a field inspection of vacuum degassed steel rail on the Norfolk & Western Railway. Slight curve wear was noted in the high side rails, and slight rail wear was noted on the low side rails. No shelling or head checking was noted.

ACKNOWLEDGEMENT:
Association of American Railroads

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052256
RAIL FAILURE STATISTICS COVERING (A) ALL FAILURES (B) TRANSVERSE FISSURES (C) PERFORMANCE OF CONTROL-COOLED RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 638, Proceeding, July 1972, pp 723-740, 4 Fig, 15 Tab

This report of rail failure statistics covers all failures, transverse fissures, and performance of control-cooled rail. Mill performance with regard to service failures is discussed. Statistics for both accumulated service failures and detected number of defects are given. No additional transverse fissure failures in control-cooled rail were reported in 1971 indicating that good quality control and mill practices have been followed in the manufacture of this rail to avoid shatter cracks. The low incidence of rail failure from welded engine burns indicates that practice of welding these burns is showing good service performance. Butt weld failures are tabulated.

ACKNOWLEDGEMENT:
Association of American Railroads

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052257
TIE RENEWALS AND COSTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 73 N, 638, Proceeding, July 1972, pp 741 -75, 9 Tab

Statistics providing information on cross tie renewals and average tie costs for the year 1971 are presented. The number of concrete ties laid in replacement and in new construction are shown. Typical prices paid for wooden cross ties in the East, South, and West are given.

ACKNOWLEDGEMENT:
Association of American Railroads

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052258
INVESTIGATION OF 140 LB/YD RAIL MADE FROM VACUUM DEGASSED STEEL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 72 N, 631, R-101, Proceeding, Feb. 1971, pp 335-371, 9 Fig, 9 Tab, 20 Phot

The purpose of this investigation is to determine whether rails made from vacuum degassed steel, which is air cooled, are comparable in properties with rail steel produced by currently common practices using controlled cooling. The manufacturing process and test specimens are described. Rolling-load tests, drop tests, slow bend tests, hardness surveys, Charpy Impact tests, chemical analysis, and microscopic examinations were performed. Results and conclusions show that the properties of rails manufactured by vacuum degassed heat without controlled cooling were comparable to rails made by conventional techniques and subjected to controlled cooling.

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052259
INVESTIGATION OF SWITCH PLATE LUBRICATING MATERIALS—PROGRESS REPORT BY AAR RESEARCH CENTER

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 72 N, 631, Proceeding, Feb. 1971, pp 405-413, 1 Tab, 8 Phot

The merits of quick-drying switch plate lubricating materials are the subjects of this investigation. Testing was performed using 36 dry-type lubricants. The summary of the tests showed the lubricants tested and the qualities of each, such as drying time, average force required to throw the switch rails and the condition of the material after 15,000 cycles of switch point movement.

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Association of American Railroads

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052260
BUTT WELD FAILURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 72 N, 631, Proceeding, Feb. 1971, p 417, 1 Tab

The record of accumulated failures in the different types of butt welds from 1962 through December 31, 1969 was furnished on a voluntary basis by railroads. However, most failures were reported by a small number of railroads indicating little uniformity in reporting failure data. Absolute comparisons and total failure rates could not be derived from the data.

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052262
SOME ASPECTS OF SERVICE DEVELOPMENTS IN RAIL-HEAD METAL

Henry, RJ, Bethlehem Steel Company

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 72 N, 633, 72-733-13, Proceeding, July 1971, pp 586-599, 1 Fig, 1 Tab, 10 Phot, 4 Ref

Service developments in rail-head metal characterized by the presence of white etching regions have been studied. After the development of microstructural white-etching regions resulting from traction and adhesion conditions, spalling begins as a result of trains passing repeatedly over these hard and increasingly brittle areas. White-etching regions on a car-dumper hoop rail resulted from impact during loading and unloading of the dumper, because these areas were in contact with mating guide wheels in the normal load and unload positions of the car dumper. White-etching also results from the effects of repeated loads on the vertical face of non-end-hardened bolted rail. A rolling-contact fatigue test concludes that rail steels have longer life at lower maximum static contact stress levels than at higher stress levels.

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052263
STRESS DISTRIBUTION IN THE PERMANENT WAY DUE TO HEAVY AXLE LOADS AND HIGH SPEEDS

Eisenmann, J, Munich Technical University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 71 N, 622, 71-622-3, Proceeding, Oct. 1969, pp 24-59, 15 Fig, 13 Tab, 1 Phot

The stress distribution in the rail head near the contact surface between rail and wheel with heavy axle loads at high speeds is discussed. An experimental investigation of the stress distribution was performed. Tensile bending stresses in the rail head and rail foot, and lateral forces are discussed. In Germany a test track of prefabricated concrete slab was constructed, and the measurements taken showed that scattering of stresses in the rail foot were small and did not vary with the driving speed.

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052265
THE THERMAL ELONGATION OF RAILS ON ELASTIC MOUNTINGS

Verge, OH, Seetru Limited

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 71 N, 626, 71-626-1, Proceeding, Feb. 1970, pp 621-643, 2 Fig, 2 Tab

Elongation and contraction of rails due to temperature changes is a primary factor affecting the variation in length of rails and their associated strains and stresses. This report considers thermal elongation in conjunction with the longitudinal elasticity of rail fastenings. The sequence of longitudinal loads on elastic rail mountings and the thermal elongation involving rail creep are mathematically presented. Numerical values worked out on a study of the Delft Viaduct show that the assumption of continuous distribution of rail mounting resistance provides a workable theory by which thermal elongation of rail systems can be effectively analyzed.

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Association of American Railroads

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052266
AAR STUDIES OF BUTT WELDED RAIL JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 71 N, 626, Proceeding, Feb. 1970, pp 646-651, 1 Fig, 1 Tab, 2 Phot

The purpose of this study was to obtain a correlation between defects shown by radiographs of thermit butt welds in track and results obtained in rolling-load tests in the laboratory. Thermit welds in the Canadian National Railway and the Denver & Rio Grande Western Railroad were evaluated. The Research Center's repeated load tests did not correspond exactly to service conditions. More study is needed on the effectiveness of the radiographic examination technique in determining if thermit welds contain defects that would seriously impair their serviceability in track.

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052267
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL METHODS FOR THEIR PREVENTION

Henry, RJ, Bethlehem Steel Company

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 71 N, 626, Proceeding, Feb. 1970, pp 682-709, 16 Fig, 3 Phot, 20 Ref

This report is in two parts. Part one presents the causes of shelly spots and head checks in rail. Samples of these service defects were analyzed and then duplicated at the Association of American Railroads Research Center. Results showed that they were stress induced microstructural changes, not foreign material attributable to manufacturing practice. Part two presents a summary of the test using fully heat-treated rails and alloy rails installed on curves with shelly histories. Changes in rail design were included in this test. For fully heat-treated rails wear on the low side rails was relatively less than on the high side rails. Use of high silicon rails was also tested. Chipping was noted in both the high-silicon and regular rails where bond wires had been attached by welding.

ACKNOWLEDGEMENT:
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052270
PROTECTION OF PILE CUT-OFFS-PROTECTION OF PILING AGAINST MARINE ORGANISMS BY MEANS OTHER THAN BY PRESERVATIVES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 611, Proceeding, Jan. 1968, pp 392-399, 8 Phot

Part one of this paper discusses protection of pile cut offs. Several systems of epoxy resins were tried. General purpose adhesive with glass fabric was the most successful. Part two discusses the use of agents other than preservatives to protect pilings against marine organisms. Concrete jackets, copper-nickel sheeting, and polyvinyl chloride sheeting were the three methods employed. Difficulty in removing the concrete and the copper-nickel sheeting for inspection were the large disadvantages of these means. Polyvinyl chloride is subject to mechanical damage. It is recommended that this assignment be discontinued until there are further developments.

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052272
BALTIMORE AND OHIO RAILROAD TEST OF TREATED WOODEN CROSS TIES-GERMANTOWN TO BARNESVILLE, MD

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 612, Proceeding, Feb. 1968, pp 537-542, 36 Tab

Red Oak, White Oak, and mixed hardwood railroad ties were treated with five different preservatives, and then installed under a section of Baltimore and Ohio track. They were inspected and tested for 38 years. Although various conditions such as drainage, support, and minor derailment damage affected the results, it was concluded that the mixed hardwoods outlast the oaks from one to 12 average years.

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052273
EFFECTS OF LUBRICATION IN PREVENTING FROZEN JOINTS AND RETARDING CORROSION OF RAIL AND FASTENINGS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 612, Proceeding, Feb. 1968, pp 559-562, 1 Tab

A rail corrosion investigation showed that none of the several preservative paints applied to clean rails performed as expected, and any further inspection of these test coatings was not warrented. An evaluation of products and methods of application for rail joint lubrication and corrosion prevention concluded that the solid packing of joint bars afforded the best and longest lasting lubrication and corrosion protective qualities. A brine corrosion protection investigation revealed that no coating provided corrosion protection for the entire seven or eight year period of the test, and recommended that the coatings be applied every three years.

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052274
MODERN METHODS OF HEAT TREATING CARBON STEEL TRACKWORK AND REPAIRING SUCH TRACKWORK BY WELDING

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 612, Proceeding, Feb. 1968, pp 564-571, 1 Fig, 2 Tab, 10 Ref

A program was developed to investigate heat-treated and flame-hardened carbon steel track work, and the repair of this type of track work by welding. The tests extended over nine years on three different sets of track. They were repaired by five different welding techniques. It was concluded that fully heat-treated materials wore better than rolled steel and flame-hardened steel, and that repair by welding extended the service of this type of track material.

ACKNOWLEDGEMENT:
Association of American Railroads

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052275
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL—METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 612, Proceeding, Feb. 1968, pp 664-707, 24 Fig, 3 Tab, 4 Phot, 2 App

The information in this report on shelly spots and head checks in rail and methods for their prevention is contained in the two appendixes. Appendix 8a is concerned with the investigation of heat-treated rail and alloy-rail service test installations on curves with histories of shelling. Appendix 8b presents the laboratory investigation and results involving rolling-load and slow-bend tests. This information is presented in tables and figures.

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052278
SWITCH PLATE LUBRICATION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 68 N, 605, Proceeding, Feb. 1967, pp 361-363, 1Tab, 1 Phot

Tests of dry-type graphite lubricants are discussed as they are conducted in a switch-plate slippage machine, a portion of a switch assembly designed to evaluate the lubrication and endurance qualities of the lubricants applied to the switch plates. Graphite lubricants of various composition and formulation are submitted by various companies, and the characteristics of the lubricants, such as drying time, average force to throw the test switch and condition of the lubricant after the 15,000 cycle test, are presented. Improved or later products are compared with earlier products of the same companies.

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052279
HOLD-DOWN FASTENINGS FOR TIE PLATES, INCLUDING PADS UNDER PLATES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 68 N, 605, Proceeding, Feb. 1967, pp 363-365, 12 Ref

Information is presented regarding service tests of hold-down fastenings and tie pads on the northbound main track of the Louisville & Nashville Railroad north of London, Kentucky. Test track is selected because it provides good traffic density of approximately 20 million gross tons per year on a 4-1/2 deg curve, 0.4 miles long, and a tangent nearly 1 mile in length. All installations are made on new ties, with 24 ties per 39 ft panel. Regular investigations and laboratory tests are made. It is concluded that hold-down fastenings with the best performance relative to tie wear are superior in holding gage. Conclusions are also drawn regarding special fastenings, the usefulness of tie plates and tie pads, and the efficiency of tie wear testing machines.

ACKNOWLEDGEMENT:
Association of American Railroads

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052280
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 68 N, 605, Proceeding, Feb. 1967, pp 463-487, 3 Tab, 3 Phot, 2 App

Causes of shelly spots and head checks in rail are discussed and methods for their prevention are presented. Two phases of the project include the inspection of heat-treated rail and alloy-rail service test installation on curves with a history of shelling, and the laboratory investigation of shelling rail involving rolling-load and slow-bend tests. Field inspections are made at test installations on the Norfolk and Western, Cheseapeake and Ohio, Great Northern, and Pennsylvania Railroads. Results of the inspections are presented for each respective railway. It is concluded that the heat-treated rails show generally good results and promise considerably more service.

ACKNOWLEDGEMENT:
Association of American Railroads

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052284
EFFECT OF LUBRICATION IN PREVENTING FROZEN RAIL JOINTS AND RETARDING CORROSION OF RAIL AND FASTENINGS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 598, Proceeding, Feb. 1966, pp 414-415, 1 Tab

The effect of lubrication is investigated in preventing frozen rail joints and retarding corrosion of rail and fastenings on a five-mile service test of North Western's eastward main track, relaid with 78-ft butt-welded 115 RE rail in 1957. Four of the five miles were sprayed out-of-face; the other mile, the control, had no protection until July, 1962, when special compounds or paints were applied to some of the welds after flame cleaning and wire brushing. Applications of metal preservatives are described for each mile of test track, indicating where corrosion was minimized. It is concluded that the spray and brush coats of Texaco 55 and NO-OX-ID provide the best protection against corrosion of rail and fastenings.

ACKNOWLEDGEMENT:
Association of American Railroads

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052285
RESULTS OF ROLLING LOAD AND SLOW-BEND TESTS OF BUTT-WELDED RAIL JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 598, Proceeding, Feb. 1966, pp 428-436, 2 Fig, 2 Tab, 4 Phot

Results of 13 rolling-load and 13 slow-bend tests of butt-welded rail joints are described. The butt welded rail joints are made by the thermit (Exomet and Orgotherm process), the electric-flash and the oxyacetylene pressure butt-welding processes, and are submitted for testing to evaluate the various welding methods. Rolling-load tests are made on either use 12 in. or the 33 in. stroke rolling-load machine; slow-bend tests are made on supports 4 ft. apart with a two-point loading 6 in. on each side of the weld. Results of rolling load tests indicate that with the thermit weld orgotherm process and the thermit weld type from Exomet, Inc. a rail broke, but otherwise no failures occurred in butt-welded rail joints. Results of slow-bend tests indicate that a rail broke in each test situation, but that there was good structure in Southern Railroad's Thermit Weld (Orgotherm) specimen.

ACKNOWLEDGEMENT:
Association of American Railroads

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052286
METALLURGICAL EFFECT OF RAIL CROPPING METHODS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 598, ER-175; ER-182, Proceeding, Feb. 1966, pp 483-492, 2 Tab, 14 Phot, 2 App

Metallurgical effects of rail cropping methods are explored in an investigation of the use of an oxygen-gasoline (petrogen) cutting torch for rail cropping. To determine the detrimental effects resulting from the use of this method, three 5/8 in. rail slices, cropped with an oxygen-gasoline cutting torch, were subjected to a metallurgical microscopic examination. Observations are made concerning use of the petrogen torch for cutting rail prior to welding it into continuous strings or making closure welds, or cutting rail in track for application of joint bars. Metallurgical effects of rail cropping methods are also explored in investigation of rail cropping by the the wet abrasive cutting method using a 26 in. N.C.G. No 310 cut-off wheel. To determine the effects of using this wheel, six 1-in. slices of used 115 lb rail cut by it were subjected to metallurgical investigation. Observations are made of the martensitic structure during the oxyacetylene welding process. Recommendations include further rolling load tests and additional metallurgical work to be conducted on welded specimens and jointed sections made from rails having cementite faces and on specimens welded from rail having untempered martensitic faces.

ACKNOWLEDGEMENT:
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052287
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 598, Proceeding, Feb. 1966, pp 493-508, 4 Fig, 3 Tab, 12 Phot, 2 App

Causes of shelly spots and head checks in rail are explored and methods for their prevention are presented. Heat-treated-rail and alloy rail service test installations are inspected on curves with shelly histories, and laboratory investigations of shelly rail involving rolling-load and slow-bend tests are also made. Service test installations on the Great Northern Railway of rails rolled from continuously cast blooms, fully heat-treated rails, Columbium-treated rail, and Curvemaster rail, were inspected, and contour tracings of the rail inspected were made. Service test installations on curves are designed to study both resistance to wear and flow and resistance to shelling. Two methods presently employed in improving these properties are the addition of alloying elements and heat treating. The addition of certain alloying elements improves resistance to wear and flow but does not necessarily improve resistance to shelling. The use of other alloying elements may improve both of these properties. It is shown that rail if properly heat treated, will be improved in both of these properties. If improperly heat treated, the results are detrimental rather than beneficial.

ACKNOWLEDGEMENT:
Association of American Railroads

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052292
JOINT BARS-DESIGN, SPECIFICATIONS, SERVICE TESTS INCLUDING INSULATED JOINTS AND COMPROMISE JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 591, Proceeding, Feb. 1965, pp 470-471, 10 Ref

Design, specifications, and service tests of joint bars are conducted, including insulated joints and compromise joints. Service test installations of joint bars for 115-lb and 132-lb rail on the Chicago and North Western and the Santa Fe railways are inspected and measured. Drilling pattern for 115-lb and 132-lb rail is compared with the old AREA pattern for 112-lb and 131-lb rail sections; rail drilling for 4-hole joint bars is also tested. It is noted that all designs of joint bars are adequate throughout the service period of 16 years. It is concluded that four bolts in 36-in. joints with 9-91/8 in. spacing are adequate to hold the rail, but do not provide sufficient rail end support. Little difference appears in the performance of the current AREA bolt-hole spacing of 6-6-7 1/2 in. compared with the former 6 1/2-6 1/2-5 1/8-6 1/2-6 1/2 in. spacing.

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052293
RAIL CROPPING BY THE WET ABRASIVE WHEEL METHOD AT THE ILLINOIS CENTRAL RAILROAD RAIL WELDING PLANT

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 591, Proceeding, Feb. 1965, pp 471-478, 2 Tab, 10 Phot

Rail cropping by the wet abrasive wheel method at the Illinois Central (IC) Railroad Rail Welding plant is discussed. Installation of a production dual-head wet abrasive wheel rail cropping machine is made. To record the new method of preparing the surfaces of the rails for butt welding by the oxyacetylene pressure process, rolling-load, slow-bend and drop tests are made. Test results indicate that butt-welded rail joints produced with weld surfaces representing both the smooth-and-clean condition and the smooth-and-smudged condition performed excellently under the rolling-load tests. Best results under the slow-bend test is obtained from a rail joint with a smudged weld surface, although this type of welding surface is not recommended. It is concluded that the wet abrasive steel cutting method for rail produces the square rail ends and clean welding surfaces necessary for the oxyacetylene pressure butt-welding process.

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052294
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 591, Proceeding, Feb. 1965, pp 479-493, 1 Fig, 2 Tab, 6 Phot, 2 App

Causes of shelly spots and head checks in rail are determined, and methods for their prevention are discussed. Two phases of the investigation include the inspection of heat treated and alloy rail

service test installations on curves with shelly histories and the laboratory investigations of shelly rail involving rolling–load and slow-bend tests. The usual service test inspections are made of the fully heat-treated and alloy rail installations to corroborate the observations of previous years. Investigations featured include the service test installation of induction-hardened rail on the Great Northern Railway and on the Norfolk and Western Railway and the test installation to compare high-carbon rail with blue-end rail on the Pennsylvania Railroad. New developments in induction and flame hardening of rails to increase their resistance to shelling are also reported.

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052295
RESULTS OF ROLLING-LOAD AND SLOW-BEND TEST OF BUTT-WELDED RAIL JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66, No. 591, Proceeding, Feb. 1965, pp 514-516, 1 Fig, 2 Tab

Results of rolling-load and slow-bend tests of butt-welded rail joints are reported. Welding methods include submerged arc, thermit process, and oxyacetylene pressure process with abrasive-wheel-cut weld faces and with variations in upset pressure and Btu input. Welds with magnaflux and ultrasonic indications of defects are also included in tests. It is noted that results, particularly results of submerged arc process, represent initial work on developments needing considerable further refinement. Results on thermit welds are representative of the results obtained in previous test of such welds, except those made by the Southern Railway, which show results meeting the standards established by tests of oxyacetylene pressure butt welds and flash butt welds for the first time. Investigations of welds with magnaflux and ultrasonic indications indicate a lack of uniformity existing in judging these indications at the inspection stations.

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052297
PHYSICAL AND MECHANICAL TEST RESULTS OF RAILS AND JOINT BARS PRODUCED BY THE BASIC-OXYGEN STEEL-MAKING PROCESS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 580, Proceeding, Oct. 1963, pp 87-88, 1 Ref

This article is an abstract of report no. ER-33

Physical and mechanical test results of rails and joint bars produced by the basic-oxygen steel-making process are investigated to obtain data on open hearth steels. These data will be given consideration in accepting the basic-oxygen steel for rails and joint bars in the AREA specifications. An excerpt on basic oxygen steel making is also included to indicate the outstanding factor in the development of steel-making technology in the past decade, the steady increase in the utilization of manufactured oxygen contributing to a new steel-making concept known as the basic-oxygen process. Comparisons are made between open hearth steel and basic-oxygen steel, indicating that the basic difference is in types of furnaces employed and extent to which high-purity manufactured oxygen is used as a refining agent. Investigation of rails and joint bars is conducted using rolling-load tests and the long-stroke rolling-load machines. It is concluded that joint bars and rails produced by the two different processes and two different companies perform the same.

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052298
DESCRIPTION OF FLAME-HARDENING OF RAIL BY THE UNION PACIFIC RAILROAD, AND PHYSICAL AND METALLURGICAL TEST RESULTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 580, Proceeding, Oct. 1963, pp 88-89

This article is an abstract of report no. ER-34

The process of flame-hardening of rail is described, and physical and metallurgical test results are presented. Rolling-load, drop, and slow-bend tests are performed on the treated rail. After an 8-hour flame-hardening process, no detrimental effects occur under the rolling-load tests for shelling; rail also conforms to accepted straightness with relatively inexpensive equipment. Since a superior fully heat-treated rail is unavailable economically to the railroads, the data described indicate a usable product for a relatively low cost.

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052299
DESCRIPTION OF FLAME-HARDENING OF RAILS BY THE SANTA FE RAILWAY, AND PHYSICAL AND METALLURGICAL TEST RESULTS OF FLAME-HARDENED FLASH BUTT-WELDED RAIL JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 580, Proceeding, Oct. 1963, pp 89-90, 1 Ref

Flame hardening of rails by the Santa Fe Railway is described, and physical and metallurgical test results of flame-hardened flash butt-welded rail joints are presented. Procedures and advantages of the flame-hardening process are cited, and rolling-load, drop, and slow-bend tests are performed. It is noted that the flame-hardening process is developed using relatively simple equipment producing a surface-hardened rail, giving satisfactory service for the cost involved, and performing well on the tests given.

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052301
INSPECTION OF CONCRETE TIES, ST. LOUIS-SAN FRANCISCO RAILWAY, NEAR CABAOL, MO., JULY 9 AND 10, 1963

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 582, Proceeding, Dec. 1963, pp 266-268, 3 Tab

Inspection of concrete ties is reported on the St. Louis-San Francisco Railway, near Cabaol, Missouri, July 9 and 10, 1963. Factors analyzed include number of ties, transverse cracks between rails, transverse cracks from bolt holes, transverse cracks from grooves,

longitudinal cracks, and torque of bolts. It is noted that there is less change in the concrete tie section than with the wood tie section in the 6-month inspection period involved.

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052304
RAIL END BATTER; CAUSES AND REMEDIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 584, Proceeding, Feb. 1964, pp 552-556, 2 Tab, 4 Phot

Causes and remedies of rail end batter are discussed. Four rail joints of 131 RE section with a 0.040-in. batter are welded, using the semi-automatic wire feed method with a modified 4560 wire electrode and gas shielding eliminated. A 700 F preheat and 1100 F post heat are produced with a propane heater. Rail joints are subjected to rolling-load tests. Results are presented of rolling-load tests of four rail joint assemblies, built up with Haynes Stellite modified 4560 wire electrode. It is noted that batter ranges from 0.006 in. to 0.016 in. on joints 69 A and 69 C that ran to 5,000,000 cycles. Hardness obtained on a standard BHN tester on the parent rail metal that was work hardened and on the weld metal before and after work hardening is reported. It is noted that the trend of spalled rail ends with a BHN range of 481-564 before work hardening and 512-600 after work hardening occurs, and that the spalling occurs about 1-1/2 in. away from the rail ends where the porosity is the heaviest.

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052305
ECONOMIC VALUE OF VARIOUS SIZES OF RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 584, Proceeding, Feb. 1964, pp 557-559, 4 Tab

The economic value of various sizes of rail is presented continuing a prior study reflecting changes in the test mileage and computed to show averages for 20 years. Labor and material averages are computed to compensate for the decrease in track mileage. Fifteen year average figures for 112 lb and 20 year average figures for 131 lb rail are presented. It is concluded that the greater savings realized through the use of 131 lb rail have been in labor and cross-ties, partially due to the use of longer joint bars, larger tie plates, and greater rail rigidity.

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052307
METALLURGICAL EFFECT OF RAIL-CROPPING METHODS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 584, Proceeding, Feb. 1964, pp 573-576, 3 Tab, 3 Phot

Metallurgical effects of rail-cropping methods are compiled and presented. New 136-lb and second-hand 131-lb rail ends cut by a friction saw are investigated to determine possibilities of using the saw in the cutting of closure rails for packaged turnouts and rails to be used in the manufacture of switch points, frogs, and other products. Depth of the heat-affected zone is decreased with the thickness of cross section; there is no significant difference between the new and second-hand rail. It is determined that the heat-affected zone caused by this method is not as great as the zone caused by some of the earlier abrasive cutting methods and may not have a harmful effect even though the presence of martensitic structures is never desirable.

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052308
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAILS; METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 584, Proceeding, Feb. 1964, pp 576-605, 12 Fig, 5 Tab, 8 Phot, 2 App

Causes of shelly spots and head checks in rail are reviewed, and methods for their prevention are recommended. Data on rolling load tests of rail flame hardened for the SP, UP, and the QNS & L, rail of Japanese manufacture, hardened by the induction method, and high-silicon rail, as well as standard carbon rail, is presented. Topics discussed include results of inspections of heat-treated and alloy rail service test installations on curves with shelly histories, and shelly rail studies at the University of Illinois.

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052309
AN INVESTIGATION OF WELDING USED RAIL WITHOUT CROPPING

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 584, Proceeding, Feb. 1964, pp 637-649, 3 Fig, 4 Tab, 7 Phot

Investigation is made of welding used rail without cropping. If such a procedure, using the electric flash method, is satisfactory, economic savings of cropping the rail prior to welding and scrapping cropped rail ends would ensue. Tests are summarized, and findings discuss calculated stress range at bolt holes, effect of weld on bolt-hole stress, and relation of test conditions to track conditions. It is concluded that the electric flash pressure weld reduces fatigue strength at bolt holes and increases the possibility of a progressive fracture developing from a bolt hole. Bond-wire holes or welds on sides of butt-welded rails suggests another possibility for progressive fracture. Use of two half joints each side of the weld has no appreciable effect on fatigue strength at the bolt hole regarding development of a progressive fracture from the hole. Use of special washers with high-strength bolts is effective in removing stress concentration effect of the bolt hole, but the procedure is not practical. It is noted that the calculated range of repeated stress at bolt holes to be expected with continuous welded rail in track is so near the fatigue strength as to give little assurance that fatigue cracks would not develop at bolt holes in time.

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052312
AN INVESTIGATION OF CROPPING RAIL BY WET AND DRY ABRASIVE WHEEL METHODS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 586, Proceeding, July 1964, pp 852-864, 14 Phot

Wet and dry abrasive wheel methods are studied in an investigation of cropping rail. Wet abrasive wheel methods are used to provide sufficient amounts of cropped relay rail for an oxyacetylene pressure butt welding plant of the Illinois Central Railroad; dry methods are used to investigate the development in improved abrasive wheels and cutting methods. Metallurgical investigation concludes that the wet abrasive wheel cropping method, using fully automated equipment, is acceptable and will be followed as it is used in the welding plant. It is noted that large improvement has been made in dry abrasive wheel cropping, although the presence of martensitic structures in the thin sections of rail are not metallurgically desirable.

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052313
LENGTH OF TRANSITION SPIRALS-A REVIEW OF RESEARCH REPORT ER-37

Code, CJ, Pennsylvania Railroad

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 586, Proceeding, July 1964, pp 881-884

A review of research report ER-37 is made to discuss length of transition spirals on curves. It is noted that existing methods and formulas provide spirals of adequate length when the work is carefully done, although situations still exist where a road has neglected to reline curves to provide spirals of desirable length and where the elevation runs out on the tangent, producing an undesirable sensation on the curve. A different principle is introduced into the calculation of spiral length, the principle that lateral acceleration should vary uniformly from zero on the tangent to a maximum on the full curve, and that the rate of change of lateral acceleration should be limited rather than limiting the rate of change of elevation. Formulas are elaborated, and their use results in new line construction, reconstruction of existing line, or setting up higher speed passenger service.

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052315
BALLAST TESTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 64 N, 573, Proceeding, Oct. 1962, pp 35-38

Conductivity tests on open-hearth slag are discussed to determine if that material is satisfactory for use as railroad ballast in track-circuit territory. A series of conductivity tests are run on the open-hearth slag using a specially built 8-cu ft box with dimensions of 2x2x2ft. The box is filled with open-hearth slag, and resistance between the copper plates on opposite faces is determined by an ohmmeter. Resistance readings of open-hearth slag ballast material is compared with a ballast of acceptable conductivity. The conductivity of individual pieces of seven different ballast materials is investigated next. It is noted that considerable difference exists between the resistance of the open-hearth slag pieces and the resistance of the other types of ballast tested in the dry state. A final phase of the investigation determines resistance for a section of railroad track. It is noted again that the lowest resistance involves the thoroughly saturated condition. It is concluded that all the tests indicate that the open-hearth slag sample had higher conductivity in the dry state than any of the other ballast materials tested.

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052316
RAIL SLIPPAGE TESTS-CONCRETE TIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 64 N, 573, Proceeding, Oct. 1962, pp 39-45, 2 Tab, 6 Phot

This article is an abstract of report no. ER-22.

Tests are conducted to determine rail slippage for concrete ties, using the fastenings to check the slippage resistance anticipated in the design calculations. Test procedure is described and results are presented. It is noted that the values of rail slippage resistance for the AAR design clips for the Type E tie are generally more than the 2000 lb minimum for 5000 lb bolt tension, except those with vibration, which are only about 1000 lb. It is concluded that the measurements of rail slippage resistance obtained agrees reasonably well with those anticipated in the design of the fastening for the AAR Type E prestressed concrete tie. It is believed that a range of bolt tension between 10,000 and 5000 lb should be maintained with AAR clips until such time as service experience indicates that a change in these limits is warranted.

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052319
RAIL WEAR TESTS ON THE ST. LOUIS-SAN FRANCISCO RAILWAY

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 566, Proceeding, Oct. 1961, pp 17-25, 4 Fig, 1 Tab

Two curves on the St. Louis-San Francisco Railway were selected for rail wear tests. The section having a slightly lower rate of wear in past service was not lubricated. The other curve had a "Meco" single rail lubrication using graphite grease at the far end of its two curves. The effectiveness of the lubrication was gaged by taking rail profiles at various intervals of time. These profiles show the amount of steel worn from the heads of the rail gage. Elevation and curvature of the high rail were measured at each point where a profile was taken. Seven sets of profiles were taken of the rails undergoing the tests. The profiles show significantly less wear on the curve with the track lubricator than on the curve with no lubrication. The effectiveness of molybdenum-disulphide was tested as a rail lubricant.

Its application showed less wear rate. These service tests definitely show that track lubricators are effective and can double the life of the outer rail in the presence of heavy sanding.

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052324
SERVICE TEST OF SOLID MANGANESE STEEL CROSSING FROGS WITH PRESTRESSED CONCRETE SUPPORT VERSUS TIMBERS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 493-494

An inspection of a service installation of a prestressed concrete crossing support is presented. The crossing had been given normal maintenance during the service period. At the end of the first winter the concrete was performing much better than the timbers, with very little vertical movement during traffic. After heavy rainfall the wet subgrade condition resulted in vertical moving of timbers double that of the concrete. A concrete corner was broken off at the point of failure in one of the post-tensioning rods, but there was no evidence of further distress due to reduction of effective rods from six to five. No cause for the break was found. A record of maintenance costs was not kept.

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052325
JOINT BARS: DESIGN, SPECIFICATIONS, SERVICE TESTS, INCLUDING INSULATED JOINTS AND COMPROMISE JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 531-532, 1 Tab

Rolling-load and physical-property tests of basic-oxygen-steel joint bars, rolling-load and bend tests of three compromise joints produced by thermit welding, and a rolling-load test of an insulated joint using fiber-glass bars were investigated. Much of the work was still in progress at the time of publication. Brinell and Mechanical tests of four bars failing the rolling-load tests were tabulated and show that three of these bars were slightly harder at the top than at the bottom.

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052326
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL: METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 532-552, 2 Fig, 11 Tab, 12 Phot, 2 App

This report is presented in two appendices. Appendix 8-a covers the inspection of service tests of fully heat-treated and alloy rail installations. There are five tests of fully heat-treated rail, three of high-silicon rail, one of chrome-vanadium, and one of columbium-treated rail. The heat treatment in some locations has shown considerable value in extending rail life under shelly conditions and in resisting head flow on the low side of curves. The high silicon and low-alloy rails show a resistance to wear and shelling. The chrome-vanadium rail shows excellent performance. Appendix 8-b covers 1) rolling-load tests to produce shelling in high-silicon chrome-vanadium rail, columbium-treated rails, basic-oxygen standard carbon rails and flame-hardened rails; and 2) end-quench hardenability curves determining the quenching characteristics of some of the low-alloy rail steels. High-silicon chrome-vanadium rails rated high in rolling-load tests. End-quench hardenability curves are given for four rail steels to furnish information on the quenching characteristics of low-alloy rail steels.

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052327
ENGINEERING ASPECTS OF CURRENT RAIL SECTIONS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 553-569, 10 Fig, 1 Tab

This article is an abstract of Report No. ER-15.

This investigation of the engineering aspects of current rail sections falls into four phases. 1) Flexural Stiffness and Strength—The additional stiffness as indicated by the moment of inertia and strength as indicated by the section modulus of the 106 CF&I, 119 CF&I and 136 CF&I sections are increased approximately in proportion to the additional amount of metal provided in these sections. 2) Shape of Head Contour—Measurements indicate the rolled contour of the 115 RE and 132 RE sections fit the worn wheel contour better than the 119 CR&I and 136 CF&I sections. Better service performance as to the development of shelling is concerned can be expected from them. Narrowing of the rail head decreases the radius of hollowing of worn car wheels with resultant increase in wheel contact pressures and internal direct stresses and shearing stresses within the rail head. 3) Depth of Rail Head—Increased depth of rail head in the CF&I sections provides additional metal for vertical head wear. Measurements of actual vertical head wear as related to traffic and traffic densities indicate the present RE sections have adequate depth of head to provide a full usable life of the rail. 4) Localized Web and Fillet Stresses—Measurements indicate that upper fillet stresses in the web are reduced with the CF&I sections as compared to corresponding RE sections.

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052329
BALLAST

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 570, Proceeding, Feb. 1962, pp 593-596

The condition of asphalt-ballast and bridge-deck-treated sections on various railroads was evaluated. The treatments were over one and two years old at the time of the evaluation. Asphalt ballast treatment did not correct soft track or foul ballast conditions. The track must be up to a high standard at the time of treatment. The sections where the surface drained laterally were in better condition. Asphalt treatments appear to be of appreciable assistance in maintaining line and surface. The coverage of the ties, plates and waterproofing of open checks and splits can provide definite extension of tie life. This also holds for bridge ties and timbers. The coverage of track fittings and base of rail should be beneficial in corrosion reduction. There is also a possible increase in anchoring efficiency.

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052333
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 563, Proceeding, Feb. 1961, pp 622-634, 1 Tab, 5 Phot

This informational progress report is contained in two appendices. Appendix 8-a covers inspections of service tests of heat-treated and alloy-rail installations at 11 locations. There were five tests of heat-treated rail, three of high-silicon rail, and three of chrome-vanadium alloy rail. Heat-treated rail continues to show decided increased life over standard rail. Use of heat-treated rail on the low side of curves has increased life of rail 5 to 8 times, and on high sides 1 1/2 to 4 times. High-silicon rails have shown greater resistance to the detrimental effects of heavy wheel loads on the low side of curves than standard rails. Chrome-vanadium alloy rails show greater resistance to wear than standard rails. However, in this test the chrome-vanadium alloy steel of the composition used was unreliable. Appendix 8-b covers rolling-load tests to produce shelling in 136-lb high-silicon vanadium rails, failed shelly rails from service, and rolling-load tests to produce detail fractures from shelling. Results of tests of 115-lb columbian rail and tests of 133-lb rail single flame hardened by the Union Pacific Railroad are also reported.

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052334
SERVICE PERFORMANCE AND ECONOMICS OF 78-FT RAIL; SPECIFICATIONS FOR 78-FT RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 563, Proceeding, Feb. 1961, pp 635-638, 2 Fig

The service test of rail laid in 78-ft lengths on the Illinois Central Railroad was covered in this progress report. The prime purpose of the test was the determination of adequate arrangement of rail anchors to control rail creepage better, and to obtain an improved rail gap uniformity. Winter gaps were measured before adjustment of the gaps was made. The average of summer gaps in the two test sections was not materially changed by the adjustment of gaps in the winter, except for one rail. The joints in this rail that would not close at high temperatures, before adjustment, now have summer gaps comparable to other joints measured. The anchorage, alternate ties boxed, in the test mile will give satisfactory results with 78-ft rail provided it is laid with expansion required to have it tight at 85 deg. Because joint slippage resistance is required to keep the joints from opening too much in the winter, especially in 78-ft rail, it is important that the track bolts be retightened frequently. In proposing expansion of the use of 78-ft rail a table is provided.

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052335
RAIL DAMAGE RESULTING FROM ENGINE BURNS; PREVALENCE MEANS OF PREVENTION; REPAIRS BY WELDING

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 563, Proceeding, Feb. 1961, pp 638-639, 1 Tab

The means of prevention and repairing rail damage resulting from engine burns are discussed. Grinding off the buildup adjacent to a burn and making several grinding passes on the rail reduces the length of short burns. Efforts to clean rails to reduce or eliminate driver slip by adding a solution to cut grease indicate that the rails need to be cleaned frequently, making the cost prohibitive. Personal contact and instruction by supervisors obtained the best results for preventing engine burns. More engine burns are accumulated by steam engines than by diesel engines. The best method for repairing engine burns is welding.

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052336
SERVICE TEST OF SOLID MANGANESE STEEL CROSSING FROGS WITH PRESTRESSED CONCRETE SUPPORT VERSUS TIMBERS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 563, Proceeding, Feb. 1961, pp 653-657, 1 Fig, 2 Phot

This preliminary report discusses the service test of two test sections of prestressed concrete crossing support under a solid manganese railroad crossing. A control crossing using creosoted oak timbers supported on 11-ft longitudinal-bolted timbers under each rail is used. The design, construction, and installation of the support are presented. A discussion of stress-strain measurements is presented. The stress data had not yet been analyzed at the time of this report.

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052337
HOLD-DOWN FASTENINGS FOR TIE PLATES, INCLUDING PADS UNDER PLATES-THEIR EFFECT ON TIE WEAR

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 563, Proceeding, Feb. 1961, pp 666-669

The service test installations of hold-down fastenings and tie pads on the Louisville & Nashville Railroad and Illinois Central Railroad and tests with the tie wear machine in the engineering Laboratory at the Research Center are covered in this report. The primary purpose of conducting these tests is to determine the effectiveness and economy of various types of hold-down fastenings, tie pads, etc. as related to tie life, regaging and readzing curves. The gage of test curves is described. Tie coatings are discussed. An in service evaluation of the performance of seven brands of tie pads is presented. This test demonstrates that softwood ties should be protected with the type of pads that retain a long term seal. Tie plate penetration measurements are obtained in a 15.6 year tests of hold-down fastenings. Included in this test are creosoted pine, gum, and oak ties. Cut spikes and screw spikes with double-coil washers are used with 13-in plates and 14 3/4-in plates. There has been no maintenance of the fastenings for six years, when the screw spikes were retightened out of face with a power wrench. At that time 20 percent of the screw spikes in the pine ties were reported to be stripped. This figure has increased considerably in the section with 14 3/4-in plates.

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052340
METHODS OF RETARDING THE MECHANICAL WEAR OF TIES, INCLUDING STABILIZATION OF WOOD, AND THE SPLITTING OF CROSS AND SWITCH TIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 1-12, 2 Fig, 5 Tab, 2 Phot

This is a progress report on the study of the effectiveness of anti-splitting devices for the reduction of splitting in cross ties. Field and seasoning tests on the effectiveness of dowels, C-irons, incising, and C-irons plus incising compared to dowels and S-ironed, were made. No difference in splitting between control, S-ironed, or doweled ties could be seen in the field tests. In seasoning tests C-irons plus incising performed best. Laboratory tests of holding power showed dowels had greater holding power than any other device. In accelerated seasoning in the laboratory comparison between ties was not possible because of the widely varying degree of splitting on the control ties. Stress measurements taken showed the maximum tension load developed in the S—or C-irons was less than the 250 lbs on the portion of the iron in the vicinity of the strain gage. Maxium tension load on the dowels was 1400 lb for those driven 6 inches from the end, and 700 lbs for those driven 3 inches from the end. Crinkled C—and S-irons with a rib hold better and stay in the tie better than the flat irons without a rib. Their additional cost appears to be worthwhile.

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052341
IMPROVING THE SERVICE LIFE OF CROSS TIES—10-YEAR SUMMARY REPORT

Gill, TG, Timber Engineering Company

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 13-50, 4 Tab, 17 Phot, 45 Ref

The purpose of this research program was to study and develop methods of treating and/or modifying wood used for cross ties to produce increased service life of ties in track. Investigative field trips were made and microscopic and macroscopic evaluation was made of the samples taken. Duplication of service failure was performed in laboratory experiments. Significant chemical changes were noted in the portion of the tie adjacent to the tie plate and spikes. Deterioration of the wood in contact with iron could be substantially reduced by improving the techniques of pre-treating the wood with calcium carbonate. Combined treating and seasoning of wood for ties was evaluated. In bending tests air-dried creosoted ties had 10 to 15 percent higher stress bending values than combined seasoned and treated ties. Several designs were developed for laminated cross ties in which the computed stresses which would be developed were not greater than the strength of the potential cross tie material. Thirty-six cross tie coatings were evaluated. Experimental strengthening of the tie plate area by the use of resins and other toughening agents showed that Butvar B-76 gave the highest increase of toughness. The use of ultrasonic vibrations in increasing the treatability of refractory woods was ineffective.

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052345
SUBSTITUTES FOR WOOD TIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 408-412, 1 Fig, 2 Phot

This progress report on substitutes for wood ties includes information on ties used in European countries, progress in prestressed concrete railroad ties, and work done in the AAR Research Laboratory. Metal and reinforced concrete sleepers (ties) have been used in France. The metal sleepers gave good results with light traffic, but could not be used on high-speed and circuited tracks. Concrete ties supplementing wooden ones were advantageous because their reported service life was from 30 to 40 years. The AAR Research Laboratory used three different rail designs on standard and light-weight aggregates. Lime-rock aggregate ties could not sustain loads imposed in heavy-duty travel. Bolts extending completely through concrete ties with rail clips were the most satisfactory rail fastenings.

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052346
METHODS OF RETARDING THE MECHANICAL WEAR OF TIES INCLUDING STABILIZATION OF WOOD, AND THE SPLITTING OF CROSS AND SWITCH TIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 412-413

Work on the effectiveness of anti-splitting devices for the reduction of splitting in cross ties conducted by the AAR Research Staff was summarized. A cooperative test with the Erie Railroad was under way in which 400 ties were seasoned 18 months, treated, and put into track in July 1959. The ties, all good quality mixed red and white oak, had various devices applied to them. A control group was without devices. A schedule of work planned for 1960 was provided, and no conclusions were drawn.

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052349
BALLAST

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 715-725, 1 Tab, 8 Phot

Asphalt treatments of ballast were applied to nine different locations on the Santa Fe Railroad and to one location on the Pittsburgh & West Virginia Railway. Deficiencies of equipment were remedied, but the equipment still had only a potential of five miles per day. Quantities of both asphalt and cover for a project were dependent on the gradation and tightness of the track ballast. The finer graded materials required less. Sufficient time had not elapsed since treatment to permit a complete appraisal of the possible benefits. However, it was reported that the treatment did alleviate much of the chronic trouble spots in selected locations, and that the life of the ties appeared to be increased.

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052352
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 869-881, 1 Tab, 4 Phot, 2 App

Most of the information in this report on causes of shelly spots and head checks in rail is contained in the two appendices. Appendix 8a covers inspections of service test of heat-treated and alloy steel rail installations at five locations. There are three tests of heat-treated rail and two of high-silicon rail. Heat-treated rail in tests on the Norfolk & Western Railway continues to show increased life over standard rail. High-silicon have shown greater resistance to the detrimental effects of heavy wheel loads in the low side of curves than standard rails. Appendix 8b contains studies done at the University of Illinois. Three rolling-load tests to produce shelling in high-silicon rails, standard carbon-steel rails and 50-kg rails induction hardened in Japan are presented and discussed. Two rolling-load tests on a high-silicon rail ran 1,944,400 and 1,480,000 cycles. A standard-carbon-steel rail gave unusually long tests of 4,347,000 and 4,371,000 cycles. These specimens deformed considerably before the shelling cracks were visible on the side of the headrail. Two induction-hardened 50-kg rails from Japan gave rolling-load tests of 577,400 and 718,300 cycles.

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052353
SERVICE TESTS OF DESIGNS OF MANGANESE-STEEL CASTINGS IN CROSSINGS AT MC COOK, ILL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 934-940

This report covers the service test of the last remaining test casting in the double-track lines of the Baltimore & Ohio Chicago Terminal Railroad and the Atchison, Topeka & Santa Fe Railway at Mc Cook, Ill. The two U. S. Steel solid pedestal castings showed that the depth-hardened frog was in service 0.8 year longer and carried 56 million more gross tons of traffic than the unhardened casting. Both depth-hardened castings were in service 26 months before the first welding of the battered tread corners a compared to the 18 months for the USS unhardened casting. The greater service life of the Rampo deepened-flangeway design than that of the USS solid pedestal type castings indicates some advantages for the more flexible casting. The USS casting with rigid support of tread corners also developed the higher receiving flangeway fillet stresses. All of the test castings were those used in the end position with a height of 6 1/4 inches to match 110 RE rail and an intersection angle of 75 degrees 48 minutes.

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052354
DESIGN OF TIE PLATES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 945-948, 1 Fig, 1 Tab

The service test of the special 8-inch by 15-inch by 1-inch thick tie plates with 1 1/4 eccentricity on a 6 degree curve on the Iowa Division of the Illinois Central Railroad near Dubuque, Iowa is covered in this report. The construction consisted of four test sections of two track panels each, with 247-inch by 9-inch by 8-ft 6-inch sawed creosoted oak ties per panel. The last three sections have the 15-inch plates on the inner rail. Section one, used for controls has 13-inch plates under both rails. Initial readings of tie abrasion, gage of track, elevation and curvature of each panel were taken in October 1955. The penetration of the 13-inch plate under the outer rail is substantially greater than that of the 15-inch plate under the inner rail. Plates with lock spikes show the least abrasion. The cross level and curvature held reasonably during the life of the test. Pressure on the outer rail was much greater than anticipated. To obtain the desired results, consideration will be given to reversing the plates between the two rails to place the special plates in the outer rail.

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052355
SERVICE TESTS–PRESERVATION OF TRACK FIXTURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 955-957

Service tests of 140 RE rail with six-hole headfree bars with receiving end plugs in all joints to prevent failure of end bolts from corrosion are examined. Three methods of joint preservation were each successively applied to every third joint in each rail to have comparable brine drip for the three variations of corrosion protection around the curve. Sixty-six joints were involved in the tests. After 2.5 years of service favorable results were obtained with the RMS plastic packing applied solid except at the rail ends with brush coats of Conoco Anti-Rust compound and receiving end plugs of Texaco Plastic "H". The bolts were well protected and the only corrosion observed was at the receiving end of the bars. The 6-inch RMC Plastic end plugs in the receiving ends of the joints were effective only in that the plugs in place were protecting the end bolts. Many of the plugs had vibrated out. The material had poor retention as an end plug.

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052359
PRESTRESSED CONCRETE TIES

Magee, GM, Association of American Railroads Research Center

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, 13 pp, 2 Fig, 15 Phot

A new design of prestressed concrete ties by the AAR is the subject of this discussion. Two different types of fastenings were used with this tie to determine the type of fastening to be ultimately used. The design calls for clip bolts to be tightened to 10,000 lb. tension, which will give a good grip on the rail and prevent rail creep. Two types of tests to determine the flexural strength of the ties were performed; repeated load and static tests. The concrete tie was more securely held in the tests. In a test installation clips were used to hold the rail down. It concludes that a potential of 50-year track could be realized through the utilization of this type of prestressed concrete tie.

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052360
HIGHLIGHTS OF ASPHALT TREATMENT OF BALLAST

Hinueber, GL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, 7 pp, 8 Phot

The treatment of railroad ballast with asphalt is the subject of this presentation. Special on-track equipment was designed and constructed for the rapid, economical distribution of asphalt. Asphalt was applied to two sections of the Santa Fe Railway track. Both jobs were in excellent condition upon inspection about 1 year later. Two years later the test section was in fair condition. Various other test sections were made. Results depended on the amount of asphalt sprayed, and the type of ballast. The intent of this testing program was to collect data for evaluating this treatment under all possible conditions of climate and traffic and for all types of ballast.

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052361
WHEEL LOAD, WHEEL DIAMETER AND RAIL DAMAGE

Code, CJ, Pennsylvania Railroad

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, 8 pp, 2 Fig, 1 Phot

The dual study of wheel load, wheel diameter and rail damage is presented. It is concluded that formulas derived from earlier studies should be applied to today's situations for worn wheel on worn rail. A report on shelly rail reviews previously gathered information before discussing a recommendation that a limitation be placed on wheel loads for diesel and turbine locomotives. The recommended limit for wheel loads is 800-lb per inch of diameter. The study concludes that shelly rail stress increases in proportion to the cube root of the load; the life of the rail up until the time failure occurs decreases very sharply for any small increase in stress.

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052362
STATIC AND FATIGUE TESTS ON PRESTRESSED CONCRETE RAILWAY SLABS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 3-50, 15 Fig, 11 Tab, 11 Phot, 6 Ref

The fatigue properties of prestressed pretensioned concrete railway slabs are discussed. A theoretical study of the fatigue resistance of such members is first presented, followed by a description of laboratory tests on six beams. Test results are discussed and interpreted. The theory of fatigue failure is based on three diagrams including a failure envelope based on a limited amount of fatigue test data on prestressing strands and a diagram of the fatigue characteristics of plain concrete. The two failure envelopes are combined with curves expressing the moment-stress relationship for a given beam. The investigator is able to predict the critical loading. It is concluded that the test results check reasonably well with the critical fatigue loads predicted on the basis of the stated theory of fatigue failure.

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052366
SPECIAL REPORT ON FIELD TESTS ON CONTINOUS WELDED RAIL ON GREAT NORTHERN RAILWAY

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 642-653, 7 Fig, 2 Phot, 3 Ref

Field tests on continuous welded rail on the Great Northern Railway are reported. Early tests, instrumentation, and test methods are discussed, and test results of temperature stresses, braking tests, jackknifing tests, and bending stresses are cited. It is concluded that the maximum stress developed in the rail due to temperature, bending and braking of the train is well below the yield strength of rail steel. Buckling pressures measured due to braking were minimal.

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052369
PREVENTION OF DAMAGE RESULTING FROM BRINE DRIPPINGS ON TRACK AND STRUCTURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 793-799, 2 Tab, 11 Phot

Prevention of damage resulting from brine drippings on track and structures is discussed in an attempt to find non-toxic brine corrosion inhibitors for use in refrigerator car bunkers. Features of inhibitors for brine corrosion are cited, and tie plate corrosion resistance is also discussed. Copper bearing steel is evaluated, and rail corrosion in tunnels is investigated. It is noted that variation in concentrations of elements such as copper, nickel, and chromium contribute nothing toward increasing the resistance of the steel against liquid brine drippings.

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052370
HOLD-DOWN FASTENINGS FOR TIE PLATES, INCLUDING PADS UNDER PLATES-THEIR EFFECT ON TIE WEAR

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 800-827, 4 Fig, 4 Tab, 24 Phot

Study is made of hold-down fastenings for tie plates, including pads under plates, and their effect on tie wear is investigated, related to tie life, regaging and readzing curves. Economic factors of hold-down fastenings are also considered. Tests are conducted, and progress of test, including additions and revisions, is reported. It is noted that a number of tie pads still in use are no longer considered satisfactory for use. Topics discussed include maintenance of hold-down fastenings, gage of test curves, general inspection, tie coatings, repeated load tests of tie pads, and economic studies.

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052371
METHODS OF HEAT TREATMENT INCLUDING FLAME HARDENING OF BOLTED RAIL FROGS AND SPLIT SWITCHES TOGETHER WITH METHODS OF REPAIR BY WELDING

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 862-869, 1 Fig, 2 Tab

Study is made of methods of heat treatment and welding repair of bolted rail frogs and split switches. The flame hardening method is included. Service tests of simulated crossing units in the Milwaukee Railroad at Mannheim, Illinois, are reported, and unit maintenance, welding, rail wear, batter, and Brinell hardness are considered. Pending future appraisal, it is concluded that good results are obtained from a majority of welds.

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052372
RAIL FAILURES STATISTICS COVERING (A) ALL FAILURES (B) TRANSVERSE FISSURES (C) PERFORMANCE OF CONTROL-COOLED RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 883-902, 4 Fig, 9 Tab

Rail failures statistics are reported, considering all failures, transverse fissures, and performance of control-cooled rail. Statistics include service and detected failures reported by 62 railroads on all of their main-track railway mileage, constituting the major part of the main track in the United States and Canada. The extent of the control of the transverse fissure problem is obtained by the use of control-cooled rail and detector car testing, giving data on the quality of each year's rollings for the various mills, and showing the types of failures occurring on the various railroads as related to the mill producing the rail.

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052373
SERVICE TESTS OF VARIOUS TYPES OF JOINT BARS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 905-915, 6 Fig, 4 Tab, 2 Phot, 10 Ref

Report is made of two service tests of joint bars for 115 RE and 132 RE rail. Service test installations are described, and test data is presented. It is concluded after 10 years of service that the test sections show good performance with little difference except that the 4-hole bars show slightly more difference in the level at the 1/4-inch points of the rail ends. The long-toe bars on the Santa Fe continue to show a slight tendency toward developing cracks in the spike slits, although the progression is slow.

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052374
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 917-969, 19 Fig, 4 Tab, 19 Phot, 10 Ref

Causes of shelly spots and head checks in rail are discussed, and methods for their prevention are recommended. Topics considered include six tests of heat-treated rail, a final report of service tests of 155-lb rail on the Pennsylvania RR laid on the high side of a 6-deg curve, a University of Illinois study of rolling tests, investigation into the significance of the hydrogen level in rail steel, and report on a three-dimensional photoelastic investigation to study the internal stresses within the rail head due to wheel contact pressures.

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052375
RECENT DEVELOPMENTS AFFECTING RAIL SECTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 970-972, 1 Fig

Report is made of measurements of the actual loss in height due to wear of rail being removed from main line tangent track during 1957. Data is furnished for rail section, year rolled, approximate annual traffic density in gross tons, measured height of rail to the nearest 1/32-inch at the mid-width of the rail and away from rail end batter or wheel burns, and the loss in height of rail. Twenty railroads with annual traffic of 20 MGT or more furnish data from a measured location. It is noted that if rail head wear on main line tangent track follows the mean curve for traffic densities, then for varying traffic densities and a total rail life in its original tangent position varying from 150 to 500 MGT of traffic, the total head wear is expected to vary from 0.100 to 0.140-inch for the conditions tabulated.

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052377
STUDIES OF ANTI-SPLITTING DEVICES FOR TIES AT THE AAR RESEARCH CENTER

Sutcliffe, HM, Association of American Railroads Research Center

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, 8 pp, 3 Fig, 3 Phot

Report is made of studies of anti-splitting devices for ties at the AAR Research Center, to determine whether anti-splitting devices should be used out-of-face, selectively, or not at all, and if they are to be used, which device is best. Topics discussed include the nature of anti-splitting devices, the forces affecting anti-splitting devices, and the holding power of the devices. It is concluded that an increase in tie life of only one year will pay for the most expensive device commonly used today, and anti-splitting devices are therefore recommended, although specific types of devices and applications are pending further tests.

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052378
FIELD TESTS ON CONTINUOUS WELDED RAIL ON GREAT NORTHERN RAILWAY

Magee, GM, Association of American Railroads Research Center

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, 2 pp

Field tests are reported on continuous welded rail on the Great Northern Railway, to determine whether accumulative stresses are developed in continuous welded rail in service due to creepage forces, to determine whether high buckling forces are produced in continuous welded rail ahead of a heavily braked train, and to determine whether jackknifing action of diesel units might produce buckling in continuous welded rail in hot weather. It is noted that two series of readings did not indicate any build up of stress in the welded rail from creepage forces, but only what would be expected from the temperature effects. Buckling forces due to braking are low and would not be expected to cause buckling of track with continuous welded rail. Jacknifing tests yielded a maximum combined tensile stress of 50,400 psi, well within the yield strength of 70,000 psi for rail steel.

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052379
THE EFFECT OF FABRICATED EDGE CONDITIONS ON BRITTLE FRACTURE OF STRUCTURAL STEELS

Harris, LA, North American Aviation, Incorporated

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 245-289, 9 Fig, 6 Tab, 7 Phot

Static tensile tests were conducted on specimens of a rimmed steel and a semi-killed steel, a structural silicon steel, and a low-alloy high-tensile steel in order to determine the effects of the edge-types on the tendency toward brittle behavior. The fabricated edge conditions used included machined edges, sheared edges, flame-cut edges, and flame-cut edges subsequently flame softened. The flame-cut edges were prepared by both manual and guided flame-cutting techniques. The procedures and methods were presented, and each test was described. It was concluded from these tests that machined edges of structural quality did not impair the physical properties of structural steels. Strength and ductility of guided flame-cut edges were good except for silicon steel. With the manual flame-cutting procedure some serious impairment of the physical properties occured. Guided flame-cutting impaired the properties of silicon steel, but ductility and strength appeared restored by subsequent flame softening of the edge. The sheared edge impaired the ductility of all the steels. The greatest loss of ductility occured in the semi-killed steel where maximum strength was also reduced. This effect was alleviated by flame-softening. Only under the most damaging conditions was the edge strength at a brittle fracture as low as the yield point.

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052385
FIFTH PROGRESS REPORT OF RESEARCH PROJECT ON BALLASTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 817-825, 4 Tab

Tabulated results on four ballast materials, granite, two samples of limestone, and asphalt coated limestone are presented. Oscillator tests, Los Angeles abrasion tests and sieve analyses were performed. Auxilliary tests included specific gravity and absorption and sodium sulfate soundness. In the 10 cycle soundness tests aggregate limestone showed losses slightly in excess of the maximum allowable. Results on fines produced in the oscillator tests on both limestone specimens yielded fines that exhibited plastic properties. A new ballast test installation is described. The new test machine utilizes hydraulic jacks actuated by pulsating hydraulic pressure to provide repeated loading to the ballast section being tested. Loads up to 100,000 lb can be applied to each section at a rate of up to 400 applications per minute.

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052386
SPECIAL TYPES OF BALLAST

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 826-835, 2 Fig, 6 Phot

Observations made and data obtained from the Santa Fe Railway and the Union Pacific Railroad concerning their work in treatment of ballast and roadway sections are presented. This work was done principally for the prevention of ballast fouling and control of drifting sand. An application of asphalt and surplus oil was made to control drifting sand over the track. Penetration for both the asphalt and oil averaged 3/4 inch. Results were very satisfactory. The ballast treatment prevented fouling of the ballast and road way treatment provided a smooth surface permitting wind-blown sands to sweep across the track with very little drifting.

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052388
LABORATORY TESTS OF CONTINUOUS WELDED RAILS

Cramer, RE, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 896-904, 3 Tab, 4 Phot

Various types of continuous welded rail were submitted to laboratory testing. Rolling-load tests in 12 inch and 33 inch stroke rolling—load machines, bend tests, and mechanical tests of specimens with the welds at mid-length of the specimens were made. Some metallurgical tests and hardness tests were also made. All thermit welds failed the 12 inch stroke rolling-load test. In the 33 inch stroke test all acetylene and electric welds ran over two million cycles without failure. Two of the thermit welds developed failures in the rail heads. Rolling-load tests with the combination of bending and heavy wheel loads are the best means of laboratory evaluation of welds in rails.

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052389
SERVICE PERFORMANCE AND ECONOMICS OF 78-FT RAIL, SPECIFICATIONS FOR 78-FT RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, 18 pp, 9 Fig

Tests and measurements made on two service installations of 78-ft rail were presented. The purpose of the tests on the Chicago & North-Western and the Pennsylvania Railroad was to determine if the presence of greater joint gaps on the 78-ft rail would create an increase in cost of maintaining the remaining joints, thereby reducing benefits due to the elimination of one half of the joints. Measurements show no outstanding difference between the 78-ft rail and the 39-ft rail at the Chicago and Northwestern site. At the Pennsylvania Railroad site measurements show pull-in of 78-ft rail to be almost identical to that of 39-ft rail. Joint gap measurements on the Illinois Central reveal that rail anchorage of 22 alternate ties boxed per 78-ft rail has given a more satisfactory rail gap uniformity than in earlier tests.

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052391
DESIGN OF TIE PLATES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, 7 pp, 2 Fig, 1 Tab

This report on the design of tie plates is presented in two parts. Part one presented the evaluation of seven designs of tie plates. Tie abrasion, tie plate bending, and gage of track were the factors used to evaluate the service wear of the tie plates. The evaluation period of 13 years was not long enough to develop the advantage of longer plates. No permanent bending developed in the thinner plates. The plates with ribbed bottoms act as a retardant to gage widening, but show an increase in cutting the tie. The outer rail on the 6-degree curve is the chief maintenance problem as to wear of rail, ties and gage widening. Part two presents a final report on tie plate bending on a curve of the Illinois Central Railroad. It is concluded that the AREA plan thicknesses for plates for the 5 1/2 inch rail base is sufficient for a satisfactory service life, except where there is severe brine corrosion and heavy traffic density amounting to more than 18 million tons per year.

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052392
STUDY OF COLUMNS WITH PERFORATED COVER PLATES

White, MW, Lehigh University
Thurlimann, B, Lehigh University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 173-292, 54 Fig, 11 Tab, 24 Phot, 18 Ref, 2 App

A complete analytical and laboratory study of the strength of columns having perforated cover plates, in place of the lacing system or batten plates, is presented. Included is a complete analytical study of eccentrically and concentrically loaded columns, considering axial rigidity, bending stiffness, transverse shear, local buckling, and stress concentration due to the perforation. Detailed recommendations for the design of such columns are made, including computation of the cross-section constants, allowable column load, design of perforated plates, design against local buckling, and shape and spacing of the perforations. Also included is description and analysis of test data obtained on two full-size columns, tested to failure in the Fritz Engineering Laboratory of Lehigh University. Test results determine and compare the ultimate carrying capacity of full-size columns with perforated cover plates fabricated from two steels with different yield points, substantiate experimentally present-day design practice of such members, and make an experimental check on certain features of the analytical study of the eccentrically and concentrically loaded columns.

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052394
LIFE OF RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 359-360

Recommendations on rail life and other revisions are adopted to amend the manual regarding operating data required for a study of the economic justification of line and grade revisions. Regarding rail and fastenings, charge should be made only for that portion in excess of that used in the present operation on the basis of experience; in the absence of actual experience, anticipated rail life on a new location

under similar operating conditions may be determined with a recommended formula. Recommendations are also made for additional bridging steel, additional creosote trestles, enginehouse additions, additional or other buildings, and additional signals.

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052397
METHODS OF HEAT TREATMENT, INCLUDING FLAME HARDENING OF BOLTED RAIL FROGS AND SPLIT SWITCHES, TOGETHER WITH METHODS OF REPAIR BY WELDING

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 903-955, 2 Fig, 4 Tab, 32 Phot

Methods of heat treatment are discussed, including flame hardening of bolted rail frogs and split switches, together with methods of repair by welding. Report includes welding techniques and metallurgical examination of experimental laboratory welds, and a description of service tests of simulated crossing units at Mannheim, Illinois. Recommended welding procedures for the service test units are made. Maintenance of tread corners is investigated, and measurements of rail wear and batter, and Brinell hardness are conducted during the entire service period. It is concluded that in the flame-hardened group, the Ramapo units had the lowest average number, receiving corner batter of 57 percent of the control units. The Cleveland units of the heat-treated group had the lowest average value of receiving corner batter of 37 percent of the control units. Average increases in Brinell hardness readings due to cold rolling and work hardening of the normal rail and the tread corners are tabulated.

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052398
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL– METHODS OF THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 1026-10, 3 Fig, 4 Tab, 13 Phot, 1 App

Causes of shelly spots and head checks in rail are discussed, and methods for their prevention are recommended. Research conducted by the research staff of the Engineering Division of AAR and by the University of Illinois is reported. Inspections of service tests of heat-treated and alloy rail are made at nine locations, including five tests of heat-treated rail, two of chrome vanadium alloy, and two of high-silicon rail. The final report of heat-treated rails on the Norfolk & Western Railway reveals a very definite advantage of heat–treated rail over standard control-cooled rail, with rail life increased by 2 1/2 times in the case of shelling. Economic advantage of heat-treated rail involves a rail life 4 1/2 times that of standard rail. University of Illinois reports results of mechanical and rolling-load tests to produce shelling failure and details fractures and tests of six rails which developed detail fractures in service.

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052400
SERVICE TESTS OF SOLID AND MANGANESE STEEL INSERT CROSSINGS SUPPORTED BY STEEL T-BEAMS AND LONGITUDINAL TIMBERS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 57, Proceeding, 1956, pp 689-696, 1 Fig, 2 Phot

The purpose of this investigation was to develop an integrally welded steel T-beam type of frog support for crossings to reduce the flexural stresses in the castings and to determine its practicality under actual use in a service test. Two steel T-beam cross section supports imbedded in asphalt bound crushed rock ballast were compared to two sections having longitudinally framed crossing timbers and crushed rock ballast. One of each of the two crossings in each group was a reversible manganese insert type, and the other a solid manganese type. It is concluded that the T-beam support was strong enough to support the crossing. The steel substructure was moderately beneficial in reducing the extent of flangeway cracks in the manganese-insert type of crossing. The solid manganese crossing with steel support developed more flangeway cracks than the solid manganese supported by crossing timbers. A vertical lip welded along the edges of the T-beam flanges would greatly facilitate the retaining of the ballast under the steel plates. The plan of having the lip on the edges of the T-beams flange with graded 3/4 in. minimum stone ballast and vibratory tamping appears to be the most practical. A greatly improved design of the clamping arrangement must be provided in order to have the steel substructure and the crossing flex function as a unit.

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052401
INVESTIGATION OF FAILURES IN CONTROL COOLED RAILROAD RAILS

Cramer, RE, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 57, Proceeding, 1956, pp 787-793, 2 Tab, 3 Phot

Failures in 43 control cooled rails were investigated and tabulated. There were no transverse fissures from shatter cracks and no rails which contained shatter cracks. Five fractures from welded engine burns were examined. Three appeared to have failed from porosity at the bottom of the weld deposited metal and two apparently developed from cracks not removed before making the welds. One head and web separation failure representing 432 track failures in insulated joints was examined. It was determined that the cracks were the results of corrosion fatigue.

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052402
FOURTEENTH PROGRESS REPORT OF THE ROLLING-LOAD TEST OF JOINT BARS

Jensen, RS, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 57, Proceeding, 1956, pp 818-829, 1 Fig, 3 Tab, 7 Phot

Tests of joint bars were covered. The tests were made in three 33-in. stroke rolling machines. The criterion for bar failure was taken to be the number of cycles of loading to propagate a fatigue crack to one-half the bar height. Brinell and Rockwell B hardness readings were taken on the upper and lower fishing surfaces of all the bars before testing. Twenty-one pieces of failed bars from service were examined and tested. Eleven tests of 115 RE, headfree, 36-in. bars with ground easements averaged 1,344,100 cycles. Four of the joints ran to 2,000,000 cycles with no failures. The ground easements of 3/64-in. in depth were adequate to eliminate gouging of the bars by the rail ends. On the four bars which failed from the top surface, the cracks started outside the easements. Six tests of cast Rajo compromise joints, type 106A failed from base with small porosity visible in four of the fractures. Examination and tests of the bars which failed in service indicated that yield points for 13 bars were below specifications. All of the bars had failed from the top surface at a gouge mark caused by a rail end.

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052403
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 57, Proceeding, 1956, pp 830-857, 5 Fig, 3 Tab, 20 Phot, 1 App

Continuing investigations confirmed that heat-treated or alloy rails were effective in extending the service interval before gage corner shelling occurs in track. A description and summary of eight test installations of heat-treated and alloy rails in areas of high shelling was presented. Appendix 8-a presented the progress of shelly rail studies. Rolling-load tests of high-silicon rails and one chrome-vanadium rail were performed. Shelly rail failures from service were examined and rolling-load tests to produce detail fractures in the laboratory were performed. Detail fractures from shelling in European rails were discussed. High-silicon rails gave rolling-load tests 50 to 100 percent better than standard carbon-steel rails before developing shelling failures. Three tests of a chrome-vanadium alloy rail gave two tests over 5,000,000 cycles and one test of 1,846,000 cycles. Rolling-load tests of high-silicon rails to develop detail fractures from shelling produce failures similar to those produced in track.

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052404
RECENT DEVELOPMENTS AFFECTING RAIL SECTIONS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 57, Proceeding, 1956, pp 858-859

Recent developments affecting rail sections were discussed. Tests made at the Area Research Center of a 115-lb rail in which holes had been punched with a velocity power punch showed that the fatigue strength of the specimen was higher than that of a specimen in which the holes had been drilled. However, cracks developed in service rail on which this tool had been used. Further testing was done, and it was concluded that an improved velocity power punch must be manufactured.

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052406
CURVE WEAR WITH DIESEL LOCOMOTIVES ON THE BESSEMER AND LAKE ERIE RAILROAD

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 56, Proceeding, 1955, pp 269-281, 1 Fig, 2 Tab, 9 Phot

A series of test runs were made to obtain definite information on the amount of rail curve wear produced by diesel locomotives relative to that produced by the remainder of the train. A second series of tests was made for the purpose of relating the effectiveness of flange oilers on the locomotive and rail lubricators in the track in controlling the amount of curve wear. Instrumentation consisted of a box to catch metal abraided by diesel units from the track and a motion picture camera to photograph the passing wheel flange on the high rail. The tests show that although the rate of rail and wheel wear with a diesel unit is greater than for a heavily loaded freight car, the greater amount of rail wear is due to the train rather than the diesel units. Rail and wheel flange wear on curved track can be practically eliminated by lubrication with either flange oilers on the diesel units or rail lubricators in track, or a combination of the two.

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052408
CROSSING FROG BOLT TENSION TESTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 56, Proceeding, 1955, pp 752-818, 14 Fig, 29 Tab, 2 Phot

This investigation was made for the purpose of determining the relative characteristics of spring washers required for the economical maintenance of adequate bolt tension in crossing and turnout frog bolts. Tests were conducted to determine the loss of bolt tension as related to the rate of wear of the crossing assembly during a five year period under service conditions on six crossing frogs including the bolted-rail manganese insert, and solid managanese types and one railbound manganese turnout frog. Dynamic measurements were made of the change in bolt tension and impact in the main bolts of a main track bolted crossing in high-speed territory. Service tests involved the measurements of bolt tension loss, pull-in of the frog assembly, and nut back-off, all requiring specially designed gages. The advantage of heat-treated nuts and hardened flat plate washers as bearing surfaces for the spring washers was investigated. Results included: 1) In the bolted-rail and manganese insert types of crossings, the No. 1 position bolts lost greatest amount of tension. 2) The use of hardened parts next to single-coil spring washers was beneficial in retarding the rate of loss in bolt tension for the medium reaction washers, but not for high reaction washers.

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052409
METHODS OF HEAT TREATMENT, INCLUDING FLAME HARDENING OF BOLTED-RAIL FROGS AND SPLIT SWITCHES, TOGETHER WITH METHODS OF REPAIR BY WELDING

AREA Bulletin (American Railway Engineering Association, 59

East Van Buren Street, Chicago, Illinois, 60605)

Vol. 56, Proceeding, 1955, pp 878-888, 3 Fig, 1 Tab, 5 Phot

Information for this investigation was obtained from laboratory and field tests of welding on flame-hardened, heat-treated and control-cooled carbon steel rails and the low alloy chrome-vanadium rail for determining the best method of building up battered crossing corners and joints. Simulated crossing intersections of bolted construction, three rail type in one side of the track, were used. Brinell hardness readings and Tukon micro-hardness readings were taken in the laboratory. For taking hardness readings on the running rails in the field, a special clamp for the King tester was made of stainless steel. Further tests must be conducted to determine the best welding procedures for building up the batter on the tread corners.

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052410
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 56, Proceeding, 1955, pp 951-959, 2 Tab, 3 Phot, 1 App

Progress in the continuing study of the causes of shelly spots and head checks was reported. The performances of various installations of heat-treated and alloy-steel rail have been tabulated. Appendix 8-a presented rolling-load tests of heat-treated chrome-vanadium rail, high-silicon rails, and 140-lb. chrome-vanadium alloy rail. Examination of shelly rails from service and rolling-load tests to produce detail fractures in the laboratory were discussed. One specimen of chrome-vanadium rail, heat-treated to 490 Brinell hardness, ran 21 million cycles in a rolling-load test. Ten specimens of high-silicon rails averaged 2,307,000 cycles in rolling—load tests. Two specimens of 140-lb. chrome-vanadium alloy rail averaged 3,625,000 rolling-load cycles. Photographs of one shelling crack in a service rail indicate the crack started at a segregation streak in the rail. All rolling-load tests to produce shelling indicate that rails with higher hardness, with corresponding increase in mechanical strength, give longer laboratory rolling-load tests.

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052412
INVESTIGATION OF FATIGUE STRENGTH OF RAILROAD TIMBER BRIDGE STRINGERS

Leggett, JL, Kentucky University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 161-211, 16 Fig, 12 Tab, 6 Phot

Laboratory testing of southern pine and Douglas fir bridge stringers was reported. The work consisted of fatigue bending tests on full-size timber stringers and standard block shear tests on small clear specimens at Purdue University, and static bending tests on small clear specimens , fatigue bending tests on small clear specimens and tests on one-quarter scale specimens in Wisconsin. The timbers were to be tested in green condition, but partial seasoning had taken place. Specimens were loaded in the fatigue machine and deflection and shear distortion measurements were taken. Results of repeated loading indicate that if checking is present failure occurs in horizontal shear rather than in bending. Failures in horizontal shear were sudden and near the centroidal axis where checks are deepest. Shear failure generally originates at the end of the specimen which has the least overhang beyond its support. Fatigue bending tests on specimens subjected to center loading on a simple beam span indicate that fatigue failures in bending the green specimens always started with a compression failure near the loaded surface. Static and fatigue bending tests on one-quarter scale specimens indicate that green checked specimens usually fail in bending rather than horizontal shear after static and repeated loads. Checked dry specimens fail in horizontal shear in static loading and repeated loading.

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052417
ILLINOIS CENTRAL ASPHALT SECTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 664-671, 1 Fig, 3 Phot

The ten year old research ballast installation on the Illinois Central was discussed. The limestone ballast was sprayed with asphaltic cement of typical heavy paving material with standard penetration of 85 to 100. The application and construction were described. The nine year maintenance data were presented. This ballast section drained well; it served as a "roof" for the track and kept out dirt and cinders. Consequently, there was less pumping than on conventional track. The seal coat of asphalt and screenings was extremely beneficial in sealing checks and splits in the ties, and prolonged tie life. This section was also very effective in maintaining line. Only one general lining was required in the 10 years. Generally the track rode well, and was up to standard at all times. Maintenance was centered at the rail joints. Many joints required raising in each of the last five years. The economic life of future asphaltic ballast sections can be increased by the use of continuous welded rail.

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052418
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 828-897, 27 Fig, 5 Tab, 14 Phot, 4 App

Five service tests of rail are discussed. There are four of heat-treated rail and one of alloy rail. In the progressive study of shelly rail rolling-load tests of flame-hardened rails, high-silicon rails, and electric furnace steel rails were performed. Examination of shelly rails from service was performed. Rolling-load tests to produce detail fractures were done. The rolling-load tests indicate that stronger rail steel should give longer life before shelling develops in service. Study and testing on simulated rails indicated that plastic deformation is the major factor in shelly failure. Design changes and metallurgical changes to limit plastic deformation would improve rail life. Use of lower wheel loads, larger wheels and higher strength material is indicated. A photoelastic study of the stresses in a model of a railhead utilizing developments in three dimensional photoelasticity for a better understanding of rail shelling was presented. Plastic models of the prototype were thinly sliced and the data obtained were subjected to a field of polarized light. Processing the data was done by the shear difference method. Principal stresses and maximum shears were studied through loading tests. Principal stresses and maximum shears were found in the transverse section of the rail under the center of the wheel.

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052421
THE EFFECT OF GRIP ON THE FATIGUE STRENGTH OF RIVETED AND BOLTED JOINTS

Baron, F, Northwestern University, Evanston
Larson, E, Northwestern University, Evanston

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 1953, pp 175-190, 4 Fig, 5 Tab, 2 Phot, 5 Ref

An investigation was made to determine the effect of clamping force and length of grip in the fatigue strength of fully reversed cycles of loading. The fasteners consisted of hot-driven rivets, cold-formed cold-driven rivets, hot-formed cold driven rivets, and high strength bolts. Three lengths of grip were considered for each type of fastener. Static tension tests were conducted of joints similar to those tested in fatigue to determine the effects of the fasteners on the efficiencies and the load-slip characteristics of the joints. The investigation showed that the clamping force of a fastener was one of the most important factors affecting the fatigue strength of a joint. The fatigue strength increased with an increase in the clamping force of a fastener. The fatigue strength of the bolted joints was greater than those of the riveted joints. The fatigue strengths of joints with hot-driven rivets were usually greater than those of the joints with cold-rivets. The degree of hole filling for the cold-driven rivets was not sufficient to prevent serious slippages from occuring during the fatigue and static tension tests. The experimental efficiencies of the joints tested in static tension were about the same irrespective of the kind of fastener.

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052423
MEASUREMENT OF TIE PLATE LOADS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 1953, pp 1044-10, 1 Tab

This report covers the measurement of the tie plate loads in tangent track under both steam and diesel power. Two dynamometer tie plates were operated in tests involving measurement of rail creepage forces that are transmitted from the rail to the ties by rail anchors. Tests were made in two series of runs. Consecutive ties were uniformly supported in condition A. Adjustment of the support to permit the dynamometer tie to swing in the second series of runs was termed condition B. Several records were taken under 6-wheel and 4-wheel truck diesel and medium weight locomotives. Condition B with swinging ties resulted in an average increase in tie plate loads of 4,000 for the steam locomotives, as compared with 5,0000 with diesel locomotives. The individual tie plate loads measured under the diesels were more uniform in magnitude than for the medium weight locomotives. The steam locomotives produced higher individual tie plate loads than the diesels.

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052426
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL– METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 1953, 14 pp, 2 Tab, 4 Phot, 2 App

A summary of the performance of heat-treated rail at five installations is presented. Results of rolling-load tests for each installation was presented. The progress on shelly rail studies was presented. Rolling-load rests on heat-treated rail, three experimentally flame-hardened rails and commercially flame-hardened rails were performed. Rolling-load tests to develop detail fractures and stress relaxation tests were made. The tests of the experimentally flame-hardened rails did not compare favorably with tests of heat-treated or alloy rail. Progress in the studies of stress relaxation in rail steel and deformational behavior of rails is reported. Bending fatigue tests of rail steel specimens were run to investigate whether a subcritical thermal treatment might heal progressive fatigue damage. No beneficial effect was noted. The mechanisms involved in rolling-load failures were then studied by work with low-carbon steels sensitive to the Fry "strain-etch" technique and with silver chloride which has optical properties and metal-like mechanical behavior. More work will be done with these two materials.

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052430
TIE RENEWALS AND COSTS PER MILE OF MAINTAINED TRACK

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 338-342, 1 Tab

Information regarding the number and cost of cross ties laid in replacement in 1950 are tabulated. The average cost per tie laid in replacement as well as the total number of ties laid in replacement in the United States was approximately the same in 1950 as in 1949.

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052433
EFFECT OF LUBRICATION IN PREVENTING FROZEN RAIL JOINTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 800-837, 10 Fig, 1 Tab, 23 Phot

Rail joint lubrication service tests on the Illinois Central Railroad and the Chicago, Burlington and Quincy Railroad were covered. Various types of lubricants or rust preventatives and methods of application were tested to determine more satisfactory and lasting treatment of rail joints and to prevent stripped joints and damaging corrosion during the life of the joint bars. A description of the test installations was given. Test measurements and data were described for the Illinois Central installation. No important conclusions as to the relative effectiveness of the rust preventatives were justified for this service test of one year. It was evident that the heat in the joint

left from the rail end-hardening was detrimental to most of the sections greased with a brush coat. In tests on the Burlington rail joint gap and joint bar pull-in measurements were taken. Inspection of dismantled joints was performed. It was concluded that in general the several kinds of lubricants were not effective in reducing joint wear or pull-in to a significant amount. The greatest benefit derived from these was in the arresting of corrosion and the prevention of hard rust slabs forming in the lower rail fillets at the ends of the joint bars.

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052434
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL– METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 899-920, 2 Fig, 2 Tab, 12 Phot

A summary of the performance of five test installations of heat-treated rail was presented. Appendix 9-a presented the progress of shelly rail studies at the University of Illinois. Repeat cradle type rolling-load tests on two specimens of manganese chrome, vanadium alloy rail indicated that these rails may be several times as good as standard carbon steel rails. A test of 115-lb heat-treated standard carbon rail indicated that this type was as good as the manganese, chrome, vanadium alloy steel of the heat-treated standard carbon steel rails. An electron micrograph of nickel alloy steel showed detail in fine pearlite structure which was not revealed by a light microscope. Appendix 9-b presented a summary of progress on the investigation of stress relaxation in rail steel. The work was in two areas: 1) Relaxation of stresses in small bar specimens was studied as a function of time and temperature, and 2) rolling-load fatigue tests on small systems. Specimens cut from the top section of the rail were tested and results indicated possibly larger values of relaxation in percent of applied stress than for other specimens. Rolling-load fatigue tests produced failures that require further investigation of the effect of alleviation of damage by stress relaxing heat-treatment.

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052435
SERVICE PERFORMANCE AND ECONOMICS OF 78-FT RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 53, Proceeding, 1952, pp 942-943, 1 Tab

The service performance and economics of 78-ft rail are presented. Seventeen installations are tabulated as to length of track, weight of rail, type of traffic, annual gross tons, train speeds, type of ballast, and subgrade conditions. Labor cost of laying a 78-ft rail is comparable to that of laying 39-ft rail. Annual maintenance savings of 78-ft rail over 39-ft rail are indicated.

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052439
RAIL END BATTER; CAUSES AND REMEDIES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 629-633, 1 Fig, 1 Tab

Testing of various methods of building up rail ends by welding was explored. Nine railroads and one contract welder were invited to weld 50 joints each, using the procedures in use on their own railroads. Seven of the panels were welded by the oxyacetylene process, three panels by the d.c. electric arc process, and one panel by the a.c. electric arc process. A record was made of the net time required by the welder and helper to do the welding, and the amount of welding rod, oxygen and acetylene or gasoline used. The procedure on each panel was presented. The following conclusions were reached. 1) Satisfactory welding can be done by either the oxyacetylene or electric arc process. 2) The cost of labor and fuel is higher for the oxyacetylene process than for the electric arc. 3) The investment in equipment for the oxyacetylene process is less than that for the electric arc process. 4) The cost of reconditioning rail ends by heating and forging is nearly the same as that for building up by welding by the oxyacetylene process. 5) There is no advantage of multiflame oxyacetylene tips. 6) The rail should be preheated before electric welding. 7) Grinding produces a better surface than finishing by forging. 8) The skill of the welder is a very important factor.

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052440
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL– METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 661-679, 1 Tab, 12 Phot, 1 App

A summary of the performance of heat-treated rail in two test installations was presented. Progress on shelly rail studies at the University of Illinois was presented in appendix 10-a. Rolling-load tests of heat-treated rails, flame-hardened rails, alloy rails and head-free rails were performed. Laboratory examination of detail fractures from shelling was performed. Design and construction of a new cradle-type rolling machine was discussed. A description of the technique used to produce electron micrographs at 35,000X magnification was given. Rolling load tests continued on 132-lb heat-treated rail revealed that yield strength was increased 65 percent, tensile strength 31 percent, elongation 18 percent, reduction of area 100 percent, and endurance limit 40 percent. Results of rolling-load tests on seven rails flame-hardened different amounts on the rail treads showed four specimens failed by head and web separation cracks, and three failed by shelling. Rolling-load and physical tests on two specimens of alloy rail steel showed that these rails have physical properties which compare closely with those of heat-treated rails. Examinations of seven detail fractures from shelling revealed that the shelling cracks started longitudinally in the steel and then turned into transverse detailed fractures.

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052441
REVIEW OF JOINT BAR RESEARCH

Jensen, RS, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59

East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 835-846, 5 Fig, 1 Tab, 4 Phot

A summary of the joint bar research program at the University of Illinois was presented. The testing machine was described. Fractures from the base and top of the bars, rail fishing surface profiles, bar hardness, physical properties, decarburization, shot peening, bolt hole spacing, and cycles of failure are discussed. The results of rolling-load tests on the new RE bars for both 115-lb and 132-lb rail which show a substantial increase in fatigue life over the older bars, together with a reduction in weight, indicate that considerable improvement has been made in the design of joint bars and should afford the railroads quite a savings both in lower cost and longer life.

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052444
USE OF HIGH STRENGTH STRUCTURAL BOLTS IN STEEL RAILWAY BRIDGES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 506-540, 18 Fig, 1 Tab, 1 Phot

In order to determine if the use of high-strength bolts were practical in railroad structures, installation of over 1000 bolts of various size and lengths in about 20 different types of joints on 12 different bridges was made. It was found that bolting of joints was more economical than riveting, particularly in small or remote structures where riveting equipment is not readily available. After approximately a year of satisfactory service an inspection revealed the following points: 1) To avoid the breakage of the bolts subjected to high bending stresses it appears that the bolts should have fillets at the junction of the head and shank. 2) Bolts should not be installed in enlarged or irregular shaped holes without providing proper bearing surface for the hardened washers. 3) All the bolts in a joint should first be tightened to the approximate torque and then each individual bolt again checked for proper torque. 4) High-strength bolts properly installed stayed tight longer than rivets in similar joints subjected to the same vibrational loads. 5) High-strength bolts have a definite use in the maintenance work of railroad bridges.

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052445
CONTINUOUS WELDED RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 569-570, 3 Tab

A report on installations of continuous welded rail remaining in the track was discussed. A summary of the installations by different processes and the failures reported was presented. Short installations had been made for station platforms, road crossings and bridges. All of them have been of the gas pressure weld type, and made with one type of equipment. The performance of the gas pressure weld was excellent.

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052446
SERVICE TESTS OF VARIOUS TYPES OF JOINT BARS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 570-584, 11 Fig

Service tests on various types of joint bars were discussed. A description of two test installations each with five types of joint bars on tangent track was given. Stress measurements were made with strain gages placed at mid length of the bars in the Santa Fe 132RE test. The range of bending stresses developed under service conditions was compared with the bending stresses the joint bars were subjected to in accelerated rolling-load tests at the University of Illinois. The actual service stresses with respect to development of fatigue failure in these field tests were found to be only half as great as the range of stress in the accelerated rolling-load tests in the laboratory. To determine stress distribution along the length of the bar gages were placed at the top and bottom of the bar. Results obtained from these measurements show maximum stresses developed under diesel locomotives and under steam locomotives. An analysis on the frequency with which stresses of any given magnitude might be expected to be developed was given. The results obtained in these tests on tangent track indicate that the stresses developed in service in the head free design of joint bars for 132RE rail are well within the fatigue strength as determined by laboratory tests. It is expected that stresses will be higher on curved track.

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052447
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL— METHODS FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 595-620, 4 Fig, 4 Tab, 16 Phot, 2 App

Progress on the continuous study of shelly spots and head checks in rail was presented. Heat-treated rail tests indicate that its use extended the life of a rail before gage corner shelling occured. Appendix 10-a described studies at the University of Illinois where examinations of shelly rails from service and laboratory tests to produce shelling were performed. It was observed that the black shelly spots developed by two processes. Two rolling-load test on an alloy rail were high. Examination of the failed specimen revealed non-metallic inclusions. Rolling-load tests on heat-treated rail specimens of standard chemical analysis compared with non-heat-treated companions revealed that heat-treated specimens gave 3 to 4 times the performance of the non-heat-treated specimens. Appendix 10-b presented a summary report on the examination of rails containing detail fractures found by detector cars. The purpose was to determine if the chemistry, mechanical properties, or structures of detail fracture rails varied from those of random rails. The average chemical analyses and mechanical properties of 44 rails having detail fractures and 26 random rails were so nearly the same that no distinction between the two groups was possible. The mechanical tests included hardness, tensile properties, and impact properties. Examination of deep etched structures and microstructures of detail fracture rails indicated that the steel used was of relatively good quality.

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052448
RECENT DEVELOPMENTS AFFECTING RAIL SECTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 620-625, 1 Fig, 1 Phot

This report presented two studies in corrosion fatigue of rail web steel. Two fatigue tests with corrosion using tap water as the corrosion medium were performed. Tests from the University of Illinois showed very little reduction in the endurance limit as obtained without corrosion. Duplicate tests performed at the Pennsylvania Railroad Laboratory at Altoona, Pa. resulted in a greater reduction in the endurance limit than that of the original at the University of Illinois. It was concluded that the Altoona tap water was more corrosive than the Urbana tap water which accounted for the difference of results, and therefore,, no further modification of the corrosion procedure was done. Results of the Altoona test could readily be interpreted as corrosion fatigue due to the severity of the corrosion present during the tests. A curve concluded fatigue with and without corrosion was present. It showed that where corrosion is present it becomes a practical impossibility to so design a rail and the rail joint as to prevent failure from corrosion fatigue. In summary it was felt that sufficient proof had been offered that rail web failures in the joint do occur from corrosion fatigue, and that the fatigue life of rail web steel can be sufficiently reduced by corrosion fatigue to account for these failures.

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052449
SERVICE TESTS ON CROSSINGS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 653-660, 1 Fig, 7 Phot

Service tests of crossings were reported. A shot peened casting installed in a test corner of a crossing showed that the depth hardened running surfaces had not worn down to fit the average wheel tread three months after installation. An inspection of four crossings using manganese insert and solid manganese supported on structural steel substructure and longitudinal timbers showed that all crossings were slightly out of line in the east and west direction, and the movement had been with the traffic on the north and south tracks. The crossings were in good condition except for some batter on the castings. A new installation of a solid manganese crossing on a structural steel T-beam substructure of revised design was described. Continuing tests of crossing frog bolt tension was discussed. The installation of a test crossing on a main line location where high speed operation prevails at Warsaw, Indiana was described.

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052450
DESIGN OF TIE PLATES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 51, Proceeding, 1950, pp 664-674, 7 Fig, 2 Tab

Investigation of specially designed tie plates for use on curved track to reduce the maintenance costs of periodically re-adzing ties to restore gage and cant of rail was discussed. Results of the investigation and suggested designs of tie plates for use on curves of three degrees and over were presented. Service tests of the performance of seven tie plate designs in 131RE rail in tangent track and a six degree curve were discussed. It concluded that several more years of traffic will b required before enough tie wear has developed to justify conclusions regarding the tie plate designs studied in these tests.

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052452
STRESS MEASUREMENTS IN SEVEN DESIGNS OF TIE PLATES FOR 112-LB RE RAIL ON THE ILLINOIS CENTRAL SYSTEM

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 1-14, 14 Fig, 1 Tab

Investigations of tie plate design are made in a test installation of tie plates for 112-lb rail on the Illinois Central System in October, 1944, and for 131-lb rail on the Southern Railway System in November, 1944. Topics discussed include stress measurements in seven designs of tie plates for 112-lb RE rail on the Illinois Central System, relative vertical movement and rocking of tie plates on the ties under traffic, measurement of the magnitude and eccentricity of tie plate loads, service test data for seven designs of tie plates in 112-lb and 131-lb RE rail, and supplemental measurements of mechanical wear of ties. Periodic measurements are made. It is concluded that tie plate stress increases as the plate thickness is reduced. Test results for the flat seat and beveled crown tie plates are more favorable than those for the rolled circular crown or pressed camber plates.

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052453
RELATIVE VERTICAL MOVEMENT AND ROCKING OF TIE PLATES ON THE TIES UNDER TRAFFIC

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 14-18, 2 Fig

Study is made to determine the compression of the tie plate into the tie and the rocking action parallel with the rail of tie plates having a flat rail seat and a rolled circular crown. Rail and tie plate stress measurements are made. Test procedure is described and data discussed. It is noted that while the tie plate is loaded the amplitude of the rocking motion under the wheels of a truck is too small to cause first one sheared edge then the other to rise off the tie. Consistent patterns of tie plate rocking and vertical movement are obtained for two or more passenger cars in the same train and also for two or more runs at approximately the same speed. Results for a representative run for each of the six tie plate locations are reported. The higher values of the rocking angle and tie compression occur on tangent track with softwood ties and the highest train speed. Tie condition has more effect on the amount of rocking than does the shape of the rail seat of the tie plate. The small magnitude of the tie plate rocking for any tie plate or tie condition is of special significance.

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052454
MEASUREMENT OF THE MAGNITUDE AND ECCENTRICTY OF TIE PLATE LOADS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 18-40, 16 Fig, 3 Tab

Measurement is made of the magnitude and eccentricity of tie plate loads. A dynamometer tie plate is developed with which the tie plate loads and eccentricity of loading can be accurately determined. Topics discussed include description of the dynamometer tie plates, discussion of test procedure and data, analysis of a 4-degree test curve, tangent track, applied vertical wheel loads and position of the centroid of pressure, and vertical stresses in lower rail fillets measured over the dynamometer tie plates. It is noted that the measurement of magnitude and eccentricity of the tie plate loads would be simplified if it were possible to determine these properties from rail stress measurements above conventional tie plates which could be left undisturbed in the track.

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052455
SERVICE TEST DATA FOR SEVEN DESIGNS OF TIE PLATES IN 112-LB AND 131-LB RE RAIL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 40-49, 5 Fig, 2 Tab, 2 Phot

Service test data is reported with measurements of tie plate penetration, tie plate deflection, track gage, elevation of the curve, and the curvature of each outer rail of curves in 112-lb and 131-lb RE rail. Data on three railroads at four locations on tangent track reveals that the position of the resultant of the tie plate load is approximately 0.2 in. outward from the center line of rail base. Tie plates with 1:40 cant and 1/4 in. eccentricity would be expected to hold the gage close to standard on tangent track and plates with 3/8-in. eccentricity to cause the gage to tighten 1/16 to 1/8 in. which is unobjectionable and may have advantages.

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052459
LABORATORY TESTS OF TWO WELDED RAILS

Cramer, RE, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 510-512, 1 Fig, 1 Tab, 2 Phot

Laboratory tests of two continuous welded rails are conducted. One welded rail is tested for comparison with previous tests, placing the rail head in repeated tension, and another test is conducted with the base in repeated tension for comparison with rolling-load tests of bolted joints. Illustrations show the specimen in the testing machine and the manner of supporting the second welded joint to place the rail head in tension. Test values for several specimens in tensile and Charpy tests and for the endurance limit obtained from the fatigue specimens are reported. Test results reveal that the welds are uniform in strength and that the properties of the welds compare favorably with the strength of unwelded rail steel.

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052460
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL-MEASURES FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 534-557, 3 Fig, 2 Tab, 16 Phot, 2 App

Causes of shelly spots and head checks in rail are reported and measures for their prevention are recommended. Reports of four study groups are presented. It is noted that no definite relationships or trends exist in the relationship between chemistry and shelling, or curvature, elevations, speeds, and grades. It is found that transposing shelly high rails to the low rail, if done in time, is worthwhile. Rail slow-cold worked under traffic in nonshelling locations and relaid in shelling locations possesses very little, if any, greater resistance to shelling than ordinary rail. Studies of high carbon rail indicate that it will retard but not eliminate shelling and that it has a tendency to head check and this in turn causes gage corner flaking or minute shelling. A seven-year summary report of shelly rail investigation at the University of Illinois is presented. Also presented is a summary report on the examination of 300 shelled spots selected from the track of 11 major roads, indicating that the shelled spots were predominantly of surface origin.

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052461
COMPARISON OF WEB STRESSES IN 131-LB RE AND 140 PS -- (PENNSYLVANIA) SECTIONS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 558-566, 7 Fig, 3 Tab

Report is made of field measurement of stresses made by the Pennsylvania Railroad in 131-lb. RE and 140 PS sections of rail. The 140 rail section is designed to compensate for the inadequacy of the 131 section, and the two sections are compared. Stresses reported include the maximum stress in the web in a vertical plane occurring under a concentrated load. It is noted that in the service tests, made under conditions where rails were failing, the maximum stress is always found on the gage side of the low rail and that is where fatigue cracks develop. It is concluded from these service measurements that the laboratory basis of design of the new section is sound and that the laboratory stress measurements forecast the reduction in service stress with satisfactory accuracy.

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052462
REPORT ON SERVICE TEST OF SOLID MANGANESE CROSSINGS FROGS AT MCCOOK, ILLINOIS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 572-576, 1 Fig, 2 Phot

Service tests of solid manganese crossing frogs at McCook, Illinois, are reported. Stress measurements are covered in the flangeways and at other significant stress areas of five different designs of manganese castings placed in the crossings of the Baltimore & Ohio Chicago Terminal Railroad and the Atchinson, Topeka & Santa Fe Railway. Service tests include tests of the original design of casting by Taylor-Wharton and the Carnegie-Illinois casting. It is concluded that some of the designs included in the tests are more resistant to the development of fatigue cracks than others, but in none were the developed stresses low enough relative to the fatigue strength of the manganese steel to give the service life under heavy traffic that should be expected, and efforts to further reduce these stresses are recommended.

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052463
HOLD-DOWN FASTENINGS FOR TIE PLATES, INCLUDING ELASTIC PADS UNDER PLATES; THEIR EFFECT ON TIE WEAR

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 595-625, 8 Fig, 3 Tab, 18 Phot

Study is made of hold-down fastenings for tie plates, including elastic pads under plates, and their effect on tie wear, in an effort to extend the service life of ties and save cost. Service tests are reported to determine, from periodical measurement of tie plate penetration, track gage, curvature, cross levels and other observations, the relative effectiveness and economy of the several types of hold-down fastenings and tie pads, as to reduction in mechanical wear of ties and the maintaining of good track gage on curves. Initial gage measurements for original construction were taken in November 1974 and checked in August 1948; readings for the 1948 construction were taken on October, 1948. It is noted that when gage widening occurred, its cause was undetermined, but forthcoming tests will determine if the pads were a major contributing factor to the gage widening. Generally the gage in most test sections on the long curve held well. Tie plate penetration measurements are taken, but in many instances a tie plate does not become finally seated in one year.

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052464
RAIL ANCHORAGE FOR VARIOUS CONDITIONS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 645-647, 3 Fig

Report is made of a test with a panel of dummy track to measure the force required to move ties in the ballast with four arrangements of rail anchors. Purpose of the test is to determine the magnitude of the forces transmitted from the rail anchors to the ties that were required to move the ties in the ballast, the forces being applied by jacking the rails of a panel of track longitudinally. It is noted that the more accurate comparison of the four methods of rail anchorage occurs when the tie plates are omitted, reducing the frictional forces and eliminating the variations that could be caused in the binding action of the tie plate shoulders on the unanchored ties. Test results are chiefly of academic interest since ballast has not been compacted by traffic, but they do show the superior and the least efficient methods studied.

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052466
CROSS TIE RESEARCH IN COOPERATION BETWEEN THE ASSOCIATION OF AMERICAN RAILROADS AND THE NATIONAL LUMBER MANUFACTURERS ASSOCIATION

Belcher, RS, Atchison, Topeka and Santa Fe Railway

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 50, Proceeding, 1949, pp 734-738

Cooperative cross tie research between the Association of American Railroads and the National Lumber Manufacturers Association is reported. Objective includes the development of methods whereby the service life of ties may be increased through the reduction or prevention of mechanical wear and preventing or minimizing tie deterioration due to end splitting or checking. Economical and practical means of effectively decreasing the shrinking and swelling of wood used for construction lumber, railroad cross ties, and other wood products is sought. Causes of tie deterioration are determined, and modification and design of wood cross ties is presented. It is recommended that the method of fastening tie plate to the tie be improved.

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052468
CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL SURFACES–DEVELOP MEASURES FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 49, Proceeding, 1948, pp 434-463, 10 Fig, 5 Tab, 19 Phot, 3 App

Causes of shelly spots and head checks in rail surfaces are investigated, and preventative measures are recommended. It is found that no definite relationship exists between chemistry and shelling, and no definite trend regarding curvature, elevations, speeds and grades. Transposing shelly high rails to the low rail, if done in time, is worthwhile. Rail slow-cold worked under traffic in non-shelling locations and relaid in shelling locations possesses little resistance to shelling compared to ordinary rail. It is also found that high carbon rail does not eliminate shelling but retards it more than ordinary carbon rail; however, the high carbon rail tends to head check and in turn cause gage corner flaking or minute shelling. Reports are submitted by the Norfolk & Western, Pennsylvania, Duluth, Missabe & Iron Range, and Chesapeake & Ohio Railroads.

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052469
FOURTEENTH PROGRESS REPORT OF THE COOPERATIVE INVESTIGATION OF FAILURES IN RAILROAD RAILS IN SERVICE AND THEIR PREVENTION

Cramer, RE, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 49, Proceeding, 1948, pp 490-495, 3 Tab, 3 Phot

Conducted by the Engineering Experiment Station, University of Illinois in cooperation with the Association of American Railroads and the American Iron and Steel Institute.

Report is made of the cooperative investigation of failures in railroad rails in service and their prevention. Careful examination of transverse fissures is made. Laboratory rolling-load tests are studied to find a type of rail steel to resist shelling failures which occur in rails on curves. Work on end-hardened rails is continuing. Failed rail conditions are summarized and illustrated.

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052470
INVESTIGATE CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL SURFACES FOR THE PURPOSE OF DEVELOPING MEASURES FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 46, Proceeding, 1945, pp 643-659, 6 Fig, 3 Tab, 6 Phot

Causes of shelly spots and head checks in rail surfaces are investigated, and preventative measures are presented. Topics discussed include mill chemistry records; curvature tabulation, elevation, speeds, and grades; effect of rail lubricators, transposing rails, slow cold rolling; field tests of special rails; experience of roads having these defects; radius of gage corners of rail, tread of wheels, radius between flange and tread of wheels; relationship between wear of rail and wheel; bearing pressure of wheel on rail; cant of rail; superelevation of rail on curves; examination of service rail failures caused by these defects; rolling-load tests to produce these effects under laboratory conditions; resistance of rail steel of various composition to the development of these defects under laboratory conditions; resistance of different heat treatments of rails to the development of these defects under laboratory conditions. Progress is made but no definite solution has been found.

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052471
INVESTIGATE CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL SURFACES FOR THE PURPOSE OF DEVELOPING MEASURES FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 45, Proceeding, 1944, pp 446-469, 14 Fig, 1 Tab, 9 Phot, 2 App

Causes of shelly spots and head checks in rail surfaces are investigated to develop measures for their prevention. Topics discussed include study of rail steel compositions, heat treatments, wheel and rail contacts and pressures, mill practices, and consideration of larger diameter wheels or lighter loads on the wheels. It is cautioned that new chemistry or heat treatment may induce other types of defects or excessive expense. Study of shelling reveals no definite trend or definite conclusions. It is noted that the control cooled process will not prevent shelling. Rolling load machines and tests are discussed.

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052472
INVESTIGATE CAUSES OF SHELLY SPOTS AND HEAD CHECKS IN RAIL SURFACES FOR THE PURPOSE OF DEVELOPING MEASURES FOR THEIR PREVENTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 44, Proceeding, 1943, pp 597-610, 3 Fig, 12 Phot, 1 App

The investigation into the causes of shelly spots and head checks in rail surfaces was presented. A definition and description of shelly spots, the most serious type of rail damage, was presented. The division of the work of this subcommittee was described. Appendix A presented the shelly rail studies conducted at the University of Illinois. Laboratory studies of failed shelly rails concluded that shelling appears to be the result of cold working of the rail steel by "line contact" with car wheels. The presence of imperfections accelerated the formation of cracks. Laboratory rolling-load tests to produce shelling were performed. Different rail steel compositions were studied through rolling-load tests. The Brinell hardness of the wheel path after rolling was measured. Full sections specimens of heat-treated carbon rail were tested under rolling-load. No conclusions were reached.

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052473
NINTH PROGRESS REPORT OF THE JOINT INVESTIGATION OF FISSURES IN RAILROAD RAILS

Moore, HF, Illinois University, Urbana
Alleman, NJ, Illinois University, Urbana
Cramer, RE, Illinois University, Urbana
Jensen, RS, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 44, Proceeding, 1943, pp 611-621, 9 Fig, 2 Tab, 1 Phot

Conducted by the Engineering Experiment Station, University of Illinois in cooperation with the Association of American Railroads and the Rail Manufacturers' Technical Committee.

The information in this report of the joint investigation of fissures in rails was contained in five sections. Field tests for batter of end-hardened rails in service on the Chesapeake and Ohio Railway were performed. The summary of the batter values was tabulated. Rail ends with large cracks had approximately three times the batter of uncracked ends. Examination of end-hardened rails from the C and O test track in Carey, Ohio revealed that most damage, weeping cracks and flow of the metal over the ends and sideways, produced batter and drooping of the rail ends. Tests of mill cooling containers for rails were discussed. Examination of control-cooled and Brunorized rails which failed in service revealed that none of the control-cooled rails contained shatter cracks, but did have transverse fissures from blow holes and welded spots, horizontal split heads, detailed fractures from engine wheel burn, fatigue failures starting in the web, and detailed fractures from shelly spots. The Brunorized rails had developed transverse fissures from shatter cracks as nuclei. A comparison of drop and bend tests was summarized.

ACKNOWLEDGEMENT:
Association of American Railroads

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052474
EIGHTH PROGRESS REPORT OF THE JOINT INVESTIGATION OF FISSURES IN RAILROAD RAILS

Moore, HF, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 43, Proceeding, 1942, pp 607-640, 8 Fig, 10 Tab, 6 Phot, 1 App

Field tests for batter of end-hardened rails in service on the Chesapeake and Ohio Railroad were presented, Batter values for the leaving rails increase with the amount of traffic, whereas the values for receiving rails decrease. Laboratory tests of cracked end-hardened rails from test track revealed that a large number of the rails developed weeping cracks which will require building up by welding. The proposed recommended practive for the control cooling of railroad rails for consideration by the mills and railroads was presented. Mill tests of control cooling and mill tests to determine the temperature and manner of the growth of shatter cracks in steel rails were performed. It was concluded that shatter cracks develop gradually in size and number in shatter sensitive carbon steel rails as they are allowed to cool between the ranges of 400 and 70 degrees F. Control-cooled and Brunorized rails in service were discussed. A comparison of drop tests and bend tests on "A" rails was tabulated. A study of the drop test for rails was presented in the appendix. The force of a blow, its measurement by deflection and its measurement by measurement of the permanent elongation in the bottom fiber of the rail at mid-span were discussed.

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052475
SECOND PROGRESS REPORT-JOINT INVESTIGATION OF CONTINUOUS WELDED RAIL

Moore, HF, Illinois University, Urbana
Thomas, HR, Illinois University, Urbana
Cramer, RE, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 41, Proceeding, 1940, pp 737-755, 9 Fig, 2 Tab, 3 Phot

Progress of the investigation of continuous welded rail was presented. Five processes of welded rail joints were studied. The rolling-load testing machine was described. Rolling-load test procedure was presented. The endurance limit for welded-joint specimens was discussed. Rolling-load tests on welded joints and joints connected by joint bars were performed. Bend tests on rail joints were conducted. Hardness tests, etch tests and metallographic examinations were discussed. Mechanical tests of specimens cut from welded joints gave a measure of the quality of the metal in the joint rather than a measure of the strength of the joint as a whole. Attention was directed to the fact that this information must be amplified by appropriate tests and that service will furnish the final criterion.

ACKNOWLEDGEMENT:
Association of American Railroads

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052476
FIRST PROGRESS REPORT-JOINT INVESTIGATION OF CONTINUOUS WELDED RAIL

Moore, HF, Illinois University, Urbana
Thomas, HR, Illinois University, Urbana
Cramer, RE, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 40, Proceeding, 1939, pp 687-613, 8 Fig, 6 Tab, 6 Phot, 1 App

Progress on the investigation of continuous welded rail was reported. Data and preliminary results of 1) metallographic studies of welded joints, 2) mechanical tests of specimens cut from rail metal, weld metal and metal in the junction zone between weld and rail, 3) tests of full-size welded-joint specimens under repeated wheel load, and 4) drop tests and bend tests of full-sized specimens of welded joints. The rolling-load testing machine for subjecting rail-joint specimens to repeated wheel load was described, as the testing rig for making bend tests of full-size rail joints. Attention was directed to the fact that all results obtained were preliminary and tentative.

ACKNOWLEDGEMENT:
Association of American Railroads

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052477
DISCUSSION ON STRESSES IN RAILROAD TRACK. PART 1

Talbot, AN, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 38, Proceeding, 1937, pp 674-681, 6 Fig

A discussion of the comparison of tests on stretches of welded track under observation was presented. The purpose was to learn of the magnitude and distribution of the anchorage given between the ties and ballast at the ends of the welded stretch and along its length to resist the forces set up by chance changes in the temperature of the rail, and to learn how the influences tending to change the length and alignment are met in the track. Stress measurements were made on the web of the rail, and the temperature of the rail was taken with the open ended thermocouple and portable potentiometer. The observations were reduced by temperature corrections of gage readings and made comparable for both strains and stresses. Throughout the intermediate part of the welded stretch very little change occurred throughout the variations in summer and winter temperatures. The rails changed length through an average distance of seven rail lengths for the end portions of the rails for both the summer and winter tests. For the higher summer temperatures and lower winter temperatures the stresses may be expected to increase in proportion to the increase in change of temperature from the 63 F base. Lateral deflection of angle bars occurred when bolts were tightened. Tightening of the inner bolts in worn bars also developed lateral bending stresses in the bars. The stresses were generally compressive and the bars bend about an axis appproaching the vertical and high tensile stresses occurred on the inner flanges of the bar. These will add to the tensile bending stresses produced by wheel loads.

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Association of American Railroads

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052478
DISCUSSION ON STRESSES IN RAILROAD TRACK. PART 2

Talbot, AN, Illinois University, Urbana

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 37, Proceeding, 1936, pp 954-961, 3 Fig, 1 Phot

Observations and tests made on the stretches of welded rail of the Delaware and Hudson Railroad, one section at Albany, and two at Schenectady, were presented. The purpose of the tests was to find changes in length in rail at any place along the stretch, anchorage or restraint at any place along the length and temperature stresses set up in the rail at any place. Readings were taken with strain gages. Temperature of the rail was taken with a thermocouple and potentiometer. Summer and winter measurements were taken. All the welded stretches kept their alignment well even on curves. The longitudinal movement at the ends of the welded stretches and at points along the length due to temperature changes was small. No noticeable movement of the ties in a direction longitudinal of the track was seen. At the end of a welded stretch a tensile or compressive force of considerable magnitude may be transmitted to the adjoining rail. Variable anchorage forces developed in the summer at points due to the presence of under-crossings and viaducts. The flexural stresses developed in the rail by the loads of traffic will be superimposed on the temperature stresses and the two sets of stresses at any point in the height of the rail must be added or subtracted according to their nature.

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053844
SANTA FE MEASURES TRACK CONDITIONS WITH NEW CAR

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 6, Nov. 1973, 1 p, 3 Phot

The Santa Fe has placed in service a highly sophisticated track geometry inspection car with a combination of significant features. The car will constantly monitor and record ten different track characteristics-surface and alignment of both rails, twist, gage, superelevation, distance and speed. Data will be produced for immediate identification and also for later analysis.

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053845
SANTA FE MECHANIZES SWITCH TRACK RENEWAL FOR BETTER RIDING TRACK

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 6, Nov. 1973, 2 pp, 3 Phot

Often, an otherwise fine stretch of running track has contaminated ballast at the switches, turnouts and crossings. Santa Fe has developed and is now well into a program of ballast renewal by a production technique of mechanized undercutting. The Santa Fe's technique is geared to the performance of the Kershaw "bent-spoon" switch undercutter.

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053858
THE CONCRETE TIE: WHAT CAN BE EXPECTED FROM IT?

Weber, JW, Portland Cement Association

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 12, Dec. 1973, 2 pp, 1 Phot

Recent investigations aimed at determining the causes of service cracks in concrete ties, along with the results, are described in this article. Modifications in a proposed specification for concrete ties resulting from these and other problems are noted. Problems involved in expanding concrete-tie production capacity are explored.

ACKNOWLEDGEMENT:
Railway Track and Structures

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053860
CALCULATING MAINTENANCE PERFORMANCE—A STATISTICAL APPROACH

Grogan, GE

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 11, Nov. 1973, 4 pp, Tabs

Figures on derailments, maintenance work performed and ton-miles are combined to produce index numbers that may be used for comparative purposes.

ACKNOWLEDGEMENT:
Railway Track and Structures

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053861
A BONDED CONTINUOUS TURNOUT FOR CWR TERRITORY

Mester, GE, De Leuw, Cather and Company
Robey, RH, De Leuw, Cather and Company

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 11, Nov. 1973, 2 pp, Fig

Design developed for use on Washington's rapid transit system involves a "glued" switch insert and a standard frog modified so as to provide a greater bonding area.

ACKNOWLEDGEMENT:
Railway Track and Structures

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053876
THE TRACK GEOMETRY CAR: NEWEST TOOL OF M/W POLICY

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 3, Mar. 1974, 5 pp

Convinced that the track-measuring car is now firmly entrenched as a tool of M/W policy, and that its use will grow rapidly in coming years, RT&S editors decided to devote their third "roundtable" to a discussion of such cars. Participants consisted solely of representatives from railroads in the United States owning such cars, and the discussion dealt with every conceivable aspect of the subject that was thought to be of interest to engineers on other railroads. An expression of opinion has been obtained from the Canadian Pacific, as well as from the Quebec, North Shore and Labrador, and these are presented. The second installment will be printed in the April issue.

ACKNOWLEDGEMENT:
Railway Track and Structures

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053884
RAISING STANDARDS TO COPE WITH HEAVY MINERAL GROWTH

Nutt, WS, Queensland Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 2, Feb. 1974, 4 pp, 4 Phot

Since completion of the Mount Isa project, 1975 will see a total of 30 million tonnes hauled. Much new construction and upgrading of existing lines has been necessary to cope with this burgeoning traffic, and track standards have been raised to match increased payloads.

ACKNOWLEDGEMENT:
Railway Gazette International

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053885
BRAZIL COMPLETES UPGRADING OF FIRST EXPORT FREIGHT ROUTE

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 2, Feb. 1974, 2 pp

New government policy favours movement of all heavy freight by rail, and RFFSA is making plans for upgrading several main lines to high standards to form export corridors.

ACKNOWLEDGEMENT:
Railway Gazette International

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053978
ROLLING RESISTANCE AND TRACK

Scales, BT

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminister, London SW1, England)

Vol. 2, No. 3, May 1973, 1 pp, 1 Fig, 2 Ref

This short paper raises the question of the effect of the track structure on rolling resistance. The author points out the reduced rolling resistance of similar cars on different track structures, and suggests the heavier track structures used in America and Russia are of advantage.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

053990
SAND LAYER FOR TRACK STABILITY

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 5, Sept. 1973, 2 pp

A number of European railroads have had encouraging results with a layer of sand just below the ballast as a means of separating the ballast and also sealing it from the subgrade, thus improving track stability. This article describes the why and how of such sand layers. It also explains a unique system developed by Plasser for applying such a layer of sand on a production basis, and without removing the track.

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054281
MATISA TRACK GEOMETRY ANALYSER

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 74-77, 4 Fig

The series AV521 analyser is provided to give information for immediate action and a record for subsequent evaluation. The analyser is carried in a track recording car and comprises an analogue unit, input/output unit and a distance measuring unit. The analysis programme which is supplied with the electronic unit is described in detail.

ACKNOWLEDGEMENT:
Rail Engineering International

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054305
THE IN-TRACK TREATMENT OF THE RAIL RUNNING SURFACE ON THE NETWORK OF THE GERMAN FEDERAL RAILWAYS (DB)

Deckart, H, German Federal Railway

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

No. 7/8, Reprint, 1973, 7 pp, Figs

The running speeds of passenger trains and express goods trains have constantly increased over the last few years. Particularly on main lines, electrification has led to the use of heavy electric locomotives with high axle loads and starting accelerations. For safety, economy and riding comfort in these conditions, a good track seating is essential. The Author deals with the need for regular grinding of rail heads on railway tracks, for which purpose the German Federal

Railways have employed the "Speno" rail-grinding train since 1968. Its design, use and results obtained are described here.

ACKNOWLEDGEMENT:
Eisenbahntechnische Rundschau

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054307
PRODUCING 78-FT RAILS IN CANADA

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 4, Apr. 1974, 3 pp, 1 Phot

When existing plant in Nova Scotia was rehabilitated the rail-finishing facilities were expanded and revamped so that rails could be handled in lengths longer than that imposed by control cooling boxes. Hydrogen gas in molten steel is said to be the "culprit that causes shatter cracks," which can result in transverse fissures. The vacuum-degassing process installed in its plant by Sydney Steel Corp., is intended to reduce the hydrogen content of the steel to acceptable levels. This obviates the need to subject the rails to control cooling so that the limitation on the length of rails imposed by the control-cooling boxes is eliminated.

ACKNOWLEDGEMENT:
Railway Track and Structures

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054339
INERTIAL PROFILOMETER AS A RAIL SURFACE MEASURING INSTRUMENT

Rudd, TJ, ENSCO, Incorporated
Brandenburg, EL, ENSCO, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-102, July 1973, 9 pp, 15 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

A pair of profilometers, modified from the original design of the Electro-Motive Division of General Motors, has been built and installed on the Department of Transportation rail test car by ENSCO, Inc. The inertial profilometer system is capable of accurately measuring variations in rail surfaces of both short wavelength (a few feet) and long wavelength (a few hundred feet). In addition to its application in vehicle-dynamic simulation, the measured inertial profile can be used as a data base for extracting mid-chord (or other types of relative profile measurement) at any selected chord length. Field and laboratory tests have been conducted to evaluate the performance of the profilometers. The laboratory tests consisted of shake table tests to measure the amplitude and phase response within the frequency range of interest. These results correspond closely to the theoretical frequency response. Extensive field tests were performed on tangent, spiral, and curved track. Both manual stringline and DOT mid-chord system measurements were made on the same sections of track. The results show good agreement between the profilometer data and the accurate stringline measurements.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054346
DEVELOPMENT OF HEAVY RAIL-SECTIONS. DEVELOPMENT OF A 60 KG/M NEW RAIL-SECTION

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

D 120/RP 2/F, Report, Apr. 1973, 115 pp, 68 Fig, 12 Ref

The principles for the study of heavy rail-sections were defined in an earlier report (Report No. 1); tests were carried out on ten rail-sections weighing in the region of 60 kg, with a view to selecting the best one. Stresses under load were calculated by extensometric and photoelastic tests and then analysed using the finite element method. This method was proved to be completely valid by trial measurements. No new rail was recommended following the examination of the results; the advantages of the best designs were considered unsatisfactory in comparison with the standard UIC 60 rail.

ACKNOWLEDGEMENT:
International Union of Railways, 1273

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1273

054629
CONSOLIDATION OF THE PERMANENT WAY

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 133-136, 5 Fig, 2 Phot

Consolidation as an associated-essential of tamping is now widely accepted and extensive tests by Plasser & Theurer investigate the effectiveness of rotating an off-centre mass to impart vibration in the statically-loaded consolidating feet compared with the practice of applying constant-amplitude oscillations directly to them under similar loading conditions.

ACKNOWLEDGEMENT:
Rail Engineering International

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054631
HIGH-FREQUENCY VIBRATION AND STATIC-LOADING COMBINED TO TAMP AND CONSOLIDATE TRACK

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 146-148, 3 Fig, 3 Phot

Oscilating 'tamping-forks' straddling the sleepers are forced into the cribs to achieve a uniform ballast-bed consolidation. Tamping groups are freely-suspended to ensure consolidation build-up.

ACKNOWLEDGEMENT:
Rail Engineering International

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054649
CN PREPARES FOR INCREASED OUTPUT OF WELDED RAIL

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 1, Jan. 1973, 2 pp, 1 Phot

Modifications now completed at Canadian National's principal rail welding plant near Winnipeg will permit acceptance of 78 ft. rails, but sawn lengths of used rail down to 12 ft. can be handled after classification and inspection for defects.

ACKNOWLEDGEMENT:
British Railways, 73/9

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054658
CRISIS IN CROSSTIES: SUPPLY SQUEEZE AND NEED FOR HIGHER TRACK STANDARDS STEPS UP CONCERN ABOUT THE CROSSTIE ITSELF

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 1, Jan. 1974, pp 61-62,, 64

A crisis in crossties that occurred in 1973 gives all indication of carrying over into 1974. Shortages of wood ties in 1973 was the cause of valuable time being lost in either track maintenance or catching up on deferred maintenance. Supply squeeze and need for higher track standards steps up concern about the crosstie itself. Alternatives are considered such as concrete ties, laminated particle board ties and steel ties.

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Canadian National Railways, Headquarters Library

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054666
THE CANCER OF MAINTENANCE DEFERRAL

Myers, ET

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 3, Mar. 1974, 3 pp

During the past 20 years there has been a marked decline in the quality of tracks expecially among the bankrupt railways. On the basis of a 37-year tie life, a railroad should install 80-90 ties per mile per year. Yet in 1972 PC installed 61. The Southern Railway presently has one of the best track maintenance programs in the U.S. and one of the highest maintenance-of-way ratios (percentage of operating revenue devoted to M/W. work) at 16.9. Continuous welded rail is also an important M/W project on the Southern. These programs typify the Southern as the prosperous railway of the South, Southwest and West.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054681
SANTA FE'S WELDED RAIL PLANT AIMS AT LOW COST PRODUCTION

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 9, May 1974, pp 36-39, 1 Fig, 4 Phot

The use of continuous welded rail is producing big savings for railroads. If those savings are to be maximized, large investments are required, at least on the major roads, to provide installations and equipment that will make it possible to produce CWR from both new and secondhand rail at minimum cost. Santa Fe's new centralized rail welding plant at Amarillo, Tex., to be dedicated on May 14, provides an example of how this line of reasoning works out in practice. On about 30 acres of land alongside its main line, Santa Fe has created a double-line rail butt-welding complex designed to produce approximately five miles of butt-welded rail daily in two eight-hour shifts the year around.

ACKNOWLEDGEMENT:
Railway Age

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054688
MODERN TRACK RENEWALS

Pitkin, KJ

Permanent Way Institution, Journ & Rpt of Proceed (Derry and Sons, Limited, Canal Street, Nottingham, England)

Vol. 91, PtIII, 1973, pp 152-158

This paper deals with modern mechanised railway track renewals, and why such renewals are necessary. It also describes briefly the rapid development during recent years in modern railway track, mentioning the materials and techniques involved.

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054752
SANTA FE CENTRALIZED RAIL WELDING PLANT

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 5, May 1974, 13 pp, Figs, Phots

Four short articles describe the various features of the Santa Fe's new rail welding plant at Amarillo, Texas.

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054777
STUDY OF MATERIALS INTENDED FOR USE IN INSULATING RAIL JOINTS

BADANIA MATERIALOW PRZEZNACZONYCH NA ELEMENTY IZOLACYJNE ZTACZA SZYNOWEGO
Wroblewska, M

Przeglad Kolejowy Drogowy (Wydawnictwa Komunikacji i Lacznosci, ul Kazimierzowska 52, Warsaw 12, Poland)

No. 10, 1973, 5 pp, 3 Fig, 3 Tab, 2 Ref

The authors describe the studies carried out at the PKP Rail Research Institute in connection with the choice of suitable materials for insulated joints.

ACKNOWLEDGEMENT:
International Union of Railways, 86

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86

054778
THE SUPERSTRUCTURE OF THE PKP'S MAIN TRUCK LINE BETWEEN SILESIA AND WARSAW

NAWIERZCHNIA CENTRALNEJ MAGISTRALI PKP SLASK-WARSZAWA
Modras, K

Przeglad Kolejowy Drogowy (Wydawnictwa Komunikacji i Lacznosci, ul Kazimierzowska 52, Warsaw 12, Poland)

No. 9, 1973, 3 pp

The superstructure of this line, intended for dense heavy freight train and very high speed passenger train traffic, consists of S 60 heavy rails laid on hard-wood sleepers, broken stone ballast over a seepage layer with switches of S 60 rails so freight trains can be diverted without deceleration. The author gives details of the structures laid in the first stage of the work, the tolerances permitted for track geometry, the track acceptance criteria adopted, the equipment used and, to end, he puts forward a few proposals for more rational organisation and for steps to achieve a higher standard of work.

ACKNOWLEDGEMENT:
International Union of Railways, 54

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54

054779
TESTS ON A NEW TYPE OF CONCRETE SLEEPER

VERSUCHE MIT NEUARTIGEN BETONSCHWELLEN
Czuba, W

Die OBB in Wort und Bild (Vienna, Austria)

No. 9, 1973, 4 pp, 7 Fig

The sleeper in question is 2.4 m long with short crosswise projections on either side below the rail. The problem was to find a solution to track side-slip, especially in small radius curves, when the rails are welded in long sections. The OBB have carried out comparative tests in the laboratory and on the track with the new sleeper and with the standard concrete sleeper (BE 14) in extended 2.6 m form. Although the experiments have still to be completed, it is already clear that the stability of the new sleeper is greater. However a cost benefit analysis still has to be drawn up before the OBB can come to a decision over this sleeper.

ACKNOWLEDGEMENT:
International Union of Railways, 59

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59

054780
BALLAST

KAMENIVO KOLEJOVEHO LOZE
Holzer, M

Zeleznicni Doprava a Technika (Otakar Martinek, Hybernska 5, Prague 1, Czechoslovakia)

Vol. 3, No. 3, 1973, 9 pp, 3 Tab, 10 Ref

This is a thorough study of the problems connected with ballast. The properties of gravel and ballast criteria are examined. Grading curve, maximum and minimum cross sections, development of the so-called "harmonic" grading curve, importance of screened ballast, examination of ballast, results of studies carried out over sections of the track are discussed. Finally, a description of ballast and gravel cleaning after track relaying is given.

ACKNOWLEDGEMENT:
International Union of Railways, 63

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63

054782
THE BEHAVIOUR OF RAILS IN RELATION TO THEIR CONDITIONS OF USE

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

D 117/RP 3, Apr. 1973, 34 pp, 27 Fig, 8 Tab

The principal rail failure statistics of 5 Administrations have been analysed with a view to determining the respective influence of the different features involved in the behaviour of rails in service. Some recommendations are proposed concerning the choice of rail-section as a function of the traffic, the grade and quality of the rail steel and the construction of rail joints. The problems raised by welds in continuously welded rails, by the substructure and by the environment are also mentioned. It seems that the rail withdrawals for fatigue defects increase proportionally with the total traffic load on the one hand with the cube of the average axle-load on the other.

ACKNOWLEDGEMENT:
International Union of Railways, 33

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054783
DEVELOPMENTS IN WAYS OF FIXING RAILS TO WOODEN SLEEPERS

WEITERENTWICKLUNG DER SCHIENENBEFESTIGUNG BEI HOLZSCHWELLEN
Eisenmann, J

Die Holzschwelle (Dusseldorf, West Germany)

Vol. 68, No. 74, 1973, 20 pp, 18 Fig

The criteria for assessing rail-fixing methods are: anchorage, rail slip and torsional strength and the stresses to which the sleeper surface is subjected. The stress from the contact between the sleeper and the rail fastening can be increased by direct fixture of the rail to reduce sleeper wear. During a fatigue test, examination was made of a direct plate fixture with tightening clamp, thus making it possible to compare two different plate fastening methods. Both gave favourable results.

ACKNOWLEDGEMENT:
International Union of Railways, 60

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054944
ELASTOMERS IN RAILWAY TRACK

Usami, T

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 5 pp, 7 Fig, 1 Tab

Large volumes of elastomers are coming into use in the track structure. The so-called Ballast Mat, which is an example of elastomer applications, is intended to serve as support for crushed stone ballast in the ballasted track structure on the elevated railway. It is expected to be effective for mitigating noise and vibration as well as preventing development of heavy wheel load and deterioration of crushed stone under train speedup. Tests have been started to check the anti-vibration, anti-noise effects of prefabricated vulcanized rubber mats as attached to the bottom of concrete slabs in the ballastless slab track. Meanwhile, elastomers of another new type with various compositions using room temperature-vulcanized polyurethane rubber as the base have come to be introduced in versatile applications such as gap-adjusting fillers for the ballastless slab track and the ballastless wooden-tie track.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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054946
DEVELOPMENT AND UTILITY OF GROUT FOR A TRACK STRUCTURE WITH GROUT-FILLED BALLAST

Harada, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 3 pp

In order to reduce the track maintenance work on the existing railway lines by means of a visco-elastic material poured into the voids among ballast particles, a grout with practical value has been developed and its utility is investigated. The results reveal that a quick-hardening cement asphalt mortar employing a regulated set cement is useful for the filling grout and such a grout filling method markedly reduces the settlement of ballast while permitting large-scale work and easy corrective work for suppressing track irregularities.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056803
METHOD DEVELOPMENT FOR THE SYSTEMATIC INSPECTION AND PREVENTIVE MAINTENANCE OF RAILROAD NETWORK OF INDUSTRIAL AND TERMINAL RAILROADS

ZUR SYSTEM-ENTWICKLUNG FUER DIE PLANMAESSIGE UEBERWACHUNG UND VORBEUGENDE INSTANDHALTUNG DER GLEISNETZE VON WERKS-UND ANSCHLUSSBAHNEN

Hoehn, P Merten, R Warlich, R

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 7-8, Aug. 1973, 9 Ref

It is stressed that a fully expanded operational system for the maintenance of industrial railroad networks could become one of the examples for the setup of corresponding organizational closed-loop control systems for the more complex conditions in the field of machinery.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100234

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056828
WELDED HOLLOW STEEL TRACK TIES

GESCHWEISSTE STAHLHOHLSCHWELLEN

Schmidt, M Goetz, A

ZIS Mitteilungen (Zentralinstitut fuer Schweisstechnik der DDR, Koethener Strasse 33a, 403 Halle/Saale, East Germany)

1973, pp 1037-44, 3 Ref

Description of the development of welded hollow steel track ties as well as some test results concerning mechanical properties of several types of these ties.

ACKNOWLEDGEMENT:
Engineering Index, EIX740204830

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056832
SERVICE TESTS OF SOFTWOOD RAILWAY SLEEPERS IN NEW ZEALAND

Hedley, ME, Forest Research Institute

New Zealand Engineering (Technical Publications Limited, CPO 3047, Wellington, New Zealand)

Vol. 28, No. 8, Aug. 1973

Tabulated data are presented on details of tests established. Periodic inspections have been made to evaluate decay, splitting and mechanical wear.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100690

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056842
PERFORMANCE OF WELDED JOINTS IN RAILS

Mel'ko, YG

Welding Production (Welding Institute, Abington Hall, Abington, Cambridge CB1 6AL, England)

Vol. 20, No. 2, Feb. 1973, pp 53-55, 2 Ref

It is shown that high-carbon and chromium alloy steel joints, produced by butt welding, possess reduced resistance to impact loading in comparison with the base metal although they have otherwise excellent mechanical properties. Gas-pressure welding insures greater resistance of the joints to impact loading in comparison with resistance flash welding.

ACKNOWLEDGEMENT:
Engineering Index, EIX740301796

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056847
MAGNETIC PARTICLE AND DYE PENETRANT TECHNIQUES AS AIDS TO THE NDT OF RAILS

Banks, J

British Journal of Non-Destructive Testing (Non-Destructive Testing Society of Great Britian, Maitland House, Warror Square, Southend-On-Sea, Essex SS1 2J4, England)

Vol. 15, No. 6, Nov. 1973

A description of the methods of magnetic particle testing, magnetic ink inspection and dye penetrant tests in revealing accurately the extent of thermal cracking in the head of a severely wheelburnt rail, whether of the continuous or isolated type of burn and the examination of the running face of Thermit welded rails for surface cracking. A description is given of the use of ultrasonic methods of rail testing with these visual picture methods as a supporting aid.

ACKNOWLEDGEMENT:
Engineering Index, EIX740300900

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057177
WARNING STAFF AT WORK ON THE TRACK BY RADIO-TELEMETRY LINK

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 189-190, 3 Phot.

The Alexander Early Warning System comprising a rail-affixed detector which transmits its warning by radio link up to three miles distant to the "lookout" man is described. A device which overcomes problems of impaired visibility and obstructed vision.

ACKNOWLEDGEMENT:
Rail Engineering International

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057178
CHANGING CANT OF SLAB TRACK

Bramall, B

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, 3 pp, 4 Fig

Laying slab track introduces a permanence which poses problems when speeds are increased and cant deficiencies arise. The author examines the track geometry putting forward two approaches embodying shims and fastenings which can be changed mutually from inside to outside rails.

ACKNOWLEDGEMENT:
Rail Engineering International

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051274
LONGITUDINAL OSCILLATIONS OF NONLINEAR ONE-DIMENSIONAL SYSTEMS UNDER DISTURBANCES SPREADING ALONG THEIR LENGTHS

PRODOL'NYE KOLEBANIYA NELINEINYKH ODNOMERNYKH SISTEM PRI VOZMUSHCHENIYAKH, RASPROSTRANYAYUSHCHIKHSYA VDOL IKH DLINY

Lazaryan, VA, Academy of Sciences, Ukraine
Blokhin, EP
Belik, LV

Prikladnaya Mekhanika (Akademiya Nauk Ukrayins'kol R.S.R., Ulitsa Repina 3, Kiev, USSR)

Vol. 9, No. 6, June 1973

A system of solid bodies is considered, connected by deformable elements in a one-dimensional chain. The disturbance is propagated with constant velocity along the length of the chain. The dependence between the force and the deformation of the connecting element is assumed to be ambiguous; therefore, additional conditions are to be prescribed. A numerical solution is obtained for the case of railroad train braking. Using a digital computer, the dependence is investigated between the transient process and the initial state of the system, the number of the masses and the magnitude of the gaps in the connecting elements. A comparison with experiments shows that the mathematical model satisfactorily reflects the processes that take place in real conditions.

ACKNOWLEDGEMENT:
Engineering Index, EIX731100047

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051296
TRACK-TRAIN DYNAMICS RESEARCH PLANNING AND PROGRESS

Lind, EF Martin, GC

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-43, 1973, 12 pp, 2 Fig, 1 Tab

This paper describes the planning effort that resulted in the development of the current AAR-RPI Research Program on Train-Track Dynamics in cooperation with the FRA. The three major phases of the program are described, with particular emphasis on Phase 1 which is aimed at improvement of train handling and train make-up, and qualification of the dynamic environment.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051297
TRACK DESIGN TO REDUCE TRAIN ACTION

Corneil, ER, Queen's University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-39, 1973, 9 pp, 10 Fig, 1 Tab

In rolling country, the possibility of severe train action excited by the track profile is a constant design problem. A consideration of car energy in rolling terrain leads, in a relatively simple way, to the identification of terrain features which causes severe train action. Train action, as the rail line traverses a valley in a level or sloping plateau, is considered. Track profile design criteria can be established. The use of a power application strategy, coupled with a track profile strategy, permits a train to negotiate conditions which have, in the past, required heavy train braking and severe speed limitations to avoid severe train action.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051395
THE FRICTION DAMPER

Koffman, JL

Rail Engineering International (Broadfields (Techncial Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, p 414-420, 15 Fig

Constant-force dampers are attractive for rolling stock with small differences between loaded and empty conditions such as passenger coaches but are not for freight wagons where the tare/loaded weight ratio is high which calls for displacement-responsive damping. Friction damping and viscous-damping are mathematically compared and assessed. The author warns of pitfalls when 'scaling down'.

ACKNOWLEDGEMENT:
Rail Engineering International

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051396
IMPROVEMENT OF WHEEL-RAIL ADHESION

Andrews, HI

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, pp 710-413

Positive identification of "secondary conditioning" by electron microscope and further investigations relating to the elimination of oily conditions round the oxide particles formed, together with a study of the effects of applying fluids to the rail surface, offer increasing practicalities to overcoming wheel-slip induced by rail surface conditions. Trials with esters ejected by commercially-manufactured rail mounted applicators showed favourable results and this system is considered the most practical after consideration of other techniques which have shown promise under laboratory conditions.

ACKNOWLEDGEMENT:
Rail Engineering International

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051407
TRANSIT CAR RIDE QUALITY: PREDICTION, TEST AND IMPROVEMENT

Rinehart, RE, General Electric Company
Roach, RE, Jr, General Electric Company
Bain, JA, General Electric Company
Croshaw, PF, General Electric Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-76, Paper, Sept. 1973, 20 pp, 17 Fig, 1 Tab, 8 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Techniques for evaluating rail car vibratory accelerations against various forms of ride quality criteria are discussed. The development of a computer program to predict these vibratory accelerations is described, and the results obtained from the program are validated by comparison with field test data and data obtained from laboratory vibration tests on a full-scale truck. An active suspension concept to improve ride quality is described, and laboratory test results of several candidate active suspension systems are presented.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051536
APPLICATION OF GUIDEWAY ROUGHNESS POWER SPECTRAL DENSITY AS A MANAGEMENT TOOL

Corbin, JC, ENSCO, Incorporated
Yang, TL, ENSCO, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-114, Paper, Sept. 1973, 8 pp, 3 Fig, 11 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Ground surface vehicles such as trucks or railway cars can be considered as mechanical systems suspended on vibrating wheels. The source of vibrational energy is the roughness in the roadway or the guideway. A portion of the vibrational energy is transmitted through the vehicle suspension system and to the passengers or lading inside the vehicle. The magnitude of the transmitted energy and its frequency content depend on the roughness of the surface, the speed of the vehicle, and the mechanical characteristics of the suspension system. If the roads and guideways are categorized by the Power Spectral Density (PSD) of their surface roughness, the amount of vibrational energy can be predicted if the speed and the characteristics of the vehicle suspension system are known. Conversely, if a safe limit of the vibration has been established for a particular lading, management can render a cost effective decision on guideway maintenance, speed practices, and vehicle design from knowledge of the PSD characteristics of a proposed route.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051904
ABBREVIATED REPORT ON FREE LATERAL OSCILLATIONS IN LONG FREIGHT TRAINS

Blader, FB Kurtz, EF

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada

#73-2, Feb. 1973

This report is an abbreviated form of a full report which has been prepared describing a study of lateral vibrations in long freight trains. A mathematical model for investigating the dynamic stability of cars in long freight trains was developed which takes into account the effects of coupler forces. The model was used to investigate the stability characteristics of a specific three-container car employed by Canadian National Railways for which dynamic stability data is available, and the model was able to predict the behavior of this car accurately. Groups containing up to sixteen cars were investigated, and the results indicate that the range of train velocities for which a long freight train will exhibit stable behavior can apparently be determined with satisfactory accuracy by consideration of individual cars free of coupling forces. The model includes the effects of creep and spin forces at the rail-wheel interface, spin forces being found to have an important effect on the determination of dynamic behavior. The lozenge stiffness of freight-car trucks was shown to be an important parameter with regards to dynamic stability. It is possible to define an optimum value of lozenge stiffness for which freight trucks of the type used in North America would be stable for all speeds of interest for freight trains. More importantly, this optimum value would also result in a well damped response of freight trucks to track irregularities in nominally straight track.

ACKNOWLEDGEMENT:
Canadian Institute of Guided Ground Transport

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Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: Req Price

051916
STABILITY OF HIGH SPEED TRAINS

Wickens, AH

Physics in Technology (American Institute of Physics, 335 East 45th Street, New York, New York, 10017)

Vol. 4, No. 1, 1973, 17 pp

Recent developments in the understanding of the lateral dynamics of railway vehicles are reviewed with particular reference to the problems of dynamic stability, guidance and response to track features. The emphasis is placed on the physical models used and the broad conclusions they lead to, rather than the engineering design that represents the practical applications of the subject.

ACKNOWLEDGEMENT:
British Railways, 29806

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051917
LOCOMOTIVE AXLE LOADS: THE EFFECT OF THE UNSPRUNG MASS

Koffman, JL

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 9, Sept. 1973, 5 pp

The evaluation of the results of tests carried out by British Railways to determine the magnitude of dynamic loads encountered at railjoints has shown that the effect of the unsprung mass is of fundamental importance. The permanent way characteristics, with particular reference to elasticity and railjoint angles are also of considerable importance as far as the dynamic wheelloads are concerned. Even when railjoints disappear consideration will have to be given to points and crossings. It will be necessary for both vehicle designers and permanent way engineers to concentrate on damping dynamic wheelloads with acceptable limits. The appreciation of the factors concerned should aid the development of freight locomotives with higher axleloads which should be of considerable allround economic benefit.

ACKNOWLEDGEMENT:
British Railways, 29786

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051938
TRACK/TRAIN DYNAMICS: A PROGRESS REPORT

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box, Bristol, Connecticut, 06010)

Vol. 174, No. 2, Feb. 1973, 2 pp, 1 Tab

The Federal Railroad Administration, the Railway Progress Institute, the Association of American Railroads, a few RPI members and a handful of railroads are participating in a multi-phase study of the interaction of track and train. The program, which is divided into three phases, is expected to take ten years to complete. In Phase I, a two-year project started in mid-July 1972, the emphasis is on train handling and train makeup and their effects on the wheel-rail relationship. Phase II, dealing with specifications for track, rolling stock and components, will follow and will last three years. The final five-year phase will deal with employment of advanced technology to achieve the ultimate goal of safer, more reliable rail transportation.

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051964
STRESSES TO WHICH THE TRACK, THE BALLAST, AND THE SUBGRADE ARE SUBJECT, UNDER THE ACTION OF MOVING LOADS

SOLLICITATIONS DE LA VOIE, DU BALLAST ET DE LA PLATE-FORME SOUS L'ACTION DES CHARGES ROULANTES.

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

May 1973, 11 pp, 5 Fig

The above article contains a synthesis of the research carried out by ORE D 71 Committee. Details are shown, in a condensed form, of the partial results set out in the 12 reports prepared by that Committee. So far as concerns research into the stresses to which the fastenings and sleepers are subjected, additional information is provided, showing the present concerning the studies carried out by the SNCF, after the general report had been drawn up. Progress effected in the field of the extensometric technique enables certain pressures to be more clearly established, and the use to be avoided of corrective coefficients, or empirical formulae, for the study of the rheological characteristics of the ballast and the subgrade. These investigations are carried out within the framework of research into the interaction between the track and the vehicle, and the optimum equipment of the conventional track.

ACKNOWLEDGEMENT:
International Union of Railways, 1017

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052261
WHEEL AND RAIL LOADINGS FROM DIESEL LOCOMOTIVES

Koci, LF, General Motors Corporation

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 72 N, 633, Proceeding, July 1971, pp 500-528, 6 Fig, 22 Tab

A review of wheel and rail loadings from diesel locomotives is presented in six areas: 1) sample derailment data, 2) basic curve negotiation mechanics, 3) experimentally determined wheel-to-rail forces, 4) rail profile data, 5) the effect of dynamic brake levels, and 6) mechanical considerations. In summarizing all of these factors the following areas deserve the most attention: 1) locomotive braking practice with regard to delay in power to brake transfer, gradual buildup of braking level and control of braking level over crossovers, turnouts, and curves; 2) track in relation to gage widening, level of rail irregularities, and possible thermal strain investigations; and 3) mechanical factors including proper alignment control in draft gears, and proper bolster stops on units without alignment control.

ACKNOWLEDGEMENT:
Association of American Railroads

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052300
LENGTH OF RAILWAY TRANSITION SPIRAL-ANALYSIS AND RUNNING TESTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 580, Proceeding, Oct. 1963, pp 91-129, 13 Fig, 8 Tab, 8 Phot, 20 Ref

Report and analysis is made of length of railway transition spiral, to provide more information on fundamental factors related to the design of the spiral easement curves and the levels of acceleration suitable for the requisite comfort on diesel locomotive and modern passenger rail cars. Previous work and history are reviewed, and the problem is analyzed. Other topics considered include test procedures and instrumentation, passenger ride comfort, lateral forces on leading locomotive trucks, and effects of track variations. It is noted that reported results confirm British ride comfort results, despite more scatter in the plots of the current study here.

ACKNOWLEDGEMENT:
Association of American Railroads

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052320
SPEEDS OF TRAINS THROUGH TURNOUTS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 566, Proceeding, Oct. 1961, pp 67-78, 4 Fig, 3 Tab

This work was done to develop and recommend a formula to give the maximum comfortable train speed through turnouts, particularly with respect to the switch point angle and length of point. Two three-way ride recorders were placed in roomettes at each end of a regular Pullman car on the rear of the Santa Fe Chief on the regularly scheduled run between Chicago and Kansas City. The recorders made a continuous record of the fore-and-aft, vertical, and lateral accelerations. The results of these tests indicate that the recommended comfortable speed through turnouts may be established on the basis of the following criteria, whichever gives the lower speed: 1) the calculated lateral acceleration for a curve having a long chord or length equal to the truck wheel base and a central angle equal to the switch point angle plus the degree of curvature of the switch point, if curved not to exceed 0.22g or 7 ft per sec.; 2) the calculated unbalance of the lead curve not to exceed 3 inches.

ACKNOWLEDGEMENT:
Association of American Railroads

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052380
EFFECT OF SPRING TRAVEL, HEIGHT OF CENTER OF GRAVITY, AND SPEED ON FREIGHT CAR CLEARANCE REQUIREMENTS ON CURVED AND TANGENT TRACK

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 305-361, 30 Fig, 4 Tab, 8 Phot

Two fully loaded 70 ton cars used to determine the effect of spring travel, the height of the center of gravity, and speed on freight car clearance requirements on curved and tangent track. Car A had 5/8-inch travel springs; Car B, 3 11/16-inch travel springs. Static lean tests and dynamic tests were performed. The longer travel—springs gave a softer ride, and when used in conjunction with a damping device resonant vertical oscillations were greatly reduced. The vertical ride was improved, but lateral stability, especially in roll was much less. The average total lateral displacement on Car B with the long travel-springs was about twice that for Car A with short springs. Therefore, use of cars with long travel-springs requires careful considerations of clearances in locations where they tend to be critical. Car B also required higher vertical clearances. The larger displacements for Car B were mostly due to its larger roll angle. Speed was a factor in the dynamic action of the freight cars. Oscillations at lower speeds were sustained, indicating a resonance of the roll mode with some periodic disturbances. There were some large roll amplitudes for the higher speeds at entrances and exits of curves. Only low speeds, such as 5 mph, were free from these oscillations.

ACKNOWLEDGEMENT:
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052382
CLEARANCE ALLOWANCES TO PROVIDE FOR VERTICAL AND HORIZONTAL MOVEMENTS OF EQUIPMENT DUE TO LATERAL PLAY, WEAR AND SPRING DEFLECTION

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, pp 661-670, 9 Fig, 1 Tab

A study on a method of ascertaining the lateral displacement of a moving car due to track irregularities and the dynamic behavior of the equipment is discussed. The results of an analysis of running test tracings on 8 passenger cars with different truck types is shown. The angular variation noted is a function of speed. A comparative tabulation of lateral displacements of the cars at a point 11 feet above the top of rail, based on the cars moving at 70 mph and at 3-in. unbalanced elevation is presented.

ACKNOWLEDGEMENT:
Association of American Railroads

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052438
PRELIMINARY TEST TO CORRELATE PASSENGER RIDE COMFORT ON CURVED TRACK WITH LATERAL ACCELERATIONS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 52, Proceeding, 1951, pp 576-588, 4 Fig, 1 Tab, 4 Ref

A description and results of tests made on the Louisville & Nashville Railroad to obtain data for re-examining the present practice of establishing maximum comfortable speed on curved track on the basis of 3 in. unbalanced elevation was given. Accelerometers were applied to the Chesapeake & Ohio track inspection car on a regular inspection run. Measurements were obtained on sections of the L & N main line containing many curves of various degrees of curvature. Twelve observers rode in the test car and recorded their impressions of the riding conditions on each curve. These observations were correlated with the measured lateral acceleration and calculated unbalanced elevation for each curve. This was a preliminary test with the objective of establishing methods of measurements and correlation of ride impressions to form the basis for securing more extensive measurements. The important conclusions are: 1) The 3-in. unbalanced elevation gives a very satisfactory riding condition. 2) The tests demonstrated that the amount of tilting of the car body on the springs is a very important factor because it reduces the effectiveness of the elevation and increases the acceleration on the passenger. 3) The tests have greatly clarified the future course that needs to be followed to establish a satisfactory method of speed limitation based on scientific measurements.

ACKNOWLEDGEMENT:
Association of American Railroads

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052530
BIBLIOGRAPHY ON ADHESION (2 VOLUMES)

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

DT28, Oct. 1973

Additional summaries will be published at regular intervals to keep the bibliography up to date.

A bibliography of an initial choice of 385 selected articles and 5 films dealing with wheel-rail adhesion particularly during traction. Summaries of each article, in English, French and German, and bibliographical details are given. The articles are classified by the keyword system, keyword lists in 13 languages being included.

ACKNOWLEDGEMENT:
Federal Railroad Administration

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053735
SOME PROBLEMS OF THE FUNDAMENTAL ADHESION AT HIGHER SPEEDS

Ohyama, T

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 7 pp, 9 Fig, 10 Ref

The conventional wheel-rail system utilizing adhesion is generally supposed to reach the limit of speed over 300 km/h. Here the problems of adhesion particularly at higher speeds are reviewed fundamentally and some methods for improving adhesion are described.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053741
A STUDY ON THE DERAILMENT OF TWO-AXLE FREIGHT CAR DUE TO INTERACTION BETWEEN TRACK AND VEHICLE–MECHANISM OF THE PHENOMENON AND FACTORS AFFECTING THE SAFETY

Matsui, S

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 10 pp, 15 Fig, 2 Tab, 3 Ref

By numerical analysis the author clarified cause and mechanism of the so-called "interactional derailment" of the two-axle freight car, the type of derailment without apparent defects of the car and the track. The key to the solution is a newly-devised simulation model. The essential point of the revealed phenomenon is that, under some practical conditions, a few cycles of excitation of the lateral vibration of a car can cause the loss of contact between the wheel tread and the rail surface, releasing a constraint of the whole dynamic system, which, in turn, invites a new motion leading derailment. In many respects the theory shows a good agreement with the investigation of accidents and the result of the derailment test performed by JNR. It is now contributing to the practical measures for safety.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053756
BRITISH RAIL IS CHECKING ADHESION VARIATIONS

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 147, No. 9, Nov. 1973, 2 pp, 3 Phot

A 12-month appraisal of variations in wheel/rail adhesion over a 180-mile circuit from Derby, England, has been undertaken by British Rail's Tribometer test train. The Tribometer is a research vehicle designed to check adhesion limits by applications of its independent braking system. When complete there will be a data bank of adhesion conditions from which it is expected to be possible to correlate adhesion with factors such as type of traffic, weather and time of day.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

053838
METROLINER DYNAMIC BEHAVIOR INVESTIGATION

May, JT, ENSCO, Incorporated

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

C 73 928-9-IA, Feb. 1973, 6 pp, 9 Fig

The Metrolinear Cars used in regular rail passenger service on the Northeast Corridor are the subject of a program sponsored by the Federal Railroad Administration, U.S. Department of Transportation, to improve the ride quality performance of the cars. The technique of mathematical modeling of the car was utilized in this program to predict and postulate methods of obtaining improved performance. The model was generated, verified, and then various parameters were altered to obtain optimum vehicle response. The altered parameters were then used to specify various car component modifications and to generate a specification for a completely new truck.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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053848
VEHICLE AND TRACK DYNAMICS RESEARCH ON BRITISH RAILWAYS

Sparrow, RW, British Railways Board

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 6 pp, 23 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

This paper outlines British Railways' current approach to the dynamic analysis of vehicle suspensions which has been evolved from a continuing research program on vehicle and track dynamics. In the plan sense, it covers the basic problem of lateral stability to ensure a high critical speed at which hunting or shimmy occurs and linear curving using tread forces. In the vertical sense it deals with requirements of satisfactory ride and the demands of the track engineer to minimize vertical dynamic loading on the track and consequential track damage.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053850
CALCULATION ON HUNTING OF HIGH SPEED RAILWAY TRUCK–PROBLEMS OF TRUCK DESIGN FOR SANYO SHIN KANSEN

Yokose, K

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 5 pp, 8 Fig, 5 Ref

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

It is extremely important to prevent the hunting of railway vehicle which occurs at high speed, for securing stability of the car. In this report, there are treated the hunting phenomenon of the railway vehicles, and the calculation which produced the basic design of the truck for the Sanyo Shin Kansen. According to these results for the test truck described above, it is clarified that there are many factors involving the track which affect the hunting velocity, for instance, the supporting stiffness of axles, the elastic stiffness between the truck frame and the side frame of the truck, the frictional moment between the truck and the other various elements. And it is clarified that there are many factors which prevent the truck hunting at the planned maximum speed. Fundamental data on the truck design are presented.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053851
THEORETICAL STUDY ON THE SIDE THRUST OF TRUCK WHEELS RUNNING ON CURVES

Kunieda, M

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 4 pp, 6 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

Many studies on the mechanics of side thrust of truck wheels running on curves have been carried out. Most of them aim at the analysis of the static behaviour of vehicles on curves. The analysis in this paper purports to present the fundamental principles for the design of the truck with a small side thrust of wheel against the curved rail. The influences of the wheelset suspension stiffness and many other factors upon the flange force of outer leading wheel are made clear.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053870
PROBLEMS CONCERNING THE INTERACTION BETWEEN VEHICLE AND TRACK

PROBLÈME DES ZUSAMMENWIRKENS VON FAHRZEUG UND FAHRBAHN
Gerdsmeier, H

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2-3, 1973, 14 pp, 8 Fig, 1 Tab, 19 Ref

A report submitted at the 14th meeting dealing with "Modern railway rolling stock", held in Graz. The German Federal Railway, Munich Technical University, Krauss-Maffei-Krupp, Rheinstahl and Mak, have founded a Company for the Study of the limits of use of the "Vehicle on rail". The report consists of a wide synthesis of the methods used, and the results obtained, in the case of the numerous works to which reference is made. The author shows the manner in which it is possible to make use of simple models, which are linear in the case of the vehicle, and reduced to periodical irregularity in the case of the track, in order to obtain data concerning the structural parameters of the vehicle and the track, and estimates of the behaviour of the vehicle based on the values of these parameters. Although these models are far from according with the reality, the estimates which they make possible are close to the results of measurements carried out during tests. It is necessary to continue this research, although it is already agreed that the limits of the system "Vehicle on Rail" are far from having been reached.

ACKNOWLEDGEMENT:
International Union of Railways, 1118

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053875
WHEEL LOAD AND WHEEL DIAMETER FROM THE POINT OF VIEW OF STRESS ON THE MATERIAL IN THEORY AND IN PRACTICE

RADLAST UND RADDURCHMESSER UNTER DEM GESICHTSPUNKT DER WERKSTOFFBEANSPRUNCHUNG IN THEORIE UND PRAXIS
Kilb, E

Glasers Annalen ZEV (Siemens (Georg) Verlagsbachhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2-3, 1973, 6 pp, 1 Fig, 3 Tab, 11 Ref

A report submitted at the 12th meeting dealing with "Modern railway rolling stock", held in Graz. It consists of a collection of formulae and data enabling conventional pressure in the wheel metal to be established, in accordance with the diameter of the wheels and their load. This pressure, calculated with the help of the Hertzian theory, depends on the normal and vertical efforts exerted in the contact surface between wheel and rail. Compared with the undefined limit of fatigue strength, it enables an estimate to be made of the distance which the vehicles are able to cover without risk of deterioration of the wheel treads. The dimensions of the contact surface, and its evolution during deformation, caused by wear, of the wheel profile, being difficult to establish, it is advisable to prepare the estimates on the basis of similarities with the characteristics of wheels subjected to stresses in a comparable manner, and whose behaviour in service is known.

ACKNOWLEDGEMENT:
International Union of Railways, 1174

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053878
FRENCH SUPPLIER DEVELOPS NEW WHEELSLIP DETECTION SYSTEM

International Railway Journal (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 13, No. 11, Nov. 1973, 1 pp

A new wheelslip detector has been developed that requires no adjustment during operation. The fully static system measures the derivative of the difference of the velocity of two different axles. A description of the system, its capabilities, and its sensitivity are given.

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053992
STATISTICAL ANALYSIS OF ADHESION PERFORMANCE OF LOCOMOTIVES

Hirotsu, T, Hitachi Limited

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-8, Aug. 1970, 8 pp, 7 Fig, 1 Tab

A method developed to calculate the expected drawbar pull of a locomotive took account of the probability distribution of the coefficient micron of ultimate friction (i.e., coefficient of adhesion) between wheel and rail. For typical micron distributions, calculations were made by this method, and the results revealed the effects of various factors. The calculated results agreed largely with observed results. The method should be helpful in rational design of locomotives and planning for locomotive operation.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053995
HYDRAULICALLY DAMPED MOTION OF GONDOLA CARS

Doyle, JM Zar, M Chu, SL

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-4, Aug. 1970, 7 pp, 6 Fig, 2 Tab, 6 Ref, Apps

The rocking motion of gondola cars in the 125-ton capacity range is investigated, and the solution is obtained by use of a simulation program on a digital computer. Predictions of maximum roll angle and maximum dynamic wheel load are made. Computed results are in substantial agreement with data observed in field tests.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053998
PLASMA TREATMENT OF RAILWAY RAILS TO IMPROVE TRACTION

Gifford, FE, General Motors Corporation
Yoshino, RT, General Motors Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-1, Aug. 1970, 6 pp, 9 Fig, 14 Ref

Plasma torch treatments of track rails to improve locomotive wheel traction were investigated as a potential substitute for rail sanding. Rolling friction tests were conducted under simulated rail-wheel load conditions at about 200,000 psi contact stress. Although traction was improved significantly in laboratory tests, total power required to significantly improve the coefficient of friction for a diesel electric operation at low speeds appears excessive. Power required at 80 mph is prohibitive. Moreover, safety, maintenance, and mechanical aspects require a considerable amount of further development before such an application can be considered possible on American railroads.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054008
ANALYSIS OF TRUCK BOLSTER CENTER PLATE RIM RESPONSE TO IMPACT LOADS

Johnson, MR, IIT Research Institute
Welch, RE, IIT Research Institute
Ojdrovich, G, IIT Research Institute

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-5, Dec. 1973, 9 pp, 18 Fig

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

The impact of a moving freight car into a string of standing cars results in a large longitudinal load acting on the center plate rim of the truck bolster. The load is the result of the rapid deceleration of the truck. The dynamic characteristics of this load and its effects within the rim are discussed. Analytical procedures are described for processing strain gage data to determine the location on the rim where the load is applied.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054011
STATISTICAL CHARACTERIZATIONS OF RAILWAY TRACK BEHAVIOR

Corbin, JC, ENSCO, Incorporated

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Dec. 1973, 15 pp, 18 Fig, 13 Ref

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Applications Society for presentation at the 1974 Joint ASME/IEEE Railroad Conference, Pittsburgh, Pa., April 2-4, 1974.

Absolute space curve data of railway track, representing the vertical and lateral perturbations of both running rails, was collected and analyzed. A variety of track is studied, including high speed versus yard, bolted versus continuous welded rail (CWR), and old versus new construction. Analytical techniques include Signal Averaging, Analysis of Variances, and Correlation analysis. As a result, it is concluded that railway track is characterized by a pure Markovian process, a periodic process, and a periodically modulated random process.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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054012
MODELING AND SIMULATING LONGITUDINAL TRAIN ACTION FORCES

Hawthorne, VT, Keystone Railway Equipment Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-1, Dec. 1973, 12 pp, 12 Fig, 1 Tab, 6 Ref

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

This paper describes the program of the effort to model and simulate longitudinal train forces being developed in conjunction with the Track Train Dynamic Program Task Force #7. One objective of this portion of the task force's effort is to complete a computer model describing longitudinal train forces, but also verifying the model with actual train tests. Another stage of the project will be to establish a test or group of tests away from the train to study component response in order to derive input for the computer model. The subprograms written to compute longitudinal forces are discussed and the ability to input the response of various devices is shown. The basic models of the hydraulic end-of-car and sliding-sill devices are illustrated and described. Mathematical models of cushion unit behavior are shown and some of the problems using these models are reviewed. A test device called a "Train Action Simulator" is illustrated in schematic form and its operation is discussed. Typical data from the Train Action Simulator is given. This data has been verified by a series of low-velocity test track tests which are illustrated.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054014
HUNTING IN FREIGHT CARS (A BRIEF DESCRIPTION OF CAUSE AND CURES, WITH SOME RESULTS OF ROAD TESTS OF VARIOUS MODIFICATIONS)

Reynolds, DJ, Southern Railway System

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-2, Dec. 1973, 12 pp, 4 Fig, 1 Tab, 7 Ref, Apps

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

A description of the forms of hunting observed in freight cars with three-piece trucks, using linear mathematics to give an engineering understanding of the oscillation and the forces causing it. The factors in the expressions giving the onset speeds show what can be done to raise or remove these speeds. Supporting test results are quoted, and the practical and economic limits appropriate to the freight car are emphasized. The initial need to establish the incidence and cost of hunting is mentioned.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054298
CONSTANT-FREQUENCY SPRINGS

Polak, WT, Lord Manufacturing Company
Thomas, DG, Lord Manufacturing Company

Machine Design (Penton Publishing Company, Penton Building, 1111 Chester Avenue, Cleveland, Ohio, 44113)

Aug. 1967

Most springs soft enough to isolate light loads deflect excessively with heavy loads; springs designed to handle heavy loads are too stiff for light loads. A constant-frequency spring produces constant response by varying the spring rate with load. The technique presented here provides a quick graphic determination of the basic design.

ACKNOWLEDGEMENT:
Machine Design

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054347
DIRECT MEASUREMENT OF STRESSES RECORDED IN THE RAILS USING A HEAD FOR MEASURING CHANGES IN PERMEABILITY

UNMITTELBARE MESSUNGEN DER IN EISENBAHNSCHIENEN AUFTRETENDEN SPANNUNGEN MIT HILFE EINES PERMEABILITATSANDERUNGS MESSKOPFES
Mazur, S

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

Vol. 22, No. 7, 1973, 5 pp, 4 Fig, 3 Ref

Measurement of elastic stresses and deformations on the basis of the relationship between their degree and the corresponding changes in magnetisation can be done using either the direct method or the method of mechanical transmission of the deformation. Both methods are described, as is the use of a measuring head which records changes in permeability and measures the stresses occurring in the rails. This measuring head, which is still in the test stage, is intended for measuring stresses, particularly following changes in temperature at any point along a full track.

ACKNOWLEDGEMENT:
International Union of Railways, 1272

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054349
LOCOMOTIVE AXLE-LOADS–INFLUENCE OF NON-SUSPENDED WEIGHTS

LOKOMDTIVACHSLASTEN–DER EINFLUSS DER UNABGEFEDERTEN MASSEN
Koffman, JL

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 9, 1973, 4 pp, 6 Fig, 1 Tab, 21 Ref

Research into the importance of the forces produced by running on rails shows that the importance of non-suspended weights and track structure, particularly the suspension constants and the rail point angle, exert an influence on the wheel dynamic force. Knowledge thus obtained will undoubtedly contribute to the design of locomotives for freight trains with heavier axle-loads, of which it would be desirable to develop the use for economic considerations.

ACKNOWLEDGEMENT:
International Union of Railways, 1301

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054350
SUMMARY OF THE RESULTS OF PRACTICAL TESTS INTO VIBRATIONS OR OSCILLATIONS DURING THE RUNNING OF THE SHIN-KANSEN ELECTRIC TRAIN SETS

SHIN-KANSEN RYOKYAKU DENSHA NO SHINDO NI KANSURU KENKYU
Misuno, S Tomani, I

Denkisha No Kagaku/Railway Electric Rolling Stocks (Denkisha Kenkyukai, C-O New Kokusai Bldg, Marunouchi 3-4-1, Chiyoda-ku, Tokyo, Japan)

Vol. 25, No. 5, 4 pp

The article considers the different sorts of vibrations and oscillations occurring on the Shin-Kansen electric trainsets when running. It goes on to describe briefly the connections found in specific tests between these vibrations and oscillations and the state of wear or aging of the various mechanical parts (shock absorbers, body supports, tyres, disc brakes, etc.).

ACKNOWLEDGEMENT:
International Union of Railways, 1302

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

054600
OPERATING CHARACTERISTICS OF LOCOMOTIVE AND CAR TRUCKS

Threlfell, WG, Canadian National Railways

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 8 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

In late 1971, problems were experienced by the CN on high curvature mainline subdivisions even though most of them had been recently upgraded. There were frequent changeout of outer rails on curves due to flange wear, misalignment and loss of superelevation at the spiral or entrance to curves, high spikes and rail turnover or partial turnover, and gauge widening due to the tie plates shifting and cutting into the ties, especially during the many months when the roadbed is frozen. The frequency of derailments increased simultaneously on certain subdivisions and the seriousness of the situation demanded immediate corrective action. The successful and quickly implemented program of action taken by CN is outlined in this paper.

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Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054608
SIMULATION OF DYNAMIC STRESSES IN WHEELSET BEARINGS

SIMULIEREN VON DYNAMISCHEN BELASTUNGEN IN RADSATZLAGERN
Kellstrom, M Norlander, G

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 1, Jan. 1974, p 22

SKF has compiled a computer program enabling an exact calculation of the accelerations and stresses occurring in wheelset bearings and thus an investigation of the influence of rail joints and damaged wheel tyre treads. The results are utilized, for example, to determine the exact running data of a test stand permitting a very good simulation of the actual operating conditions in a railway bogie.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054610
THE FRAME DISPLACEMENT OF THE THREE-PIECE DIAMOND TYPE BOGIES

DIE RAHMENVERSCHIEBUNG DER DREITEILIGEN DREHGESTELLE DER BAUART DIAMOND
Koffman, JL, British Railways Board

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 2, Feb. 1974, p 56

The widespread use of the three-piece Diamond type bogies with the 120km/h Freightliner Container trains of British Railways has caused occasional damage to track crossings and also led to wheel howling. Supression of bogie hunting made it necessary to raise the rotational resistance to $x = 0.1$. Tests have shown that when running through curves as well as on straight track the side frames can lozenge to an extent causing the wheel flanges to strike the edge of the crossings or to run on the straight as if in a curve. To eliminate this, preference shall in the future be given to the use of single frame bogie designs.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054692
THE EFFECT OF TRACK AND VEHICLE PARAMETERS ON WHEEL/RAIL VERTICAL DYNAMIC FORCES

Jenkins, HH
Stephenson, JE Clayton, GA Morland, GW Lyon, D

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 3, No. 1, Jan. 1974, pp 2-16, 22 Fig, 4 Tab

The railway track and vehicle combination comprises heavy rigid wheels running on heavy rails. Imperfections in either will give rise to dynamic effects which increase with speed. These will supplement the contact forces which, on perfect track with perfect wheels, are basically the static wheel loads. The commercial necessity for higher speeds and greater axle loads has been established and this historical trend will probably continue. Forces and stresses will therefore become more severe unless technical progress is made in track and vehicle design. In this context, close co-operation between the Civil and the Mechanical Engineer is essential. Track must have a high standard of alignment and level and maintenance quality must be improved as far as practicable. The forces that the rails and track structure will withstand must also be specified. New vehicles, particularly those for high speed operation or with heavy axle loads, must not generate excessive track forces.

ACKNOWLEDGEMENT:
Railway Engineering Journal

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054781
IMPROVEMENTS OF MAINTENANCE CRITERIA COVERING THE RUNNING GEAR OF SHIN-KANSEN RAILCARS BY MEASURING THE TRANSVERSAL ACCELERATIONS OF THE BODY

SHIN-KANSEN DENSHA SOKO KANRI SHIRYO SEIDO UO KOJO NI KANSURU KENKYU
Tanida, I

Denkisha No Kagaku/Railway Electric Rolling Stocks (Denkisha Kenkyukai, C-O New Kokusai Building, 3-4-1, Chiyoda-ku, Tokyo, Japan)

Vol. 26, No. 6, 1973, 5 pp, 8 Fig

Osaka engine shed officials measure, under 200 km/h on line conditions, the body accelerations of Shin-Kansen railcars each time the wheels are re-profiled (every 70,000 km). Following these measurements, an index is calculated in accordance with an empirical formula that is a linear combination of the acceleration occurrence frequencies classified by section (linear combination of the values of the acceleration distribution analysis). Bogie overhaul is scheduled in accordance with the value of this index. In applying this method, the JNR encountered difficulties due to the effect of 3 factors on transversal accelerations: the state of the track, the speed (the index is very sensitive to speed variations of only a few km/h), weather conditions (transversal stability is distinctly improved in rainy weather). The article describes how corrective laws were worked out to eliminate the effect of the first 2 factors. For the 3rd factor, it was decided to limit measurements to periods of wet weather.

ACKNOWLEDGEMENT:
International Union of Railways, 95

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95

054784
MAXIMUM SPEED ATTAINABLE ON WHEEL/RAIL SYSTEM PRELIMINARY INVESTIGATION

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

S 1004/RP 2, Supplement, Apr. 1973, 73 pp, 31 Fig, 3 Tab, 30 Ref

This report should supplement the Report on Preliminary investigations S 1004/RP 1, published in April 1972. It contains, in particular, the views of the JNR concerning that report and it also furnishes a survey of enlisting and planned high speed test sections and existing test vehicles. Finally, an analysis is given of the various system components and also an indication of the problems involved in the preparation of a synthesis of the overall system.

ACKNOWLEDGEMENT:
International Union of Railways, 35

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35

054785
HOW TO REDUCE THE PRESSURES IN RAILS DUE TO AN INCREASE IN TEMPERATURE

ZMNIEJSZENIE NAPREZEN W SZYNACH POWODOWANYCH WZROSTEM TEMPERATURY
Veremczuk, J

Przeglad Kolejowy Drogowy (Wydawnictwa Komunikacji i Lacznosci, ul Kazimierzowska 52, Warsaw 12, Poland)

No. 3, 1973, 2 pp, 2 Fig

In order to prevent the buckling of the track—particularly when continuously welded rails are used—during the hot summer period, it is of importance to prevent an increase in the temperature of the rails exposed to the heat of the sun. Experiments have shown that the temperature of the metal can be approximately 10 degrees C, by coating the top, the web, and the upper part of the flange, of the rail with a layer of white paint. The author describes the construction of a mechanical vehicle, which runs along the track, in order to cover the rails with white paint.

ACKNOWLEDGEMENT:
International Union of Railways, #68

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#68

054786
ELASTIC DEFORMATIONS IN TRACKS WITH S 60 RAILS

Zroznicowanie Odksztatcen Sprezystych Nawierzchni S 60
Baluch, H

Przeglad Kolejowy Drogowy (Wydawnictwa Komunikacji i Lacznosci, ul Kazimierzowska 52, Warsaw 12, Poland)

No. 9, 1973, 11 pp, 14 Fig, 15 Ref

The author looks back over studies carried out by the PKP over a four-year period into the behavioural pattern of tracks with S 60 rails on wooden or concrete sleepers, on main intercity routes. The article gives the results obtained for elastic depression of rails, their side-slip and stress, for rail deflection (including its height) or the coefficient of rigidity of track formation and rail, the effect of ballast grain size on depression, etc. He also gives forecasts for increases in track irregularities in relation to the loads carried in practice according to mathematical models and analysis of the measurements. The conclusions drawn underline the considerable advantages provided by the S 60 rail tracks which could be increased still more by perfecting the technology and quality of laying and maintenance work.

ACKNOWLEDGEMENT:
International Union of Railways, 52

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52

054921
FRA TO GET BRITISH RESEARCH RESULTS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 9, May 1974, p 14

A two year contract has been signed with British Railways to provide the Federal Railroad Administration with the results of existing and projected technical research. The areas covered in the contract include track dynamics, track characteristics such as roughness, ballast, concrete ties, etc. and data on rail vehicles. The contract is designed to avoid duplicate research in the United States and Great Britain.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054945
VIBRATION NUISANCE CAUSED BY RUNNING TRAINS AND ITS COUNTERMEASURES

Kobayashi, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 6 pp, 5 Fig, 4 Ref

Effects of carriage type, running speed, track structure, railway structure, subsoil condition, object, etc. on vibration along railroad caused by running trains are described with data obtained by JNR and other authors. Several countermeasures which can be executed at various stages as source, midway or object are enumerated and their characteristics are discussed on the basis of some data and theoretical considerations.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056781
CONTRIBUTION OF TRIBOLOGY TO THE DEVELOPMENT AND OPERATION OF RAILWAYS

Barwell, FT, University College of Swansea

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England)

Vol. 187, No. 1, 1973, pp 1-16, 29 Ref

The contribution of the railway pioneers to the development and practice of tribology is reviewed. The numerous locations within a modern electrified railway wherein surfaces interact in relative motion are listed and discussed from the point of view of reduction in maintenance and enhancement of reliability. In particular, recent work on adhesion between wheel and rail is reviewed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205349

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056797
TECHNICAL ASPECTS OF HIGH-SPEED TRAINS. TRACK AND ITS INFRASTRUCTURE. ELECTRIC INSTALLATIONS

L'ASPECT TECHNIQUE DES GRANDES VITESSES. LA VOIE ET LES INSTALLATIONS ELECTRIQUES DES LIGNES A GRANDE VITESSE

Prud'homme, A, French National Railways
Weber, O

Travaux (Federation Nationale des Trav Publ & des Synd Aff, 6 Avenue Pierre Premier de Serbie, Paris 16e, France)

Sept. 1973, pp 461-462

Two-part paper states that the problems raised by trains traveling at 260-300 km/h are related essentially to vehicle operating stability and track stability, and have been substantially solved at the present time. Without going into the details of calculations, these problems are discussed along with the results of theoretical studies and tests. The techniques and approaches used can, for the most part, be regarded as operational today. The speed of the wheel-rail system is certainly not limited to 300 km/h: faster trains would raise economic as well as technical problems. In spite of the efforts made to raise speeds on existing lines, it is not possible to exceed 200 km/h on these lines, owing to the infrastructure which dates back to the last century, except on short stretches where high-speed tests have been conducted. The design of the infrastructure and superstructure (track, signaling and catenaries) of new allowable train speeds of 300 km/h is described in the article along with the engineering studies which have been making increasingly greater use of data processing techniques.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205261

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056831
RESTORING FORCE OF THE HELICAL SPRINGS IN THE CROSS DIRECTION SHOWN ON THE EXAMPLE OF REMODELING THE LOCOMOTIVE E 3173 ON BRITISH RAILWAYS

DIE DUECKSTELLKARAFT VON SCHRAUBENFEDERN IN DER QUERRICHTUNG AM BEISPIEL DES UMBAUES DER LOKOMOTIVE E 3173 DER BRITISH RAILWAYS

Koffman, JL

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 7-8, Aug. 1973, 9 Ref

The results of calculations carried out in accordance with spring formulas are compared with experimentally obtained data. Road test results are dealt with particular reference to riding qualities and tractive resistance of the modified locomotive at speeds of up to 125 mph.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100232

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056833
INFLUENCE OF NONSUSPENDED MASSES ON THE AXLE LOADS OF LOCOMOTIVES

DER EINFLUSS DER UNABGEFEDERTEN MASSEN AUF DIE ACHSLAST VON LOKOMOTIVEN

Koffmann, JL, British Railways Board

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 9, Sept. 1973, pp 297-304, 21 Ref

The evaluation of the results of tests carried out by British Railways to determine the magnitude of dynamic loads encountered at rail joints has shown the fundamental importance of the effect of unsuspended masses on the axles of railroad rolling stock.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104052

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056838
NONLINEAR WHEELSET DYNAMIC RESPONSE TO RANDOM LATERAL RAIL IRREGULARITIES

Law, EH, Clemson University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/RT-3, Paper, Nov. 1973, 20 Ref

The nonlinear equations of motion for a railway vehicle wheelset having profiled wheels and contact of the wheel flange with flexible rails are presented. The effects of spin creep and gyroscopic terms are included. The rails are considered to have random lateral irregularities which are described by prescribed power spectra. The equations of motion are integrated numerically and the effects on the dynamic response of quantities such as speed, track roughness, wheel wear, flange clearance, and lateral stiffness of the rails are investigated.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304670

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056839
ON THE EFFECT OF TRACK IRREGULARITIES ON THE DYNAMIC RESPONSE OF RAILWAY VEHICLES

Siddall, JN, McMaster University
Dokainish, MA
Elmaraghy, W

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/RT-1, Paper, Nov. 1973, 13 Ref

The steady state response for models of a six-axle locomotive running on a sinusoidally irregular track has been investigated. Two mathematical models have been set up, a full model for the stationary vehicle in which creep between wheels and rails was neglected, and a full model for the moving vehicle in which creep forces gravity stiffness effects and wheel tread profiles were considered. The use of the generalized method of complex algebra to obtain the steady state response of the railway vehicle components to varying input frequencies was used. The results given in this paper are for the case of sinusoidal lateral track irregularities only, but the method is general enough to allow also for vertical track irregularities. The analysis may be used to check the response of any proposed design for a railway vehicle to economically attractive track irregularities. It may also be used to adjust geometry, spring rates and damping characteristics in order to maximize operating speeds while providing optimum damping for the trucks and body motions.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304668

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056852
DYNAMIC STABILITY OF CARS IN LONG FREIGHT TRAINS

Blader, FB, Williams (Sir George) University
Kurtz, EF

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-WA/RT-2, Paper, Nov. 1973, 13 Ref

A method is described for investigating the lateral response and hunting tendency of cars in long trains. A linear model is developed representative of North American freight-car design with parameters descriptive of wheel wear and truck flexibility. Included is a simple model of the couplers assumed under tension. Transfer matrices are used to examine the behavior of groups of cars. Results are given showing that the behavior of a group of such cars under tension is no less stable than that of the single uncoupled car. The effects of variation in certain parameters on the natural response are described. Truck stiffness is shown to have a primary effect on the lateral stability of the car.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304669

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056855
EFFECT OF RIM THICKNESS ON WHEEL STRESSES CAUSED BY SIMULATED SERVICE CONDITIONS

Novak, GE Kucera, WJ Eck, BJ

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-WA/RT-10, Paper, Nov. 1973, 4 Ref

An analytical solution is presented for the stresses in both thin and thick rim CH-36-in. wheel designs under rail loads applied at the tape line and 3/4 of an inch from the front rim face. Octahedral stress mapping is employed to display the stress fields generated in the wheels under rail loading. The effect of the variation in rim thickness is evaluated through application of the octahedral shear stress concept. Accuracy of the analytical stress field solution was determined by comparison of computed and experimentally measured principal strain values on the surface of a wheel. The measured strains were obtained using strain gages bonded along both top and bottom plate and fillet surfaces. The results were in good agreement with the computed values.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104847

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056858
ACCELEROMETER FOR VIBRATION ANALYSIS

Newton, AW Tinslay, PJ

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 4, July 1973

An accelerometer suitable for vehicle ride analysis is described. The instrument is of the linear type (measuring acceleration in a straight line), incorporating a seismic mass that is free to move along one axis. The bulk of the seismic mass is incorporated in the core assembly of a differential transformer which produces an electrical output proportional to the applied acceleration. The damping of the system is electro-magnetic, achieved by a shorted turn of copper suspended in a strong magnetic field, and is independent of ambient temperature variations.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205184

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056859
CORRELATION OF SHOCK ABSORBER FORCES ON PASSENGER CARS

Voy, C, Technical University, Berlin

Society of Environmental Engineers, Journal of (Society of Environmental Engineers, 68a Wigmore Street, London W1H 9DL, England)

Vol. 12, No. 59, Dec. 1973

Calculation of the correlation between front and rear excitation for a passenger car and the correlation between left hand and right hand excitation.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304791

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056860
MODEL STUDY FOR VERTICAL TRACK BUCKLING

Kerr, AD, Princeton University

High Speed Ground Transportation Journal (Planning-Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 3, 1973, pp 351-368, 1 Ref

A study is presented of two models which represent the mechanism of vertical buckling of a track when subjected to a mechanical or to a thermal compression force, respectively. The postbuckling equilibrium curves and their stability are discussed and a stability criterion is defined. The effect of various track model parameters, upon the buckling load or buckling temperature, is shown. Graphs reveal that the range of safe compression forces for the mechanically compressed structure is much smaller than the range of the safe forces due to constrained thermal expansions; indicating a possible explanation why in the tests in which the compression forces are induced by jacks the track buckles predominantly in the vertical plane, whereas when the track is compressed by constrained thermal expansions it exhibits mainly horizontal buckling modes. It was found that the buckling loads, or temperatures, obtained from a linearized analysis have no relevance to the actual values obtained from a nonlinear analysis; the difference in results being substantial for buckling temperatures.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304468

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056868
TRAIN ACTION MEASUREMENTS IN THE TROPICANA UNIT TRAIN

Powers, RG, Tropicana Production Sales Incorporated
Stephenson, JG

American Society of Mechanical Engineers, 345 East 47th Street,

New York, New York, 10017

73-WA/RT-9, Paper, Nov. 1973

The extensive test program conducted with the Tropicana unit train operation has led to a better understanding of train dynamics, train handling procedures, and the required in-train characteristics of hydraulic end-of-car units. Results of the test with a conventional gear train containng a group of 100-ton cars have shown the presence of train action forces in the 300,000—to 400,000-lb range. The magnitude of train action forces are dependent to a large degree upon individual car weights. As the car weights increase, the dynamic force levels increase.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304671

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056869
MOTION OF A GUIDED RAILWAY CAR WITH INDEPENDENTLY ROTATING WHEELS

Koyanagi, S

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 3, Quart Rpt, Sept. 1973

The search was made for a new type of wheel-rail system of high speed rolling stock and it was found that the independently rotating cylindrical wheel truck was meeting the need.

ACKNOWLEDGEMENT:
Engineering Index, EIX740300280

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057160
LITERATURE SURVEY OF RAILWAY VEHICLE DYNAMICS RESEARCH

Law, EH, Clemson University
Cooperrider, NK, Arizona State University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 49-78, 6 Fig, 94 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

A survey of the research concerned with the dynamics of single, conventional railway vehicles is presented. Attention is concentrated on analytical research and experimental research performed in conjunction with analytical efforts. The often conflicting objectives for railway vehicle suspension design and the research done to understand the design implications of these objectives are discussed.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051277
ENGINEERING FOR MAINTENANCE-FREE FREIGHT CARS

McLean, LS, Seaboard Coast Line Railroad

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

72-RT-4, 1972, 19 pp, 17 Fig, 2 Tab, 2 App

Rail Transportation Proceedings, Papers and discussions from joint IEEE-ASME Railroad Conference, Jacksonville, Florida, 14-15 March 1972.

Freight car construction has passed a phase where car design was aimed at lowest cost acceptable for interchange. This paper discusses the advantages and economics available from engineering cars to surpass minimum requirements and with a goal of minimizing future expenditures for maintenance. The ultimate car would remain serviceable throughout its first cycle of life without repairs other than "service-station" type.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051278
MEASUREMENT OF FREIGHT CAR WHEEL QUALITY

Taylor, AO, Trailer Train Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

72-RT-5, 1972, 13 pp, 13 Fig, 1 Tab

Rail Transportation Proceedings, Papers and discussions from joint IEEE-ASME Railroad Conference, Jacksonville, Florida, 14-15 March 1972.

A random selection of freight car wheels of 28-, 33-, and 36-in. dia was made from the production inventory of several wheel manufacturers and various measurements were taken. Among the quantities measured were imbalance, out-of-roundness, eccentricity, and weight variation. The paper outlines the procedures used to gather the data and includes a tabulation of the results. It also proposes that further work be done to relate wheel quality to freight car ride quality.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051281
STEEL FOR UNIT-TRAIN CARS

Clapp, HP
Swan, JD, United States Steel Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

72-RT-2, 1972, 12 pp, 13 Fig, 4 Tab, 12 Ref

Rail Transportation Proceedings, Papers and discussions from joint IEEE-ASME Railroad Conference, Jacksonville, Florida, 14-15 March 1972.

The performance of ASTM A242 Steel in railroad cars, since its introduction in the early 1930's is reviewed. This includes results of periodic measurements primarily of coal cars in regular service. Data obtained in the 1960's on unit-train coal cars, that are being built in increasing numbers, are presented. An economic, comparison between the use of A242 steel and other steels in included.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051283
IMPACT VULNERABILITY OF TANK CAR HEADS

Shang, JC

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1972, 23 pp, 8 Fig, 5 Tab, 11 Ref

An Impact Vulnerability study of tank car heads was undertaken by means of semi-analytical evaluation of head failures through careful observation of indentations and punctures which were produced in a series of full-scale tests. The parameters which would influence the vulnerability of tank car heads were identified. Simple formulas which could be used to determine the permanent indentation and the impact force were developed in conjunction with a theoretical analysis of influential dimensionless parameters and an application of Hertz' force-indentation law to collision problems. Finally, the tank car head failure criteria were established.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051327
HSFV SUSPENSIONS READY FOR SERIES PRODUCTION

Gilchrist, AO, British Railways Board Research Department

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 423-426

BR's Research Department has been investigating the design of two-axle wagon suspensions since 1965. A series of designs has been produced, mostly in collaboration with the Chief Mechanical & Electrical Engineer's design staff, and they have all been designated HSFV (high speed freight vehicle).

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051374
SIDE BUFFERS AS TRAIN STABILIZERS

Scales, BT

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 6, Nov. 1973, 1 p, 1 Fig, 1 Ref

This short article discusses the use of side buffers as train stabilizers. It comments on their success on Amtrak's French Turbotrains, and suggests their use on the Metroliners.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

051376
THE FREIGHT BOGIE

Ash, JFG

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 6, Nov. 1973, 7 pp, 19 Fig

This article reviews the how and why of freight truck development from early American designs up through modern designs. The article covers friction damping, suspensions, deflections, the design of various parts, and hunting.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO: Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

051386
DB'S EXPERIENCE WITH SMALL-WHEELED WAGONS

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, pp 466-468

Three years of running long-distance piggyback services with small-wheeled multi-axle wagons has given the German Federal Railway full opportunity to evaluate a system which requires minimum outlay on terminal facilities but careful maintenance of wheel treads.

ACKNOWLEDGEMENT:
Railway Gazette International

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051387
APT PROGRAMME MOVES AHEAD AFTER SEARCHING REAPPRAISAL

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, pp 469-471

Preliminary runs at 200 km/h and 8 degrees cant deficiency have confirmed the curving performance of BR's experimental APT-E, and the three-year test programme has commenced. After a detailed examination of Research Division proposals, the CM&EE has now defined design parameters for the APT prototypes, and DoE approval is being sought for building four 14-car electric trains to operate a prestige service between London and Glasgow in 1977.

ACKNOWLEDGEMENT:
Railway Gazette International

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051397
FRENCH RAILWAYS CONCLUDES THE INITIAL STAGE OF TRIAL RUNS WITH ITS TEV .001 TURBOTRAIN OVER 300 KM/H

Portefaix, A, French National Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, pp 407-408

Test running experience has provided a great deal of data which is being analysed with a view to its application on the new Paris-Lyon high speed line.

ACKNOWLEDGEMENT:
Rail Engineering International

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051398
TESTS AND SERVICES OF THE SNCF TURBOTRINS RTG AND TGV.001. THE TURBOTRIAN-A TRUMP-CARD FOR RAILWAYS

Bernard, JP, French National Railways
Garde, M, French National Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, pp 401-406, Phots

Daily high-speed running by SNCF of turbotrains and the two test sets at 250/300 km/h have established that the application of aero gas turbines to railway rolling stock is sound engineering and that services of 250 km/h are commercially and technically worthwhile as well as establishing beyond doubt that the steel wheel on the steel rail is the most satisfactory and economic form of transit for speeds in the order of 300 km/h.

ACKNOWLEDGEMENT:
Rail Engineering International

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051409
STANDARD LIGHT RAIL VEHICLE

Muehlberger, RF, Massachusetts Bay Transportation Authority

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-80, Paper, Sept. 1973, 12 pp, 8 Fig, 1 Tab

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper summarizes the results of a joint agency cooperative effort to develop the National Standard Light Rail Vehicle for surface-subway passenger transport. Selected vehicle performance characteristics, design criteria and design features are described.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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√ 051416
THE SPECIFICATION OF MULTIPLE UNIT RAIL CAR PERFORMANCE

Phelps, DR, General Electric Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-90, Paper, Sept. 1973, 9 pp, 3 Fig, 5 Tab, 5 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The importance of carefully reasoned multiple unit railcar performance specifications is discussed. Two methods of specifying performance are presented, speed-time-distance and schedule speed. Reasons for favoring schedule speed, as determined from computer simulation, are advanced, and a sample specification format exhibited.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051423
CRITICAL VELOCITY FOR COLLAPSE OF A SHELLING CIRCULAR CROSS SECTION WITHOUT BUCKLING

Abrahamson, GR, Stanford Research Institute

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-APMW-31, Paper, Sept. 1973, 5 pp, 6 Fig, 4 Ref

Contributed by the ASME Applied Mechanics Division for presentation at the Applied Mechanics Western Conference, Stanford Research Institute, Menlo Park, Calif., Sept. 17-19, 1973.

Many practical devices involve high-speed collapse of shells of circular cross section. In all of the devices the stability of the collapse motion is of interest and in some it is essential for successful operation. In this paper, the buckling motion of shells of circular cross section during high-speed collapse is analyzed and critical collapse velocities are determined for which the growth of initial nonuniformities by buckling during collapse is 10 and 100.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051425
OPTIMUM DESIGN OF AN IMPACT ABSORBER

Afimiwala, KA, New York State University, Buffalo
Mayne, RW, New York State University, Buffalo

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-DET-4, Paper, Sept. 1973, 7 pp, 14 Fig, 12 Ref

Contributed by the Design Automation Committee of the Design Engineering Division of The American Society of Mechanical Engineers for presentation at the Design Engineering Technical Conference, Cincinnati, Ohio, Sept. 9-12, 1973.

A shock absorber with nth order stiffness and mth order damping is designed for optimum response to a step change in base velocity (an acceleration impulse). The objective of the design is to minimize the maximum acceleration level occurring during the transient response. A single constraint is used to limit relative motion between the base and the isolated mass and another constraint is added to limit the oscillatory nature of the system response. Results of the study are presented on dimensionless curves showing the optimum stiffness and damping coefficients and the expected system performance as functions of m and n.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051442
EVOLUTION OF BOGIES FOR FAST ROLLING STOCK

EVOLUZIONE DEI CARRELLI PER ROTABILI MOTORI VELOCI

Manzo, M

Ingegneria Ferroviaria (Collegio Ingegneri Ferroviari Italinai, Piazza Croce Rossa, Rome, Italy)

No. 2, Feb. 1973, pp 137-150

Competitiveness with other means of transport imposes on the Railways, in addition to an improvement of the services (such as speed, safety and comfort), an appreciable reduction in expenditure for the maintenance of rolling stock and track. Rolling stock with satisfactory running qualities can be obtained only with bogies of particular design, making use of appropriate constructional solutions made available by the latest techniques. For the coding of the constructional principles, means of measurement are available which permit an exact knowledge of the influence of various parameters, leading one, at the same time, towards fundamental choices for running stability. A brief indication is given of the lines followed in the design of the latest bogies for Italian Railroad rolling stock, bringing out the results in practical tests and the savings achieved in the field of construction and maintenance.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 055641

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051447
INTERCITY AND ADVANCED TRANSPORTATION TECHNOLOGY

Cautley, P, British Railways Board

Canaveral Council of Technical Societies, Cocoa Beach, Florida

1972, pp 37-44

9th Space Congress Proceedings, Cocoa Beach, Florida, 19-21 April 1972.

The need for high speed intercity rail travel has been recognized in the last decade as evidenced by the developments in Japan, France, Germany and Italy. This paper defines the concept, development and application of the British Rail Advanced Passenger Train (APT) to provide a competitive form of intercity transportation making effective use of existing rail networks.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056355

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051448
POWER SUPPLY OF THE EQUIPMENT WHICH IS NOT TRACTION CONDITIONED IN THE EXPRESS MULTIPLE-UNIT TRAIN TYPE ET 403

DIE ENERGIEVERSORGUNG DER NICHT TRAKTIONSBEDINGTEN EINRICHTUNGEN IM SCHNELLTRIEBZUG ET 403

Scheideler, K

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 7, July 1973, pp 142-153

Express trains developed for intercity transportation for the West German Railroad System are considered. The air conditioning and kitchen equipment for the dining car is described, along with the facilities and features of the electric power supply system.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 058904

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051464
FREQUENCY-DEPENDENT ELASTOMER SUSPENSION COMPONENTS FOR FAST TRAINS

Batchelor, J, Railway Technical Center

Institute of Rubber Industries, London, England

Proceed, 1972, 6 pp, 11 Ref

Rubbercon 72, Institute of Rubber Conference Proceedings, 15-19 May 1972.

Requirements for a frequency-dependent spring, with little hysteresis, and for a damping material with little change of modulus with frequency were investigated together, as frequency-dependence of modulus and hysteresis are closely related. Dynamic test data on a variety of polyester urethanes are presented and shown to be consistent with an amorphous domain structure. The hysteresis correlates well with the rate of change of modulus with frequency.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 059735

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051471
URBAN RAPID RAIL VEHICLE AND SYSTEMS PROGRAM

Boeing Company, Vertol Division, Surface Transportation Systems Department, Philadelphia, Pennsylvania, 19142 UMTA-IT-06-0026

DI-74-10021-1, Ann Rpt, 7207-7307, July 1973, 70p

Contract DOT-UT-10007

See also report dated Jul 72, PB-212 848.

The report reviews the second year's efforts of the Urban Mass Transportation Administration's Urban Rapid Rail Vehicle and Systems Program. The objective of the program is to enhance the attractiveness of rail rapid transit to the urban traveler by providing him with transit vehicles that are as comfortable, reliable, safe and economical as possible. Review of the BART prototype testing has been completed. The State-of-the-Art Car (SOAC) was delivered and tested at the High Speed Ground Test Center. The full-scale SOAC mockup has been exhibited in several cities. The design and specification development phase of the Advanced Concept Train (ACT-1) was completed.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224141/2

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PB-224141/2

051482
MASS TRANSIT TECHNOLOGY: A COMPREHENSIVE SURVEY OF VEHICULAR HARDWARE

Sibley, KS

Rensselaer Polytechnic Institute, School of Engineering, Troy, New York

Final Rpt, June 1973, 132p

Grant NSF-GT-32162

Prepared in cooperation with New York State Assembly Scientific Staff, rept. no SS-304. Sponsored in part by Urban Mass Transportation Administration. Master's thesis.

An inventory of mass transit hardware has been compiled, tabulated in an organized format and classified first according to the most appropriate functional usage and then according to physical attributes. Information conveyed includes background data, vehicle description, vehicle performance, system characteristics, land use, costs and considerations, significant advantages and disadvantages and illustrations. The inventory is to be reviewed not only as a collection of specific transit vehicles and example systems but also with attention given to the advances in vehicle component technology represented therein.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224568/6

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PB-224568/6

051587
DETAIL SPECIFICATION FOR STATE-OF-THE-ART CAR

Boeing Company, Vertol Division, Surface Transportation Systems Department, Philadelphia, Pennsylvania

D174-10018-1, May 1973, 208 pp

Contract DOT-UT-10007

Includes Revision A dated Oct 73. Supersedes PB-222 147. Detail specification report.

The report contains the detail specification for the State-of-the-Art Car (SOAC). This specification represents the SOAC configuration as delivered to the Urban Mass Transportation Administration (UMTA) for test and demonstration. The SOAC has been developed under UMTA's Urban Rapid Rail Vehicle and Systems program which has the objective of enhancing the attractiveness of rapid rail transportation to the urban traveler by providing him with transit vehicles that are as comfortable, reliable, safe and economical as possible. The SOAC is one phase of this program. (Modified author abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225934/9

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PB-225934/9

051901
BART PROTOTYPE CAR DEVELOPMENT PROGRAM—VOLUME 1, PROGRAM SYNOPSIS

Rohr Corporation, P.O. Box 878, Chula Vista, California, 92012

Vol. 1, UMTA-CA-06-0032-73-1, Final Rpt, 6906-7112, Mar. 1973, 90 pp, Figs

Contract CA-06-0032

Sponsored by Urban Mass Transportation Administration and prepared in cooperation with Parsons Brinckerhoff-Tudor-Bechtel (Engineering consultants to the Bay Area Rapid Transit District, Oakland, California).

This report traces The Bay Area Rapid Transit District Rapid Transit Vehicle Program through the planning phase, design phase, and the development and prototype test phase. The program was established to enhance the attractiveness of rail rapid transportation to the urban traveler by providing a comfortable, reliable and safe car incorporating the latest engineering concepts. This report provides design justifications, testing highlights, and reasons for modifications and changes resulting from the prototype test program, sponsored by the Urban Mass Transportation Administration. This report is divided into two volumes. Volume 1, Program Synopsis, provides an overview of the complete program and is directed toward Federal, Local Government and Rail Transit Management personnel. Volume 2, Program Details, provides the detailed technical material for Engineering personnel.

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051902
BART PROTOTYPE CAR DEVELOPMENT PROGRAM—VOLUME 2, PROGRAM DETAILS

Rohr Corporation, P.O. Box 878, Chula Vista, California, 92012

Vol. 2, UMTA-CA-06-0032-73-2, Final Rpt, 6906-7112, Mar. 1973, 273 pp, Figs, 5 Tabs

CA-06-0032

Sponsored by the Urban Mass Transportation Administration, DOT and prepared in cooperation with Parson Brinckerhoff-Tudor-Bechtel (Engineering consultants to the Bay Area Rapid Transit District, Oakland, California).

This report traces The Bay Area Rapid Transit District Rapid Transit Vehicle Program through the planning phase, design phase, and the development and prototype test phase. The program was established to enhance the attractiveness of rail rapid transportation to the urban traveler by providing a comfortable, reliable and safe car incorporating the latest engineering concepts. This report provides design justifications, testing highlights, and reasons for modifications and changes resulting from the prototype test program, sponsored by the Urban Mass Transportation Administration.

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051908
WORK CONDITIONS AND EQUIPMENT DESIGN IN DIESEL LOCOMOTIVES: FEASIBILITY STUDY AND RECOMMENDATIONS

Michaut, GME McGaughey, TP

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada

#72-11, July 1972

This report deals with a variety of problems associated with work conditions in locomotives. The purpose is to present guidelines for further recommendations concerning the design of a new cab and improvements for existing cabs. Observations were conducted on workers during long periods in their actual conditions on routes between Montreal and the West Coast. The authors have identified general psychological problems, and problems connected with the design of the cab.

ACKNOWLEDGEMENT:
Canadian Institute of Guided Ground Transport

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Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: Req Price

051909
THERMAL STRESS DEVELOPED IN S PLATE, STRAIGHT PLATE, AND DEEP DISH WHEELS

Wetenkamp, HR, Illinois University, Urbana

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-RT-1, Jan. 1973, 11 Fig, 1 Tab, 8 Ref

Contributed by the Rail Transportation Division, ASME, for presentation at the IEEE-ASME Joint Railroad Conference, St. Louis, Mo., April 11-12, 1973.

Heating of the rim of a railway car wheel by brake shoes can result in axial movement of the rim of the wheel and a change in hub diameter. Five-wheel designs were examined by theoretical analysis and compared with some experimental results obtained from subjecting the wheels to braking cycles on the dynamometer. Specific values of elastic stress developed by a given thermal load are presented so that direct comparison between wheel designs is possible.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051919
AXLE FAILURES AND REMEDIAL MEASURES

Clarke, CW

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 5, Sept. 1973, 6 pp

Shortly after some locomotives were placed in service as an emergency measure, a remarkable incidence of axle failures occurred. This paper describes a review of the axle design, how axle stresses were computed, and the remedial measures effected.

ACKNOWLEDGEMENT:
British Railways, 29798

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051924
COUPLER AND KNUCKLE SERVICE PERFORMANCE

Morella, N Cook, RM

Association of American Railroads Research Center, 3140 South Federal Street, Chicago, Illinois, 60616

No. 5, #R-149, Tech Rpt, 7106-7303, June 1973, 67 pp, 3 Ref

Sponsored by RPI/AAR Railroad Coupler Safety Research and Test Project.

Combines failure data from two sources with fleet population data to obtain a relative failure index which is a measure of the relative failure rates among the coupler and knuckle components currently in freight service on american railroads. Also, includes statistics from the AAR mechanized car repair billing exchange system for couplers and knuckle components currently in freight service on

American Railroads. Also, includes statistics from the AAR mechanized car repair billing exchange system for couplers and knuckles removed from service during an eighteen month period. A relative wear index has been calculated. Includes recommendations for removal from service of highest failure rate coupler and knuckle components.

ACKNOWLEDGEMENT:
Association of American Railroads Research Center

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AAR, Repr PC: Req Price

051925
YOKE SERVICE PERFORMANCE, AAR MECHANIZED CAR REPAIR BILLING EXCHANGE SYSTEM DATA

Morella, N Cook, RM

Association of American Railroads Research Center, 3140 South Federal Street, Chicago, Illinois, 60616

No. 6, # R-150, Tech Rpt, 7110-7303, July 1973, 24 pp, 4 Ref

Sponsored by RPI-AAR Railroad Coupler Safety Research and Test Project.

Presents the initial 18 months of yoke removal data (for foreign cars only) reported to the newly established AAR Mechanized Car Repair Billing Exchange System in Washington, D. C. This computerized system lists the reason the yoke was removed under eight code numbers which interpreted mean, worn out, broken, missing, bent, bent beyond repair, obsolete, account other repairs, and removed in good condition. There were a total of 19,647 yoke removals reported in the initial 18 months. The number of reporting railroads (11 total) participating in the system at the end of the first 18 months accounted for a little over half of the freight car ownership in 1972 and therefore perhaps about half of the yokes removed from foreign cars by railroads (foreign cars are cars not owned by the reporting railroad). Considering this condition combined with other factors it seems reasonable to multiply the total removals reported to the AAR Billing Exchange by about 6 to obtain the total removals by the industry for the entire current service fleet of freight cars.

ACKNOWLEDGEMENT:
Association of American Railroads Research Center

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AAR, Repr PC: Req Price

051926
CURRENT POPULATION OF COUPLERS AND KNUCKLES IN FREIGHT SERVICE INCLUDING IDENTIFICATION OF RECLAIMED COUPLERS

Morella, N Cook, RM

Association of American Railroads Research Center, 3140 South Federal Street, Chicago, Illinois, 60616

No. 4, # R1-119, Tech Rpt, 7205-7210, Feb. 1973, 85 pp, 1 Ref

Sponsored by RPI-AAR Railroad Coupler Safety Resarch and Test Project.

A field population study looking at couplers and knuckles on one end of 5053 active freight cars in the U. S. fleet at eleven classification yards operated by nine major railroads at five different cities; namely, Chicago, Illinois, Washington, D. C., Atlanta, Ga., Houston, Texas, and Los Angeles, Calif. The specific coupler data included coupler catalog number, date of original manufacture, name of manufacturer and date most recently reclaimed. The specific knuckle data included knuckle catalog number in all cases but date of original manufacture and name of manufacturer only if the car was not coupled. Car data included age of car (new or rebuilt), type of car, capacity of car and car number.

ACKNOWLEDGEMENT:
Association of American Railroads Research Center

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AAR, Repr PC: Req Price

051936
AMTRAK'S FRENCH CONNECTION

Houser, FN

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 3, Feb. 1973, 2 pp, Phots

Amtrak recently moved to acquire a pair of French five-car, turbine-powered trainsets expected to go in service in the Midwest later this year. The new RTG (Gas turbine trainset) is propelled by a pair of gas turbines driving through hydraulic transmissions to the truck under the lead end of each power car at the train's end. Between the two power cars are three unpowered trailers. In addition to producing 2,280 hp for traction, a smaller turbine in each power car drives a 250-kw auxiliary generator which supplies electric power for all train services—lighting, heating and air conditioning.

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051944
LIGHT RAIL VEHICLES FOR THE GOTHENBURG TRANSIT SYSTEM

Mansson, J, Goteborgs Sparvagar

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 184, Pt3S, 1970, 6 Fig, 2 Tab

Proceedings of the Symposium on Rapid Transit Vehicles for City Services 22-23 April 1971. Arranged by the Automobile Division of the Institute of Mechanical Engineers.

The paper describes a new type of light rail vehicle which has been introduced into the Gothenburg transit system. The general features of the vehicle are described and details given of the equipment. Maintenance requirements, testing, and reliability are discussed. The differences which will be incorporated in future vehicles are briefly noted.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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051947
RAIL VEHICLES FOR URBAN AND UNDERGROUND SERVICE

Jowett, WG, British Railways Board

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 184, Pt3S, 1970, 22 Fig, 4 Ref

Proceedings of the Symposium on Rapid Transit Vehicles for

City Services 22-23 April 1971. Arranged by the Automobile Division of the Institute of Mechanical Engineers.

The paper commences with a brief description of the commuter situation in most great cities of the world today, and gives a little background as to why the situation has arisen. The basic elements of train movement are briefly considered with special reference to urban and suburban traffic, and the salient requirements from this are combined with other electrical, mechanical, and passenger amenity features to form a picture of the general requirements for this type of stock. Next, examples are given of modern stock designed to meet the requirements. The new high-density stock of British Railways is described and reference is made to the London Transport Victoria line stock with particular reference to automatic train operation. Short descriptions are then given of North American practices, followed by a brief review of European developments. For these examples a general similarity in design emerges which very adequately meets the requirements of the commuter problem, and it is suggested by the author that an urban railway system in conjunction with other forms of street transport can provide a suitable overall solution to this modern and increasing problem.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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051955
ROLLING STOCK FOR SUBURBAN SERVICES. PROGRAMME TO BE MET. TYPES OF SOLUTIONS. TECHNICAL ARRANGEMENTS ADOPTED BY THE SNCF

Portefaix, A, French National Railways
Boileau, R, French National Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 38 pp, 32 Fig

Rolling stock for suburban railway services must meet numerous demands, some of which are contradictory. Even when seeking to determine priorities or accepting compromise solutions, the diversity of the services to be worked calls for a certain diversification of rolling stock. The present report is intended to show how the SNCF have classified the demands to be satisfied, to describe the solutions which have been adopted, and to emphasize the measures which have been taken in order to ensure that the unavoidable diversification of types does not affect the principles of homogeneity and standardization which govern the economy of operation and maintenance of a fleet of rolling stock.

ACKNOWLEDGEMENT:
Rail International

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051960
PUBLIC PASSENGER TRANSPORT VEHICLES FOR REGIONAL RAILWAYS

FAHRZEUGE IM OFFENTLICHEN PERSONENNAHVERKEHR FUER REGIONALBAHNEN
Runkel, M

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel Und Dr. Strasse, Darmstadt, West Germany)

No. 3, Mar. 1973, 10 pp, 7 Fig, 5 Tab, Refs

The author considers that rolling stock for use on regional services should be designed on the basis of the following two principles: sufficient capacity to enable every passenger to be carried, at peak hours, with an acceptable degree of comfort; capacity reduced to a sufficient extent to ensure that the accommodation provided is not excessive during offpeak periods. He sets out a number of histograms showing the distribution of traffic in accordance with the different hours during the day, and deduced therefrom a law covering the distribution of traffic as a percentage of the traffic expected at the peak hour. He defines the proportion of standing room which appears to be acceptable, as well as the surface area provided for passengers, the standards covering the maximum number of seated and standing passengers to be allowed for in the case of each door, the dimensions of corridors, and door vestibules, and the widths of door necessary for the flow of passengers, and, basing on these data, he designs 4 types of coach suitable for different hourly volumes of passenger traffic, provided with differing degrees of comfort, and carried in trains of varying frequency.

ACKNOWLEDGEMENT:
International Union of Railways, 1059

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
1059

051962
ROLLER BEARINGS USED ON HIGH-SPEED RAIL VEHICLES

WALZLAGER IN SCHIENENFAHRZEUGEN FUER HOHE GESCHWINDIGKEITEN
Hammar, HB Pitroff HE

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2/3, 1973, 11 pp, 17 Fig, 20 Ref

The combination of load and speed is decided by the condition of the track and operating considerations. In order to arrive at the dimensions of the roller bearings, account must be taken of every combination of stress, as well as of their length of life. The impulse control, depending on the frequency, enables use to be made of rapid traction motors, without commutators. The increase in the number of revolutions, in the case of these motors, requires use to be made of new anti-friction methods, as well as of flexible intermediate links, for resilient transmission of the moment of rotation between the motor and the gears. In spite of the higher speeds, expenditure on maintenance must be reduced. Control and safety equipment in the vehicle is to be amplified by means of testing equipment in the repair shops.

ACKNOWLEDGEMENT:
International Union of Railways, 1042

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051963
IS THE CORRUGATION AND PITTING OF RUNNING AND ROLLER ASSEMBLIES CAUSED BY ULTRASOUND?

RIFFELN UND GRUEBCHEN AUF ROLL–UND WALZKORPERN. SIND SIE ULTRASCHALLBEDINGT?
Werner, K

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

No. 4, 1973, 8 pp, 10 Fig, 18 Ref

The corrugation of railway wheels, which is revealed on the test bench, is due to the tone-frequency bending vibration of the wheel discs. Corrugation which is vertical to the direction of running is explained by lateral ultrasonic waves.

ACKNOWLEDGEMENT:

International Union of Railways, 1019

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International Union of Railways, BD, 14 rue Jean Rey, 75-15 Paris, France, Repr PC: Req Price
1019

051968
TECHNICAL PROBLEMS CONCERNING HIGH-SPEED TRANSPORT

TECHNISCHE PROBLEME DES SCHNELLVERKEHRS
Rahn, T Althammer, K Bischofberger, G Zeilhofer, M

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2/3, 1973, 9 pp, 15 Fig, 3 Ref

Based on the operating programme, and the problems of high-speed rail transport, details are shown of high-speed passenger coaches, and goods wagons. Solutions to tractive and braking problems are then discussed. Details are also shown of the effects of high-speeds on the layout, and deformation, of the track. Based on the terms "dependability" and "security", a description is given of a data-processing system. Finally, the authors deal with the necessity of research and development.

ACKNOWLEDGEMENT:
International Union of Railways, 996

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052069
THE WESTINGHOUSE APPROACH TO THE METROLINER UPDATING PROBLEM

Uher, RA

Westinghouse Electric Corporation, TRansportation Division, Avenue A and West Street, East Pittsburgh, Pennsylvania, 15112

Feb. 1974, 82 pp, Figs, Tabs, 4 Ref

The Metroliners have operated in high speed, intercity service in the Northeast Corridor for several years. During this period of time, they have received public acceptance as a fast, convenient and comfortable mode of transportation. However, a further expansion of service to greater passenger volume has been prevented by the low availability of the fleet. In late 1970, the Department of Transportation instituted a Metroliner Updating Program designed to improve the availability of the fleet. The program is proceeding in three major phases: (1) Program Definition, (2) Engineering Design and Prototype Hardware, and (3) Verification Testing. At this writing four of the present cars have been modified to prototype configuration and are ready for verification testing. This paper describes the approach to the program taken by Westinghouse Electric Corporation which updated two of the cars. An analysis of the causes of low reliability and poor maintainability led to a definition of the updating program. Simplified performance requirements and major modifications to several car systems are expected to increase reliability by a factor of four over that of the present car. Designs which are directed toward ease of maintenance together with monitoring and failure diagnosis equipment are expected to improve the maintainability so that 80% rather than the present 20% of all problems can be diagnosed and repaired within the turn-around time of one hour at the terminal.

ACKNOWLEDGEMENT:
Westinghouse Electric Corporation

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Westinghouse Electric Corporation, Transportation Division, Avenue A and West Street, East Pittsburgh, Pennsylvania, 15112, Repr PC: Req Price

052078
PUBLIC ADDRESS ON DB TRAINS

Wendrich, H, German Federal Railway

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 2 pp, 2 Fig

In readiness for the 1976 deadline when all coaches in European international traffic must be wired for public address, the German Federal Railway has developed standardised loudspeader installations based on decentralised amplifier techniques. Much of this equipment is used also in its suburban rolling stock, where exterior loudspeakers and selective announcements in different units within a train help to speed movement of crowds.

ACKNOWLEDGEMENT:
Railway Gazette International

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052091
AAR WHEEL OUTPERFORMS OTHERS

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 145, No. 11, Nov. 1971, 2 pp

Six treads—the AAR standard, the standard with a drop-off taper, cylindrical with a drop-off taper, a modified Heumann contour, an unbalanced worn tread and a balanced worn tread—were put through a battery of tests by Griffin engineers during a 13-day period last year. Scene of the testing was a 20-mile stretch of Burlington Northern trackage.

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052099
RESILIENT WHEELS OF SAB DESIGN APPLIED TO MAINLINE LOCOMOTIVES OF HIGH POWER

Cavell, BG

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 1, Jan. 1974, 7 pp, 8 Fig, 3 Phot, 3 Ref

Resilient wheels of SAB design for main line use have been applied to some 5,000 wheelsets and are standard for BR Class 86/2 175 km/h 3,700 kW electric locomotives to reduce lateral and dynamic wheel/rail forces after exhaustive testing under high-speed main-line conditions. Experience on SJ has shown increased tyre life on Class DM3 7,300 kW electric locomotives due to absence of slipping and that creep deflection after long periods of standing corrects itself very shortly after running is resumed.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

052104
THE EXPERIMENTAL TURBINE TRAIN T.G.V.-001

Bernard, JP, French National Railways

French Railway Techniques (Federation des Industries

Ferroviaires, 12 rue Bixio, 75007 Paris, France)

No. 1, 1973, 24 pp, 25 Fig

Turbine train T.G.V.-001 is the first example of rolling stock designed from the start for speeds in excess of 250 km/h. Of course it is a multiple-unit train because it is a certain fact that locomotive hauled trains, the traditional arrangement inherited from the days of steam traction, are no longer suitable for very high speed running. The multiple-unit train offers considerable advantages such as better aerodynamic characteristics, limitation of the axle load to about 16 tonnes, a high proportion of powered axles and better braking performance.

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052122
ELECTRIC EQUIPMENT OF THE EXPRESS MULTIPLE-UNIT TRAIN TYPE ET403

DIE ELEKTRISCHE AUSRUESTUNG DES SCHNELLTRIEBZUGES ET 403
Koeller, HM Loessel, W Winden, R

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 6, 22 pp, 10 Ref

Principal features, layout and operation are described of the electric equipment of a recently developed electric train used by the West German Railroad System for rapid intercity traffic. The train reaches a maximum speed of 200 kn/hr; an acceleration of 0.6m/sec/sec is attained in about 120sec.

ACKNOWLEDGEMENT:
Engineering Index, EIX731201693

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052310
ENGINEERING ASPECTS IN THE OPERATION OF LONG CARS

Magee, GM, Association of American Railroads

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 586, Proceeding, July 1964, pp 743-747, 2 Fig

Engineering aspects are discussed in the operation of long cars. Problems discussed include loading and unloading, clearances, negotiability of sharp curves, derailment, fatigue cracks, and rocking action. Geometry of coupled cars is noted. Problems are being continually investigated, and progress has been made in increasing clearances, suggesting new car design, and analyzing tests dealing with impact and lateral car motion.

ACKNOWLEDGEMENT:
Association of American Railroads

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053729
ROLLING STOCK FOR THE SUBURBAN SERVICES OF THE ITALIAN STATE RAILWAYS

Giovanardi, G, Italian State Railways
Cardini, E, Italian State Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvain, 1000 Brussels, Belgium)

No. 1, Jan. 1973, 25 pp, 34 Fig

The Italian State Railways have developed suitable suburban public transport systems in the more important Italian conurbation areas such as Rome, Milan, Turin, Genoa, Bologna and Naples. In this connection, it became necessary, after the end of the second world war, to provide purpose designed rolling stock for these services. Special vehicles with low slung floors were developed for the peak commuter services operated in the suburbs of the more important cities. These vehicles afford direct access from the station platforms through two large vestibules with double doors on either side.

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053746
THE FUTURE 25 KV 50 HZ MULTIPLE-UNIT TRAINS

Chabanas, G, French National Railways

French Railway Techniques (Federation des Industries Ferroviaires, 12 rue Bixio, 75007 Paris, France)

No. 4, 1973, 6 pp

This article discusses the multiple unit trains designed to operate as two motor cars with two trailer cars between. The article covers body and chassis design, traction motor characteristics, regenerative braking, truck design, braking characteristics, and electrical equipment.

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053748
NEW COACHES FOR EUROPE. A NEW GENERATION OF PASSENGER ROLLING STOCK REFLECTS THE RAILWAYS' FAITH IN THEIR FUTURE

Modern Railways (Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England)

Vol. 31, No. 305, Feb. 1974, 1 p, 1 Phot

This article describes the new passenger cars being placed in service on the various European Railways. Diagrams of the car interiors are given, and some information is furnished on trucks, etc.

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053750
TUBESILL: HOW CAR CONSTRUCTION CAN BE SPEEDED

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 147, No. 5, June 1973, 3 pp, Phots

The freight car backbone—the center sill—is taking on a new look in a group of 50 multi-purpose open-top hopper cars orderly by the Soo Line from The Maxson Corp. In the cars, the standard Z section sill has given way to a square tube section (called, appropriately, Tubesill) furnished by Welded Tube Company of America.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

053751
MLW M420 HAS CN'S NEW CAB DESIGN

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 147, No. 5, June 1973, 2 pp, Phots

The major feature of the new design is the cab which is the product of a two-year development project of CN. The new locomotives have new safety factors and crew comfort features designed to improve the work environment of locomotive operators.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

053829
CONVERSION OF THE TGS EXPERIMENTAL TURBOTRAIN FOR COMMERCIAL SERVICE

LA TRANSFORMATION DU TURBOTRAIN EXPERIMENTAL T.G.S. POUR L'UTILISATION EN SERVICE COMMERCIAL
Boutonnet, JC, French National Railways
Chambadal, M, French National Railways

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Oct. 1973, 9 pp, 7 Fig

The authors, Ingenieurs Principaux Adjoints, SNCF Rolling Stock Management, begin with a description in retrospective of the trials of the first SNCF experimental turbotrain, the TGS. Without retracing the construction of this trainset in 1966/67 which was reported in detail in an article published by the RGCF in 1968, they refer to the main stages in this experiment which provided valuable information for the definition of certain fundamental characteristics of the turbotrains built subsequently (ETG, RTG and TGV 001). After explaining why it was decided to convert the TGS into a fast trainset for party charter working, they describe the alterations made during this conversion, particularly the provision of an air-conditioned section and dining facilities completed in 1973, as well as certain standardization and overhaul work carried out during the operation. In conclusion, they give details of the research that preceded the conversion and the manner in which it was executed.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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053831
A NEW MEANS OF STUDYING RAILWAY AERODYNAMIC PROBLEMS. THE LONG WIND TUNNEL AT THE SAINT-CYR L'ECOLE AEROTECHNICAL INSTITUTE

UN NOUVEAU MOYEN D'ETUDE DES PROBLEMES D'AERODYNAMIQUE FERROVIAIRE: LA SOUFFLERIE A VEINE LONGUE DE L'INSTITUT AEROTECHNIQUE DE SAINT-CYR L'ECOLE
Bernard, M, French National Railways

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Dec. 1973, 8 pp, 10 Fig

A new wind tunnel for aerodynamic tests on railway vehicles has been operational since May 1972. It meets the need felt so many times, when experimenting with high-speed trains, to have available a wind tunnel sufficiently long to take the models of trains made up of a large number of vehicles. This testing plant, built on the initiative and with the aid of S.N.C.F., comprises a 15 to 18 m long and 2.20 m wide tunnel of which the height can be regulated between 1.10 and 1.75 m. It can take 1/20 th scale models of trains 300 m long in full size. Maximum air flow speed is 60 m/s. Drag and the corresponding moments are measured by means of dynamometric bridges with strain gauges. The research carried out with this wind tunnel since it was opened has been mainly confined to the aerodynamic resistance of long trains of the TGV type and the intakes and exhausts of the turbines on ETG and RTG turbotrains.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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053834
500 COACHES FOR INTERNATIONAL SERVICES ORDERED BY EUROFIMA FROM A GROUP OF EUROPEAN MANUFACTURERS FOLLOWING AN INTERNATIONAL INVITATION TO TENDER

500 VOITURES POUR LE SERVICE INTERNATIONAL
de Lespinois, PB, French National Railways
Marcotorchino, J, French National Railways

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Dec. 1973, 6 pp

The authors, who are respectively Ingenieur General at SNCF Headquarters and Ingenieur en chef at the Rolling Stock Department, explain in this article that the wish to unify and improve operating conditions led the UIC to design a standard type of passenger coach, after dealing with the wider and more varied sphere of freight rolling stock. The article refers more specifically to a procedure used for the first time in this area which consisted of a project followed by an invitation to tender, both being European and international in scope. The authors deal in turn with the part played by the UIC organization working in cooperation with industry, the drafting of the specification and the invitation to tender, and the contribution made by EUROFIMA which is a non-committed organization. Following the tenders submitted in 1971, an order was placed on 18 May 1973 for 500 coaches, including 10 prototypes, with a group of European manufacturers, after technical, commercial and financial details had been settled. The technical characteristics of the European standard coach are then given, and it is stated that improvements may be incorporated after the prototypes have been tested.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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053837
STANDARDIZED FORMAT FOR RAILROAD ENVIRONMENT

Cook, RM, Association of American Railroads

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-RT-2, Jan. 1973, 8 pp, 4 Fig

This paper outlines a format for recording railroad environmental spectrum data that utilizes the standard arrangement of the modified Goodman diagram. In this form the environmental data is applicable to theoretical finite life fatigue design and to variable-cycle spectrum-type fatigue testing. Maximum loadings for operational guidance, equivalent static design analysis, lading damage studies, and proof testing are also accurately portrayed. The extensive environmental data requirements for modern design dictate the need for standardization of data format and content to provide compatibility of data from various sources and facilitate formation of the national data bank required by the railroad industry.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053846
NEW "STANDARD" BOXCARS

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 6, Nov. 1973, 3 pp, Phots

Pullman-Standard is producing a new general purpose boxcar. The new model boxcar has a direct lineal relationship to the PS-1 "standard" boxcar which was manufactured in large quantities about two decades ago. The new boxcar is stronger, standardized for large-scale production, but with key customer options. A very detailed description is given in this article.

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053847
CONTINUING TO MEET THE RAILROAD ENGINEERING CHALLENGE TOGETHER

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

Proceeding, 1974, 107 pp

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973. See RRIS #s 053848-053857 for individual papers.

In addition to the major articles, which are separately abstracted of themselves, this proceedings book has several short articles, keynote speeches, and discussions on the general subject of freight car components.

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053849
FEDERAL RAILROAD ADMINISTRATION RESEARCH PROGRAMS

Ullman, KB, Federal Railroad Administration

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 5 pp, 12 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

This article describes some of the FRA research programs in the area of trucks and suspension systems. It discusses truck requirements and variables affecting design.

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053852
A RE-EVALUATION OF FREIGHT CAR TRUCK PERFORMANCE REQUIREMENTS

McLean, LA, Seaboard Coast Line Railroad

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 10 pp, 16 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

This article discusses truck performance requirements. It covers such items as safety, tracking, endurance, ride cushioning, component wear resistance, and rollability. Brake beam moment is considered.

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053854
FATIGUE DESIGN CRITERIA FOR CARBODY BOLSTERS

Reichow, K, Pacific Car and Foundry Company

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 8 pp, 29 pp

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

The purpose of the static test is to prove design and, more or less, verify stress calculations of the bolster. Where, this is a step in the right direction, it does not point out indeterminates and areas of concentrated high stresses. It is these high stress areas that will lead to fatigue failure of the bolster. Unless these areas are located and steps taken to correct these conditions, failure will continue to occur. In making these tests, employed was the use of photoelastic analysis, which has helped in pointing out high stress areas that calculations of the bolster would not indicate.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053855
ACF'S PROGRAM TO IMPROVE CARBODY BOLSTER AND CENTERPLATE AREAS RIGID UNDERFRAME CARS.

Billingsley, RH, Jr, ACF Industries, Incorporated
Binsbacher, ACF Industries, Incorporated

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 6 pp, 15 pp

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

The AMCAR design and test program for 100-ton centerplates is presented. In the design phase, a team with maximum experience and background in the problem area was assigned to produce candidate configurations for both new and retrofit 100-ton centerplate applications. The general criteria set up as guidelines are listed. The key words are "integrated design." The centerplate, center filler, and associated bolster structure were to be treated as a functional subsytem.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053856
DETERMINATION OF FATIGUE DESIGN CRITERIA FOR CARBODY BOLSTER AND CARBODY CENTERPLATE AREAS

Manos, WP, Pullman-Standard Car Manufacturing Company

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 7 pp, 21 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

Fatigue testing has always been a part of Pullman-Standard's testing practice. In retrospect it seems that the evolution of bigger and longer cars and declining track conditions introduced roll conditions for which the industry was not prepared. In May of 1967 the DT&I Railroad furnished a hy-cube car so that P-S could seek out the problems and their causes. At the test center this car was equipped with a new set of "in-kind" centerplates that were strain gaged in the critical areas.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053857
TRADE-OFF ECONOMICS FOR JUMBO RAIL CARS

Meislahn, HS, Illinois Central Gulf Railroad

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1974, 7 pp, 14 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

The original topic for this presentation was limited to the trade-offs between large railroad cars and track structure. But there are several other economic trade-offs that large cars force the railroad industry to make, and some of these have received rather little analysis or comment. This list includes five topics: 1) Operating expenses for large cars, real compared with formula; 2) Capital costs of large cars: a case of diminishing returns; 3) The relationship between heavy cars and track wear; 4) Heavy cars as a limit on line capacity; 5) The marketing implications of large cars in our post-industrial economy.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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053866
FREIGHT CAR INNOVATION AND DESIGN

Webb, CE, Southern Railway System

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 2, Feb. 1974, 5 pp, Phots

This article describes the Southern's efforts to obtain better freight cars. Car and truck design improvements are discussed. Truck hunting research is discussed, and so is the use of computers in car design and in fleet analysis.

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

053883
MOVES TOWARD STANDARD WAGONS IN EUROPE

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 2, Feb. 1974, 4 pp, Phots

At a time when work is well advanced on the development of 12 standard designs of freight wagon for European railways, it is useful to examine current trends in wagon design. These in turn will play a considerable part in determining how far the UIC-sponsored designs become the basis of multi-national bulk orders.

ACKNOWLEDGEMENT:
Railway Gazette International

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053980
AUSTRALIAN LONG DISTANCE PASSENGER DMU STOCK

Blakeney-Britter, WC

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 5, Sept. 1973, 6 pp, 15 Fig

This paper describes the features of these cars, including the design parameters, the power units, transmissions, trucks, brakes, ride quality, sound levels, and economics of operations.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

053993
FACTORS AFFECTING AXLE STRESSES

Horger, OJ, Brenco Roller Bearing Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-6, Aug. 1970, 5 pp, 10 Fig, 10 Ref

Changing operating environment suggests a critical review of heat-treating and design specifications for axles used under freight cars, locomotives, and transit equipment. Too little application in practice is being made of advanced technology to increase the fatigue strength of axles. Various means are presented to show how the detrimental influence of high stress concentration factors and fretting corrosion on axle and wheel assemblies can be reduced.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053994
DESIGN CONSIDERATIONS FOR CAR BODY BOLSTER THROUGH SILL-CUSHIONED UNDERFRAME FREIGHT CAR

Cook, RM Halcomb, SP

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-5, Aug. 1970, 9 pp, 6 Fig

This paper reviews the changes in freight-car body bolster design brought about by the transition from the rigid underframe car to the modern through-sliding sill hydraulically cushioned cars of the 60's. Space limitations to the body center plate and above the bolster are outlined to describe the design envelope. A theoretical method of structural analysis is then presented for the cushioned underframe body bolster under vertical loading conditions which normally govern the design.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053997
FREIGHT CAR CUSHIONING WITH VARIABLE ORIFICE HYDRAULIC SHOCK ABSORBERS

Hawthorne, VT, Keystone Railway Equipment Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-RR-5, Jan. 1970, 9 pp, 14 Fig, 4 Ref

Cushioned freight car impact tests and test data are often misinterpreted. By combining experience obtained during several years of impact testing with a theoretical analysis of the physics of impact and performance of a variable orifice hydraulic cushion device, reasons for this misinterpretation are developed. The effect of not providing a safety factor in the optimization of the hydraulic cushioning design is discussed.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053999
PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1969-1970 REPORT OF SURVEY COMMITTEE)–CARS AND EQUIPMENT

Manos, WP, Pullman-Standard Car Manufacturing Company
Marshall, MG

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-10, Aug. 1970, 13 pp, 46 Fig, 35 REf

The Cars and Equipment portion of the 1969-1970 two-part report on Progress in Railway Mechanical Engineering is presented in this paper. Innovations and engineering advances discussed and illustrated include those for passenger cars and facilities, containerization, bulk-materials handling, and freight-car components.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054000
COMPONENTIZATION FOR FATIGUE DESIGN AND TESTING

Cook, RM, ACF Industries, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #71-RR-2, Jan. 1971, 8 pp, 5 Fig, 7 Ref

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the IEEE-ASME Joint Railroad Conference, New York, N.Y., April 19-21, 1971.

This paper briefly reviews the most common cause for fatigue initiation in freight cars, the specialized data required for theoretical fatigue design, fatigue design criteria, appropriate modern fatigue testing equipment, and the types of full-scale component tests believed most applicable to the car building and railroad industry. The concept of componentization is introduced as a means for expediting both the fatigue design and testing phases of a freight car development program. An objective has been to present the overall aspects of the subject in terms understandable to the person who is not an expert in the fatigue area by presenting only the fundamentals most directly applicable to freight cars.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054006
DEVELOPMENT OF FATIGUE STANDARDS FOR FREIGHT CAR TRUCK COMPONENTS AND WHEELS

Johnson, MR, IIT Research Institute

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-4, Dec. 1973, 11 pp, 17 Fig, 8 Ref

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

Factors which should be considered in the development of fatigue standards for freight car truck components and wheels are discussed. These standards would be formulated to provide a desired level of operational reliability, and they would be based on the fluctuating loads acting on the components in service. Typical data describing this environmental are presented. Statistical considerations in establishing the margin between the environmental loads and component fatigue strength are also described.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054007
DETERMINATION OF CAR BODY CENTER PLATE FATIGUE DESIGN CRITERIA BY FULL-SCALE CAR TESTING

Martin, AE, Dresser Transportation Equipment Division
Smith, LW, Dresser Transportation Equipment Division

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME-#74-RT-8, Jan. 1974, 9 pp, 16 Fig, 3 App

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

Fatigue design criteria are established based on full-scale car tests conducted on a 100-ton Southern Railway Hopper car. Stress levels on body center plate and its attachments to the car were determined for static car loading by means of jacking, for standing car dynamic loading under a full roll mode received on AAR rock and roll environmental prepared track testing. Correlation of determined stress loadings leads to three proposed axioms for design criteria.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054119
BEHAVIOR AND TRANSIT VEHICLE DESIGN

Lepper, R, Carnegie-Mellon University

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 13 pp, 6 Ref

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

A transit vehicle is a specific 'behavioral setting'. An ideal transit vehicle may be defined as a finite mobile enclosure which will self-load and carry a maximum number of self-stowing units which vary widely in physical size, weight and volitility of temperament while generating the minimum of internal friction within and among the units. The definition has two parts: the vehicle as carrier and the characteristics of the materials carried. The fit between the two, the carrier and the carried, is a mutual relationship. A bad fit will generate internal frictions within and among the carried. An improved fit will improve the competitive position of mass transit where there is modal choice.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054285
NEW SNCF DOUBLE-DECK COACHES FOR OUTER-SUBURBAN SERVICES

Tachet, P, French National Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 58-64, 11 Fig

Increasing growth of suburbia demands better passenger comfort because of longer daily journeys. To increase capacity SNCF develops a new series of stock with driving trailers for locomotive pull-and-push operation, the passenger in—and out-flow having been made a special study in relation to acceptable station times for train running in outer-suburban areas.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054286
WHEEL SIZES FOR CITY AND SUBURBAN STOCK

Koffman, JL

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 53-56, 4 Fig, 9 Ref

Dearth of suitable guiding information brought to a head with long-accepted P-D ratios restricting wheel-diameter reductions which are conducive to wheelset weight-saving, savings in first cost and energy economies. P-D ratios shown to over simplify the position and recent studies into contact stresses of wheels and rails have given valuable information. The author shows that maximum contact pressures of higher values than could be accepted by traditional P-D values are currently giving no problems.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054288
THE LRC–A CANADIAN HIGH-SPEED DIESEL TRAIN

Tomaka, JZ, Alcan Aluminum, Limited

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 88-96, 9 Fig, 1 Tab, 9 Phot

Canadian-consortium engineered light-weight prototype 125 mile-h 12-vehicle consist offers high-comfort standard incorporating two locomotive-type power cars and Alcan-designed coaches based on skin-stressed aluminum tube principal-and carried on power tilt bogies to suit 9-in. cant deficiency. MLW is the main builder with GE traction electrics.

ACKNOWLEDGEMENT:
Rail Engineering International

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054310
MONTREAL TIGHTENS UP FIRE PRECAUTIONS

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 1 p

Tenders to be opened on March 21 for 423 pneumatic-tyred cars required as part on Montreal's 1976-78 metro expansion programme must comply with a new specification designed to reduce heat build-up in tunnels and the associated risks of fire. Floors, walls and ceilings must be of material which does not release noxious gases when heated, and each car must carry fire extinguishers and emergency tools. Choppers with provision for regenerative braking will reduce the amount of waste heat generated, but ventilation inside the cars will also be improved.

ACKNOWLEDGEMENT:
Railway Gazette International

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054312
NS DESIGNERS IMPROVE THE FRONT END

Wijsenbeek, SS, Netherlands Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 2 pp, 5 Phot

A new generation of multiple-units, both for inter-city and suburban traffic, has given NS industrial designers an opportunity to reconsider the driving cab and front end layouts. The author, an NS Design Co-ordinator, describes the stages in development of two functionally different front end designs.

ACKNOWLEDGEMENT:
Railway Gazette International

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054313
TALGO OFFERS A NEW ANGLE ON SLEEPING CAR DESIGN

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 2 pp, 1 Fig, 1 Phot

An ingenious layout of angled compartments makes it possible to provide two-level sleeping berth accommodation within the small dimensions of a Talgo train. Using the already well-proven gauge changing system a sleeping car train on this principle is to enter service between Barcelona and Paris this summer.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

054314
FS AND RENFE TRY OUT TILT-BODY PROTOTYPE TRAINS

Santanera, O, Fiat Railway Division

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 4 pp, 3 Fig, Phots

A four-coach train with powered body tilting for use on sharply curved lines is being delivered by Fiat shortly for trial service in Italy, and a similar broad gauge set will be supplied to Spain next year. Two years of experience with Fiat's single Y.0160 test coach have demonstrated the efficiency of the electro-hydraulic tilt servo controlled by an accelerometer but supplemented by a gyroscope to reduce the response time to 0.1 sec.

ACKNOWLEDGEMENT:
Railway Gazette International

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054590
MILLION GALLON "TANK CAR"

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 1, Jan. 1974, p 59

General American Transportation, applying the benefits of volume transportation through the unit train, has come up with an integral train concept that it calls a "million gallon tank car." Since it involves handling techniques of storage tanks, it holds potential of improving the distribution of bulk liquid commodities. The new system has a unique combination of interconnects of flexible hoses and special valves. With them a million gallon 40 car tank train can be filled or emptied from a single connection. The train thus brings that capability to the terminal.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

054614
IMPROVING RAIL TRANSIT WITH A RESEARCH AND DEVELOPMENT PROGRAM

Silien, JS, Urban Mass Transportation Administration

Highway and Urban Mass Transportation (Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590)

Sept. 1973, pp 8-10, 2 Phot

Commuter rail, rapid transit, and light rail are all of vital importance to our national transit operation. Yet all have been neglected, particularly light rail, which has had no R&D work since the PCC streetcar of the thirties. The article describes UMTA research programs involving the State of the Art cars, the Advanced Concept Train, and the standard light rail vehicle.

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054615
SPECIFICATION FOR A STANDARD LIGHT RAIL VEHICLE

Highway and Urban Mass Transportation (Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590)

Sept. 1973, pp 22-24, 1 Phot

This article describes the development of specifications for a new light rail vehicle to replace the PCC streetcars now in service in several major U.S. cities. The specifications are for performance rather than for hardware. Standard overall dimensions are specified, but smaller versions may be produced if required. Each agency purchasing such vehicles can add its own requirements as an appendix to the standard specification.

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054627
REMOTE ELECTRICAL READ-OUT SPIRIT-LEVEL TECHNIQUE APPLIED TO BR APT BODY-TILT CONTROL

Granger, NJ, Irvin Great Britain Limited

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 124-127, 8 Phot

Unbalance of conducting liquid volume in glass-vial sensing-head of Irvin Electrolevel provides signal-control current precisely related to degree of tilt to effect action of bogie-mounted tilting-jacks when negotiating curves at high speed.

ACKNOWLEDGEMENT:
Rail Engineering International

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054630
VEHICLE CHANGE-OF-GAUGE DEVELOPED FOR UIC AS AN AUTOMATED-PROCESS AT BORDER STATIONS

Raeber, V

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 137-139, 2 Fig, 2 Phot

Railway axles and gauge-change equipment developed by Vevey SA for site-changing as an automated procedure—which received UIC award in 1968—being introduced at Irun RENFE for service trials.

ACKNOWLEDGEMENT:
Rail Engineering International

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054637
THE IMPORTANCE OF AERODYNAMICS IN THE DESIGN OF INTRA-URBAN TRAINS TRAVELLING IN TUNNELS

Kurtz, DW Dayman, B

High Speed Ground Transportation Journal (Planning-Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 3, Sept. 1973, pp 381-399

Aerodynamics can be a major factor in the design and operation of intra-urban subway-train transportation systems. In order to develop an adequate understanding of the aerodynamic characteristics of such systems, an experimental program was carried out. The major portion of the testing was conducted under equilibrium, incompressible conditions so that the fundamental aerodynamic characteristics could be isolated. The effects of geometric parameters (such as train speed, blockage ratio, wall roughness and train tunnel length) upon train drag and tunnel flow velocities were determined and compared with a simple theoretical model. The effect of aerodynamic forces upon typical subway-train operations is shown in order to give proper perspective to the importance of aerodynamics.

ACKNOWLEDGEMENT:
British Railways, 30110

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Planning Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706, Repr PC: Req Price

054644
PROTOTYPE E.M.U. SETS FOR DB'S HIGH-SPEED INTER-CITY ROUTES

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 128, No. 8, Aug. 1972, 3 pp, 3 Fig, 1 Phot

With all vehicles motored, the DB's ET.403 inter-city trains can be made up in any formation without affecting performance. Offering TEE standards of comfort, these 200 km/h sets have tyristor control and rheostatic braking, and are designed to operate over Swiss and Austrian railways as well as DB lines.

ACKNOWLEDGEMENT:
British Railways, 72/358

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054662
RAILPAC OVERCOMES CLEARANCE LIMITS

Railway Age (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 5, Mar. 1974, p 48

RailPac has evolved as a prototype standardized auto transporter. The tri-level transporter was developed in conjunction with Penn Central, Chessie, and Grand Trunk Western and the first prototype was delivered in Februrary. The superstructure of the car is installed on a TTX-type low-deck flat car. A slightly modified version of the car was developed for Chrysler.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054665
NEW CARS MARK SEPTA'S SEVENTH YEAR

Railway Age (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 5, Mar. 1974, p 34

In February 1974, the Southeastern Pennsylvania Transportation Authority (SEPTA) began to receive 144 new commuter cars from General Electric. The cars represent the fourth generation of stainless-steel cars, first of which were purchased in 1957 by the Pennsylvania Railroad, The Silverliner IV is an 85 foot vehicle with a seating capacity of 129. Each car has a "performance and fault indicator display unit" which is expected to simplify maintenance and trouble shooting. The unit had originally been developed by GE for Amtrack Metroliners. Fourteen of the cars will go to the Reading and 130 to PC.

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Canadian National Railways, Headquarters Library

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054718
THE DEPARTMENT FOR RIDING QUALITIES AND VIBRATION ENGINEERING OF THE FEDERAL RAILWAY RESEARCH INSTITUTE IN MINDEN (WESTPHALIA). 1. HISTORICAL DEVELOPMENT, FIELDS OF ACTIVITY, AND ORGANIZATION STRUCTURE

DIE ABTEILUNG FUER LAUF-UND SCHWINGUNGSTECHNIK IN DER BUNDESBAHN-VERSUCHSANSTALT MINDEN (WESTF.). 1. GESCHICHTLICHER WERDEGANG, ARBEITSGEBIETE UND GLIEDERUNG

Zottmann, W

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 3, Mar. 1974, p 69

After some general remarks on the problems in connection with the riding qualities and vibration properties of railway vehicles, the present state of research in this field is outlined briefly. The department for riding qualities and vibration engineering of the research institute, which is engaged in research work in this field at Deutsche Bundesbahn, has originated from the research centres for locomotives and wagons of the former RAW in Berlin-Grunewald. As compared to the original tasks of these research centres, the present fields of activities of the department are considerably more diversified and mainly focussed on the solution of the problems arising in connection with the proposed higher train speeds. In conclusion, the setup of the department is described, referring also to the special requirements regarding the technical qualifications and character of the employees.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054756
INSPECT WHEELS "IN MOTION": AT ITS ARGENTINE YARD, SANTA FE SET UP AND TESTED AUTOMATIC SYSTEM TO CHECK FOR FLAWS IN WHEELS

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 1, Jan. 1974, pp 50-52

Scanning Systems Inc., of Danbury, Connecticut developed an automatic system to check for flaws in freight car and locomotive wheels. In its Argentine Yard, Santa Fe set up and tested this development which is known as "Wheelfax." Various types of cracks were identified by ultrasonics, a non-destructive testing method widely accepted in metallurgy. The article explains in detail how the system works and its ability of detection at speeds of up to 30 mph. The system is also said to provide faster test evaluation.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: $1.00

054787
THE PASSENGER SECTIONS OF THE ET 403 HIGH-SPEED ELECTRIC MOTOR-COACH TRAIN

DER WAGENBAULICHE TEIL DES ELEKTRISCHEN SCHNELLTRIEBZUGES ET 403
Forster, H Liepert, M

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 8&9, 1973, 23 pp, 36 Fig, 2 Tab

This train is composed of leading and rear coaches, comprising ordinary compartments and a saloon compartment, and a dining car; adherence is total. The use of aluminium for the coach bodies has enabled the load per axle to be maintained at 15 ft. Special importance has been attached to heat and sound insulation. The train is air-conditioned throughout. The electrical equipment is placed along the underframes. Body tilting allows for higher speeds when taking curves. All the vehicles are linked by automatic coupler with central buffer.

ACKNOWLEDGEMENT:
International Union of Railways, 112

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054788
THE AERODYNAMICS OF TRAINS PASSING EACH OTHER IN TUNNELS AND ON THE OPEN TRACK. STUDIES AND EXPERIMENTS ON THE STATIONARY AND NON-STATIONARY DISTRIBUTION OF PRESSURE AND RESISTANCE ON RAILWAY VEHICLES BEFORE AND DURING THE PASSING OF TRAINS IN TUNNELS AND ON THE OPEN TRACK

ZUR AERODYNAMIK DER ZUGBEGEGNUNG IM TUNNEL UND AUF OFFENER STRECKE. EXPERIMENTELLE UND THEORETISCHE UNTERSUCHUNGEN DER STATIONAREN UND INSTATIONAREN DRUCKVERTEILUNG UND WIDERSTANDE AN SCHIENENFAHRZEUGEN VOR UND WAHREND EINER ZUGBEGEGNUNG IM TUNNEL UND AUF OFFENER STRECKE
Gaillard, Ma

Fakultat der Tech Wissenschaften an der ETH Zurich, Zurich, Switzerland

No 4874, Thesis, 167 pp, 46 Fig, 27 Tab, 67 Ref

On the basis of both theory and tests, the author presents relationships and numerical elements. Tests include measurements of air resistance and pressure, carried out on train models and during on line tests.

ACKNOWLEDGEMENT:
International Union of Railways, 32

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
32

054789
QUALITY CONTROLS OF TWO-POINT TEMPERATURE REGULATORS IN RAILWAY COACHES

GUTEUNTERSUCHUNGEN VON ZWEIPUNKT-TEMPERATURREGELLUNGEN FUR EISENBAHNWAGEN
Weinmann, A

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 10, 1973, 3 pp, 3 Fig, 1 Tab, 1 Ref

As only the additional hot air is controlled in two-point heating regulation, it might first be thought that its effect would be small in maintaining the temperature level. On account of the good thermodynamic conditions of heating in the compartment, because of the arrangement of the thermostat and the constructional design of the air distributor, thermal inertia in the compartments is low. Temperature fluctuations are therefore small, all the more so as the time constant in the compartments ensures a good smoothing effect. From the research carried out, it is found that the remaining oscillations are low and the two-point regulation is precise.

ACKNOWLEDGEMENT:
International Union of Railways, 117

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054790
LIGHTING ON THE ET 403 HIGH SPEED ELECTRIC RAILCAR

BELEUCHTUNG IM ELEKTRISCHEN SCHNELLTRIEBZUG ET 403
Frick, FD

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 9, 1973, 4 pp, 8 Fig

12 V/55 W incandescent halogen lamps are used for the locomotive's head lights and for signals. The driver's cab has two 25 W incandescent lamps fitted in the middle of its ceiling. A small spotlight is installed to the right of the working schedule to light it up. Lighting in compartments and saloon coaches is virtually the same as on TEE trains. The dining car has diffused light with strip lighting. One innovation is the table lamp which gives the required light by means of reflection from within a rectangular perspex shade.

ACKNOWLEDGEMENT:
International Union of Railways, 89

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054791
COMPARATIVE CONSIDERATIONS ON THE WEIGHT REDUCTION OF RAILWAY ROLLING STOCK

VERGLEICHENDE BETRACHTUNGEN ZUM LEICHTBAU VON SCHIENENFAHRZEUGEN
Haug, A

Leichtbau der Verkehrsfahrzeuge (Augsburg, West Germany)

Vol. 17, No. 4, 5 pp, 5 Fig, 1 Tab

Details are given of various criteria for judging different materials and comparing the shape of parts made from them, so as to reduce the weight of railway rolling stock. A comparison is made of side walls, with reference to their stability and weight. Types of mixed and composite construction are illustrated by means of examples. Elastic resilience, conditioned by elongation-stress behaviour, is, for aluminum, roughly three times greater than for stainless steel.

ACKNOWLEDGEMENT:
International Union of Railways, 97

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
97

054919
COATINGS: A $30 MILLION MARKET–AND STILL GROWING

Bartley, RD

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 7, Apr. 1974, 4 pp

The railroads represent a $26-30 million market for the coating industry and the market is growing. However, there are increasing shortages in the coating industry and the price of the products are increasing rapidly. The new car market represents about one-half of the total railroad market for coatings. New coatings are being developed that will protect surfaces better and are easier to apply. A thermal shield coating is under investigation for tank cars to reduce the danger of fires in the event of a rupture. Several railways have opened new paint shops in recent years and two of the newest are CP Rail's Ogden Shops, Calgary and Burlington Northern's at Havelock, Nebraska.

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Canadian National Railways, Headquarters Library

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054937
EUROSPEED BOGIE FOR FREIGHT

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, p 149, 1 Phot

This three-piece cast steel bogie for speeds above 120 km/h has roller bearing axleboxes mounted in rubber rings to provide a degree of primary suspension.

ACKNOWLEDGEMENT:
Railway Gazette International

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054949
APPLICATION OF FINITE ELEMENT METHOD TO THE STUDY OF STRENGTH OF CAR BODY STRUCTURE AND WHEEL

Arai, H

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 9 pp, 18 Fig, 4 Ref

Regarding stress distribution of railway car body, the calculation method for the strength of side frame was developed and has been used for initial design of new cars. Other parts (e.g. wheel, axle, truck framing) have been respectively designed by comparatively elementary calculation methods. However, by using finite element method (F.E.M.), these calculation methods for design can be unified and made precise. In this study, its application to structural problems of car body and stress distribution of wheel under the lateral load, centrifugal force due to high, speed rotation and temperature rise due to braking are described.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056744
SHUTTLE TRAIN FORMATIONS FOR MIXED ADHESION AND RACK OPERATION ON THE FURKA-OBERALP RAILWAY

Streiff, H

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973, pp 539-550, 10 Ref

Four up-to-date shuttle-service train formations have been in service on the Furka-Oberalp Railway (FO) since the summer of 1972. The stringent safety regulations for mountain railways are all complied with, thanks to careful and objective design of the remote and multiple control systems and the braking and monitoring equipment. They can operate without restriction on a network of mixed adhesion and rack sections and with widely varying profiles.

Each formation consists of a class Deh 4/4 motorcoach with luggage compartment for mixed adhesion and rack operation, two class B intermediate coaches, and a class ABt driving trailer. Data is given for both the railway system and the trains.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504760

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056749
BM&LP'S STEEL HOPPERS FEATURE AUTOMATED ALUMINUM CLAMSHELL DOORS

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 148, No. 2, Feb. 1974

The 125-ton hopper cars built for Black Mesa & Lake Powell's coal train are featured. Each car is equipped with an automated electrical system for the opening and closing of the hopper doors. Cars have steel bodies with an aluminum clamshell door dumping arrangement that is operated hydraulically upon receipt of the electrical signal.

ACKNOWLEDGEMENT:
Engineering Index, EIX740503522

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056752
DEVELOPMENT OF LIGHT-METAL RAILROAD VEHICLES MADE BY THE SCHWEIZERISCHE INDUSTRIE-GESELLSCHAFT (SIG), NEUHAUSEN

ENTWICKLUNG VON LEICHTMETALL-SCHIENENFAHRZEUGEN DER SCHWEIZERISCHEN INDUSTRIEGESELLSCHAFT SIG NEUHAUSEN
Geiser, JP, Schweizerische Industrie-Gesellschaft (SIG)

Schweizer Alumin Rundschau/Revue Suisse de Alumin (Interessengemeinschaft de Schweiz, Alumin-Huetten, Utoquai 37, Ch-8008 Zurich, Switzerland)

Vol. 24, No. 1, Jan. 1974

A review and description is presented of the most recent types of lightweight railroad cars manufactured of special weldable Al-Zn-Mg-based alloys for the Swiss Railroads.

ACKNOWLEDGEMENT:
Engineering Index, EIX740502942

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056753
EFFICIENT USE OF WELDING IN RAILROAD CAR MANUFACTURE

RATIONELLER EINSATZ DER SCHWEISSTECHNIK IM SCHIENENFAHRZEUGBAU
Guder, E

Schweisstechnik (VEB Verlag Technik, Oranienburger Strasse 13-14, 102 Berlin, East Germany)

Vol. 23, No. 11, Nov. 1973, pp 488-492, 5 Ref

The thermal characteristics of CO2, submerged arc-, and resistance welding are given and the shrinkage occurring in electric arc— and CO2 welding is compared. Emphasis is placed on optimum welding techniques in the manufacture of railroad cars. Numerous practical examples are presented.

ACKNOWLEDGEMENT:
Engineering Index, EIX740501797

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056761
SUBURBAN TRAINS OF NORWEGIAN STATE RAILWAYS (NSB) FOR THE OSLO AREA

Joeger, A Zwahlen, R

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

The electrical equipment for a series of thyristor-controlled suburban trains, is described. The basic composition of one train is a motorcoach and driving trailer. Longer trains can consist of up to four pairs of coaches. The short journey times and relatively short distances between stations require high acceleration from rest. Automatic control of acceleration and speed, together with automatic fixed-point braking greatly help the driver to keep to the timetable. The large number of starts and the long running time per day lay particular emphasis on the question of maintenance costs. The most effective way to meet these various requirements is to use undulating-current motors with series and separate excitation, and thyristor control for supplying the armature and external fields.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504762

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056771
NEW UNITED STATES STANDARD LIGHT RAIL VEHICLE

Lenow, M, Boeing Company

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

N740227, Preprint, Feb. 1974

This paper presents details of the new United States standard light rail vehicle (LRV) being built by the Boeing Vertol Co. for the Boston and San Francisco public transportation authorities. System operation, design features, and performance are described for the LRV, successor to the ubiquitous President's Conference Committee car, last built in the United States in 1951. Used most effectively for an intermediate mass transit volume of 8000-24,000 passengers/h, the Boeing LRV incorporates much of the available state-of-the-art technology. The car body is tough and lightweight with numerous functionally oriented features. The propulsion system is the latest in thyristor-chopper control as applied to separately excited d-c traction motors. In addition, a variety of features enhance the comfort, safety, and maintainability of the LRV. Its multiple-wear resilient wheels make it a more quiet neighbor.

ACKNOWLEDGEMENT:
Engineering Index, EIX740506279

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056772
BOEING DESIGNS LIGHT MASS TRANSIT VEHICLE

Automobile Engineer (IPC Transport Press, Limited, Dorset

House, Stamford Street, London SE1 9LU, England)

Vol. 82, No. 4, Apr. 1974

This light rail vehicle is designed to operate in mixed traffic on city streets or in subways, at a mass transit volume of 8000 to 24,000 passengers per hour. Each motorized truck has a resiliently mounted 210-hp (continuous) at 1135 rpm separately excited d-c traction motor, and incorporates a pneumatic–hydraulic friction brake system as a reserve to dynamic braking. High/low steps allow passenger use in subways or streets.

ACKNOWLEDGEMENT:
Engineering Index, EIX740506414

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056783
AERODYNAMIC LIFT CHARACTERISTICS OF CARS

Carr, GW, Motor Industry Research Association

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1H 9JJ, England)

Vol. 187, No. 30, 1973, pp 333-347, 14 Ref

The principal factors determining the aerodynamic lift of cars are identified from the results of an extensive series of wind-tunnel tests involving simple models of bluff and streamlined form and a variable-geometry saloon-car model. The influence is examined of basic parameters such as camber, incidence, thickness, ground clearance, and underbody roughness. An indication is also given of the extent to which the lift is modified by the squaring of individual edges, particularly the horizontal leading and trailing edges; and the effectiveness of devices fitted under the nose of a car to reduce lift is discussed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205377

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056787
EVOLUTION OF THE MARK II COACH

McMenamin, JT, Railway Technical Center

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 4, July 1973

The paper describes the reasons for the introduction of the Mk II passenger car, its construction and subsequent modifications to the original design. New design was prepared within the overall dimensions, 65 ft 4 in. long, 9 ft wide, 46 ft 6 in. truck centers, with improved riding and heating. The body is a stressed skin structure. The underframe is 10 in. deep and is built up of Z section longitudinals of 3/16 in. thickness and solebars of 3/16 in. thickness channels with cross members at intervals.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205185

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England

056793
HIGH SPEED TRAIN

Stanier, WM, Railway Technical Center

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 4, July 1973

Introduction for high speed train built to ensure that the necessary substantial reductions in journey time become available. The train consists of two power cars, one at either end of a rake of 7 trailer coaches. Each power car comprises power equipment and a luggage car. The coaches are operationally compatible with existing passenger coaches, but have 36-way control cables running through them. The power cars comprise main power unit (diesel/alternator set), auxiliaries, main cab, luggage car and small rear cab for shunting movements and for returning light from main works attention. Prime-mover is a Paxman type 12RP200L 'Valenta' 12 cylinder diesel engine, having a UIC rating of 2250 hp at 1500 rev/min. It is pressure charged and inter-cooled; intercoolers and main water jacket have separate cooling systems.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205183

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England

056795
FINNISH NATIONAL RAILROADS COMMUTER LOCOMOTIVE

NAHVERKEHRSTRIEBZUG DER FINNISCHEN STAATSEAHNEN

Karha, K Myllarniemi, K

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 10, 1973

Details are presented about the mechanical and electric equipment of the local rapid transit system in Helsinki, Finland. The trains feature new design imrprovements, such as the use of light-weight metal for the bodies of the cars instead of steel which was used in the past. The trains are capable of producing an acceleration from 0.8 to 1.1 m/sec 2 for a corresponding speed from 0 to 30 km/hr.

ACKNOWLEDGEMENT:
Engineering Index, EIX740306237

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056815
ROLLING STOCK AND HIGH-SPEED TRAINS

MATERIEL ROULANT ET GRANDES VITESSES FERROVIAIRES

Portefaix, A, French National Railways

Travaux (Federation Nationale des Trav Publ & des Synd Aff, 6 Avenue Pierre Premier de Serbie, Paris 16e, France)

Sept. 1973, pp 461-462

Study made by the French National Railways (S. N. C. F.) concludes that the upgrading of railway equipment from the 160-200 km/h level to 260-300 km/h involves the following technical conditions: The solid-cast wheels with heat-treated rims, as well as the axles and bearing boxes used today, are adaptable without modification for new requirements. Electric traction and the gas turbine are also capable of providing the required power levels which are moreover moderate owing to the excellent efficiency of the wheel-rail effect. The suspension and guiding elements are instrumental to the improvement of potential train speed and must apply the principles developed by recent theoretical and experimental studies. Aerodynamics, different from that of conventional trains, and also from that of aviation, has made substantial progress, making it possible to reduce drag beyond expectations, without sacrificing train accommodation. Braking requires the combined use of new and known techniques; friction now plays only a minor role. The considered speed level is in keeping with the external and internal environment; comfort has even been significantly improved compared with today's best trains. In short, the design and construction of equipment capable of traveling 260 km/h on new lines are now well under way.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205260

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056818
WROUGHT STEEL WHEELS AND FORGED RAILWAY AXLES

American Iron and Steel Institute, 150 East 42nd Street, New York, New York, 10017

Sept. 1973

Appeared in the Steel Products Manual.

The progressive steps in producing a wheel, including forging the blank, rolling, heat treating and machining are described, followed by analysis of defects in service and criteria for wheel specifications. Grades of steel used, heat treatment, metallurgical specifications, machining and forging procedures for axles are covered.

ACKNOWLEDGEMENT:
Engineering Index, EIX740103553

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056827
WELDED CONSTRUCTION IN ALUMINUM ALLOYS FOR THE LONG DISTANCE EXPRESS TRAIN ET 403

SCHWEISSKONSTRUKTION AUS ALUMINIUMLEGIERUNGEN FUER DEN FERNSCHNELLTRIEBZUG ET 403
Goenner, P

Schweissen und Schneiden (Deutscher Verlag fuer Schweisstechnik GmbH, Schadowstrasse 42, 4 Duesseldorf, West Germany)

Vol. 25, No. 9, Sept. 1973

A description is given of the carriage construction for an intercity express train by welding together large aluminum extrusions. The description covers the underframe, side walls, front wall, and roof. AlZnMg 1 F 36 was used for the load bearing parts and AlMgMn F 26 for the roof. S-AlMg5 or S-AlMg4.5 wire electrodes were employed in MIG welding.

ACKNOWLEDGEMENT:
Engineering Index, EIX740300259

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056829
WELDING PROBLEMS IN THE CONSTRUCTION OF THE NEW ARTICULATED TRAINS FOR THE SUSPENDED OVERHEAD RAILWAY IN WUPPERTAL

CHWEISSTECHNISCHE PROBLEME BEIM BAU DER NEUEN GELENKZUEGE FUER DIE WUPPERTALER SCHWEBEBAHN
Zschiesche, J

Schweissen und Schneiden (Deutscher Verlag fuer Schweisstechnik GmbH, Schadowstrasse 42, 4 Duesseldorf, West Germany)

Vol. 25, No. 9, Sept. 1973

An outline is given of the problems to be considered in comparison with welding of conventional railway cars when in a suspended overhead railway, a rotating trolley provides the connection between the load carrying rail and the suspended carriage and, as a result, the car roof becomes the load carrying part of the carriage box while the floor provides the lower closure and only takes the vertical loads. Welding of the floor plating, the outriggers, and the rotating trolley are discussed. AlZnMg 1 F 36 and AlMgMn F 26 are used in the cars and steel St52-3 in the trolley.

ACKNOWLEDGEMENT:
Engineering Index, EIX740300260

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056830
WELDED RAILROAD ROLLING STOCKS MADE OF AL-MATERIALS

GESCHWEISSTE SCHIENENFAHRZEUGE AUS AL-WERKSTOFFEN
Schlebeck, E Krohn, H

ZIS Mitteilungen (Zentralinstitut fuer Schweisstechnik der DDR, Koethener Strasse 33A, 403 Halle/Saale, East Germany)

1973, pp 1111-26, 22 Ref

Review of the developments of railroad rolling stock manufactured over the last 30 years by welding lightweight aluminum alloys. The current status in this field is outlined and the most efficient welding techniques are pointed out.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205196

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056844
NEW LOCOMOTIVE FEATURES NOVEL SUSPENSION AND SAFETY/LUXURY CAB

McInerney, FT Parker, JH

Design Engineering (Mclean-Hunter Limited, 481 University Avenue, Toronto M5W 1A7, Ontario, Canada)

Vol. 19, No. 12, Dec. 1973

The first of a new generation of locomotives designed and manufactured by MLW-Worthington of Montreal was delivered to Canadian National earlier this year. Designated the M420, the new model is rated at 2,000 hp for traction and incorporates many innovations such as new trucks, an updated diesel engine, a crew-comfort operator's cab, a specially tailored electrical package and improved chassis systems.

ACKNOWLEDGEMENT:
Engineering Index, EIX740204396

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056861
COOLING OF THE ENGINE COMPARTMENT OF A DIESEL LOCOMOTIVE BY USING EXHAUST GAS EJECTORS

DIE KUELUNG DES MASCHINENRAUMES DER DIESEL-LOKOMOTIVE DURCH STRAHLGEBLAESE
Koffman, JL

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 11, Nov. 1973, 5 Ref

Experimental use of exhaust ejectors of the new British Railways high speed diesel trains for locomotive cooling is dealt with.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304705

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056866
PROGRESS IN RAILWAY MECHANICAL ENGINEERING: 1972-1973 REPORT OF SURVEY COMMITTEE

Manos, WP, Pullman-Standard Car Manufacturing Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-WA/RT-4, Paper, Nov. 1973

This survey covers some of the major developments in freight, passenger, and transit equipment. The past year has seen continuing developments for the handling of bulk materials. The trend for these developments is toward higher cubic capacity and more rapid unloading. As a result of the many train studies, freight components are being developed for greater safety as evidenced by the new couplers and truck designs.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104842

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056867
PROGRESS IN RAILWAY MECHANICAL ENGINEERING: 1972-1973 REPORT OF SURVEY COMMITTEE

Baker, PH, General Electric Company
Schulze, FW

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-WA/RT-6, Paper, Nov. 1973, 49 Ref

Covers several developments in high-speed passenger locomotives and train sets which are having continued interest in foreign countries and growing interest through Amtrak in the United States. Data and photographs for 12 new diesel locomotives and 8 electric locomotives introduced to service in the survey period of September 1, 1972 to September 1, 1973 are also provided and discussed.

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056876
EUROFIMA TESTS PROTOTYPE STANDARD COACHES

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 189-191, 1 Fig, 4 Phot

Delivery of the first of ten prototypes of the European standard coach (RG April) marks a further stage in the Eurofima-financed scheme under which six national railways last year placed a joint order for 500 coaches with a multinational group of manufacturers. From now until March 1975, the prototype coaches will be extensively tested, and any modifications arising from this will be incorporated in the production batch, scheduled for delivery during 1976.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

056954
THEORETICAL AERODYNAMIC CHARACTERISTICS OF VEHICLES IN CONFINED SPACES

Transit Development Corporation, Incorporated, 1000 Connecticut Avenue, NW, Washington, D.C., 20036 UMTA-DC-06-0010

Tech Rpt, Mar. 1974, 40p

Grant DOT-UT-290

Prepared by California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.

The report has been prepared under the Transit Development Corporation (TDC) project, 'Ventilation and Environmental Control in Subway Rapid Transit Systems,' and is one of many such reports leading to the final product—a 'Subway Environmental Design Handbook.' It describes the results of a theoretical effort pertaining to the non-steady flow in a tunnel induced by a moving vehicle. A study is made of the entry problem and the problem of a vented tube.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231385/6

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NTIS, Repr PC: $3.25, Microfiche: $1.45
PB-231385/6

056955
EXPERIMENTAL AERODYNAMIC CHARACTERISTICS OF VEHICLES IN CONFINED SPACES

Transit Development Corporation, Incorporated, 1000 Connecticut Avenue, NW, Washington, D.C., 20036

Tech Rpt, Dec. 1972, 190p

Grant DOT-UT-290

Prepared by California Inst. of Tech., Pasadena. Graduate Aeronautical Labs. Prepared in cooperation with Institute for Rapid Transit, Washington, D.C.

The report has been prepared under the Transit Development Corporation, Inc. (TDC) project, 'Ventilation and Environmental Control in Subway Rapid Transit Systems,' and is one of many such reports leading to the final product— a 'Subway Environmental Design Handbook.' It describes the results of an experimental effort pertaining to the aerodynamics of vehicles traveling in tubes, conducted in facilities at the Jet Propulsion Laboratory.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231386/4

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $5.50, Microfiche: $1.45
PB-231386/4

057171
AMERICAN STEEL FOUNDARIES DYNAMIC TEST FACILITY FOR RAILWAY TRUCK COMPONENTS

Tennikait, HG, American Steel Foundries

Closed Loop (MTS Systems Corporation, P.O. Box 24012, Minneapolis, Minnesota, 55424)

Vol. 4, No. 2, Apr. 1974, pp 10-16, 6 Fig., Phots.

This article describes the ASF test facility for truck components. The facility permits dynamic testing of the various components. The article describes the test equipment and the test procedures, and several conclusions that have been reached are discussed.

ACKNOWLEDGEMENT:
Closed Loop

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
MTS Systems Corporation, P.O. Box 24012, Minneapolis, Minnesota, 55424, Repr. PC: Req. Price

057181
SOME ASPECTS OF AUTOMATIC CENTER-COUPLERS APPLIED TO EUROPE

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 158-160, 3 Fig.

The decision to introduce centre-automatic couplers as the sole draw and buffing gear and obviate the manual uncoupling and coupling up of trains has been the subject of a great deal of attention by railways and industry alike. A point raised by some administrations highlights the advantages obtained by controlling the train by the locomotive brakes only, when this can be effected through the transmission. The foregoing therefore dictates a draw gear which will provide for braking at the head of the train.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr. PC: Req. Price

051375
DESIGN CRITERIA FOR HIGHLY RATED DIESELS

Bhalla, P, Indian Railways
Sondhi, J, Indian Railways
Syngal, SP, Indian Railways

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 6, Nov. 1973, 12 pp, 13 Fig, 2 Tab, 23 Ref, 2 App

Whereas traction engines of 2000 to 3000 hp were adequate a decade ago, the current requirement is for outputs increasing from 3000 hp to as high as 6000 hp. This has necessitated the introduction of highly rated traction diesel engines on a larger scale. Traction applications impose certain constraints in view of the limitations of loading gauge and permitted axle loads. Size, shape and weight of the diesel engine, therefore, become critical. Higher horse power output from single units necessarily requires the development of engines of comparatively higher specific power output per unit of weight and envelope volume.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

051384
ENERGY ECONOMICS THROUGH SOLID-STATE POWER CONVERSION

Bjerkehagen, O Kollberg, B

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, pp 459-461, 1 Fig

Energy savings of around 30 per cent can be achieved on rapid transit systems through the use of thyristor choppers and blended regenerative/rheostatic braking schemes. In a.c. traction scope for energy saving through the use of thyristors is more limited, but replacement of rotary machines by solid state frequency converters reduces substation losses by up to 40 per cent.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051391
FOUR AXLE 2500 KW 3 FT 6 IN. GAUGE SOUTH AFRICAN RAILWAYS ELECTRIC LOCOMOTIVES OF HIGH PERFORMANCE

Scott, M, GEC Traction Limited

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, p 438

Class 6E and 6E1 ownership reached 300 as build-up to a 500 unit fleet proceeds embracing a South African designed 87.5 tonne Bo-Bo for SAR 3000V d.c. network incorporating GEC Traction electrical equipment. This Union carriage design is a product of the company in co-operation with GEC and includes regenerative braking.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

051392
DIESEL ELECTRIC SIX COUPLED SHUNTERS FOR NIGERIAN RAILWAY CORPORATION WITH QUICK RUNNING ENGINES

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, p 433, 3 Fig

Brush designed and built this 3 ft 6 in. gauge design with good visibility based on similar locomotives supplied to WAGR Australia and powered by Ruston Paxman 1,250 rev/min pressure charged engines developing 400 hp.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

051393
LOCOMOTIVE RELIABILITY

Hamilton, AB, General Motors Corporation
Jnr, ME, General Motors Corporation

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, p 429, 3 Fig

Freight train operation comprises the bulk of American railway service and dictates locomotive annual milages in excess of 150,000. To provide for this Elecro-Motive Division of General Motors has developed reliability targets based on warranty periods comprehensively evolved by its Product engineers whose experience embraces both manufacture and service conditions.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

051394
TRIPLE EVENT IN WASHINGTON LAST APRIL: GAS TURBINE AND DIESEL AND GAS ENGINE DIVISIONS OF ASME COMBINE WITH IMA

Janota, MS, London University
Knott, JE, General Motors Corporation

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, p 425

About 5,000 "International Combustion Engine Men" from all over the world gathered in Washington D.C. to discuss the present and future of the Internal Combustion Engine against the threatening background of fuel shortage, pollutant emission legislation and the increasing demand for safe, reliable and low cost power. This took place in a triple event of the A.S.M.E. Diesel & Gas Engine Power Conference (April 1-5), the CIMAC Congress–covering both the Diesel and Gas Turbine engine (April 5-9) and the 18th A.S.M.E. International Gas Turbine Conference (April 8-12). It was the world'd largest meeting devoted to Internal Combustion Engines, and the first time the CIMAC Congress had been held outside Europe.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

051441
NEW CONVERTER DRIVE SYSTEM FOR A DIESEL ELECTRIC LOCOMOTIVE WITH ASYNCHRONOUS TRACTION MOTORS

Brenneisen, J, Brown Boveri and Cie
Futterlieb, E
Muller, E
Schulz, M

IEEE Transactions on Industry Applications (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. IA-9, No. 4, July 1973, pp 482-491

A short explanation is given of the need to develop a new power transmission system in accordance with the general demands on the performance of a locomotive. The main components of an existing diesel electric locomotive, such as the alternator, converter, traction motors, and the whole control system are described in detail. Consideration is given to the interaction between the different components. Good operating experience has shown that the system was well chosen. For the future a uniform drive scheme for different power supplies appears realizable.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056135

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051446
RAILROAD MOTOR CARS WITH INVERTOR FED ASYNCHRONOUS DRIVE FOR LOCAL TRAFFIC IN THE UNITED STATES

NAHVERKEHRSTRIEBWAGEN MIT UMRICHTERGESPEISTEM ASYNCHRONMOTORANTRIEB IN DEN USA
Teich, W

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 5, May 1973, pp 108-114

The development of a three-phase power transmission system for the Cleveland Transit System is reported. The lines are equipped with overhead contacts for the 600-v dc system. The transmission system converts the direct current into three-phase current of variable voltage and frequency so that the three-phase short-circuit rotor motors can be used as traction motors. Details about the electric and mechanical systems are presented.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056292

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051449
DRIVING BOGIE OF THE ET 403

DIE TRIEBREHGESTELLE DES ET 403
Kayserling, U

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 6, June 1973, pp 130-135

The bogie developed for the express train type ET 403 for the West German Railroad System is described. The bogie represents a modification of a previous model which has been incorporated in the train type ET 420. Various changes necessitated by the increased speed are discussed.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 058654

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051468
WABCO DATA ACQUISITION SYSTEM. AC PROPULSION PROJECT

Smith, RD Cymbor, WP

Cleveland Transit System, 1404 East 9th Street, Cleveland, Ohio, 44114 UMTA-OH-06-0006

Aug. 1973, 102p

In June, 1971, the Cleveland Transit System received a grant contract (Project OH-06-0006) from the Department of Transportation's Urban Mass Transportation Administration to test and evaluate three rapid transit cars an AC propulsion system developed by the Westinghouse Air Brake Company (WABCO). The AC propulsion system incorporates a pulse width modulated inverter to convert constant voltage DC energy to variable frequency, variable voltage AC energy which in turn powers simple AC traction motors. The report describes the data acquisition system which was developed to measure, record and analyze performance data for the AC-powered rapid transit cars. The report is one of a series on various aspects of the project.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-223898/8

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NTIS, Repr PC: $4.25, Microfiche: $1.45
PB-223898/8

051566
A REPORT ON DIESEL LOCOMOTIVE DESIGN AND MAINTENANCE ON SOVIET RAILWAYS

Association of American Railroads Research Center, 3140 South Federal Street, Chicago, Illinois, 60616

Report, Sept. 1966, 195 pp, Figs, Tabs, Phots, Apps

This book is a report on a visit to several locomotive centers in the U.S.S.R. Subjects covered include operating practices and maintenance practices.

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AAR, Repr PC: Req Price

051940
CUMMINS DIESELS TESTED AS POWER FOR B&M'S RDCS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 3, Feb. 1973, 1 p, 2 Phot

Boston & Maine have been increasingly concerned about the power plants on its 88 Rail Diesel Cars with which it operates suburban service out of Boston for the Massachusetts Bay Transportation Authority. Presently under test on one car is an installation utilizing Cummins diesel engines and Twin Disc transmission in place of the General Motors engines and transmissions.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

051945
GAS TURBINE/ELECTRIC CARS IN COMMUTER SERVICE

Ronan, WJ, Metropolitan Transportation Authority of New York

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 184, Pt3S, 1970, 3 Fig

Proceedings of the Symposium on Rapid Transit Vehicles for City Services 22-23 April 1971. Arranged by the Automobile Division of the Institute of Mechanical Engineers.

The rapid growth of metropolitan areas has created the need for high-speed commuter services around the world. The locomotive-hauled train cannot provide the rapid acceleration and fast braking required to move increasing numbers of people over commutation distances. It is being replaced by the self-propelled or 'multiple unit' car. This paper describes research carried out by the Metropolitan Transportation Authority, New York, to develop high-speed equipment for commuter services, and deals firstly with electric cars and secondly with a dual powered car taking power from a third rail and also powered by gas turbines. The tests carried out are described and conclusions reached are stated.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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051957
GETTING THE BEST OUT OF DIESEL TRACTION

Gakuo, EN, East African Railways Corporation

Developing Railways (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

1974, 4 pp, 1 Fig, 1 Tab, 4 Phot

While more than 200 steam locomotives remain in use, East African Railways finds efficient utilisation and good maintenance of its diesel fleet not always easy to achieve. The need to avoid redundancy is a serious constraint, but much can be done by the comprehensive approach to efficiency typified by EAR's new diesel depots.

ACKNOWLEDGEMENT:
Developing Railways

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IPC TRANSPORT PRESS, Repr PC: Req Price

051961
THE PHYSICALLY-RESTRICTED DIMENSIONS OF THE OVERHEAD CONTACT LINE SYSTEM IN THE CASE OF THYRISTOR VEHICLES, THE INFLUENCE OF THE SUPPLY SYSTEM, AND MEASURES TO EFFECT AN IMPROVEMENT

DIE PHYSIKALISCH BESTIMMTEN GRENZWERTE DER FAHRLEITUNGSNETZGROSSE BEI THYRISTORFAHRZEUGEN, DER EINFLUSS DES SPEISENETZES UND MASSNAHMEN ZUR VERBESSERUNG

Lunden, H

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2/3, 1973, 6 pp, 9 Fig

After having made reference to the advantages of the use of the thyristor technique on electric motive-power units, the author deals with the negative aspects of this technique. In this connection, particular attention must be paid to the power factor, and to current causing interference. Methods are discussed of improving the former, and reducing the latter. The results of measurements are shown in illustration of the text.

ACKNOWLEDGEMENT:
International Union of Railways, 1050

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051969
THE REACTIONS ON THE SYSTEM OF SECTOR CONTROLLED THYRISTOR VEHICLES

NETZRUCKWIRKUNGEN SEKTORGESTEUERTER THYRISTORFAHRZEUGE

Forster, J

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2/3, 1973, 10 pp, 20 Fig, 11 Ref

In order to improve the power factor, and to reduce the electromagnetic effect on the environment, in the case of thyristor motive-power units, a contribution is made by the new blow-out, thyristor current-rectifier, contact, particularly as an unsymmetric, semi-controlled, singlephase bridge. The method of operation is shown by means of model experiments, and a brief report is given concerning tests carried out on a series 420 German Federal Railway motive-power unit.

ACKNOWLEDGEMENT:
International Union of Railways, 1048

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051970
THE ELECTRO-MAGNETIC EFFECT ON THE ENVIRONMENT OF THYRISTOR VEHICLES

ELEKTROMAGNETISCHE UMWELTBEEINFLUESSUNG DURCH THYRISTORFAHRZEUGE

Buckel, R

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2/3, 1973, 9 pp, 11 Fig, 3 Ref

The effect on the environment of electro-magnetic forces, to which electric motive-power units, with thyristor control, give rise, is discussed in broad outline. In this connection, details are shown both of the causes, and of several possibilities of reducing, or preventing them.

ACKNOWLEDGEMENT:
International Union of Railways, 1045

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052098
NEW HIGH-PERFORMANCE DIESEL-POWERED TRACTION UNIT

Kovacshazy, E, Budapest Technical University

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 1, Jan. 1974, 6 pp, 12 Fig

Ganz-MAVAG developes a compact diesel-engine-hydraulic torque-converter transmission group providing a quasi-constant power characteristic for outputs up to 750 hp for rail and other purposes.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

052102
NEW 25 KV-50 HZ 5400 KW CC ELECTRIC LOCOMOTIVES FOR THE CHINESE RAILWAYS

Caire, D, Societe Nationale des Chemins de Fer Francais

French Railway Techniques (Federation des Industries Ferroviaires, 12 rue Bixio, 75007 Paris, France)

No. 2, 1973, 10 pp, 8 Fig

In 1960 the Alsthom and MTE Companies delivered 25 standard gauge CC locomotives, of the 6Y2 series, to the Chinese Railways. These locomotives are supplied at 25 kV 50 Hz single phase and the conventional series-motors take undulating current supplied from the line at variable voltage through a transformer and SW Ignitron type rectifiers. These locomotives are still giving excellent service and the Chinese Railways again demonstrated their confidence in French equipment by ordering, in 1970, 40 additional locomotives of the same design. However, these are substantially more powerful, being rated at 5400 kW at the rim instead of 4000 kW. Like their predecessors they can be multipled in pairs. Of course they incorporate the latest progress in electrotechnology and the traction current for the motors—one per axle—will this time be rectified by thyristors. For trial purposes two of the locomotives will be equipped with regenerative braking, a natural consequence of the thyristor rectifiers.

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052103
BBB LOCOMOTIVES FOR THE SOUTH KOREAN RAILWAYS

Caire, D, Societe Nationale des Chemins de Fer Francais

French Railway Techniques (Federation des Industries Ferroviaires, 12 rue Bixio, 75007 Paris, France)

No. 2, 1973, 9 pp, 5 Fig

The originality of the locomotives lies in the way in which these function. The object of the design of the Bo Bo Bo locomotive was to produce a locomotive which would behave like a Bo Bo; the central bogie was to exert no transverse reaction on the outer bogies and the vertical reactions, due for instance to track twist, were to be minimal. Thus the only functions of the central bogie were the contribution of tractive effort and the support of the locomotive body at the center. This end would seem to have been attained by the arrangement adopted for the body suspension systems of the three bogies. The three bogies are identical up to the level of the body suspension and are interchangeable. They are of conventional design.

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052167
HOT CORROSION OF DIESEL ENGINE EXHAUST VALVES

Chaudhuri, A

Caterpillar Tractor Company, Peoria, Illinois

SAE-730679, June 1973, 10 pp

The purpose of this paper is to show that although 'hot corrosion' (which is, in fact, a sulfidation-accelerated oxidation phenomenon) is more prevalent in gas turbine applications, diesel engines are not immune to this under certain conditions. Evidence of this type of corrosion in the case of some iron-base and nickel-base exhaust valves is presented to illustrate the point. The successive stages of the corrosion process are discussed, and the beneficial effects of some alloying elements in affording protection against hot corrosion are pointed out. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, HS-013965

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Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001, Repr PC: Req Price

053747
CHOPPERS ON THE SNCF–EXPERIMENTAL DESIGNS

Cossie, A, French National Railways

French Railway Techniques (Federation des Industries Ferroviaires, 12 rue Bixio, 75007 Paris, France)

No. 4, 1973, 10 pp, 16 Fig

This article describes some experimental thyristor control systems on the French National Railroads. Details are given of installations on both multiple unit equipment and on locomotives. Test results are discussed.

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053752
C CLAMP SPEEDS ASSEMBLY REMOVALS

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 147, No. 10, Dec. 1973, 2 pp, Phots

Two Chessie System shop supervisors have come up with a device which speeds the removal and installation of power assemblies and other heavy components of diesel locomotives.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

053869
EFFECT ON THE SYSTEM OF A.C. LOCOMOTIVES REGULATED BY THE ASSEMBLY IN STAGES OF THYRISTOR BRIDGES CONNECTED IN SERIES

NETZVERHALTEN VON WECHSELSTROM-TRIEBFAHRZEUGEN MIT MEHRFACH-FOLGESTEUERUNGEN IM STROMICHTERSPARSCHALTUNG

Winter, P

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2-3, 1973, 10 pp, Figs, 6 Ref

A report submitted at the 14th meeting dealing with "Modern railway stock", held in Graz. The assembly in question was designed by Brown Boveri, in order to: 1. Suppress, in the supply system, the high-frequency harmonics, as well as their induced effects causing interference on the lines carrying weak current. 2. Suppress the low-frequency harmonics capable of having an effect on the track circuits. 3. Improve the power factor. This assembly was tested on an RC 4/4 locomotive No. 161. The report contains a theory covering this assembly, as well as details, set out in the very numerous diagrams, of the results obtained during tests, and conclusions concerning the conditions under which the desired effects can be obtained.

ACKNOWLEDGEMENT:
International Union of Railways, 1187

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053984
THE USE AND DEVELOPMENT OF ELECTRONICS IN LOCOMOTIVE CONTROL SYSTEMS

Bradley, RM Wilson, RM

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 2, Mar. 1973, 9 pp, 8 Fig, 3 Ref

This article discusses the use of electronics in locomotive control systems. The article considers the conditions under which the equipment must work. It considers both the railway point-of-view and the manufacturers' point-of-view.

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053991
PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1969-1970 REPORT OF SURVEY COMMITTEE)—LOCOMOTIVES

Baker, PH, General Electric Company
Schulze, FW, General Electric Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-9, Aug. 1970, 9 pp, 12 Fig, 2 Tab, 11 Ref

This paper presents the Locomotive portion of the two-part 1969-1970 report on Progress in Railway Mechanical Engineering. Reviewed are developments in locomotives abroad and in the United States, including diesel and electric locomotives for commuter and freight trains, motive power distribution in the United States, and electrification.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054282
BRITISH B-B TWIN-ENGINE UNDERGROUND MINES DIESEL-HYDRAULIC OF 216 HP FOR 24-IN./36-IN. TRACKS

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 71-72, 2 Fig.

Hunslet 21-ton locomotive for National Coal Board designed for 25 mile/h running with Hunslet exhaust conditioner to operate manriding and supply service on 36-in. track for runs up to 6 miles to coal face. NCB specified Phosphate Ester Fluid applied to Twin Disc transmission under service conditions after extensive evaluation trials at Eastington Colliery.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054287
SWISS RAILWAYS BO-BO-BO OF 8,000 KW WITH CONVENTIONAL COIL-SPRING SECONDARY-SUSPENSION

Meyer, K, Swiss Federal Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 81-87, 7 Fig, 5 Phot

Swiss Federal Railways selects a simple design for series production following comprehensive evaluation-trials in service with four prototypes; two with jointed-underframes and two with full-length single-piece bodies, one incorporating air secondary-suspension. Principal duties embrace heavy freight and passenger services over the severely-graded and curbed Gotthard line.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054338
THE HISTORY OF THE ELECTRIC LOCOMOTIVE

Haut, FJG

Allen (George) and Unwin Limited, Museum Street 40, London WC1, England

Book, 1969, 147 pp, 32 Fig, 255 Phot

This book traces the development of the electric locomotive in main line railroad service. A considerable amount of technical information is provided on the locomotives, and some on the electrifications. Photographs and diagrams supplement the text. The coverage is worldwide.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Allen (George) and Unwin Limited, Museum Street 40, London WC1, England, Repr PC: Req Price

054366
MAINTENANCE OF ELECTRIC LOCOMOTIVES AND RAILCARS AS CARRIED OUT BY THE SWISS FEDERAL RAILWAYS

Meyer, E, Swiss Federal Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 13 pp, 5 Fig

This paper describes the inspection and maintenance procedures for electric locomotives as performed by the Swiss Federal Railways.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England, Repr PC: Req Price

054369
THE IMPACT OF ELECTRIC LOCOMOTIVE DESIGN ON THE ORGANISATION OF MAINTENANCE

Gauthier, P, French National Railways
Blanc, A, French National Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 17 pp, Figs, Tabs, Refs, 1 App

This paper discusses the impact of electric locomotive design on locomotive performance and on locomotive maintenance. The advantages of coupled driving axles are discussed.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England, Repr PC: Req Price

054370
DESIGN OF NEW MOTIVE POWER FOR EASE OF DRIVING AND MAINTENANCE

Nouvion, FF, French National Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 23 pp, 25 Fig, Refs

This paper discusses the factors in locomotive design that promote ease of operation and maintenance. It covers aspects of both mechanical and electrical maintenance on the locomotives, and also the impact of the locomotive on track maintenance.

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Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England, Repr PC: Req Price

054476
PRE REVENUE SERVICE ACTIVITIES. AC PROPULSION PROJECT

Pier, JR

Cleveland Transit System, 1404 East 9th Street, Cleveland, Ohio, 44114 UMTA-OH-06-0006

Intrm Rpt, Sept. 1973, 71 pp

Prepared by Westinghouse Air Brake Co., Wilmerding, Pa.

In 1971 the Cleveland Transit System received a grant contract from the Department of Transportation's Urban Mass Transportation Administration to test, demonstrate and evaluate a solid state AC propulsion system on three rapid transit cars. The retrofit process is described and illustrated in detail. The car check-out program to verify system performance is also described and specific problems and solutions discussed. The problems and unusual difficulties encountered in the pre revenue service effort are summarized in the report. The installation of a car carried computer based data acquisition system is described and the problems encountered in this unique effort enumerated.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-228983/3

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PB-228983/3

054477
SINGLE CAR PERFORMANCE. AC PROPULSION PROJECT

Cymbor, WP Smith, RD

Cleveland Transit System, 1404 East 9th Street, Cleveland, Ohio, 44114 UMTA-OH-0006

Aug. 1973, 93 pp

Prepared by Westinghouse Air Brake Division, Wilmerding, Pa.

The report presents the testing, demonstration and evaluation of a solid state AC propulsion system on three rapid transit cars. To demonstrate general performance and applicability of the propulsion system, an on-board computer controlled data acquisition system was used to collect performance data. The data were reduced, analyzed, and plotted by computer. The description of the general performance characteristics of the propulsion system is presented in the form of tabular listings and graphs. Some of the areas covered include rolling resistance, acceleration and braking capability, torque output, power consumption, system efficiency, and motor temperatures.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-228987/4

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NTIS, Repr. PC: $4.00, Microfiche: $1.45
PB-228987/4

054606
MLW MOTIVE POWER 1973

Weglinski, HA

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 5 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

In the late 1960's, MLW developed a new generation of "M" line motive power featuring modern, modular design utilizing high-adhesion trucks, unitized air brake system, AC generation, transistorized electrical control and improved chassis systems. The latest arrival is the M420-M427, four axle, four-motor, 2000-2700 HP series which today appear to be the popular models. The M420-M427 is a very flexible design which can be built in weights varying from 240,000 to 272,000 lbs with fuel capacities up to 4000 U.S. gallons. This model, with a 60,000 lb continuous tractive effort capability with 65 mph (74:18 gearing), is powered by the 12V251 diesel engine which has a 2000 to 2700 HP for traction capability. It is 61 feet long, with 56 cu. ft. of sand capacity. Details are given.

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Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054621
SERIES-PRODUCTION SNCF DIESEL-ELECTRICS OF HIGH POWER INCLUDING TRIALS AT 4,200 HP

Garde, R, French National Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 101-105, 6 Fig, 2 Tab

Alsthom design powered by 16-cylinder AGO engine and mounted on three-axle monomotor bogie common with comparable SNCF electric locomotives which develops very good tractive effort characteristics, largely contributed by Alsthom Hyperadherence transmission. This standard series of 3,650 hp has enabled appreciable acceleration on Paris-Nantes services to be obtained with averages of 129 km/h and service experience reveals a casualty rate comparable to straight electrics. For evaluation and future higher powers, trials in service with one locomotive fitted with a PA6 engine of 4,200 hp were successfully completed and this unit is now allocated to normal service duties.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs,
Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054622
HIGH-SPEED ELECTRIC AND GASTURBINE TRACTION PREDOMINATE IN SNCF 1974 PROGRAM

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 104-110, 1 Fig, 4 Phot

Five years of continued improvement including doubling of freight tonnage together with ever increasing demands on Paris suburban services dictate traction and rolling stock requirements including a new series of 200 electric locomotives whilst 200 km/h turbotrain links and exhaustive trials with TGV.001 and RTG.01 set the pace for the future.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs,
Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054623
A 4,000 KW FAMILY OF SNCF LOCOMOTIVES FOR A.C. AND D.C. MAIN LINES

Boileau, R, French National Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 112-116, 13 Fig

SNCF develops a programme of 240 locomotives comprising three classes embodying the experience obtained with the first in this new series introduced in 1972. A large degree of standardization is achieved and one is for dual-voltage operation. Thyristor and chopper techniques are widely applied.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs,
Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054625
A DIESEL ENGINE TO UIC TRACTION LOADING GAUGE REQUIREMENTS WITH 400 HP/CYLINDER POTENTIAL

Gallois, J, S.E.M.T. Pielstick

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 118-119, 3 Fig

The technical parameters of the SEMT-Pielstick PA6-280 which has entered trial service on SNCF powering a series 72000 locomotive at 4,200 hp are briefly reported. Simplicity in design and layout studies in the early stages facilitate maintenance and promote standardisation.

ACKNOWLEDGEMENT:
Rail Engineering International

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054626
FRENCH 3,650 HP DIESEL-ELECTRICS FOR CHINA TO WORK HEAVY FREIGHT SERVICES

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 120-122, 2 Fig, 5 Phot

Alsthom and MTE Co-Co units of conventional modern design for 100 km/h with SACM quick-running engines generally based on SNCF CC72,000 but with nose-suspended traction motors and built for ambiant working conditions between—40 to +40 deg C without the need of anti-freeze provision in the coolant are described.

ACKNOWLEDGEMENT:
Rail Engineering International

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Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

054628
RECENT SKODA ELECTRIC LOCOMOTIVE DEVELOPMENT AND PROJECTS

Opial, M

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 128-131, Figs, 5 Phot

Rheostatic braking adopted as standard for high-speed locomotives. Bo-Bo, Co-Co and Co-Co+Co-Co prototypes and 25-kV and 3,000 V d.c. involve 4,200 to 8,000 kW and 200 km/h for USSR and other European countries; these incorporating progressive design development and being subjected to trials at CKD testing station. Hump shunters for 25 kV and 3,000 V d.c. are remote controlled.

ACKNOWLEDGEMENT:
Rail Engineering International

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054632
SERIES PRODUCTION FOR HUNGARIAN RAILWAYS OF 2,700 HP DIESEL-ELECTRICS

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 149-152, 8 Fig, 3 Phot

Ganz-MAVAG Co-Co designed for 3,000 hp introduced at 2,700 hp in two variants for 130 and 160 km/h completed extensive service-trial running on Hungarian State Railways for which it has placed orders. Pielstick quick-running engines and Ganz Elecric designed-and-built electrics incoporating rheostatic braking are embodied in a carefully laid-out integrally-constructed super-structure carried on weld-fabricated plate bogies.

ACKNOWLEDGEMENT:
Rail Engineering International

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054646
PIELSTICK 6300 HP ENGINE FIRST TO PASS 360-HOUR ORE TEST

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 128, No. 3, Mar. 1972, 4 pp, 5 Fig, 2 Tab, 1 Phot

Introduced a year ago for traction, marine and stationary applications, the SSMT-Pielstick PA6-280 series offers single-engine locomotive ratings previously thought attainable only through the use of gas turbines. The 6,300 ph 18-cylinder version is the first engine to complete ORE's new 360-hour acceptance test.

ACKNOWLEDGEMENT:
British Railways, 72/109

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IPC TRANSPORT PRESS, Repr PC: Req Price

054650
ALGERIA BUYS MORE 3000 V D.C. ELECTRIC LOCOMOTIVES

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 2, Feb. 1973, 1 pp, 1 Phot

A series of 32 Co-Co electric locomotives designed to handle heavy mineral and general passenger traffic in severe climatic conditions has been built for Algerian Railways in the German Democratic Republic.

ACKNOWLEDGEMENT:
British Railways, 73/53

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IPC TRANSPORT PRESS, Repr PC: Req Price

054655
LOCOMOTIVES: ENERGY-CRISIS ASSET

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 2, Jan. 1974, 2 pp

In the current fuel shortage, diesel-electric locomotives are one of the country's primary assets. They use one fourth fuel of a truck per ton mile and contribute only minimally to air pollution. Many railroads are undertaking fuel conservation programs, such as shutting off engines instead of letting them idle and maximizing utilization of diesel locomotives. Turbocharged locomotives save about 10 percent in fuel and fewer, high horsepower locomotives are more efficient than a similar amount of hosepower with smaller units. Considerable interest is being shown in electrification. The Union Pacific has a short test section and other railways are conducting studies.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054679
DOT AWARDS CONTRACT FOR ACT I TO GARRETT

Myers, ET

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 3, Mar. 1974, pp 67-68

Garrett AiResearch Manufacturing Company, Torrance, California received an $8 million contract from the DOT for the construction of a prototype train of the Advanced Concept Train (ACT-1). The exterior of the train will be similar to Britain's Advanced Passenger Train (APT), but will incorporate a revolutionary new propulsion system. An energy-storage flywheel propulsion system will be designed to conserve electricity. When the train is braking, the motors will act as generators to accelerate a high velocity flywheel. When the train starts, it will draw upon the energy stored in the flywheel to provide an extra boost of power.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

054719
DEVELOPMENT OF COOLING SYSTEMS FOR DIESEL LOCOMOTIVES OF THE GERMAN FEDERAL RAILWAYS

ENTWICKLUNG DER KUHLANLAGEN IN DEN DIESELLOKOMOTIVEN DER DEUTSCHEN BUNDESBAHN
Feulner, A

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 3, Mar. 1974, p 71

Referring to the development of DB's diesel locomotives from 1950 until today, the development of cooling systems and cooling circuits is described. The influence of the requirements imposed by the diesel motor and of corrosion and cavitation problems in high-power motors on the design of the cooling circuit is discussed. Mention is made of the various measures taken in order to obtain a simple and reliable cooling system and fan drive featuring minimum maintenance requirements.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054792
ELECTRIC LOCOMOTIVE CONSTRUCTION IN THE USSR

ELEKTROVOZOSTROENIE V SSSR
Elektriceskaja i Teplovoznaja Tjaga (Moscow, USSR)

No. 11, 1973, 4 pp, 5 Fig

The authors give a short description of typical electric locomotive construction in the USSR and assess the technical standard of mass produced electric locomotives for main lines. They also describe characteristics of new, more modern electric locomotives being built and commissioned within the current five-year plan.

ACKNOWLEDGEMENT:
International Union of Railways, 107

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
107

054793
COMBINED REGENERATIVE AND RHEOSTATIC BRAKE ON ELECTRIC RAILCARS POWERED BY DIRECT CURRENT

GEMISCHTE NUTZ–UND WIDERSTANDSBREMSE BEI GLEICHSTROMTRIEBFAHRZEUGEN
Loderer, P

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 8, 1973, 5 pp, 9 Fig, 2 Ref

Most rectifier-type sub-stations feeding catenaries are fitted with values that can allow current flow in both directions. This is impossible in a system with three-phase current. When catenary absorption capacity is variable, regenerative and rheostatic braking should be possible with electric brakes. In a braking situation the first step consists of increasing the braking current supply through a direct current converter; then this current is fed into the system by a diode for as long as the system can absorb it. If the circuit system does not require any power, there is a brake thyristor to activate and maintain a braking resistance right up until the end of the direct-current converter cycle.

ACKNOWLEDGEMENT:
International Union of Railways, 91

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054923
MILWAUKEE FIRST TO GET NEW EMD COMMUTER LOCOMOTIVES

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 8, Apr. 1974, p 62

The Milwaukee Road is the first railway to receive the newest locomotive design specifically for commuter service; the F40C from General Motors' Electro-Motive Division. These locomotives are 3,-200 hp six axle units equipped with an auxiliary power system to provide A.C. power for train lighting, heating and air-conditioning.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054929
POWER ELECTRONICS IN A.C. AND D.C. TRACTION SYSTEMS

Band, CE

Journal of Science and Technology (General Electric Company Limited, East Lane, Wembley, Middlesex HA9 7PP, England)

Vol. 40, No. 4, 1973, 9 pp

This article covers the use of thyristors in power circuits for a.c. and d.c. traction vehicles. After discussing the principles of the d.c. chopper and its method of control, a modern regenerative/rheostatic chopper is described. The growth of thyristor control on a.c. vehicles is reviewed and the scheme for a high-power a.c. thyristor locomotive is given. In conclusion the environment in which traction electronics have to perform is discussed.

ACKNOWLEDGEMENT:
British Railways

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General Electric Company Limited, East Lane, Wembley, Middlesex HA9 7PP, England, Repr PC: Req Price

054932
FIRST NARROW-GAUGE THYRISTOR LOCOS PIONEER ADHESION GAINS

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, 4 pp, 4 Fig, 1 Phot

Adhesion values of around 50 percent have been recorded on the metre-gauge Rhaetian Railway since Switzerland's first series-production thyristor locomotives were delivered last year. Mechanically-similar to SBB's numerous Re 4/4" class, RhB's ten Ge 4/4" units with their four-stage thyristor/diode bridge connection have proved the electrical advantages of stepless solid-state control without adverse effect on the traction supply network.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

054948
DEVELOPMENT OF PHASE ANGLE MEASURING DEVICE FOR THYRISTOR CONTROLLED ELECTRIC RAILCAR

Yabe, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 2 pp, 4 Fig

In order to comprehend the operational control characteristic of a thyristor phase controlled railcar, it is necessary to measure the controlled phase angle. To make consecutive measuring of controlled phase angle, a method to detect the controlled phase angle by taking the gate signal for measurement and AC power source for synchronization from an electric car was proposed and a trial device was designed and built. As for operational state and characteristic of each circuit of the device, improvements in accuracy and stability were achieved through laboratory and field tests. After feasibility had been confirmed through service tests, a report summarizing the structure, circuits and handling of the device and the test results was written.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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054951
STUDY ON TESTING METHODS OF CARBON BRUSHES FOR ELECTRIC ROLLING-STOCKS

Teraoka, T Ishikawa, K

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 5 pp, 10 Fig

New testing methods of carbon brushes for rolling stocks are proposed: 1. Performance of carbon brushes refers to its non-linearity of sliding contact drop to current, so the examination of brushes must be done in a view of measurement of its non-linearity. 2. The characteristics of brushes under sliding contact is affected by humidity, so that the examination of carbon brushes must be conducted in the humidity controlled chamber. 3. Brush wear is affected by such factors as current, contact force, sparking and humidity so it is necessary

to use the wear test equipment which enables to combine these factors and to analyse the effect of each factors.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056746
PERFORMANCE OF EXPERIMENTAL INVERTER LOCOMOTIVE CLASS BE 4/4 NO. 12001 OF SWISS FEDERAL RAILWAYS

Brechbuehler, M Bohli, WU

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973, pp 581-588, 10 Ref

An inverter traction vehicle equipped with three-phase induction motors and supplied from a contact wire was built with the prime purpose of clearing up a number of technical questions. These concerned particularly the performance of squirrel-cage induction motors supplied with variable voltage and frequency, fed either individually or in parallel from busbars, the behavior of the motors during wheelslip due to poor adhesion between wheel and rail, and also transient phenomena in general.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504766

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056748
LOCALIZED FEEDBACK CONTROLS FOR MULTI-LOCOMOTIVE POWERED TRAINS

Peppard, LE McLane, PJ Sundareswaran, KK

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

5 Ref

Presented at the IEEE Conf on Decis and Control, Incl Symp on Adapt.

A model for the longitudinal dynamics of a multi-locomotive powered train is developed. Using this model the theory of the LQG (Linear-Quadratic-Gaussian) problem is applied to the problem of minimizing coupler forces in the train consist while maintaining a practical schedule velocity. The controllers developed are easily realized and in one form provide commands for throttle setting changes to a human operator. Experimental results are presented for a 62 car consist traversing a severe grade with locomotives placed at the front, middle and end of the consist. For these experiments the controllers developed were found to meet the system specifications.

ACKNOWLEDGEMENT:
Engineering Index, EIX740502704

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056755
GE 4/4 THYRISTOR LOCOMOTIVES NOS. 611 TO 620 OF RHAETIAN RAILWAY

Bohli, WU

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

Performance figures and specifications are given for a series of meter-gage locomotives. The locomotives are equipped with thyristor phase-angle control and oil-immersed rectifiers. From both electrical and mechanical aspects the locomotives are designed for optimum adhesion between wheels and track. The result is a four-axle locomotive with a performance almost equal to that of a six-axle vehicle of conventional design. The trial runs showed that the set objectives were not only reached, but even surpassed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504759

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056757
OIL-COOLED TRACTION CONVERTORS

Vogel, X

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

Locomotives equipped with oil-immersed semiconductor converters are described. The converters are notable for their low maintenance, complete protection against contamination and extremely compact construction. These three outstanding features make them particularly suitable for installation in motorcoaches, and it is expected that the oil-immersed converter will become standard equipment for motorcoaches in the same way as the oil-immersed transformer. The whole converter, except the control electronics, is contained in a tank, in much the same way as the core and coil of a transformer. In this container all the components are immersed in insulating oil. Harmful environmental factors are thus excluded. In this way the insulating capacity is kept constant and the permanently clean surfaces ensure uniform heat dispersal.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504761

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056760
SOME PROBLEMS OF ELECTRIC TRANSPORT WITH COMBINED POWER SUPPLY

NEKOTORYE VOPROSY ELEKTRICHESKOGO TRANSPORTA KOMBINROVANNOGO PITANIYA
Krasnobaev, NI

Izvestiya Akademii Nauk SSSR, Energetika I Transp (USSR)

No. 6, Dec. 1973

Problems of application of accumulator-fed electric drive for traction purposes, in particular as a supplementary source of electric power, with electrically driven railroad rolling stock using combined power supply, are considered. The experience of application of contact and accumulator-driven electric trains and shunting electric locomotives on the Baltic Railroads in the USSR is analyzed. Data are presented on the introduction of new types of accumulators and impulse control at the contact and accumulator-driven electric railroad rolling stock.

ACKNOWLEDGEMENT:
Engineering Index, EIX740503832

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056764
CONTROL ELECTRONICS FOR THE RE 6/6 LOCOMOTIVES OF SWISS FEDERAL RAILWAYS

Albrecht, W

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

A large number of different functions are combined in the electronics units for the Re 6/6 locomotives. The modular system with plug-in functional units designed to cope with the special requirements of traction operation has proved itself during commissioning trials and in operation. Built-in check facilities eliminate additional auxiliaries and make maintenance extremely simple. Many modules are designed for several similar tasks.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504765

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056765
CHOPPER CONTROLS FOR TORONTO SUBWAY CARS

Roberts, FW

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Presented at the IEEE International Electr, Electron Conference and Expo. Toronto.

The Toronto Transit Commission has installed regenerative chopper controls in six of its latest subway cars, type H-2, replacing conventional electromechanical cam shaft controls. The operation of the cars, and future trends, are discussed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504163

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056766
CLASS RBDE 4/4 RECTIFIER MOTORCOACHES FOR REGIONAL RAILWAY COMPLEX

Vollenwyder, K

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

A shuttle-service train covering an area of central Switzerland, has to cope with brisk goods traffic while providing extensive commuter and excursion services. Local operating conditions led to an arrangement with contactor-controlled tapchangers, oil-immersed rectifiers and ripple current motors with series and separate excitation. Facilities are provided for changeover from rectifier and tapchanger to thyristor equipment sometime in the future.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504763

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056812
PROTOTYPE LOCOMOTIVES OF SERIES RE 6/6 OF THE SWISS FEDERAL RAILWAYS

DIE PROTOTYPLOKOMOTIVEN DER SERIE Re 6/6 DER SCHWEIZERISCHEN BUNDESBAHN
Meyer, K

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 7-8, Aug. 1973, 7 Ref

An order for 4 six-axle prototype locomotives of Series Re 6/6 was placed by Swiss Federal Railways. The 1-hr rating amounts to 10,600 PS and the top speed is 140 km/hr. The locomotives are of Bo Bo Bo type. The article reports in detail on the mechanical and electrical equipment of the 4 prototype locomotives, which differ partly in their design.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100235

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056814
SELF-COMMUTATED RECTIFIER TO IMPROVE LINE CONDITIONS

Zander, H, Telefunken

Institution of Electrical Engineers, Proceedings (Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England)

Vol. 120, No. 9, Sept. 1973

When thyristor rectifiers are used for electric drives, reactive power is produced with fundamental and harmonic frequencies. Especially in single-phase traction lines, with their low short-circuit power, a technical solution of this problem, applicable mainly to thyristor-driven rail cars and locomotives, had to be found. In this paper, the sector-control system of a self-commutated unsymmetrical bridge is described. In the unsymmetrical half-controlled bridge connection, the two thyristors can be quenched by adding a self-commutating device. This attachment (supplement) can be applied to the single bridge or to two bridges in series (sector control). By using this self-commutating attachment, it is possible to shift the fundamental of the current to a leading angle with respect to the voltage.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100145

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056821
T 476. 0 LOCOMOTIVE–THE SECOND MEMBER OF A NEW SERIES OF CKD LOCOMOTIVES

Dolezal, Z

Czechoslovak Heavy Industry (Rapid U1.28, Rijna 13, Prague 1, Czechoslovakia)

No. 10, 1973

Description of the design and operation of the new Czechoslovak Class T 476. 0 diesel-electric, passenger and goods service locomotive covering the 1400-1800 hp range and having an axle load of 17. 5 Mp at a maximum speed of 100 km per hr. The basic specifications are given.

ACKNOWLEDGEMENT:
Engineering Index, EIX740204489

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056854
DIESEL-ELECTRIC LOCOMOTIVES FOR SHUNTING DELIVERED TO BRAZILIAN TRANSPORTATION MINISTRY

Kato, K Nakazato, T Ote, Y Kawai, I

Toshiba Review (Tokyo Shibaura Electric Company Limited, 1-1 Uchisaiwaicho, Chiyoda-ku, Tokyo, Japan)

No. 84, Aug. 1973

Recently Toshiba delivered 14 diesel-electric locomotives to the Brazilian Government. Of these locomotives, six weighing 64 metric tons are intended to run on 1600 mm gage track and have an output of 1050 HP, while the other eight weighing 52 metric tons are intended for 1000 mm gage track and have an output of 500 HP. Design of the locomotives placed emphasis on simplicity of construction, ease of operation and maintenance. The locomotive transmission consists of a dc generator directly coupled to a diesel engine made by Caterpillar. The article describes the characteristics of the locomotives and gives other technical data.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102533

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056863
INSTRUMENTATION METHODS FOR MEASUREMENT OF TORQUE OF CARDAN SHAFTS IN DIESEL LOCOMOTIVES

David, R

Institution of Eng (India) J, Elect Telecom Eng D (Institution of Engineering (India), 8 Gakhale Road, Calcutta 20, India)

Vol. 53, PtET, 1973

Some of the methods that could be used for measurement of torque are described, such as slip rings, inductive transmission and optical transducer. The strain gage method of measuring torque is not only accurate, but is also versatile. The basis of the strain gage technique is to interpret torque from torsional strain measured in the shaft. Due to the limitation in the use of slip-rings, the merits of some of the other types of systems in torque measurement that could be adopted are discussed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100441

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056864
HIGH PERFORMANCE TEST STAND FOR THE DYNAMIC INVESTIGATIONS OF THE DRIVE SHAFTS

HOCHLEISTUNGSPRUEFSTAND FUER DYNAMISCHE UNTERSUCHUNGER AN GELENKWELLEN

Heier, D Hulke, D

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 9, Sept. 1973

A testing device was developed according to the principle of a closed bracing system, which has a maximum rating of 4200 kW. The article reports that this rating can be provided with a drive rating of 550 kW only. A hydropulse cylinder installed in the test stand serves to simulate axial movements.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104051

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057174
SACM AGO ENGINE IN ITS LATEST FORM POWERS SNCF CLASS 72000 DIESEL FLEET

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 198-200, 2 Fig., 1 Phot.

SACM AGO-powered C-C diesel-electrics constituting Europe's most powerful express locomotive class in series production are running monthly km up to 20,000 and are equipped with engines which have been progressively improved in detail without jeopardizing the interchangeability of assemblies.

ACKNOWLEDGEMENT:
Rail Engineering International

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057176
LOCOMOTIVES WITH SECMAFER HYDROSTATIC TRANSMISSIONS

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 191-193, 2 Fig., 1 Phot.

A 875 hp general-purpose B-B with two secmafer hydrostatic pumps and eight similar motors mounted on the bogies for an Italian track maintenance contractor introduces a range of units with powers envisaged up to 1,800 hp following earlier types of fixed-wheelbase construction. A concept of higher power applied to designs of electric locomotives is discussed.

ACKNOWLEDGEMENT:
Rail Engineering International

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047476
ELECTRIC BRAKING–PART 1: MULTIPLE UNITS

Scott, M

Modern Railways (Allen (Ian) Limited, Terminal House, Shepperton TW17 8AS, England)

Vol. 30, No. 299, Aug. 1973, pp 318-321, 3 Fig, 4 Phot

Braking is simply a means of converting energy from one form into another. The moving train has kinetic energy which can be calculated. If the train slows down for any reason, its kinetic energy must be converted into some other kind of energy. If a simple mechanical brake is used, the energy appears as heat; similarly, if the vehicle is coasting to a lower speed, heat appears in the bearings as a result of friction. If an electric brake is used, electricity is the new form of energy. This article is the first of two dealing with electric brakes on railways; it deals mainly with electric braking on multiple-unit trains.

ACKNOWLEDGEMENT:
Modern Railways

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052101
THE DISC BRAKE. A CONTRIBUTION TOWARDS THE STUDY OF ITS RATIONAL USE ON RAIL VEHICLES

Laplaiche, M, French National Railways

French Railway Techniques (Federation des Industries Ferroviaires, 12 rue Bixio, 75007 Paris, France)

No. 3, 1973, 16 pp, 17 Fig, 4 Phot

From the point of view of their conventional methods of production, and given the same wheel diameters, the disc brake enables, in the case of braking to a stop, a greater amount of energy to be dissipated than does a cast-iron brake block. There exists, therefore, a field, which is that of high speeds and heavy axle loads, in which the use of the disc brake is more appropriate than of the brake block. It is, however, difficult to define where precisely the limits of this field lay, as they also depend, in fact, on the braking performance, i.e. the average rate of deceleration required and, therefore, on the signalling system used. The brake lining pads play an outstanding part. The results which can be expected from a disc brake depend, in the first place, on the lining pads, which should be capable of satisfactory performance, both when the temperature is high, and under special atmospheric conditions (low temperatures, and considerable humidity).

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052119
BRAKING MOVEMENT OF TRANSPORT VEHICLES WITH HYDRAULIC RETARDATION

DVIZHENIE TRANSPORTNYKH SREDSTV V TORMOZNOM REZHIME S GIDROZAMEDLENIEM

Uzhanov, AY Sorokin, LA

Izvestiia Vysshikh Uchebnykh Zavedenii, Gornyi Zhu (Proyezed Vladimirova, d.6, podyezed 11, Moscow K-12, USSR)

No. 6, 1973

Conditions of hydraulic braking are given in the form of mathematical dependence formulas. Base equations of motion in the braking mode of operation and of speed change during the period of braking are presented. Conditions are defined for the absence of wheel sliding, formulas are given for determining the path and time of braking in different conditions. Dependence relations are given determining the necessary hydraulic counterpressures. Results of this work can be utilized for designing hydraulic braking systems for mine cars railroad rolling stock, automobiles and other types of transport.

ACKNOWLEDGEMENT:
Engineering Index, EIX731203904

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053742
BRAKING PERFORMANCE OF FREIGHT TRAIN–BRAKING RATIO AND BRAKING DISTANCE

Takami, H Iwase, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 2 pp, 5 Fig

The braking distance of trains on JNR's narrow gauge lines is stipulated in a regulation as to be within 600m in any case. This must be a primary consideration in designing either vehicles or ground facilities. In order to have more traffic available, train speed must be increased and each train must be composed much longer. These are contradictory requirements for freight trains with conventional air brake equipment. These circumstances brought the study on this theme. This paper deals with (1) the survey of actual trains on their consist, their loading conditions and so on, (2) method of simulation for making up train consist, and (3) the result obtained therefrom.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053874
BRAKE BLOCK SHOE MADE OF COMPOSITE MATERIALS

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

B64/RP10, Oct. 1972, 169 pp, 17 Fig, 56 Tab, 2 Ref

The final report consists of a summary, in which the different partial problems are shown, as they exist at the beginning of 1972. In addition to a brief outline of the work carried out previously, the report contains a more detailed description of a number of more recent studies (comparative bench tests, effect of composite brake block shoes on adhesion, and chemical and physical alterations to the friction surfaces of brake block shoes made of composite materials, and the wheels). In addition to the considerable information obtained concerning brake block shoes, the positive advantages include the use–although, of course, to a provisionally limited extent–of brake block shoes made of composite materials, ensuring advantages from the point of view of profitability and the braking technique. Finally, there is also shown, as one result, a proposal concerning a provisional specification for approval, which takes into account the existing stage of developments. The negative side includes the defects and disadvantages which still affect composite brake block shoes, and which must be taken into account, as they are capable of restricting the latters' use and profitability. Amongst the problems which are still in suspense, the most important are those concerning adhesion between wheel and rail, metal inclusions, and the effect of atmospheric conditions (particularly in winter), and, they are, therefore, problems which affect braking efficiency. The Committee leaves it to braking experts on the different railways to decide themselves, on the basis of the information obtained and placed at their disposal, whether to make use of composite brake block shoes.

ACKNOWLEDGEMENT:
International Union of Railways, 1175

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
48M1

053982
THE DEVELOPMENT OF RAILWAY BRAKES

Marsh, GH Sharp, AC

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 1, Jan. 1973, 8 pp, 11 Fig

Note: Part 2 of this article appeared in the March 1973 issue.

This article traces the development of railway braking systems from the earliest mechanical brakes through the development of air brakes.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

054015
IMPROVEMENTS IN THE DESIGN OF AIR BRAKE CONTROL VALVES

Moore, IG, Westinghouse Brake and Signal Company, Limited
Wickham, DJ, Westinghouse Brake and Signal Company, Limited

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-3, Dec. 1973, 9 pp, 8 Fig

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

The paper traces the development of the air brake control valve from its earliest ancestor, the original triple valve invented by George Westinghouse, up until the present day. Emphasis is placed on the way in which constructional techniques evolved, developments on both sides of the Atlantic being considered. The desire for improved performance, reduced costs and an extended maintenance period is shown to be the driving force towards change, which is inevitable once the required skills and techniques become available. The authors show how worthwhile improvements are still feasible and introduce a new design of control valve based on constructional techniques intended to realize these.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054598
TRAIN BRAKE SYSTEMS APPLICATION AND RELEASE

Peterson, JH, Westinghouse Air Brake Company

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 23 pp, Figs

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

Unusual and unpredictable braking actions were reported by engine men around 1970 on Canadian Railways. The problems coincided with changes in train consists that now include a greater number of 70 and 100-ton cars. The ratio of horsepower to locomotive weight had increased to the point where the independent brake was no longer capable of holding trains on grades while the train was being recharged. These problems are outlined in detail and general recommendations to prevent unusual braking are given.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054636
AUTOMATIC ANALYSIS OF BRAKE TESTS

Merle, A Foureys, J

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Vol. 93, Jan. 1974, pp 26-32

The authors, who are Inspecteurs at the SNCF Rolling Stock and Research Departments, explain in this article the method adopted to determine the braking performance of modern highspeed trains (TGV 001), i.e., the distance needed to bring the train to a halt from various speeds with all the brakes in operation, then with all or part of each braking system isolated. This method is possible because the results of the tests are analysed by computer, and details are given of the programme and the principles on which it operates. The results are printed out directly and form an extremely useful catalogue with which all the brake equipment and the performance of future tractive stock can be defined with precision.

ACKNOWLEDGEMENT:
British Railways, 30112

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054950
DATA CONVERSION OF BRAKING SPEED

Takami, H Iwase, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 2 pp

Recently, in JNR, most trunk lines are heavily congested with scheduled trains and it is gradually becoming difficult for a test train to be additionally planned, if sticking to the condition of test section to be level and straight. This study was made to find out the way to convert the data of train speed, measured in any section with grades or curves included, into that to be expected for train on a level and straight section. The conversion in opposite direction is considered too.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056745
REGENERATIVE BRAKING EQUIPMENT FOR CLASS RE 6/6 LOCOMOTIVES OF SWISS FEDERAL RAILWAYS

Schacher, R

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

The advantages of electric braking are listed as are the advantages of regenerative type braking when compared to rheostatic type for ac traction vehicles. An advance in capacitor technology has made feasible the resonance excitation system for a locomotive employing six single-phase ac motors. All six traction motor fields of these locomotives can be connected in series, thus dispensing with the excitation transformer.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504764

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056747
THYRISTOR-CONTROLLED RHEOSTATIC BRAKING FOR THE SERIES 1042 LOCOMOTIVES OF AUSTRIAN FEDERAL RAILWAYS (OBB)

Albrecht, W

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Vol. 60, No. 12, Dec. 1973

Over 100 series 1042 locomotives of the Austrian Federal Railways are equipped with thyristor-controlled rheostatic braking which provides virtually constant braking effort over a wide speed range. Features of the equipment include simplicity and reliability.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504767

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056837
REQUIREMENT AND IMPLEMENTATION OF REGENERATIVE TRAIN CONTROL

Berman, B Gelb, G

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Paper

Ind Appl Soc, Annual Meeting, 8th Conf Rec.

Advances beyond the state of the art are desired for car performance, reliability of scheduled service and passenger comfort. The train propulsion and control system constitutes a major element affecting such requirements as car configuration, acceleration and braking, jerk rate, efficiency, maintainability, initial and operating cost, etc. This paper discusses the requirements imposed on an optimized propulsion system for this type of service. These requirements are then implemented by utilizing an advanced concept regenerative drive coupled to a dc shunt or series motor. A generalized approach is evolved. It is shown that close analogy exists between ac and dc systems intended to fulfill the same requirements. The paper thus projects the philosophy that advanced concepts and improved performance are not synonymous, as is often assumed, with the exercise of varying the method of implementation. It concludes by showing that the stress should be on the mating of the system elements to the source of supply and the car and on the method and techniques of exploiting their inherent characteristics advantageously. The discussions and arguments are supported by suitable signal flow diagrams, block diagrams and schematics.

ACKNOWLEDGEMENT:
Engineering Index, EIX740303826

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056845
INVESTIGATION OF WATER—AND AIR-PRESSURE TESTS FOR COMPRESSED-AIR CONTAINERS FOR RAIL AND ROAD TRANSPORT VEHICLES

UNTERSUCHUNGEN ZUR WASSER UND LUFTDRUCK-PRUEFUNG VON DRUCKLUFTBEHAELTERN FUER SCHIENEN-UND STRASSENFAHRZEUGE

Benke, P Bretschneider, H Ackermann, E

ZIS Mitteilungen (Zentralinstitut fuer Schweisstechnik der DDR, Koethener Strasse 33a, 403 Halle/Salle, East Germany)

Vol. 15, No. 8, Aug. 1973, pp 918-929, 17 Ref

Water-pressure and air-pressure tests for examining the leakproof condition of compressed-air containers are described and compared. The general adoption of the air-pressure test is proposed and the specific advantages of this test are pointed out.

ACKNOWLEDGEMENT:
Engineering Index, EIX740100882

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056853
DISK ASSIST, THE SIMULTANEOUS USE OF TREAD AND DISK BRAKES

Archibald, RH, Westinghouse Air Brake Company
Cabble, GM

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-WA/RT-11, Paper, Nov. 1973

The combination of on-tread and disk braking is an excellent method to obtain the advantages of each kind of braking and to minimize the disadvantages. There is a real need for combination braking on rapid transit cars and many freight cars. Results of in-service performance of a test car are given.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104848

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057175
INFORMING THE DRIVER OF BRAKE-PIPE FLOW AND LEAKAGE PARAMETERS

Wickham, DJ, Westinghouse Brake and Signal Company, Limited

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 194-197, 2 Fig

It is important that drivers receive ready information on air brake performance when effecting routine test and ensuring breakway, and that brake equipment faults and emergency applications made in the train be identified quickly. Westinghouse Brake & Signal has developed a new simple air-flow measuring device which can be mounted directly on the main reservoir supply to the brake valve.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr. PC: Req. Price

051313
AUTOMATIC TRAIN OPERATION

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

Sept. 1973, 41 pp

This selective bibliography covers 75 articles on automatic train control, many of them in journals and from reports not covered by RRIS. The articles are from the middle sixties to the early seventies, and most are from European or Japanese sources.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

051314
AUTOMATION OF MOTIVE POWER UNITS AS REGARDS THE CONSTRUCTION OF ELECTRIC LOCOMOTIVES

Gierth, E

International Railway Congress Assn Monthly Bull (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

Vol. 6, No. 6-7, June 1969, 35 pp, 11 Ref

The author shows the reasons for which the railways are particularly suitable for automation, from both a technical and an economic point of view, and then examines automatic train running control, continuous automatic control and cab signals, and automatic running and braking control, describing, as an example, the DB's type 103 high-speed locomotive and its equipment. He also describes the experiments carried out on series 110 300 and 110 299 locomotives, as well as on locomotive 112 270, equipped for braking to a stop, and refers to the ultimate object of research, which should result in the rationalization, as well as in an improvement and speeding-up, of the whole process of transport.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

051315
RECENT DEVELOPMENTS IN THE REGULATION OF THE MOVEMENT OF TRAINS

Alston, LL

International Railway Congress Assn Monthly Bull (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

Vol. 6, No. 1, Jan. 1969, 19 pp, 16 Fig, 7 Ref

The above article deals with the studies which are now being carried out on British Railway with the object of improving the flow of traffic. A description is given of the necessary equipment, which is now being perfected, for the creation of a system of communications enabling permanent bilateral communications to be established, as well as a more material link for the tramsission of data between the control centres and the moving trains, and a special computer is being constructed which, when placed on the train, will constantly keep the driver informed of the maximum speed to be observed. It should be noted that the control centres will not transmit information concerning safety, so that, even in the case of breakdown, it will be possible for the trains to continue to run in complete security. A computer, known as a "safety computer" will record, on punched cards, the safety details relating specifically to a train, and will process them with the help of the information obtained from the track.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

051317
CYBERNETIC OPERATION OF RAILWAY TRAFFIC

Alston, LL Davies, D

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

Sept. 1970, 4 pp, 5 Ref

This is a statement of the BR's future prospects about automatic train operation and lines control. The principles of "module operation" achieving exact functions are given.

ACKNOWLEDGEMENT:
International Union of Railways

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051319
BAY AREA TRANSIT SYSTEM WILL HAVE AUTOMATED CENTRAL CONTROL

Gibson, TR

Westinghouse Engineer (Westinghouse Electric Corporation, Westinghouse Building, Pittsburgh, Pennsylvania, 15222)

Mar. 1970, 4 pp, 4 Fig

The above article contains details of the BART central control system, together with a brief description of the network. The system will comprise a central unit ensuring optimum working, and local units carrying out vital operation. The central unit has no control over the local units, except in the case of certain of their non-vital operations, such as the length of stops. The article contains a reproduction of the diagram of the central unit, as well as details of the characteristics of its different parts, and an explanation of its method of operation and functions.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Westinghouse Electric Corporation, Westinghouse Building, Pittsburgh, Pennsylvania, Repr PC: Req Price

051320
AUTOMATIC CONTROL OF TRAIN MOVEMENT ON A RAPID TRANSPORT SYSTEM FOR LONDON

Hadaway, HW

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

Sept. 1970, 6 pp, 4 Fig

The paper covers system arrangements for the automatic operation of the Victoria Line, and explains the part played by the programme machines for signaling associated with automatic train operation and its cybernetic application for management control. The paper also covers the communication system employed.

ACKNOWLEDGEMENT:
International Union of Railways

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051321
DEVELOPMENTS IN TRAIN CONTROL ON BRITISH RAILWAYS

Alston, LL Birkey, JW

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Nov. 1971, 8 pp, 10 Fig, 4 Ref

After commenting briefly on the equipment available up to 1970, the authors provide a description of the Southern Region Automatic Warning Systems (STRAWS), which is used on the line between Totton and Bournemouth. This installation is to be improved by means of the following additional equipment; (1) automatic speed control with an integrated programme on the motive-power unit; (2) introduction of a central cabin for the control of programme alternations; (3) marshalling and running control of trains in the event of delay. This equipment has been designed in such a way as to remain compatible with the later development of train control by means of a central computer. Provision has been made for two types of equipment–that which is directly concerned with operating safety, and that which is independent of it. During 1972, an automatic installation for bringing a train alongside a platform by means of centralized control will be tested at Glasgow Central Station. It comprises a computer with store which optimises the use of the 13 tracks in accordance with the schedules of the trains running through a 6-track bottleneck at the entrance to the station.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

051323
PERFORMANCE TEST OF AN AUTOMATIC TRAIN POSITIONED STOP SYSTEM

Kambe, T Saruya, T

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

No. 3, Quart Rpt, 1971, 2 pp

The author shows the lay-outs provided on a vehicle incorporated in a train, as well as between the tracks on the Shin-Kansen line, in order to ensure that trains stop at a given point in Kyoto station. The installation operates at an approach speed of 70 km/h using multiplex equipment, with transmission and reception of signals on 72 KHz. The conventional train equipment has not been altered–the brakes are operated by this equipment, and by the control device, which receives the signals in accordance with the running speeds and the distance to the stopping point. The stopping distance is adjusted to some 0.05 m. As this technique has now been perfected, its practical application is expected very soon.

ACKNOWLEDGEMENT:
International Union of Railways

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051341
YARD RADIO

Sugioka, N, Japanese National Railways

Japanese Railway Engineering (Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan)

Vol. 14, No. 2, 1973, pp 20-21, 2 Fig

Development studies, including tests of prototypes, have been carried out on the yard radio system to assure that it would be a wireless information transmission system most suited for shunting operations, and on the radio apparatuses from the aspects of conveniency and reliability. The purpose of introducing the yard radio system and the outline of the setup are dealt with.

ACKNOWLEDGEMENT:
Japanese Railway Engineering

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051381
SIGNALLING AND COMMUNICATIONS FOR KOREA'S FIRST ELECTRIFIED LINES

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, p 472, 1 Fig

This article describes the protection provided for signaling and communications facilities when the line was electrified.

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051408
THE WASHINGTON METRO AUTOMATIC TRAIN SUPERVISION SYSTEM

Hillman, HD, Gibbs and Hill, Incorporated
Cerbins, OH, TRW Systems Group

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-79, Paper, Sept. 1973

The Washington Metro will be operated as a fully automated rapid transit system. Normal system operation will be controlled by the Automatic Train Control System which is comprised of the Automatic Train Protection, Operation and Supervision subsystems. This paper is divided into two parts: Part I provides an overview of system operation, including the role played by each of the subsystems in providing control of train separation and train speed, route security, control of acceleration and station stopping, and maintenance of schedules through computer-directed performance level and dwell adjustments. Part II provides a detailed description of the Automatic Train Supervision system and the methods employed by the computer software to exercise supervisory control of the system. The major programs and the software-hardware interface which provide the supervisory functions for train and terminal operations are described. A discussion of the strategies employed during major service disruptions closes the paper.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051444
ATC EQUIPMENT FOR NEW SOBU LINE CARS OF JNR

Takaoka, T
Yasunami, M

Hitachi Review (Hitachi Limited, #4-1 Marunouchi, Tokyo,

Japan)

Vol. 22, No. 9, 1973, pp 390-398

The Sobu Line of the Japanese National Railways (JNR) recently added an underground section connecting Kinshicho Station to Tokyo Station, and the new section went into service in July 1972. This article describes the Type TS-7 automatic traffic control (ATC) equipment for electric railcars adopted on the new underground line. This ATC equipment employs a triple-system totally digital ring-calculation system and features high accuracy, high reliability, and fail-safe performance. The most outstanding feature is the ring calculation system which makes dynamic control possible. It is composed of fewer parts and simpler circuits, still ensuring high reliability and positive detection of faults. As such the ring calculation system is expected to find wide application.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 057473

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051528
TELECOMMUNICATIONS RESEARCH IN THE UNITED STATES AND SELECTED FOREIGN COUNTRIES: A PRELIMINARY SURVEY

National Academy of Engineering, 2101 Constitution Avenue, NW, Washington, D.C., 20418

Vol. 2, June 1973

Contract NSF H-1221

Report to NSF by Panel on Telecommunications Research, Committee on Telecommunications, NRC.

A preliminary investigation has been carried out on the command and control of rail transportation, both in the U.S. and overseas. An overriding consideration of rail transportation is safety, both for reasons of preservation of human life and for the high cost of a failure in potential damage to property. As such, railway signaling has evolved not only in a "fail-safe" mode, but in one where innovation must pass a series of slowly ascending levels of trial before being generally accepted in the industry. The second consideration is that of low R&D funding levels. In recent years gross investment in rail transportation has been low as the high technology fields of air and space have preoccupied governments.

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051558
TRACK CIRCUITS FOR MODERN RAPID TRANSIT SYSTEMS

Kalra, P, Bechtel Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-62, Paper, Sept. 1973, 8 pp, 9 Fig, 3 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Track circuits have been used in American Railroads for over a hundred years. Although the basic idea (use of rails as part of detection circuit) remains the same, changes in implementation have been made constantly to meet new requirements and to take advantage of advances in technology. In modern rapid transit applications track circuits must meet certain requirements in performing their function of train detection and broken rail protection. The track circuits must operate reliably without insulating joints and with lightweight cars using disk brakes. As modern rapid transit systems use chopper controlled propulsion systems the track circuits have to be designed for operation without interference from chopper harmonics. Track circuits without insulating joints result in problems which must be solved for safe and reliable operation.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051905
BIBLIOGRAPHY ON RAILWAY SIGNALLING 1960-1972

Mackay, NAM Martin, BD

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada

#73-9

The purpose of this study was to examine present-day railway signalling systems with a view to formulating recommendations for improved signalling on Canadian railways. Such recommendations were to be made on the basis of increasing efficiency and/or safety and reducing maintenance and operating costs. The present bibliography list reference published during the period of 1960 to the present, with an emphasis on references after 1965. No attempt has been made to list all titles available during this period. However, where possible representative titles of those subject areas considered relevant to advanced railway signalling systems have been included.

ACKNOWLEDGEMENT:
Canadian Institute of Guided Ground Transport

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: $2.50

051946
THE AUTOMATIC DIGITAL COMPUTER CONTROL OF VEHICLES IN RAPID TRANSIT SYSTEMS FOR URBAN TRANSPORTATION

Anderson, JH, Waterloo University
Powner, ET, Manchester University Institute of Science & Tech
Bergman, N, Waterloo University

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 184, Pt3S, 1970, 7 Fig, 13 Ref

Proceedings of the Symposium on Rapid Transit Vehicles for City Services 22-23 April 1971. Arranged by the Automobile Division of the Institute of Mechanical Engineers.

This paper considers the problem of controlling vehicles in a rapid transit system using an on-line digital computer. Vehicle speeds and spacings are obtained periodically and are used by the control computer to calculate the required driving or braking forces for the next time period. A largely non-mathematical description is given of multivariable control methods which allow rapid transit schemes to operate efficiently for any number of vehicles with maximum capacity consistent with safety requirements and comfort. Difficulties which arise because of uncertainties in data in practical cases due to measurement errors, interference, or malfunction are alleviated by the control method and produce no significant deterioration in system performance. Consideration is given to non-linearities, merging, starting, etc., which are inherent in any overall scheme. Practicality is borne in mind throughout the description.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

051958
EVOLVING MODERN SIGNALLING TO MEET LOCAL NEEDS

Joseph, CM, Indian Railways

Developing Railways (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

1974, 4 pp, 1 Fig., 5 Phot.

Because few foreign suppliers can offer equipment that fully meets operating needs, signalling techniques can make progress in a developing country only if a strong indigenous base exists for system design. Each country has its own maintenance and reliability problems, best solved by local engineers.

ACKNOWLEDGEMENT:
Developing Railways

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IPC TRANSPORT PRESS, Repr PC: Req Price

052080
CONTINUOUS AUTOMATIC TRAIN CONTROL ON MUNICH S-BAHN

Kohler, EJ

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 3 pp, 2 Phot., 3 Ref.

The German Federal Railway has already introduced continuous ATC on some of its main lines, but the greater traffic density on its Munich S-bahn network has justified the cost of a more sophisticated version known as LZB 110, which comes into limited operation mext month. Dipl.-Ing. E. J. Kohler of Siemens describes how this system will ultimately replace colourlight signalling, which would remain in a standby capacity.

ACKNOWLEDGEMENT:
Railway Gazette International

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052306
INSULATED RAIL JOINT DEVELOPMENT AND RESEARCH. SECOND PROGRESS REPORT

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 65 N, 584, Proceeding, Feb. 1964, pp 560-572, 2 Tab, 7 Phot

A second progress report on insulated rail joint development and research is presented. Objectives of the work and principles of the problem are discussed, and laboratory tests citing the experience of eight service test joints are reviewed. Characteristics of a rail joint are enumerated, and reasons for development of better insulated joints are presented. It is noted that the AAR design includes joint bar, insulation, armor and thimbles all molded and bonded into an integral unit, and the design has other advantages also. Exposure of the joint to a rolling load machine is also discussed.

ACKNOWLEDGEMENT:
Association of American Railroads

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052317
INSULATED RAIL JOINT DEVELOPMENT AND RESEARCH

Cruse, WJ

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 566, Proceeding, Oct. 1961, pp 1-12, 1 Fig, 1 Tab, 7 Phot

This article is an abstract of Report No. ER-9.

An effort to design rail joint insulation capable of resisting high compressive and abrasive forces that develop between rails and joint bars was presented. A protective steel armor bonded to the insulation in the joint bars was selected as the best method to protect the insulation. Rolling-load tests were run on seven types of insulated joint bars, including the VulcaBond joint designed by the AAR. The rolling-load tests gave good comparative data on the action of the joints in flexure and the fatigue life in flexure. The VulcaBond joint had the smallest deflection. A standard armoured continuous type was next lowest, and the plastic joint had the greatest. The fiber-glass joints were the best of the plastic type tested, but had considerably greater deflections than the VulcaBond or continuous type and a lesser life in fatigue. The VulcaBond joints were installed on track in several railroads. Several weaknesses were found and remedied or eliminated. However, the bushings need further strengthening.

ACKNOWLEDGEMENT:
Association of American Railroads

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052331
TEST OF 120-FT SANTA FE RAILWAY FLOODLIGHT TOWER

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 559, Proceeding, Oct. 1960, pp 133-152, 10 Fig, 2 Tab, 3 Phot

This report contains a description and analysis of a field test on a 120-ft floodlight tower in the Santa Fe Railway yard at Clovis, N. Mex. This location was selected because of the high wind velocities that prevail there. Towers similar to the one tested have collapsed under wind loading, and this test was performed to obtain data on the relation between the wind velocity, stresses in the tower legs, and displacement of the top of the tower. Some of the conclusions are: 1) The tower continually oscillated during wind generally in an eliptical path and at a natural vibration of 0.8 cps. 2) Wind velocity continually increased or decreased. 3) Wind velocities were recorded increasing at one level on the tower and at the same instant decreasing at another level. 4) There was an increase in the mean stress in the tower legs with an increase in wind velocity. 5) Semi-amplitude stresses in the tower legs were not related to the mean stresses or wind velocities, but are related to the frequencies of wind gusts. 6) Mean stresses in the tower legs at the 40 and 80 ft levels were not always proportional to the mean stresses at the base. 7) Displacements of the tower at the top were not related to the wind velocities or the stresses in the tower legs.

ACKNOWLEDGEMENT:
Association of American Railroads

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052367
FEASIBILITY STUDIES ON NEW NUCLEAR LIGHT SOURCES

Holtzman, R, Armour Research Foundation

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 60, Proceeding, 1959, pp 693-710, 4 Tab, 19 Ref

Study is made to determine the feasibility of using light sources activated by nuclear radiation. A conventional light operated by a nuclear battery, and phosphors directly activated by radioisotopes are investigated. The conventional light is impractical due to inefficiency and high cost. The activated phosphors would promise 10 to 50 times the light output if they were modified to make them transparent, and it is discovered that transparent activated phosphor-type crystals may be produced, although none were available by the conclusion of this study for determination of their luminescent properties under nuclear radiation. The advantages of physically or chemically mixing radioisotopes with the phosphors is examined, but the work is not pursued due to small gain to be achieved. A survey of commercially available nuclear light sources reveals that these sources are not suitable for signs and could be improved.

ACKNOWLEDGEMENT:
Association of American Railroads

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053739
ANALYSIS OF DISTORTION CHARACTERS IN TRANSMISSION OF BASEBAND CODE AND ITS APPLICATIONS

Takahashi, K

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 7 pp, 13 Fig

The present situation of a baseband code transmission in a cable line is reviewed, and its trend in the future is taken into consideration with some expectations, then it is noticed that the qualities of the code, expecially the distortion character, have to be studied. The calculation method for the distortion degree has been derived from the step response function of a cable circuit. Applying the method to practical problems in lines of JNR's systems, the distortion characters have been evaluated. A quite simple method for improving the character also has been studied, and its application to pratical usages is illustrated.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053827
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. 1. TESTS TO COMPARE THYRISTOR-CONTROLLED TRACTIVE UNITS FOR 16-2/3 HZ ON THE SAME TEST TRACK

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, ORE A 122/RP4, Report, Feb. 1973, 1 p

A comparison of the measured results which had been obtained from tests made with thyristor-controlled locomotives of about the same type showed variations in the interfering currents measured by some railway administrations (DB and SJ) which could not be explained as having been caused only by the connection for feeding the overhead contact system. After an adjusted measuring technique had not produced appreciable changes, it was held that the type and magnitude of the supplying overhead contact systems and high voltage systems exerted a certain effect on the interfering current.

ACKNOWLEDGEMENT:
Rail International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

053828
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. 2. ADDITION OF PSOPHOMETRICALLY WEIGHTED INTERFERING CURRENTS PRODUCED BY SEVERAL THYRISTOR-CONTROLLED A.C. TRACTIVE UNITS

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, ORE 122/RP5, Report, Feb. 1973, 1 p

Simultaneous running of several tractive units gives rise to severe variations in the composition of the interfering currents since the different harmonics which are dependent on the characteristics of the tractive units, the control and the conditions of the system change continuously their phase relationship to one another and also to fundamental frequency.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

053840
PLAN FOR WASHING ACI LABELS

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 1, Jan. 1974, 1 p

This short article notes the problems with unreadable labels that have plagued ACI, and outlines a label washing plan proposed by Servo.

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053842
LABEL READABILITY–CRISIS IN ACI

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 6, Nov. 1973, 1 pp

The "shocker" was the threat of the Southern Railway, after having made a most comprehensive study of advantages and disadvantages, to defer ACI. Car labels are in such poor condition that they cannot be read reliably enough. The Southern Railway contended that it "cannot justify an ACI system at its present level of reliability... The major limitation to the applicability of ACI is label condition. ACI readability will not improve until a vigorous program of label maintenance is undertaken by the industry."

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053862
AXLE COUNTERS DEFINE BLOCK SECTIONS IN ELECTRIFIED TERRITORY

Gupta, KK, Indian Northern Railway

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 4, No. 11, Nov. 1973, 5 pp, 11 Fig

Indian Railways has installed electronic axle counters in a section of railway line having 25 kv, 50 Hz electric traction. The railway had the requirement of increasing capacity on the double-track Grand Chord line from Mughalsarai to Asansol which carries a major portion of the country's vital coal traffic. Due to hilly terrain, construction of a third main track would have been difficult and costly. Steel ties are used extensively because wood ties are in short supply. Hence track circuiting on an extensive scale is difficult. It was decided to provide electronic axle counters for splitting up some of the block sections with intermediate signaling and thereby reducing headway between trains.

ACKNOWLEDGEMENT:
Railway System Controls

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053863
PLASTIC INSULATION FOR RAIL JOINTS

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 69, No. 9, Sept. 1973, 1 p, 4 Phot

Extended service life is claimed for new material, resulting in reduced costs for track maintenance.

ACKNOWLEDGEMENT:
Railway Track and Structures

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053864
D&RGW CENTRALIZES, COMPUTERIZES CTC DISPATCHER CONTROL

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 5, No. 3, Mar. 1974, 6 pp, Phots

Centralized traffic control is not new on the Denver & Rio Grande Western. A pioneer in adapting this technology to more efficient railroad operations, Rio Grande's CTC experience dates back over 30 years. What is new on the Rio Grande is CTC that is both computerized and centralized. To get the story first hand, RSC Editor Al Klinger recently visited Rio Grande's Denver headquarters, inspected the new setup, and talked with the men who conceived, designed and implemented the system. This is his report on Rio Grande's centralized dispatching concept—and also on a computer switch which the designers accomplished in midstream, as it were, in the best pioneering spirit.

ACKNOWLEDGEMENT:
Railway System Controls

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053865
REFINEMENTS IN SURGE PROTECTION

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 5, No. 3, Mar. 1974, 3 pp, 2 Fig

Surges from lightning and power sources have long been a problem for people working with electronic equipment on the railroads. Many approaches to the problem have been taken and all of the solutions found have been quite adequate for protecting the traditional equipment of the past. Today, new surge protection is being developed to protect the solid state components in much of the equipment being used in signaling and communications.

ACKNOWLEDGEMENT:
Railway System Controls

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

053886
HOW TO OBTAIN BETTER TRANSMISSION FROM CABLE

Skahan, PJ, Sola Basic Industries

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 4, No. 11, Nov. 1973, 3 pp, 2 Phot

With considerable interest in communications, especially with increasing demands for data transmission facilities, railroads are looking with greater intensity at the possibilities of using cable systems. The following article from TELEPHONY describes the basics of cable pressurization and how it can reduce or avoid service interruptions. Some of the advantages of cable pressurization are: 1) Positive internal dry gas pressure prevents moisture or damp air from entering sheath openings, and the resulting dryness helps minimize electrical leaks and noise, prevents cross talk and guards against complete loss of the cable's transmission capabilities. 2) Even in PIC cable, pressurization prevents serious transmission loss and facilitates locating leaks or breaks. 3) Maintenance costs are reduced greatly.

ACKNOWLEDGEMENT:
Railway System Controls

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054013
SOUTHERN PRACIFIC'S WEST COLTON YARD

Young, FE, WABCO

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Dec. 1973, 7 pp, 1 Fig

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Applications Society for presentation at the 1974 Joint ASME/IEEE Railroad Conference, Pittsburgh, Pa., April 2-4, 1974.

This paper contains a description of the design and operation of a digital computer controlled automatic railroad freight car classification yard on the Southern Pacific at West Colton, California. The information includes site selection, physical layout, capacity requirements, operating parameters and procedures as well as the application of dual digital computers for process control and interface with a management information computer 500 miles away for car inventory.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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054280
BR SOUTHERN REGION APPLICATION OF ELECTRONIC MAGAZINE TRAIN DESCRIBERS

Eglise, D, AP Electronics Limited

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, pp 77-79, 4 Fig

An equipment developed by EP Electronics for incorporation in existing signalbox installations or to replace electro-mechanical train describers which can provide 12-, 24—or 36-channel transmission and reception, the latter comprising up to nine stores, is described.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
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054283
AUTOMATIC TRAIN CONTROL FOR MADRID METRO

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 2, Feb. 1974, p 70, 1 Fig

Automatic train protection and operating system by Westinghouse Brake & Signal in conjunction with Dimetal S.A. is being installed on Lines 1 to 5 and new lines 6 and 7. A.T.P. is coded carrier signal system and A.T.O. is signals sensed by bogie-mounted coils giving stopping distance, gradient and coasting orders.

ACKNOWLEDGEMENT:
Rail Engineering International

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054306
WANTED: NEW STANDARDS FOR AFO

Railway System Controls (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 5, No. 4, Apr. 1974, 8 pp, 12 Fig

With the advent of AFO track circuits many problems have been presented since impedance is the primary attenuating factor, not resistance. With a given shunt, the resistance will remain constant, but as the audio frequency goes up, the impedance goes up, thus less attenuation. If the standard .06 ohm shunt is used for aligning AFO track circuits, the impedance is affected by frequency, track conditions and ballast conditions. This spring General Railway Signal Co. will start an extensive project to compile the information needed for developing new standards and new equipment which will make the alignment of AFO track circuits more accurate.

ACKNOWLEDGEMENT:
Railway System Controls

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054326
MEASUREMENTS AND ANALYSIS OF 115 KV POWER LINE NOISE AND ITS EFFECT ON PUEBLO TEST SITE RADIO LINKS

Buck, RE Esposito, RE Gagnon, R Leonard, ET Yoh, P

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142 FRA-RT-73-36

DOT-TSC-FRA-72-5, Tech Rpt, 7111-7205, May 1972, 43 pp

Contract T-RR-204

Noise measurements were made for 115 KV power lines near the frequencies 166, 217 and 406.8 MHz with a receiver bandwidth of 1 MHz. The measurements consisted of counting the numbers of pulses per minute at preset threshold values and RMS: The variations of the noise level vs the lateral distance from the power line were also measured. The worst noise level,—40 dBm, was observed at 217 MHz under a noisy power line. The results of these measurements show that, under normal conditions, power line noise will not have significant effects on the radio links at the Pueblo Test Site.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-222410

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054334
SIGNALLING AND TELECOMMUNICATIONS WORKS ON THE EUSTON MAIN LINE ELECTRIFICATION

Brentnall, EG, British Railways Board

Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England

Vol. 181, Pt3F, 1967, pp 65-86, 24 Fig

Proceedings of a Technical Conference sponsored jointly by the British Railways Board and the Institutions of Civil, Mechanical, Electrical, Locomotive and Railway Signal Engineers, 25-26 October 1966.

The basic requirements of the signalling and telecommunications scheme are presented in this paper. Details of maximum speed of various types of trains, average headway, desirability for consistency of aspects, all necessitated the provision of four-aspect colour-light signalling with continuous track circuiting. Originally, power signal boxes with limited range were programmed, but economic conditions necessitated reconsideration for some electromechanical boxes. Difficulties arising in the manning of the signal boxes later caused replanning for power signal boxes throughout with much longer sections controlled from each box following technical developments. Particulars are given of the telecommunications requirements in principle. The planning of the signalling and telecommunications schemes are dealt with in some detail with special reference to the various factors to be met. Sections of the paper deal with design factors and equipment both for signalling and telecommunications with special reference to the methods which had to be adopted to give immunization against inductive effects from the 25 000 V 50 c/s traction system. Particular reference is also made to the instances where other electrical factors had to be met. Developments which occurred during the progress of the scheme are detailed and their effect on the original design is mentioned. The planning and execution of the installation work and the testing and commissioning are described, with some reference to the maintenance of the works. At the end of the paper reference is made to present-day experiences and some remarks are presented about the future.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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054373
EXPERIENCE WITH THE AUTOMATIC DRIVING OF TRAINS ON THE PARIS METRO

Guieysse, L, Regie Autonome des Transports Parisiens

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 12 pp, 6 Fig

This paper discusses the automatic train operation on the Paris Metro. The design of the equipment and the experience with its use are covered.

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054595
VOICE TRAIN CONTROL SYSTEMS

Priddy, RH, Chessie System
Johnson, HC, Chessie System
Boyd, RK, TRW Systems

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 15 pp, 1 Fig

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

The Voice Train Control System is made practical by the continuing advancement of communications technology. The telegraph made Train Orders practical and code lines made Train Control System practical. Mobile Radio and recent advances in electronics make Voice Train Control System possible. Voice Train Control System is described at length in this very complete paper.

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054601
USE OF RADIO FOR TRAIN DISPATCHING

Vlasin, BD, Florida East Coast Railway

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 6 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

The Florida East Coast Railway placed a 71 mile section of non-block, single track territory, under a manual block system of operation. Since then train operations have been controlled by radio communications between the train dispatcher and the engineer.

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054687
ON TRACK SIGNALLING PROBLEMS RELATIVE TO MODERN PERMANENT WAY PRACTICE

Whitehouse, WH

Permanent Way Institution, Journ & Rpt of Proceed (Derry and Sons, Limited, Canal Street, Nottingham, England)

Vol. 91, PtIII, 1973, pp 133-144, 6 Fig

In recent years a considerable change has taken place in the formation and construction of permanent way and in its maintenance by on track mechanised methods. Much of this development and application has occurred without the Signal and Telegraph Engineer having the opportunity to apply concurrent development of the signalling equipment associated with track work. In this paper the Author highlights some of the difficulties experienced with the continued use of old established methods for Signal and Telegraph equipment on track and suggests some alternative arrangements for development.

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054700
SOLID STATE REPEATERS

Gupta, MS Tan, HH

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada 1.21

This study was jointly funded by Canadian National Railways, Canadian Ministry of Transport and Queen's University.

A solid-state repeater is being designed for a guided radar system which is to be used for obstacle detection by railways. The repeater consists of two microwave transistor amplifiers in a microstrip circuit with coaxial ports, designed to operate in both directions at 1 GHz. This work involves the design, fabrication, and testing of the repeater.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

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Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: Req Price

054794
TREADLE RAIL CONTACTS–A COMPARISON OF SYSTEMS

SCHIENENKONTAKTE–EIN SYSTEMVERGLEICH

Sander, H

Signal und Draht (Verlag Dr Arthur Tetzlaff, Niddastrasse 64, Frankfurt am Main, West Germany)

Vol. 65, No. 10, 1973, 5 pp, 4 Fig, 1 Tab, 6 Ref

Despite the many possiblities for treadle construction, only a few have actually proved suitable in practice. A description is given of the different treadle construction principles. Comparison of these methods shows why only three have been developed i.e.–mechanical treadles using the deformation of the web of the rail, magnetic treadles operating with uniform magnetic suspension and, to a growing extent, electronic impulse generators working on the principles of connection variations between coils.

ACKNOWLEDGEMENT:
International Union of Railways, 84

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:

International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
84

054795
TRAIN MONITORING BY RADIO

DER ZUGBAHNFUNK

Rossberg, RR

Europaverkehr (Darmstadt, West Germany)

No. 3, 1973, 4 pp, 4 Fig, 3 Ref

Tests on the Lubeck-Puttgarden line have shown that on-train radio is subject to more interference from the catenary when the 160 MHz frequency is used as opposed to the 460 MHz wavelength adopted by the International Union of Railways. If the future development of traffic over the main trunk routes is to be more profitable, it is essential to introduce ground-to-train radio communications. The article also explains the structure of radio installations on board trains.

ACKNOWLEDGEMENT:
International Union of Railways, 83

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
83

054942
AUDIO RESPONSE UNIT

Kimura, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, pp 1-7, 17 Fig, 10 Ref

This is an explanation of several voice out-put units. First, human voice out-put mechanism is described. Then, various interpretations of voice are shown, thereby several voice out-put units are considered by tracing the mechanism and the physical phenomena of voice. Audio response units by record editing type are actually used today in a few systems. Concerning voice composing types a device made by partial autocorrelation method seems to be the most hopeful.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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054947
CODE QUALITIES IN UNBALANCED INTERFACE CIRCUITS COMPOSED OF OFFICE CABLES

Takahashi, K

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 5 pp, 2 Tab

Recently, with a trend of appearances of large-scale computerized systems, a distance between a computer and a telecommunication equipment has come to be longer gradually. In this paper, the qualities of transmitted codes in an unbalanced interconnection circuit between them are analyzed theoretically and experimentally to perform a reliable code transmission in comparatively short distance up to about 300 m with removal of the restriction of the length of 30 m recommended by CCITT. From these studies, it is explained that in a JNR's computer center, the unbalanced interface circuits have been composed already in ranges of the cable length of up to 150 m and of the speeds of 200, 2400 and 9600 bands, using a star-quad cable with layer-shields, and driver and receiver circuits used in the practice so far.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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056770
ADAPTIVE CONTROL IN TRANSPORTATION

Darling, EM Ricci, RC Colella, AM

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

pp 74-82, 43 Ref

Presented at the IEEE Conference on Decis and Control, including symposium on Adapt.

Recent progress in the implementation of adaptive control systems in transportation is summarized. In transportation applications an adaptive control system combines five basic functions: (1) surveillance, to detect traffic; (2) communications, to relay surveillance data and control signals; (3) performance evaluation, to compare the difference between the desired and current operation; (4) on-line data processing, to determine the control signals and scheduling; and (5) overall system operation, i. e. , the functional summation of (1), (2), (3) and (4). The applications discussed include control of freeway ramps, urban street traffic, air traffic, and urban rapid transit.

ACKNOWLEDGEMENT:
Engineering Index, EIX740502690

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056782
DATA-TRANSMISSION CHARACTERISTICS OF RAILWAY TRACK

Mellitt, B, Birmingham University

Electronic Letters (Institution of Electrical Engineers, P.O. Box 8, Southgate House, Stevenage, Hertshire, England)

Vol. 9, No. 23, Nov. 1973

Command data may be transmitted to a train by using the track as an inductive link. Measurements of the transmission characteristics of the track are presented. A method is presented for reducing signal attenuation that uses capacitors connected between the rails.

ACKNOWLEDGEMENT:
Engineering Index, EIX740204137

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056789
ELECTRO-MAGNETIC COMPATIBILITY DESIGN FOR RAPID TRANSIT SYSTEMS

Barpal, IR

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Presented at the IEEE International Electromagn Compat Symp Rec, New York, N.Y.

Design criteria and techniques used to minimize the interference levels between the communication and signal channels for control of rapid transit vehicles and other working systems (such as propulsion, power system, auxiliaries, etc.) or the environment, are analyzed in this paper. The particular system under consideration utilizes a higher frequency band to allow a wide separation from signal to noise, but below 10 KHz and at low power level so that it does not require special license to operate. In addition, the use of FSK and the well known features of signal capture as developed in fm systems, are used to further increase the EMC of the overall system. The techniques presented in this paper have been successfully implemented in various transit systems which are presently in operation.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102349

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056790
ELECTROMAGNETIC COMPATIBILITY BETWEEN THRYSITOR-CHOPPER CONTROLLED CARS AND ELECTRIC FIXED INSTALLATIONS IN TOKYO SUBWAYS

Yukawa, R

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Presented at the IEEE International Electromagn Compat Symp Rec, New York, N.Y.

When commercial operation was initiated between Ayase and Kasumigaseki stations on the Chiyoda Line (Tokyo) in March, 1971, the Teito Rapid Transit Authority put into service 130 chopper-controlled cars made up of thirteen 10-car trains. In February 1972, 60 chopper-controlled cars were put into service. Compared with conventional rheostat-controlled cars, chopper-controlled cars offer improved riding comfort, reduced electric power consumption, and low temperature rise in subway tunnels. However, the thyristor-chopper control generated ripple currents in the trolley wires and rails causing problems with the signaling and communication installations. Analytical studies and tests provided a solution to these problems by employing such measures as filtering and adopting a 660 Hz chopper frequency. As a result of the tests, compatibility between chopper-controlled cars and electric fixed installations was established

ACKNOWLEDGEMENT:
Engineering Index, EIX740102348

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056791
ELECTROMAGNETIC COMPATIBILITY BETWEEN ELECTRIC TRACTION SYSTEM AND SIGNALLING AND TELECOMMUNICATIONS AT THE SWEDISH RAILWAYS

Svensson, S

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Presented at the IEEE International Electromagn Compat Symp Rec, New York, N.Y.

When 16 2/3 Hz electric traction systems were developed in the twenties, comprehensive research was undertaken concerning the interference produced in telecommunication circuits. To solve the problem, modifications were made to both the traction system and the telecommunication lines. With the introduction in 1967 of thyristor controlled locomotives and motor coaches, extensive investigations were made of disturbances in signaling and telecommunication circuits. During 1971-1972, a prototype static frequency converter for transforming utility-supplied three-phase 50 Hz power to single-phase 16 2/3 Hz power was tested to investigate harmonic disturbances and to determine ways of reducing the disturbance. Finally, techniques have been developed for reducing interference of railway telecommunication and signaling circuits resulting from exposure to induction and earth potentials from power lines and plants.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102345

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056798
INTERFERENCE TO TELECOMMUNICATION INSTALLATIONS BY RAPID TRANSIT SYSTEMS

Buckel, R Riedel, HA

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Presented at the IEEE International Electromagn Compat Symp Rec, New York, N.Y.

Power conversion by means of semiconductor elements, i. e. the use of thyristors in traction systems operating with dc or ac has resulted in new electromagnetic compatibility problems. While it has hitherto been possible to control the interference to telecommunication installations caused by the fundamental frequency and harmonics of the traction current without great difficulties, the growing number of harmonics may call for special measures to be taken. In addition, traction currents are also increasing due to the demand for higher acceleration and speed of trains, particularly of rapid transit systems in densely populated areas—a demand which can particularly be met by the thyristor technique. This paper examines the electromagnetic compatibility problem from both the viewpoint of the Railways and the telecommunication authorities. Moreover, measures for keeping the interference within tolerable limits are indicated.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102347

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056810
RAILWAY RE-SIGNALLING FOR ELECTRIFICATION

Goldsbrough, JV, GEG-General Signal Limited

Journal of Science and Technology (General Electric Company Limited, East Lane, Wembley, Middlesex HA9 7PP, England)

Vol. 40, No. 3, 1973

Railroad signalling principles are outlined. Contract work carried out is reported for British Railways Scottish Region in re-signalling 90 miles of the West Coast Main Line between Carlisle and Glasgow Central, in preparation for the introduction in 1974 of electric traction on the 25 kv overhead system.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304256

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056823
SYSTEMS OF COMMUNICATION BETWEEN TRACK AND TRAINS ON PARIS SUBWAYS

LES SYSTEMES DE TRANSMISSION ENTRE LA VOIE ET LES TRAINS DU METRO DE PARIS

Besacier, G

Automatisme (Dunod Editeur, 92 rue Bonaparte, Paris 6e, France)

Vol. 18, No. 10, Oct. 1973

The first transmission devices used in the past to transmit signals between the tracks and the trains are briefly recalled. With a view to increasing the traffic and improving the control and ease of train driving, new transmission systems have been introduced. In the case of the Paris Metro network, 14 transmission systems are currently in use. They are briefly described.

ACKNOWLEDGEMENT:
Engineering Index, EIX740205696

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056825
TELEPHONE EQUIPMENT IN THE MUNICH SUBWAY

Hilscher, G

Reports on Telephone Engineering

Vol. 8, No. 4, July 1973

Author describes the most important telephone equipment of the latest state of the art as used for the operational systems of the Munich subway in West Germany.

ACKNOWLEDGEMENT:
Engineering Index, EIX740103050

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056836
RAILROADS AND ELECTROMAGNETIC COMPATIBILITY

Siemens, WH

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

pp 92-98, 22 Ref

Int Electromagn Compat Symp Rec, New York, N.Y.

This paper outlines the methods by which the railroads will achieve electromagnetic compatibility, with both high voltage transmission lines that are paralleling railroad right-of-ways and soon to appear modern main line railroad electrification systems.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102346

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056957
LOW SENSITIVITY DESIGN OF OPTIMAL FEEDBACK SYSTEMS FOR LONGITUDINAL CONTROL OF AUTOMATED TRANSIT VEHICLES

Yang, SC

Minnesota University, Minneapolis, Program in Urban transportation, Minneapolis, Minnesota, 55455

July 1973, 159p

Many new urban transportation systems involve the use of automatically controlled vehicles. Some new systems, such as personal rapid transit (PRT) and dual mode, are characterized by small automated transit vehicles traveling on exclusive guideways. The number of passengers per vehicles is small, and short headways are necessary for high capacity. A versatile, efficient, and safe control system is needed to maintain proper spacing between vehicles without causing passenger discomfort. The report is devoted to the design of a longitudinal control system using modern control technology. A detailed mathematical model of the longitudinal motion of automated transit vehicles in an external-reference system is presented.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231441/7

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057173
CONTINGENCIES IN THE DESIGN OF THE AUDIO TRACK-CIRCUIT

Frielinghaus, KH, General Railway Signal Company

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 182-188, 12 Fig

Problems exist with little used track due to dirty surface conditions leading to development of unbalanced track-circuits raising inter rail-relay drop out voltage. Factors include track-circuit lengths, adjustments to obtain constant lengths of pre-shunt and extended-shunt distance, effect of ballast resistance and its measurement. Little data is published on shunting characteristics, ionization voltage and relevance of the AAR standard minimum shunt in relation to audio-frequency.

ACKNOWLEDGEMENT:
Rail Engineering International

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057179
RE-SIGNALLING THE SCOTTISH SECTION OF THE ELECTRIFIED BR WEST-COAST MAIN LINE TO GLASGOW

Goldsbrough, JV

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 174-181, Figs., Phots.

Remodelling the 90-route miles north of Carlisle over Beattock summit embraced power-signalling with remote control from only two signal-centre control panels and incorporated computer-based train-describers. This comprehensive scheme exploits to the full the electrification of this severely-graded main line to Scotland.

ACKNOWLEDGEMENT:
Rail Engineering International

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054597
LOCOMOTIVE ENGINEER MOTIVATION

Ziegler, AB

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 4 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

Man's thinking is more or less guided or directed by three basic factors: Freedom from hunger, freedom from danger, and security. The locomotive engineer has these three factors. The question then is how to reach this man who has the basic needs of life? By applying the most powerful motivator in the world–usually, it is so personal, so closely identified with each person's ego that most people will not admit even having it or being motivated by it, but it is there, always. It is the need to feel important, and it is the most powerful motivation in the world. The motivation, the need to feel important, supplies the power, the drive, to do something outstanding.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054693
EXAMINATION OF WORK-REST SCHEDULES OF RAILWAY LOCOMOTIVE OPERATORS

Wilde, GJ

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada 5.11.71

This study was jointly funded by Canadian National Railways, Canadian Ministry of Transport and Queen's University.

This research is a sequel of the study by G.M.E. Michant and T.P. McGauhey: work conditions and equipment design in diesel locomotives (CIGGT report, July 72) and attempts to collect further information on the lengths and distribution of work and rest periods in train drivers, with particular reference to biological rhythms such as sleep and disruptions in these rhythms. The data are gathered by means of the questionnaire method.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

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Canadian Institute of Guided Ground TRansport, Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: Req Price

057163
BIODYNAMICAL PROBLEMS RELATED TO TRANSPORTATION VEHICLES–DIGITAL SIMULATION OF OCCUPANTS

Karnes, RN, Boeing Computer Services, Incorporated
Tocher, JL, Boeing Computer Services, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 123-142, 7 Fig, 11 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

Several parallel efforts are underway to develop and use dynamic occupant simulation computer programs in automobile and aircraft crashworthiness research. This paper reports upon a study funded by the Office of Naval Research evaluating five well known occupant simulation programs. Evaluation factors include numerical integration techniques, mathematical accuracy, computing time, and occupant belt and seat modeling. Additional factors evaluated are graphical output quality, readability of output, usage of documentation, and coding quality. A set of program design specifications was developed concurrently which, if followed by current researchers, should eliminate most of the numerical and user-oriented problems encountered with current occupant simulation programs. Finally, a program structure which is designed for fast turnaround studies is described. The key element in this structure is on-line graphics, which provides a rapid visual summary of the completed results.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051337
STATE OF THE ART REPORT ON RAILROAD-HIGHWAY GRADE CROSSING SURFACES

Hedley, WJ, Federal Highway Administration

Federal Highway Administration, Railroads and Utilities Branch, Washington, D.C.

N5120.1, Sept. 1973, 28 pp, Figs, 2 Tab

For additional copies write in care of J.E. Kirk.

This state of the art report has been prepared from information available from, and following extensive review and comment by, various railroad, highway and industry sources. The report provides information on the various types of grade crossing surfaces currently being used in significant amounts and describes some other types more recently developed.

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Elsevier Publishing Company, Railroads and Utilities Branch, Amsterdam, Netherlands, Repr PC: Req Price

051470
GRADE CROSSING PROTECTION IN HIGH-SPEED, HIGH-DENSITY, PASSENGER-SERVICE RAIL CORRIDORS

Hopkins, JB

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-FRA-73-3, Final Rpt, 7301-7302, Sept. 1973, 40p

Contract DOT-RR-302

The report is a preliminary examination of special aspects of grade crossing protection for operation of high-speed passenger trains in rail corridors for which complete grade separation is not possible. Overall system needs and constraints are indicated, and their implications examined. Application of conventional and improved hardware is considered, with special attention to activation criteria, appropriate motorist-warning devices, stalled-vehicle indicators, and train-mounted components. Non-technical aspects of the problem are also discussed, and areas for which future research efforts may be appropriate are identified. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-223902/8

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051966
THE USE OF MODERN SAFETY EQUIPMENT AT LEVEL CROSSINGS

ANWENDUNG NEUZEITLICHER SICHERUNGSEINRICHTUNGEN FUER BAHNUEBERGANGE
Endmann, K

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

No. 4, 1973, 11 pp, 13 Fig, 12 Ref

Guide lines are laid down for the use of technical equipment ensuring safety at level crossings, and a summary is given of its development on the German Federal Railway. The use at level crossings of safety equipment operated by hand, as well as by the trains, is described. Details are also shown of the difficulties and possibilities involved in the operation of the barriers by the signals, and the connection between level-crossings and modern central signal cabins.

ACKNOWLEDGEMENT:
International Union of Railways, 1006

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International Union of Railways, BDC, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
1006

053727
ECONOMIC ANALYSIS OF GRADE CROSSING IMPROVEMENTS

Halagera, RT Miller, MS

Chicago Area Transportation Study, 300 West Adams Street, Chicago, Illinois, 60606

CATS 313-05, Dec. 1973, 55 pp, 12 App

Sponsored in cooperation with the U.S. Dept. of Transportation, Federal Highway Administration.

A Rail-Highway Crossing Study was initiated by the Chicago Transportation Study in 1972. The project goal was to develop an analytical tool which could identify optimal capital investments for improvements to the 3,100 at-grade crossings, and replacements of the 2,000 grade-separated crossings within the region. Using the analytical results, the project set regional priorities for feasible improvements to, and replacements of, rail-highway crossings.

ACKNOWLEDGEMENT:
Chicago Area Transportation Study

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053832
ELIMINATION OF LEVEL CROSSINGS ON THE STRASBOURG-BASLE LINE IN THE HAUT-RHIN DEPARTMENT

SUR LA LIGNE STRASBOURG-BASLE SUPPRESSION DES PASSAGES A NIVEAU DANS LE DEPARTMENT DU HAUT-RHIN
Cailliez, R, French National Railways

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Dec. 1973, 6 pp, 7 Fig

The Assistant Regional Manager of the SNCF who is the author of this article gives brief historical details of the routing and the construction of the Strasbourg-Basle line across the plain on the left bank of the Rhine which is a particularly fertile and much parcelled out part of the country. This situation and the large number of tracks crossing the line involved the construction of many level crossings (236 between Strasbourg and Basle), and the policy followed subsequently has been to eliminate these level crossings progressively. The final phase has now been reached with the section across the Haut-Rhin department up to Mulhouse, which is being dealt with globally. It is expected that by 1976 the remaining 48 level crossings will have been closed and replaced by 24 new structures.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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054940
THE CASE FOR THE WALKOUT CANTILEVER

Railway System Controls (Simmons-Boardman Publishing

Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 5, No. 5, May 1974, pp 21-22, 3 Phot

Cantilevers have received increasing emphasis over the last few years for several reasons. Street and roadways have become wider and safety legislation has required signaling devices to be set back further from the roadway. Unlike the traditional flashing light signal, cantilevers put the signal over the traffic lanes, providing greater safety for both highway and rail traffic. And they can be set further back from the roadway.

ACKNOWLEDGEMENT:
Railway System Controls

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054941
NEW PRIORITY FOR GRADE CROSSING SAFETY

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 5, No. 5, May 1974, 3 pp, 1 Tab, 1 Phot

Grade crossing safety has a new national priority. For the first time in history, Highway Trust Fund money is authorized specifically for rail-highway crossing safety projects. Also for the first time, Federal money is available for crossing projects off the Federal-aid highway systems. How much money is actually available? What kind of projects can it be used for? Who has charge of planning how it will be spent? The purpose of this article is to provide answers to these and other questions—as a guide for follow-up action at local and state levels.

ACKNOWLEDGEMENT:
Railway System Controls

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057168
THE BIG BREAKTHROUGH IN GRADE-CROSSING IMPROVEMENT

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 6, June 1974, pp 15-16

The Federal Highway Act of 1973, for the first time in history, authorized the use of Federal Funds for defraying the entire cost of projects designed to eliminate safety hazards at intersections of railways and highways at grade. Betterment of the crossing surfaces is included. In these pages RT&S editors first summarize the essential points of the legislation, particularly those that serve as guide lines on how the money is to be spent. This is followed by a comprehensive report on the "state of the art" in grade-crossing surfaces, and a showcase of the latest developments in this area.

ACKNOWLEDGEMENT:
Railway Track and Structures

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057169
SURFACES FOR GRADE CROSSINGS: THE STATE OF THE ART TODAY

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 6, June 1974, pp 17-20, Figs., 1 Tab.

Summary of a report prepared for Federal Highway Administration which gives information on the more common types of construction, including their physical characteristics and other considerations that affect their suitability under various conditions.

ACKNOWLEDGEMENT:
Railway Track and Structures

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047639
ENVIRONMENT ENHANCED FATIGUE CRACK GROWTH IN HIGH-STRENGTH STEELS

Wei, RP Simmons, GW

Lehigh University, Institute of Fracture and Solid Mechanics, Bethlehem, Pennsylvania, 18015 NR-036-097

IFSM-73-39, Tech Rpt, Mar. 1973, 61 pp

Contract N00014-67A-0370-008

The current state of understanding of the phenomenology and mechanism(s) for corrosion fatigue of high-strength steels is reviewed. Particular attention is directed towards corrosion fatigue in hydrogen and in water/water vapor environments. Available experimental data indicate that fatigue crack growth in high-strength steels is influenced by loading variables, such as frequency, stress ratio and waveform in regions above and below KIscc. The influences of these variables are directly attributed to interactions with the external chemical environment. Possible synergistic interactions and their relation to chemical reaction kinetics are indicated. Pertinent information on oxygen-metal and water-metal reactions is summarized. Initial results from a coordinated program of study for determining the water-metal reaction kinetics and the kinetics of crack growth on a single high-strength steel are discussed. (Author Modified Abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-759088

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AD-759088

048075
THE EFFECT OF SURFACE FILMS ON FATIGUE CRACK INITIATION

Crosskteutz, JC

Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri, 64110

TR-12, Tech Rpt, 1972, 14 pp

Contract N00014-71-C-0020

Availability: Pub. in Corrosion Fatigue, p201-210 1972.

The suppression of fatigue crack initiation by surface films can be viewed in terms of two mechanisms: (1) protection against environmental attack, and (2) suppression of surface plasticity. These two mechanisms are described in detail. Environmental protection requires a flawless coating which is impermeable to the active component of the environment and resistant to fracture under repeated cyclic strain. Suppression of plasticity requires a film with an elastic modulus greater than the substrate metal. The stiffer coating repels dislocations from the surface and suppresses the development of slip bands and crack initiation. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-760072

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AD-760072

048360
ANALYSIS OF TWO DIMENSIONAL THERMAL STRAINS AND METAL MOVEMENT DURING WELDING

Bryan, JJ

Massachusetts Institute of Technology, Department of Ocean Engineering, Cambridge, Massachusetts, 02139

MS Thesis, May 1973

The strain response of metal plates during welding is discussed and current state-of-the-art efforts to analyze the phenomena are reviewed. Mechanical and physical temperature dependent properties; transient strain and temperature distribution data obtained from experiments on 6061 aluminum alloy in the T651 condition; and a data reduction computer program are presented. The experiments were designed to look at the macroscopic effects of welding upon heat treatable age hardened alloys while at the same time approximating ship structural weldments. The transient strain response was found to be predominantly longitudinal but transverse strains were significant in the region of the welding arc. It was also found that residual strains correlated reasonably between similar experiments with a variation of the second stress deviator tensor invariant J sub 2 representing the "state of stress" rather than by individual strain components. Several recommendations are made concerning continued experimental investigation aimed at further development of the National Aeronautics and Space Administration programs.

ACKNOWLEDGEMENT:
Massachusetts Institute of Technology

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048365
OUT-OF-PLANE DISTORTION CAUSED BY FILLET WELDS IN ALUMINUM

Taniguchi, C

Massachusetts Institute of Technology, Department of Ocean Engineering, Cambridge, Massachusetts, 02139

MS Thesis, Sept. 1972

Out-of-plane distortion caused by angular changes at fillet welds on aluminum structural panels was analysed in two steps, namely, the experimental and the analytical. In the experimental step, a series of data were obtained from test specimens with varying thicknesses, which were fillet welded to either a single frame or to three equally spaced frames. The results of the tests were analysed and were then compared with those available for steel panels. It was found that although the distortions of the aluminum panels were larger when the same amount of consumed weld metal is considered, the steel panels have shown larger distortion if the same fillet size is taken as a parameter. In the second step, this behavior of the aluminum was studied and an analytical investigation concerning the free joint angular distortion was developed, assuming that the distortion will be caused by a point heat source moving in a straight line. The theoretical analysis was based on the incremental strain method theory and the thermal, elastic-plastic angular deformations were estimated for the aluminum and steel panels for the simpler case of the free-joints, because the free-joint angular distortion is directly related to the distortion of the contrained joint panels.

ACKNOWLEDGEMENT:
Massachusetts Institute of Technology

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051265
WELDING IN RAILROAD ENGINEERING

SCHWEISSTECHNIK IM EISENBAHNBAU

Masumoto, I, Nagoya University
Handl, H
Teramoto, T

ZIS Mitteilungen (Zentralinstitut fuer Schweisstechnik de DDR, Koethener Strasse 33a, 403 Halle/Saale, East Germany)

Vol. 15, No. 6, June 1973, pp 626-635, 44 Ref

Review of the current status of welding technology in Japanese railroad construction. The welding techniques employed are outlines, and a number of examples given illustrate their application in railroad rolling stock manufacture.

ACKNOWLEDGEMENT:
Engineering Index, EIX731000140

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051360
THE ELASTOMETRIC "BEARING:" WHAT IT CAN DO FOR YOU

Potter, JL, Lord Kinematics

ASME Journal of Mechanical Engineering (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

Dec. 1973, p 22

Replacing sliding surfaces with the internal mobility of elastomers is a significant breakthrough in bearing technology that can increase service life 5 to 10 times that of conventional antifriction bearings. In addition to longer life, elastomeric bearings need no lubrication, are easy to inspect, require minimum maintenance, and simplify designs. Thousands of hours of laboratory and service testing have verified the performance of these bearings.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051366
THE PROCEDURE HANDBOOK OF ARC WELDING

Lincoln Electric Company, 22801 St Clair Avenue, Cleveland, Ohio, 44117

Nov. 1973

The 12th Edition is directed at those who have a day-by-day working interest in arc welding—supervisors and management personnel of fabrication shops, welding operators, engineers and designers. Designers will find the Handbook a bridge between references of engineering design and the realities of production. Design data has been condensed since it can no longer be thoroughly covered in a volume that emphasizes welding processes. The hardbound book now features larger type in tables and figures.

ACKNOWLEDGEMENT:
Railway Locomotives and Cars

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Lincoln Electric Company, 22801 St Clair Avenue, Cleveland, Ohio, 44117, Repr PC: $5.00

051368
STOPPING VIBRATION WITH DYNAMIC DAMPERS

Khol, R

Machine Design (Penton Publishing Company, Penton Building, 1111 Chester Avenue, Cleveland, Ohio, 44113)

Vol. 45, No. 20, Aug. 1973, 5 pp

A simple piece of bolt-on hardware can stop resonant vibration in products ranging from huge machine tools to small blowers. This remedy is actually the most sophisticated and efficient approach to the problem. Properly tuned, a dynamic damper provides a synchronized stabilizing force that cuts overall vibration to a small fraction of the undamped motion.

ACKNOWLEDGEMENT:
British Railways

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051369
RUBBER VIBRATION MOUNTS

Siwiecki, KJ

Machine Design (Penton Publishing Company, Penton Building, 1111 Chester Avenue, Cleveland, Ohio, 44113)

Vol. 45, No. 18, July 1973, 6 pp

Choosing the right vibration mount for a product consists of much more than providing a slab of rubber between the base and the vibrating component. Vibration mounts are sophisticated products, and they come in many shapes, sizes, and materials for widely varying applications.

ACKNOWLEDGEMENT:
British Railways

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051370
NEW ALLOY FIGHTS CORROSION AND WEAR

Cameron, CB Ferriss, DP

Machine Design (Penton Publishing Company, Penton Building, 1111 Chester Avenue, Cleveland, Ohio, 44113)

Vol. 45, No. 19, Aug. 1973, 5 pp

Some metal alloys are wear resistant, some are corrosion resistant, and some are relatively easy to fabricate. But try to find an alloy that rates high in all three areas. After a long development program, metallurgists have come up with a series of alloys that combines these three unusual characteristics. These proprietary, intermetallic alloys are based on cobalt or nickel, and they're called Tribaloy.

ACKNOWLEDGEMENT:
British Railways

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051371
ROUGHNESS OF METAL SURFACES FOR THE PAINTING OF RAILWAY VEHICLES

Goertz, H

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 7/8, July 1973, 4 pp

A long useful life of the paints applied to the metal surfaces of railway vehicles depends, among other things, on the surface condition. The relevant stipulations contained in the current technical specifications are still insufficient for arriving at a clear and satisfactory definition of surface quality. The definitions, measuring methods and apparatus as well as the procedures are mentioned and described from the points of view of actual experience and economy. The article reports in detail on the term "roughness" and the use of surface reference standards. Based on practical experience in the construction of wagons, data are given on the order of roughness both for steel blasting and grinding, which permit the necessary standards regarding the surface quality to be established.

ACKNOWLEDGEMENT:
British Railways

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051451
HALF-CELL POTENTIALS AND THE CORROSION OF STEEL IN CONCRETE

Stratfull, RF, California Division of Highways

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 433, 1973, pp 12-35, 7 Ref

The half-cell potential of steel embedded in concrete specimens in laboratory tests was periodically measured and related to the visual observation of concrete cracking. It was observed that, when the half-cell potential values were more negative than−0.45 V to the saturated calomel electrode, 60 percent of the reinforced concrete blocks were cracked from the corrosion of the steel. A prototype-simulated bridge deck was exposed outdoors to periodic wetting and drying of a chloride salt solution, and half-cell potentials were measured by using various techniques.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 058692

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Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: Req Price

051915
FRACTURE MECHANICS–ONLY A THEORY?

Kalkbrenner, E

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 9, Sept. 1973, 4 pp

Fracture Mechanics, a new branch of the fields "Material Research" and "Theory of Strength of Materials" has during the last 5 years been introduced into the European Technical Literature. This branch deals with research on non-deformed brittle fractures in high tensile materials. Suitable functions have been established for different shapes of cracks but these functions include only the tension in the undisturbed zone and the shape of cracks, and it is thus possible to detect the stress intensity at the tip of the crack. The critical stress intensity during spontaneous crack widening (i.e. at failure of the test specimen or the structural member) is concurrently the material characteristic. This offers the possibility to calculate the allowable crack dimensions in structural members. So far the method is still limited to materials of ideal elasticity, i.e. to brittle materials, but there is reason to hope that it can be expanded to more common tough materials.

ACKNOWLEDGEMENT:
British Railways, 29822

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052093
ON-LINE VIBRATION SPECTRUM MONITORING

Kerfoot, RE, Spectral Dynamics Corporation
Hauck, LT, Spectral Dynamics Corporation
Palm, JE, Spectral Dynamics Corporation

ASME Journal of Mechanical Engineering (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 96, No. 2, Feb. 1974, 7 pp, 10 Fig, 11 Ref

There is a need to reduce unscheduled machine downtime, and thus reduce overhaul and repair costs. A better planned maintenance program can be implemented by knowing a machine's operational characteristics. Real-time spectrum analysis can provide this capability. In practically the same time required to read a meter, the entire vibration spectrum, showing the exact frequency and amplitude, can be reviewed.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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052283
OPTIMUM SAND AND EPOXY RESIN MIXTURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 594, ER-62, Proceeding, Oct. 1965, pp 43-64, 8 Fig, 3 Tab, 10 Phot

Description and analysis is presented of the data obtained in a laboratory investigation of the effect of varying the amount of sand in sand-filled epoxy-resin systems on physical properties of such systems. Physical properties considered include flowability, coefficient of linear expansion, flexural modulus of elasticity and ultimate flexural strength, compressive modulus of elasticity and ultimate compressive strength, and resistance to detergents. It is concluded that in crack filling it is desirable that the mix have a high ratio of sand to epoxy resin liquid by volume. The coefficient of linear expansion is found to decrease as the ratio of sand to epoxy resin increases. The flexural modulus of elasticity increases with an increase in the mix ratio, varying from 455,000 psi for an unfilled system to 1.157,000 psi for a 3:1 mix. The compressive modulus of elasticity increases with an increase in the mix, varying from 367,000 psi for an unfilled system to 628,000 psi for a 3:1 mix. After immersion in a detergent solution for one year, no softening or other deteriorating effects are noted on either the filled or unfilled specimens.

ACKNOWLEDGEMENT:
Association of American Railroads

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052288
THE DISTINCTIVE PROPERTIES OF CREOSOTE WITH SPECIAL REFERENCE TO PROTECTION OF WOOD FROM DECAY AND WEATHERING

Roche, JN, Koppers Company, Inc.

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 67 N, 600, Proceeding, July 1966, pp 720-730, 4 Fig, 1 Tab, 1 Phot

Distinctive properties of creosote, a wood preservative largely responsible for economic savings on the railroads, are summarized, with special reference to protection of wood from decay and weathering. Topics discussed include the development of creosote from coal tar, the use of various terms to specify the same material, the composition of creosote, creosote and wood interaction, creosote-coal tar solutions, creosote-petroleum solutions, creosote viscosity, and test for creosote retention. It is noted that by 1960 the Association of American Railroads estimated that pressure-preserved timber products such as creosote save America's railroads about $300 million a year.

ACKNOWLEDGEMENT:
Association of American Railroads

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052289
EPOXY RESIN COATINGS ON STEEL AND CONCRETE

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 66 N, 587, Proceeding, Oct. 1964, pp 59-72, 4 Tab, 3 Phot

Epoxy resin coatings on steel and concrete are analyzed. Epoxy resin formulations used to coat steel as protection against brine, including two-coat systems specifically recommended for this purpose, are discussed. A service test of the two-coat systems along with several other coatings to provide comparative data is described. In a field investigation of epoxy resin coatings on steel after two years of exposure, coatings are described and test specimens are presented. Epoxy resin formulations that might be used for waterproofing concrete surfaces are also discussed. Formulations 632-1255 and 632-1555 are recommended. The performance of these coatings and others usable is investigated. Coatings are described, and test specimens, procedure, and results are presented, indicating specimens with and without coating failure.

ACKNOWLEDGEMENT:
Association of American Railroads

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052332
THE ABILITY OF VARIOUS WATERPROOFING MEMBRANES TO BRIDGE CRACKS THAT MIGHT DEVELOP IN THE CONCRETE ON WHICH THEY ARE APPLIED

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 62 N, 559, Proceeding, Oct. 1960, pp 153-167, 7 Fig, 2 Phot

This report contains a description and results of an investigation of waterproofing membranes fabricated with different combinations of fabrics and felts with asphalts or tars. The object of these tests was to determine the ability of various waterproofing membranes to bridge cracks that might develop in concrete on which they are applied without failure or leakage. Test specimens of concrete cylinders were prepared for the application and tests of the waterproofing membranes. Features of the membranes studied included the kind and grade of bituminous materials, the kind of fabric employed, the number of plies, the bond or slippage strength and the effect of prevailing temperatures. The test apparatus, a cooling chamber, and its operation was described. The results of the investigation show the most important factor in the performance of the membranes is temperature. Above-ground asphalts with cotton fabric are superior in the test performances. For special asphalts no conclusions could be made since two different supplies of the same type material behaved differently, but both were comparable to above-ground asphalts. The performance of preformed membranes increases with the number of its plies. Asphaltic emulsion with glass mat showed very little crack coverage ability, and cutbacks with glass mat had little stretch from 10 to 70 F. Epoxy resin did not give any stretch.

ACKNOWLEDGEMENT:
Association of American Railroads

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052343
FACTORS AFFECTING THE PENETRATION BY WATER OF BITUMINOUS AND SILICONE COATINGS

Dolch, WL, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 195-208, 7 Fig, 2 Tab, 2 Phot, 9 Ref

This study dealt with two types of water-resistant coatings commonly used to protect porous material such as cement: bituminous emulsions and silicone resins. The purpose of this work was to measure the contact angles of water on the various materials and to discover how this angle is influenced by certain weathering exposures. Sample preparations of the bituminous emulsions and silicone resins were applied to amalgamated brass molds, and then applied to glass plates. Contact angles of water on the samples were then measured. A wetting and drying technique and exposure to accelerated action of light, air, and water in a laboratory weathering machine were the weathering processes applied to the samples. The following conclusions were reached: 1) the contact angle is influenced by weathering processes; 2) considerable differences exist between the various materials with respect to their susceptibility to change of contact angle with water through weathering; 3) coal-tar emulsions may be more susceptible than asphalt to harmful decreases of contact angle with water; 4) immersion in water lowers the contact angle of water on bituminous coatings, but subsequent drying restores the high value; 5) the contact angle of water on silicone films is lowered by weathering.

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052344
EFFECT OF PROPRIETARY FIRE-INHIBITING SUBSTANCE ON THE FLAMMABILITY OF TREATED SOUTHERN YELLOW PINE

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, pp 209-241, 14 Fig, 7 Tab, 9 Phot, 7 Ref

This investigation evaluates the contribution toward self-extinguishment of fires made by a fire inhibitor incorporated into the conventional pressure treating process. The purpose of these studies was to make possible the writing of a satisfactory specification covering the performance of fire-retardant coating materials. Experimental materials and equipment were described. Various sized specimens of southern yellow pine pre-coated with three preservatives and a fire inhibiting additive, an aromatic ester of phosphoric acid, were burned in the fire test cabinet for various time periods. The internal temperature of the burning specimen was measured. After, burning weight-loss measurements were taken. Temperature investigations were made. Weathered specimens were also burned in the same manner. The results of the weight-loss studies and temperature investigations show that incorporation of the fire inhibitor confers a built-in fire quenching action to timber treated with creosote and creosote-tar solutions. The same additive mixed into creosote-petroleum solutions appears to be non-operative. Narrower timbers bolted together sustain considerably more damage than larger timbers when both have the same pre-treatment with the additive.

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052356
FIRE RETARDANT TREATMENTS ON THE SANTA FE

Collister, LC

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 61, Proceeding, 1960, 8 pp, 4 Fig, 3 Tab, 3 Phot, 7 Ref

Fire protection of bridges presently in track and protection of new construction are the prime areas of this report. For bridges now in track the most promising method is a surface treatment with grease-like material with phosphorus in the form of triaryl phosphate. For protection of new construction triaryl phosphate in 50/50 creosote-petroleum mixture treating solution is being used. The effectiveness of other compounds has been studied. Laboratory tests indicate that a chloroalkyl phosphate and a bromoalkyl phosphate show three to five times the effectiveness of triaryl phosphates. However, the triaryl phosophates performed much better in rigorous field tests. Most persistent flaming always occurs in protected locations where entrapped heat could cause volatile materials to burn above the wood surface and away from the phosphate additive, indicating a need for a flame-controlling agent. It is concluded that triaryl phosphate contributes materially to the reduction of the fire hazard.

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052390
PREVENTION OF CORROSION FROM BRINE DRIPPINGS ON TRACK AND STRUCTURES

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 59, Proceeding, 1958, 11 pp, 9 Fig, 3 Phot

The use of brine corrosion inhibitors was investigated. A discussion of the process of corrosion was presented. Laboratory tests consisting of disks of rail steel coated with different types of inhibitors and immersed in various brine solutions were performed. The effects of each type of brine solution on each type of inhibitor and the rail steel disk are discussed. There are no conclusions in this progress report.

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052393
A STUDY OF BITUMINOUS WATER PROOFING COATINGS

Blackburn, JB, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 293-337, 14 Tab, 8 Phot, 40 Ref, 2 App

Study of bituminous waterproofing coatings is made, to develop information for revising of the AREA specifications for waterproofing bitumens for saturant and mopping for above—and below-ground use. Proprietary coatings are also investigated to study waterproofing capabilities. Results of the study indicate no superiority in test performance for AREA above—and below-ground asphalts over the performance of comparable grades of ASTM asphalts when they met specification requirements. Performance of the proprietary coatings varied. Clay—type asphaltic emulsions for use in exposed locations appear more stable in the weathering tests than the soap or chemical type. None of the emulsions was effective in the long-time immersion test. The properties of the coal-tar pitches yielded tests results superior to those of the above-ground asphalts.

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052395
DESTRUCTION BY MARINE ORGANISMS; METHODS OF PREVENTION

Richards, AP

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, pp 563-567, 1 Tab

Destruction of wood by marine organisms such as marine borers is discussed, and method of prevention is recommended. It is found that mixtures of creosote and coal tar offer better protection against limnoria than any of the straight distillates and that vertical retort tar creosote alone is not as effective for this purpose as the other types of creosote studied. Results do not show real difference between the performance of regular creosotes made low in tar acid or naphthalene content and straight run creosotes of otherwise the same characteristics.

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052399
FIRE-RETARDANT COATING RESEARCH, AND AAR PARTICIPATION IN A-BOMB STUDIES

Coburn, SK

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 58, Proceeding, 1957, 10 pp, 12 Phot

Fire-retardant coating research is discussed, and AAR participation in A-bomb studies is presented. Objective includes recommendations of fire-retardant coatings for use on preserved timber structures normally subject to a wide variety of fires. It is noted that proper evaluation of protective coating materials must be carried out on wood specimens similar to the kind of substrate the coating material will be protecting in field service; specimens of selected southern yellow pine and Douglas fir are treated under empty cell and full conditions, with creosote, 60:40 mixtures of creosote and coal tar and a 50:50 mixture of creosote and petroleum. Specimens are treated to have retentions ranging between 10 and 40 lb of preservative per cubic foot. Participation in an A-bomb test, Operation Cue, involves thermal ignition and response of materials. It is concluded from the test that white paint augmented by fire-retardant components offers

more positive protection than black paint containing the same fire-retarding constituents, when the two systems are exposed to an atomic device.

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052411
DESCRIPTION AND RESULTS OF FIELD TESTS EVALUATING FIRE-RETARDANT COATING MATERIALS, PERFORMED BY THE ATCHISON TOPEKA AND SANTA FE RAILWAY SYSTEM AT ALBUQUERQUE, N.M.

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 135-159, 2 Fig, 6 Tab, 14 Phot

A description and the results of tests designed to evaluate the protective features of fire-retardant coating materials applied to treated structural timbers is presented. Preliminary tests used to screen coating materials consisted of placing 5-minute fuses on the top and side surface of a coated block cut from a treated tie. Coating materials passing this test were then applied to the ties and guard timbers of a full scale open deck trestle replica and again tested with fuses. Most of those tested were bituminous based coatings and required mechanical aids on the timber surface for satisfactory adherence. These were glass fabric and glass mat wrapped around the timber forming a base to which the coatings were applied. A tumbleweed fire was chosen for the ground phase study where a large surface area, such as the underside of a deck, is subjected to heat. Specimens, individual piles and full scale replicas of end and interior panels of ballasted-deck pile trestles were tested by burning. Temperatures developed by these fires were recorded by thermocouples. Attempts to confer fire-resisting properties to new timbers were made by introducing various materials in conjunction with the preservative oils during the treating process.

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052415
TESTS OF FULL-SIZE REINFORCED CONCRETE BRIDGE SLABS

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 462-465, 1 Tab

Progress on the testing of full-sized reinforced concrete bridge slabs was reported. The slabs tested varied in length from 15 ft. to 19 ft. and in width from 7 ft. 3 in. to 6 ft. 6 in. Two of the test specimens were over 40 years old and recently removed from service. The other slabs were new and designed 1) in accordance with current specifications, 2) in accordance with the ultimate-load theory, and 3) prestressed by pretensioning in accordance with current practices. The testing machine and procedure were described. Results show that the old slabs carried a load of over 3 1/2 times the design load. A comparison of the ultimate loads for the regular design and the ultimate-load and prestressed slabs shows that the three slabs carried approximately the same load. There was no indication of bond failure or slippage in the prestressed slab. There was no indication of diagonal tension failures in the prestressed slab.

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052419
BRINE CORROSION INVESTIGATIONS AT THE CENTRAL RESEARCH LABORATORIES OF THE ASSOCIATION OF AMERICAN RAILROADS

Coburn, SK, Association of American Railroads Research Center

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 55, Proceeding, 1954, pp 1084-10, 23 Phot

In an effort to control brine corrosion the possibility of using a neutralizing agent with the brine, so that efficient control could be exercised the moment a drop of brine contacts a steel surface was investigated. Tests on metal specimens were performed by wetting them in two and five percent "polyphose" inhibited brine solutions, and allowing them to dry in controlled humidity with simulated day and night temperatures. Rinsing in distilled water simulated washing by rain. Rust formation was observed and measured. Comparison was made with untested specimens. The observations and weight loss studies obtained were utilized in determining a relative rating of a corrosion inhibiting material. Electrolytic descaling was used to remove rust without harming the substrate or base metal.

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052422
TESTS ON WATERPROOFING COATINGS FOR CONCRETE SURFACES-FINAL REPORT

Blackburn, JB, Purdue University

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 54, Proceeding, 1953, pp 191-242, 7 Fig, 5 Tab, 10 Phot, 1 Ref

One hundred and three waterproof coatings were applied to small concrete specimens in order to determine the relative merits of each. The specimens were subjected to a series of weathering tests, the effects of which were evaluated by immersion tests in which the permeability of the coatings was determined by increases in the weight of the specimens. Comparisons were made with the increases in the weights of the uncoated control specimens. Sixteen of the coatings were subjected to additional tests to determine the relative severity of the first series of tests and to determine the merits of using impermeable coatings rather than permeable coatings. The results of the second series of tests show that impermeable coatings are superior to permeable coatings for the prevention of deterioration of concrete surfaces when all the surfaces that are subject to moisture absorption are waterproofed. The impermeable coatings are more durable than the permeable when subjected to freezing and thawing.

ACKNOWLEDGEMENT:
Association of American Railroads

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053753
SFSA: PREVENTING BRITTLE FRACTURE

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 147, No. 10, Dec. 1973, 1 p

Prevention of brittle failures in steel castings has been the goal of a technical research program of the Steel Founders' Society of America. SFSA now recommends the results of its research involving the NDTT (Nil Ductility Transition Temperature) concept. A related project involves the relationship between fracture toughness and strength. SFSA sees this pointing toward a new design philosophy of not specifying an absolutely flawless metallurgical structure but enabling an engineer to predict whether or not a flaw of given dimension will cause brittle failure.

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053758
LINEAR EQUALITY CONSTRAINTS IN FINITE ELEMENT APPROXIMATION

Szabo, BA Kassos, T

Washington University, St Louis, St Louis, Missouri, 63130

Sept. 1973, 32 pp, Figs, 16 Ref, Apps

Research sponsored by Department of Transportation and Association of American Railroads. Work done in cooperation with AMCAR Division of ACF Industries, Inc.

This is the first of a series of reports to appear in which the development of a new finite element stress analysis technique will be documented. The work is being conducted at Washington University under a cooperative research program with AMCAR Division of ACF Industries, Inc. Washington University's participation is sponsored by the U.S. Department of Transportation under the Program of University Research and by the Association of American Railroads. The main project objective is the development of a mathematical modeling capability for the benefit of the rail transportation industry that will permit design optimization of key structural components such that the probability of fatigue failure can be minimized with respect to a given load environment. The current finite element technology is not cost-effective in fatigue design applications because a very large number of successive analyses must be executed with progressively refined finite element subdivision in order to establish confidence in the accuracy of solution in those areas where stresses change rapidly.

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053853
FRACTURE MECHANICS

Wallace, JF, Case Western Reserve University

Dresser Transportation Equipment Division, 2 Main Street, Depew, New York, 14043

1973, 7 pp, 14 Fig

Presented at the Tenth Annual Railroad Engineering Conference, Depew, New York, Sept. 5-7, 1973.

Failure of components is a matter of concern to both design engineers and materials engineers. Looking at this problem from a materials standpoint, three types of failures are of particular significance because of the frequency and, at times, unexpected behavior. These three types of failures are fatigue, stress corrosion cracking and brittle or abrupt failure. This paper is concerned with brittle failure. The situations are different, of course, in the other two cases. Brittle failure in engineering materials is generally defined as failure that takes place at applied stresses below the yield strength level of the material. Designing against this type of failure has been a very important consideration.

ACKNOWLEDGEMENT:
Dresser Transportation Equipment Division

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054005
ENVIRONMENTAL FINITE LIFE FATIGUE TESTING. UTILIZING MINER'S HYPOTHESIS

Cook, RM, Association of American Railroads

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-7, Jan. 1974, 8 pp, 3 Fig, 13 Ref

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

This paper outlines one method suitable for cost effective computerized theoretical finite life structural fatigue design and determination of means for conducting laboratory fatigue tests that can predict or confirm finite service life of a component or product. Basic modified Goodman type fatigue test data is utilized with the actual environmental loading spectrum and Miner's hypothesis to determine the damaging cycles experienced in service. The total damaging portion of the environmental loading incurred during the long life of railroad equipment can then be applied in laboratory tests of practical duration. Hence, this is truly an environmental test and not what is often termed an accelerated fatigue test. The technical opinions expressed herein are those of the author and do not necessarily represent the policy of the Association of American Railroads.

ACKNOWLEDGEMENT:
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054316
LUBRICATING WITH ELASTOMERS–THE CONCEPT AND TWO RAILROAD APPLICATIONS

Thomas, DG, Lord Manufacturing Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #64-WA/RP-14, Sept. 1964

Contributed by the Rubber and Plastics Division for presentation at the Winter Annual Meeting, New York, N. Y., Nov. 29-Dec. 4, 1964.

The paper introduces the concept that elastomers are lubricants. The concept is developed by considering the nature and behavior of elastomers, then comparing this to the properties needed in a lubricant. A section on the general design of elastomer parts for lubrication is given, followed by two design examples. The examples are elastomeric parts designed to overcome lubrication problems on railroad freight cars.

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054340
FORMAFLEX CARBIDE COATINGS–A NEW TECHNOLOGY

Wolf, JD, Mallory Composites, Incorporated
Richmond, WJ, Mallory Composites, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-PEM-5, June 1973, 7 pp, 9 Fig

Contributed by the ASME Plant Engineering and Maintenance Division for presentation at the Plant Engineering and Maintenance Conference, Cincinnati, Ohio, Sept. 9-12, 1973.

This paper is intended to familiarize the reader with a new coating technology based on the use of flexible, chamois-like sheets composed of metal and/or carbide powders. The techniques of applying the sheet to the surfaces to be coated and the subsequent fusion steps are described. Physical, mechanical, and micro structural data are presented for the resultant fused coatings which exhibit the unusual combination of high carbide concentration with high strength metallurgical bonding. General wear data and coating costs are discussed along with a summary of typical applications.

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054341
FRICTION VIEWED AS A RANDOM PROCESS

Kilburn, RF, IBM Systems Development Division

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-LUB-3, Aug. 1973, 9 pp, 10 Fig, 6 Ref

A stationary cast-iron button sliding against a rotating cast-iron disk generated a time-varying friction signal. The signal was recorded using digital computer data-acquisition techniques. Sixty runs were taken, using different values for various parameters (such as load, velocity, and temperature). The data were analyzed on a digital computer by two different techniques. The first was a time-series analysis: the Fourier transform of each run was taken and the power spectral density of the runs was studied. The second technique was a standard statistical analysis using the Kolmogorov-Smirnov goodness-of-fit test. From the two analyses, some interesting conclusions were made: (1) the friction behaves like a random process; (2) friction may be treated as a constant signal with superimposed white noise; (3) the instantaneous coefficient of friction is normally distributed; (4) friction is influenced by load and velocity; and (5) the mean value and standard deviation are functionally related.

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054351
THE MECHANICS OF RUPTURE–DOES IT ONLY BENEFIT SCIENCE?

BRUCHMECHANIK–NUR FUER DIE WISSENSCHAFT?
Kalkbrenner, E

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 9, 1973, 4 pp, 3 Fig, 1 Tab, 14 Ref

The article examines ruptures due to brittleness without deformation of materials with high tensile strength. Functions have been calculated for different types of fissure taking into account only the residual tension and the shape of the fissure, and this enables the stress intensity at the edge of the fissure to be ascertained. A characteristic of the material is the critical intensity of the stress when the sample or component part is ruptured. This method is still limited to ideally elastic and brittle materials, but could also be extended to real materials.

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054410
DEVELOPMENT AND TESTING OF A CADMIUM TELLURIDE HIGH TEMPERATURE (750 F) INFRARED FIRE DETECTOR

Entine, G Farrell, R Wilson, F

Tyco Laboratories Incorporated, Waltham, Massachusetts AF-3048

C-222, Final Rpt, 7202-7309, Nov. 1973, 73 pp

Contract F33615-72-C-1489

CdTe photodetectors capable of operating continuously at 750F were packaged for flight testing as an aircraft engine fire detector. The sensors at temperature could detect a photosignal of 50 microwatts per square centimeter with a signal-to-noise ratio of over 20:1 and an output impedance of 1000 ohms. The units consist of two CdTe sensors separately sealed in hermetic TO-8 headers which are mounted inside a larger hermetically sealed housing made of inconel. The detectors meet MIL-Spec 810B including temperature cycling up to 750F, well above the capability of all the available semiconductor infrared detectors. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-773324/9

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054447
FIREFIGHTING EFFECTIVENESS OF AQUEOUS-FILM-FORMING-FOAM (AFFF) AGENTS

Geyer, GB

National Aviation Facilities Experimental Center, Atlantic City, New Jersey

FAA-NA-72-48, Final Rpt, 7101-7202, Apr. 1973, 73 pp

Contract F33615-71-M-5004

Information was obtained by conducting laboratory experiments and full-scale fire-modeling tests which were of value in estimating the firefighting effectiveness of two aqueous-film-forming-foam (AFFF) agents. Minimum quantities and application rates were established for each AFFF agent in relation to the size and configuration of simulated aircraft ground fuel-spill fires involving JP-4, JP-5 and aviation gasoline. (Author)

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054672
HIGH-PERFORMANCE CASTINGS

National Academy of Sciences-Natl Research Council, National Materials Advisory Board, Washington, D.C., 20418

NMAB-291, Rpt, Mar. 1972, 235 pp, Figs, Tabs, Refs, Apps

This report delineates the factors influencing the characteristics, design, and properties of high-performance castings and the existing problems that must be resolved to increase their reliability and use. A number of programs and methods for improving the integrity and encouraging industry-wide acceptance of high-performance castings are suggested.

ACKNOWLEDGEMENT:
National Academy of Sciences-Natl Research Council

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054680
WHAT DESIGNERS SHOULD KNOW ABOUT FRACTURE TOUGHNESS

Elliot, AL

ASCE Civil Engineering (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

Apr. 1974, pp 70-71

Is brittle fracture a brand new problem? Brittleness becomes a threat with high strength steels or thicker plates. Only within the past 20 years have we started using these higher strength steels for structures. During the same time, welding has become commonplace and has brought a strong temptation to use thicker plates. In about 90% of the cases involving cracking, if any toughness at all had been specified, trouble would probably have been avoided. Designers or owners should test the steel he gets; steel companies also have an obligation to provide information on steel toughness. They should state the range of fracture toughnesses at given temperatures.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054747
PATH SYNTHESIS OF ROLLING CONTACT MECHANISMS

Minardi, LR, Tufts University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-DET-60, June 1973, 8 pp, 9 Fig, 4 Ref

Presented at the Design Engineering Technical Conference, Cincinnati, Ohio, Sept 9-12, 1973.

A method of synthesizing planar oscillating rolling contact mechanisms with the aid of a digital computer is presented. The procedure used approximates the path to be synthesized and the fixed centrode as a series of arc and straight line segments. This method of describing a curve simplifies the equation for the moving centrode. These equations are used to develop a computer program that will determine the moving centrode from a series of points that define the path and fixed centrode in terms of arc and straight line segments. The resulting computer drawn moving centrodes are more accurate than those determined by the traditional graphical techniques.

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054748
OPTIMUM DESIGN PARAMETERS FOR IMPACT DAMPERS

Dokainish, MA, McMaster University
Elmaraghy, H, McMaster University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-DET-61, June 1973, 7 pp, 7 Fig

Presented at the Design Engineering Technical Conference, Cincinnati, Ohio, Sept. 9-12, 1973.

User oriented charts for optimum design of impact dampers are developed and presented. The charts can be used to select optimum combination of impact damper parameters which meet the design requirements. Periodic symmetric two impacts per cycle dampers were optimized. The maximum displacement amplitude of the primary system was minimized. A minimax principle and direct search algorithm are used to optimize the nonlinear constrained multivariable objective function.

ACKNOWLEDGEMENT:
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054952
RELIABILITY ESTIMATION FROM FIELD DATA

Abe, S

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 9 pp, 7 Fig, 2 Tab, 7 Ref

On estimating the failure characteristics of extremely reliable units, field data of the units are very useful, but there exist some traps and difficulties to overcome in their observation and analysis. This paper points out five problems concerning the matter, and shows four methods to solve them under the extended models of failures and generalized ways of observations. Some make it possible to take into account various maintenance informations and to estimate the reliabilities, or mode-by-mode failure characteristics, from short interval observations of the units in a field.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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054953
FATIGUE STRENGTH OF UNFINISHED BUTT-WELDED JOINT (SM 58)

Okuda, T Asakawa, K

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 15, No. 1, Quart Rpt, Mar. 1974, 1 p, 2 Fig, 1 Tab

Generally, a butt-welded joint with finished toe of weld has the same fatigue as that of the base metal. This paper describes the effect of the tangent angle of reinforcement and the notch radius at the welding toe on the fatigue strength of unfinished butt-welded joint.

ACKNOWLEDGEMENT:

Railway Technical Research Institute

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056800
IMPROVEMENT OF THE PROPERTIES OF NODULAR CAST IRON BY COMPLEX ALLOYING

ULUCHSHENIE SVOISTV MAGNIEVOGO CHUGUNA PRI POMOSHCHI KOMPLEKSNOGO LEGIROVANIYA
Petrichenko, AM, Khar'kov Highway Institute
Solntsev, LA
Laktionova, SI
Dobrynina, LD

Izvestiia Vysshikh Uchebnykh Zavedenii, Mashinostr (USSR)

No. 11, 1973

The influence of different quantities of nickel, molybdenum, copper, and chromium on the properties of nodular cast iron at normal and high temperatures was investigated. This material is used for the manufacture of pistons, heads and liners for cylinders of diesel locomotives. Long-term and fatigue strength and scale-resistance tests were carried out. Cast iron alloyed with 0. 8-1. 0% Ni, 0. 7-0. 8% Mo, 0. 4-0. 6% Cu and 0. 3-0. 5% Cr is recommended for the manufacture of loaded and heated parts.

ACKNOWLEDGEMENT:
Engineering Index, EIX740306202

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056834
SOME APPLICATIONS OF GAS-SHIELDED WELDING TO THE CONSTRUCTION OF RAILROAD ROLLING STOCK

QUELQUES APPLICATIONS DU SOUDAGE SOUS PROTECTION GAZEUSE A LA CONSTRUCTION DU MATERIEL FERROVIAIRE
Nicolas, C

Soudage et Techniques Connexes (Publications de la Soudure Autogene, Paris, France)

Vol. 27, No. 9-10, Oct. 1973

Some applications of bare-electrode gas-shielded welding in the construction of railroad rolling stock are discussed. Emphasis is placed on applications to car axles and chassis.

ACKNOWLEDGEMENT:
Engineering Index, EIX740303538

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056850
EXPERIENCE ACQUIRED WITH THE USE OF STEEL ST 45/60 C FOR DYNAMICALLY STRESSED WELDED STRUCTURES

ERFAHRUNGEN BEIM EINSATZ VON ST 45/60 C IN DYNAMISCH BEANSPRUCHTEN SCHWEISSKONSTRUKTIONEN
Butler, S

ZIS Mitteilungen (Zentralinstitút fuer Schweisstechnik der DDR, Koethener Strasse 33a, 403 Halle/Saale, East Germany)

1973, pp 1006-22, 11 Ref

Discussion of some structural and welding problems and their solutions associated with the application of type St 45/60 C higher-strength steel for heavy railroad crane structures.

ACKNOWLEDGEMENT:
Engineering Index, EIX740204827

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048122
WATER POLICIES FOR THE FUTURE

National Water Commission, 800 North Quincy Street, Arlington, Virginia, 22203

June 1973, 579 pp

Final report to the President and to the Congress of the United States.

The Commission has examined virtually the entire range of water resources problems facing the Nation, including the effects of water management on the Nation's economy and on its environment and how the differences between these two major objectives can be best resolved. The problems of reconciling Federal and State water law have been addressed, as have the problems of integrating ground water and surface water management. Each of the important purposes for which water is used has been studied, and appropriate policies have been drawn for improving both water-related programs and organizational arrangements. Ways in which existing water supplies can be used more efficiently and present supplies can be augmented have also been examined. Standards by which interbasin transfers of water and other kinds of water projects should be judged have been developed and ways in which water management decision making can be improved have been formulated. The report considers the problems of acquiring basic water data and pursuing research so that management of the Nation's water resources can be more knowledgeably and effectively based. Finally, the financing of future water programs as well as the important question of how and by whom the cost of water programs should be paid are also addressed. An extensive presentation is made on the cost and development of inland waterways. Projections on the possible methods for putting inland waterways on a pay as you go basis is recommended.

ACKNOWLEDGEMENT:
National Water Commission

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5248-00006

051334
RAILROADS AND THE ENVIRONMENT IN RAIL FREIGHT OPERATIONS

National Industrial Pollution Control Council, Washington, D.C., 20230

Mar. 1972, 28 pp, 4 Tab, 6 Phot

Sub-Council Report prepared for the Secretary of Commerce.

Because a large number of railroads operate in more than one state, equipment is interchanged on a national basis. Therefore, it is essential that national standards be established for pollution control measures that will preempt local or regional measures, rather than forcing the railroads to face a panoply of partial attempts at environmental controls set at state and local levels.

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051347
THE COLLECTED SPEECHES OF JAMES R. COXEY

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

72-73, Feb. 1972, 100 pp

This publication presents the speeches of Mr. Coxey on various environmental subjects including air pollution, wayside fires, and noise.

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051349
ENVIRONMENT AND THE RAILROADS, PROGRAMS AND COSTS

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

Status Rpt, Jan. 1973, 38 pp

In 1970 sixteen specific categories were identified by the railroads as sources of pollution, attention to which, if successful, would lead to controlling these sources and thus contribute significantly to an improvement in the quality of air and water. Other objectives were to reduce noise, assist burgeoning communities with their ever increasing problem of waste removal, control the growth of weeds and brush for esthetic reasons and to reduce fire hazards, improve sanitary facilities on railroad equipment, and generally to be responsive to society's sensible desire to improve its health, safety, and appearance. This is the first time a comprehensive compilation has been made, or has been possible to make, of what the railroads are doing, and what it is costing them to do it, to improve the quality of the environment through attention to sixteen specific categories of pollution control and abatement. The report that will be possible at the end of 1973 is certain to show the programs to be well along and by 1975 the full impact will be possible to assess.

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051350
RAILROAD ENVIRONMENTAL NOISE: A STATE OF THE ART ASSESSMENT

Bender, EK Ely, RA Remington, PJ Rudd, MJ

Bolt, Beranek and Newman, Incorporated, 50 Moulton Street, Cambridge, Massachusetts, 02138

No. 2709, Jan. 1974, 105 pp, Figs, Tabs, Refs

Railroads are one of the most complex and least understood sources of environmental noise. However, railroads have a number of unique sources: both wheels and rails radiate sound; car retarders used in hump type classification yards generate intense squeals; impacts occur between cars as they couple in classification yards; steel bridges amplify the noise of passing trains; and an assortment of special purpose equipment in yards contributes to the total noise around a rail system. Presently, most data on railroad noise is based on limited statistical sampling and descriptive techniques. The purpose of this report is to assemble essential information on railroad noise to eliminate reliance on such techniques. In particular, the report focuses on the environmental effects of railroad noise, identification of the relative importance of various sources, and prediction of the noise levels that may be reached through the application of various noise control strategies. The measurements and calculations presented in this report are compared on the basis of three parameters that have been found useful in ascertaining the cumulative effects od discontinuous sounds characteristic of railroad noise.

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051352
ASSESSMENT OF NOISE ENVIRONMENTS AROUND RAILROAD OPERATIONS

Swing, JW Pies, DB

Wyle Laboratories, 128 Maryland Street, El Segundo, California, 90245

No. WCR 73.5, July 1973, 112 pp, Figs, Tabs, Refs, 10 App

Contract 0300-94-07991

Prepared for Southern Pacific Transportation Company, Union Pacific Railroad, The Atchison, Topeka & Santa Fe Railway Company, and The Association of American Railroads.

The railroad industry has moved to supplement the current knowledge in the areas of prediction of noise emitted by railroad operations in anticipation of Federal and State regulations concerning the environment. This report is largely directed at satisfaction of the "noise elements" portion of the State of California Code Number 65302 and to provide useful background data to aid the Federal Government in its efforts towards proposed rule making. The California Code requires that the agency responsible for the construction or maintenance of the railroads provide data on the present and projected noise levels of their system and any information used to develop such levels. The noise levels or contours may be expressed in any standard acoustical scale which includes both the magnitude of and the frequency of occurrence. In satisfaction of the "noise elements" requirement, this report incorporates A-weighted noise measurements of both line and yard operations, and weights their duration in terms of total integrated sound energy for each event or combined series of events. Additionally, a methodology has been presented for application to line and yard operations which allows inclusion of weighting factors for time of day of the noise event and numbers of events during defined time periods. The broad topic of noise emitted by railroad operations has been divided into two general categories: line operations and yard operations.

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051353
CHARACTERIZATION OF EFFLUENT FROM BIODEGRADABLE TOILETS

Stewart Laboratories, Incorporated, Knoxville, Tennessee, 37921

AMR 01446, Mar. 1972, 43 pp, 5 Fig, 13 Tab, 1 App

During 1970 and 1971, the Southern Pacific Transportation Company conducted an investigation to evaluate the performance of three basic types of toilets which showed potential application on railroad equipment. Three prototypes were selected–biodegradable, chemical, and incinerating type. As the result of this study, the biodegradable toilet was deemed the most acceptable and was subjected to road testing on cabooses. The units were found to perform satisfactorily from a mechanical standpoint, and there was no problem with their general acceptance by railroad crews. The test cabooses were equipped with temporary holding tanks during a portion of the road test so that the effluent could be analyzed. Conclusions reached from these analyses indicated that a more intensified and sophisticated effluent characterization was desirable.

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051354
REPORT ON EXHAUST EMISSIONS OF SELECTED RAILROAD DIESEL LOCOMOTIVES

Southern Pacific Transportation Company, 1 Market Street, San Francisco, California, 94105

Mar. 1972, 86 pp, Figs, 5 App

Jointly funded by the Association of American Railroads, Atchison, Topeka & Santa Fe Railway Company, Southern Pacific Transportation Company, and Union Pacific Railroad Company.

A joint program was conducted within the American railroad industry to study the quality of exhaust emissions from diesel-electric locomotives. Specific concentrations of exhaust constitutents were determined by tests conducted on four modern diesel locomotives. Results were compared with the California code in force for heavy duty diesel highway vehicles. These initial studies indicate that, in the event a California-type code was extended to cover railroad diesel power, these 1973 requirements could generally be met. However, the level of unburned hydrocarbons and oxides of nitrogen allowed in the 1975 standards could not be met to a significant degree.

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051355
A STUDY OF THE ENVIRONMENTAL IMPACT OF PROJECTED INCREASES IN INTERCITY FREIGHT TRAFFIC

Creswick, FA
Dee, N Drobny, NL Flinn, JE Lemmon, AW, Jr McGinnis

Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio, 43201

Final Rpt, June 1971, 46 pp, 5 Fig, 12 Tab, 72 Ref, 4 App

This study was conducted by the Battelle Columbus Laboratories (BCL) to provide the Association of American Railroads with a look at the environmental impacts in the United States which can arise as a consequence of projected future increases in intercity freight traffic and which will depend upon the share of this increase that will be carried by the American railroad industry. Of principal concern is a comparison of the impacts of railroads and intercity motor trucks, since it can be assumed that the railroads must compete more directly with the trucking industry than with water carrier pipelines, or airlines for the market increases. A comprehensive analysis of all environmental impacts of transportation of freight would require the identification and categorization of all of the possible interactions between the transportation activities and the major environmental sectors. A quantitative evaluation of each of these impacts should then be obtained and an appropriate integration of the individual impacts should be performed to provide an understanding of the effects of transportation activities on the environment. This study constituted the first step of such a comprehensive study, and consisted of an initial analysis and evaluation of a number of the more important impacts of rail and truck transportation. Comparisons were developed between the impacts of rail transportation and truck transportation to establish perspectives of decision making within the railroad industry.

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051373
SP-AAR PROGRAM TO DEVELOP CERTIFICATION PROCEDURES WITH RESPECT TO VISIBLE EMISSIONS FROM NEW AND OUT-SHOPPED LOCOMOTIVES

Southern Pacific Transportation Company, 1 Market Street, San Francisco, California, 94105

Final Rpt, Aug. 1973, 17 pp, 6 Fig, 3 App

On May 16, 1972, Southern Pacific Transportation Company began a program designed to lead to the development of certification procedures for locomotive visible emissions. The program was jointly funded by the Association of American Railroads' Research and

Test Department and the Southern Pacific. This final report describes tests of smokemeters installed for this evaluation on Southern Pacific locomotives at their Taylor Yard at Los Angeles and in their Sacramento Shops. Conclusions and recommendations are made with respect to requirements for smokemeters and for procedures that should be followed in examining emissions from locomotives. One objective of the program was to develop specifications, methodology, and reporting formats for certifying new locomotives and applying the same certification to repaired locomotives with respect to visible emissions. A further objective involved the selection and evaluation of existing smokemeters for adaptation to locomotives to implement certification procedures. These objectives have been achieved.

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051399
INTEGRATION OF ENVIRONMENTAL ISSUES IN THE URBAN TRANSPORTATION PLANNING PROCESS

Mouchaboir, GE, Mitre Corporation
Arrillaga, B, Mitre Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ITC-51, Paper, Sept. 1973, 15 pp, 5 Fig, 4 Tab, 9 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

During the past decade, environmental degradation has been increasing in our urban areas at a fast pace. A major cause of this degradation is attributed to our transportation systems and to the lack of perception and consideration of the environmental issues in the transportation planning process. These issues and problems are analyzed and suggestions are made as to how solutions can be integrated in the different phases of the planning process. These suggestions are in the form of institutional and methodological changes dealing with the planning process.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051402
SUBWAY AERODYNAMIC SCALE MODEL TESTING

Seeman, GR, Developmental Sciences, Incorporated
Culliah, CA, Developmental Sciences, Incorporated
Krachman, HE, Developmental Sciences, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-57, Paper, Sept. 1973, 19 pp, 15 Fig

Contract UT-290-SC-3001

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Described is a 1/16-scale model test (SAT) facility designed, built, and operated for the purpose of studying the aerodyanmics and thermodynamics of subway systems as they relate to the understanding and improvement of subway environmental control. The SAT facility is horizontal, the models run at real speeds, and the geometry is more realistic than previous experimental studies. A detailed description of the SAT facility and the train models used is presented, as well as a discussion of the measurements made, and several examples of results, e.g.: drag coefficients, air flow motion values, as a function of tunnel venting. Drag coefficient results for a range of train blockage ratios and tunnel length-to-diameter (L/D) ratios are compared to a theory developed at CalTech by Harris and data from several drop tube experimental studies; the comparison is seen to be good. SAT facility data for several venting configurations are also presented.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051583
SUMMARY OF PHASE II ACTIVITIES

Institute for Rapid Transit, 1612 K Street, NW, Washington, D.C., 20006 UMTA-DC-06-0010

Tech Rpt, Jan. 1973, 31 pp

Prepared by Parsons, Brinckerhoff, Quade, and Douglas, Inc. See also report dated Jan 71, PB-201 877.

The report has been prepared under the Transit Development Corporation (TDC) project, 'Ventilation and Environmental Control in Subway Rapid Transit Systems' and is one of many such reports leading to the final product—a 'Subway Environmental Design Handbook.' The report describes the various task assignments that were undertaken by all participating contractors during the second year of the project. It includes highlights of these activities, and identifies the major accomplishments. A list of the project technical reports prepared during the year is included. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225201/3

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PB-225201/3

052164
AERODYNAMIC AND THERMODYNAMIC VALIDATION TESTS IN BERKELEY HILLS TUNNEL. VOLUME I

Transit Development Corporation, Incorporated, 1000 Connecticut Avenue, NW, Washington, D.C., 20036 UMTA-DC-06-0010

Final Rpt, June 1973, 123 pp

Prepared in cooperation with the Associated Engineers/A Joint Venture. See also Volume 2, PB-226 897.

A milestone report has been prepared on the project 'Ventilation and Environmental Control in Subway Rapid Transit Systems,' one of many such reports leading to the final product—a 'Subway Environment Design Handbook.' The report describes a series of field tests conducted on the Bay Area Rapid Transit (BART) system in California for the purpose of validating analytical tools developed for the project. The document is the first volume in a two volume set.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226898/5

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PB-226898/5

052165
AERODYNAMIC AND THERMODYNAMIC VALIDATION TESTS IN THE BERKELEY HILLS TUNNEL. VOLUME II

Transit Development Corporation, Incorporated, 1000 Connecticut Avenue, NW, Washington, D.C., 20036 UMTA-DC-06-0010

Final Rpt, June 1973, 63 pp

Prepared in cooperation with the Wilson, Ihrig, and Associates, Oakland, Calif. See also Volume I, PB-226 898.

The report describes the validation of a subway environment simulation (SES) computer program. This validation was done by field test in the Berkeley Hills tunnel of BART. Volume 2 contains the detailed pressure measurements made inside the tunnel, on-board six-car trains and at the tunnel portal. Pressure measurements involve entry and exit transients and pressure fluctuation inside the tunnel caused by both train and emergency fan operations.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226897/7

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PB-226897/7

053877
PRACTICES, PROBLEMS, POSSIBILITIES IN TIE RENEWALS

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 70, No. 3, Mar. 1974, 2 pp

To avoid disturbing the track line and surface more than necessary most railroads now cut old ties into three when removing them from track. But this raises the problem of disposing of the tie chunks. Several factors—ecology, appearance, safety—have lent urgency to this problem. The situation today—and some possibilities—are explored in this and the following articles.

ACKNOWLEDGEMENT:
Railway Track and Structures

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054001
THE PREDICTION OF RAILWAY NOISE PROFILES

Peters, S

Journal of Sound and Vibration (Academic Press Incorporated, Berkeley Square House, Berkeley Square, London SW1, England)

Jan. 1974, 13 pp

A method is described for predicting the rise and decay of the noise (the noise profile) of a passing train. There are two principal assumptions in developing the method: (a) the railhead and wheels are in good condition; (b) the train noise is primarily rail-wheel noise. Good agreement between the predictions of the method and measured train noise profiles has been obtained.

ACKNOWLEDGEMENT:
Journal of Sound and Vibration

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054114
KINEMATIC SOUND SCREEN: UNIQUE SOLUTION TO HIGHWAY NOISE ABATEMENT

Hauskins, JB

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

Vol. 100, No. TE1, 10353, Proc Paper, Feb. 1974, 10 pp

A new noise barrier, known as a kinematic sound screen, that also has see-through properties, has been designed and tested by Engineering Corporation of America. Preliminary tests, conducted on a full-scale working model of the barrier, demonstrate the feasibility of the design, and show that it is capable of providing significant noise level reduction. The kinematic sound screen's noise attenuation properties compare favorably with other known sound barriers. In addition to its esthetic qualities, ease of construction, costs, and see-through properties, it has added advantages to the user or installer. The tests conducted to date have been unsophisticated but do verify the mathematical data on which the design was based. An actual computer study, using the TSC method, developed for the department of Transportation, shows that the sound screen's properties are equal to those of a solid barrier.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054300
ENERGY PROBLEMS AND ENVIRONMENTAL CONCERN

Train, RE

Science and Public Affairs (Educational Foundation for Nuclear Science, 1020-24 East 58th Street, Chicago, Illinois, 60637)

Vol. 29, No. 9, Nov. 1973, 5 pp

There are some who simplistically blame the strong concern over environmental quality as the cause of our energy problems. This assertion is simply not true. Energy problems are complex and closely related to a wide variety of forces. Prominent among these forces is, of course, the question of environmental quality; but prices, technology, regulatory requirements, international relations, and national security considerations are also integral parts of the problem.

ACKNOWLEDGEMENT:
Science and Public Affairs

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054348
MEASUREMENT OF SOUND PROPAGATION IN BODIES AND THE AIR ON UNDERGROUND RAILWAY LINES

KORPERSCHALL UND LUFTSCHALLMESSUNGEN AN UNTERIRDISCHEN SCHIENENBAHNEN
Hauck, G Willenbrink, L Stuber, C

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

Vol. 22, No. 7, 1973, 12 pp, 15 Fig

The results obtained from these tests to measure sound propagation in bodies, carried out with various types of track construction, show that sound propagation in bodies is reduced in neighbouring buildings as well as by special track constructions, and building methods used for tunnel construction. Details are given about the various factors affecting the extent of propagation, in the air, of sounds coming from vehicles passing through tunnels. To reduce traffic noise in stations, it is recommended that they be equipped with special noise absorbing material.

ACKNOWLEDGEMENT:
International Union of Railways, 1246

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Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany, Repr PC: Req Price

054412
NOISE AND VIBRATION OF A STEEL WHEEL/STEEL RAIL PERSONALIZED RAPID TRANSIT SYSTEM

Gramse, HE Spence, JH

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-UMTA-73-2, Intrm Rpt, Jan. 1974, 82 pp

Contract DOT-TSC-436

The report describes a test program which has been conducted to establish baseline noise levels and ride characteristics for a state-of-the-art steel wheel on steel rail personalized rapid transit vehicle. A full-scale test vehicle and an 840-foot track, including two 30-foot curves, have been built and used for 128 test runs under various conditions of operation. Permanent records have been made on magnetic tape and oscillograph paper for future analysis as needed. The vehicle has been successfully demonstrated and has met speed and acceleration design goals. Noise levels of 82 to 85 dB(A) have substantially exceeded proposed criteria for both tangent track and curve track. The ride vibration has met current criteria on tangent track to the 30-mph test speed and to a 5-mph speed limit on the tight 30-foot curve track. There is some tendency to vehicle-hunting.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227806/7

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PB-227806/7

054474
TUNNEL CLEANING METHOD

Apperson, RW

California Department of Transportation, Equipment Branch, Sacramento, California

CA-HY-7107-1-73-01, Final Rpt, June 1973, 95 pp

A method has been devised to scrub tunnel surfaces clean by using rotating brushes, water and tunnel washing soap. Proportional Electro-hydraulic Control Valves provide accurate controls for the operator to position boom mounted brush heads on the tunnel surfaces. The four axle, 48,000 GVW carrier vehicle transports 1,000 gallons of water, 700 gallons of soap, operator and driver cabs, as well as all hydraulic components needed to accomplish the task of tunnel washing. Since the speed of operation is related to the amount of contaminant deposited and the surface condition of the tunnel, the effective forward travel speed of the washer varies up to a top speed of 143 ft/min.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-228511/2

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054683
QUANTIFYING IMPACT OF TRANSPORTATION SYSTEMS

Smith, WL

ASCE Journal of the Urban Plan and Develop Div (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. UP1, #10416, Proc Paper, Mar. 1974, pp 79-91

The stochastic supply and demand analysis method suggested in this paper represents an attempt to provide a technique applicable to the analysis of a large number of resources. However, the key point is not the elaboration of this particular method but rather the demonstration of the need and benefit achieved from the comprehensive analysis of environmental resources. Engineering, in general, and those in the transportation field specifically have been criticized severely for what is termed insensitivity to the "harm" caused by their projects. This is not a just indictment. Still, many projects are being blocked or delayed that could well prove highly beneficial. A prime reason for this difficulty is the inability to demonstrate need in the face of environmental damage. It is important to develop the analytical tools to meet the need for total resource evaluation before alternative methods are thrust upon us outside our discipline.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054685
DESIGN AND OPERATION OF AN AUTOMOBILE AND RAILROAD CAR INCINERATOR

Bilbrey, JH, Jr Dean, KC Sterner, JW

American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017

TMS A74-88, Preprint, Feb. 1974, 6 pp

A low-cost, smokeless automobile incinerator capable of burning up to 80 flattened automobiles in an 8-hour operating day was designed by the Bureau of Mines and has been operated during the past 4 years. Based upon the successful operation of this prototype, a modified incinerator capable of burning both railroad cars and automobiles was designed and constructed by a major scrap processor in conjunction with the Bureau of Mines. Research on the operation of this incinerator has been conducted during the past year, burning flattened and unflattened automobiles and stock, box, and work railroad cars. Although many maintenance problems were encountered from materials of construction, operation of the incinerator was successful. Smokeless incineration of railroad cars as well as automobiles was found possible in 23 of 25 tests made in the late stages of operation. Smoke emission in the other two burns was of less than 2-minute duration in each case. The average time for burning a batch of 20 unflattened automobiles was about 35 minutes, and the railroad cars ranged from 60 to 75 minutes each for complete burnout.

ACKNOWLEDGEMENT:
Bureau of Mines, OP 30-74

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American Inst of Mining, Metallurg & Petrol Engrs, 345 East 47th Street, New York, New York, 10017, Repr PC: Req Price

056742
STATISTICAL ANALYSIS OF CONTINUOUS DATA RECORDS

Corotis, RB, Northwestern University, Evanston

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE1, Paper, Feb. 1974

Simple stochastic techniques described permit efficient utilization of information contained in continuous data records. Statistical parameters are analogous to corresponding random variable quantities. Evaluation of autocovariance functions provide approximate results for a large number of physical phenomena. Simple hypothesis testing techniques follow directly from the procedures presented. Actual

subway noise data illustrate application of the techniques.

ACKNOWLEDGEMENT:
Engineering Index, EIX740500642

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056809
NOISE IN GROUND TRANSPORTATION SYSTEMS

Ward, EJ, Stanford University

High Speed Ground Transportation Journal (Planning-Transports Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 3, 1973, pp 297-305, 8 Ref

Passage of the Noise Control Act of 1972 has given added impetus to the drive for noise reduction. Section 17 of the Act empowers the Environmental Protection Agency to issue railroad noise standards which will be enforced by the Federal Railroad Administration (FRA). FRA's High Speed Ground Transportation R&D program has a goal of substantially increasing the speed of ground passenger travel. Without improvements in the state-of-the-art of noise suppression and noise avoidance higher speeds will inevitably mean higher noise levels. Therefore, the new systems developments are forced to include good acoustic designs by specifications of maximum permissible noise levels. Data on the wayside noise levels of various rail, transit and tracked air cushion vehicle systems are tabulated, and for comparison the noise specification used for developing the DOT ground vehicles is shown. Noise sources for guided ground transportation are discussed with respect to steel wheels, railroad yards, tunnels, elevated guideways, aerodynamics, propulsion, tracked air-cushion vehicles, tracked magnetically levitated vehicles, and tube vehicles. It is indicated where research and development can contribute to noise abatement.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304464

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056848
HEAT IN SUBWAYS

Murray, JA, Kaiser Engineers
Tyrrill, AF

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/RT-5, Paper, Nov. 1973

The various heat sources in a subway rapid transit system are quantified and their spatial distribution along the tunnels and stations are determined. The results show that the trend to higher speeds will create a much larger heat load on the subways thus potentially driving the temperatures even higher than experienced in existing systems. Strategies for controlling the subway temperature by traditional technology are discussed as well as the opportunities for application of new technologies.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104843

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056892
HIGHWAY NOISE–A FIELD EVALUATION OF TRAFFIC NOISE REDUCTION MEASURES

Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

#144, NCHRP Rpt, Dec. 1973, 80 pp

The study considered four basic highway noise reduction constructions: (1) roadside barriers, (2) elevated structures, (3) depressed highway sections, and (4) roadside structures. To minimize the number of variables to be evaluated, strict criteria were imposed on the selection of the test sites. For the roadside barrier, elevated highway, and depressed highway configurations, the result of the evaluation indicate that the design guide procedures tend to underpredict the noise reductions at locations involving small path length differences, and overpredict the noise reductions at locations distant from the roadway when the intervening terrain is free of ground cover.

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Transportation REsearch Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: #4.40

056896
ASSESSMENT OF CONTROL TECHNIQUES FOR REDUCING EMISSIONS FOR LOCOMOTIVE ENGINES

Storment, JO Springer, KJ

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas, 78228

Final Rpt, 7209-7306, Nov. 1973, 316p

The primary objective of this study was to determine the most effective method of reducing emissions of oxides of nitrogen from a two-cylinder version of an EMD series 567C locomotive engine. The control method judged most effective was that which resulted in the greatest reduction in NOx, had the least adverse effects on other emission constituents and engine operation, yet was simple to install and maintain. Results of these tests indicated that the most effective control method was retarded injection timing (4 degrees from standard). The next most effective method was EGR, with the recirculated exhaust cooled to 125-150F. It was necessary to derate (or reduce) engine power at certain points to maintain smoke opacity at acceptable levels with all of these control techniques. (Modified author abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229991/5

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056953
DEVELOPMENT OF AN ACOUSTIC RATING SCALE FOR ASSESSING ANNOYANCE CAUSED BY WHEEL/RAIL NOISE IN URBAN MASS TRANSIT

Schultz, TJ

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-UMTA-74-3, Intrm Rpt, 7307-7309, Feb. 1974, 60p

Contract DOT-TSC-644

Prepared by Bolt Beranek and Newman Inc., Cambridge, Mass.

A number of recent studies of the impact of train noise on the community are reviewed. From this information and the results of other noise-annoyance studies, a scale for rating the annoyance of urban transit system operators and patrons, as well as the surrounding community, caused by wheel/rail noise is recommended. In general, the peak A-weighted sound-pressure level for the given exposure should be used, with an additional 5 dB if there are pure tones present (squeal). If in comparing the different kinds of train noise (squeal, impact, wheel roar, etc.) the total exposure is to be assessed,

an additional term, 10 log T, should be added to the mean peak noise (where T is the total exposure in seconds during any 24-hour period).

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231363/3

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057157
MECHANICS OF NOISE GENERATION BY GROUND TRANSPORT VEHICLES

Muster, D, Houston University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 153-176, 12 Fig, 1 Tab, 61 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

Motor vehicle noise is discussed in terms of the individual noise sources in trucks, automobiles and other vehicles. The sources include the engine and transmission, the tires (and where they meet the roadway), and the body of the vehicle and its appurtenances. There are several physically different mechanisms by which motor vehicle noise is generated. They are loosely grouped as being mechanical (impact, vibration), aerodynamic (interrupted flow, turbulence) and acoustic (exhaust and induction, tire/roadway interaction, combustion processes). The character of the mechanisms and their relative importance to the overall vehicle noise spectrum are discussed.

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051280
SPLIT PROPULSION FOR HIGH SPEED GROUND TRANSPORT

Gouse, SW, Jr, Carnegie Institute of Technology
Rawal, CH

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

72-RT-1, 1972, 16 pp

Rail Transportation Proceedings, Papers and discussions from joint IEEE-ASME Railroad Conference, Jacksonville, Florida, 14-15 March 1972.

The purpose of this study is to investigate conditions under which it might be desirable to split the source of high-speed ground transport propulsion capability between the vehicle and the guideway. Two limits are obvious. If the high-speed ground transport system (HSGTS) had only one vehicle, it would be best to put all the propulsion capability on board the vehicle. If, on the other hand, the number of miles of vehicle exceeded the number of miles of guideway, one would put all of the propulsion capability in the guideway. Between these two limits there must be a range of variables for which one would vary the degree of the split of the propulsion capability between the vehicle and the guideway. The authors have investigated a range of variables of potential high-speed ground transport systems and have found it is attractive to split the propulsion capability for certain operating and economic conditions.

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051300
CONTROL CONCEPTS FOR PNEUMATIC-TUBE VEHICLES

Wright, D, Duke University
White, KP, Jr, Duke University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-31, 1973, 12 pp, 10 Fig, 9 Ref

The pneumatic-tube transport system, its operation, and its conceptual development as a high-speed-ground-transportation alternative are discussed briefly. Schemata for control of passive and non-passive tube vehicles are proposed. System simulations employing a Fanno-flow model and each of the control schemata are outlined. Results contrasting controlled and uncontrolled system operation are presented as plots of the vehicle's velocity and acceleration versus the vehicle's position in the tube. Results evidence the infeasibility of existing, passive vehicle concepts.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051302
DYNAMICS OF SOIL-SUPPORTED GUIDEWAYS WITH THERMAL AND AIR CUSHION VEHICLE LOADING

Wilson, JF, Duke University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-28, 1973, 11 pp, 8 Fig, 6 Ref

Using Bernoulli-Euler beam theory, responses are calculated for an elastic slab supported on an elastic foundation and subjected to constant-speed shear and normal loads which span the slab width. Investigated are the effects of traverse speed; of longitudinal load distributions in terms of the classical wave length 1/lambda; and of additional axial loads which may arise from temperature changes. Responses are bounded at critical resonance speeds with realistic values of system damping. Results are applicable to the design of at-grade guideways for high speed air cushion vehicles.

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051305
DYNAMIC CHARACTERISTICS AND CONTROL REQUIREMENTS OF ALTERNATIVE MAGNETIC LEVITATION SYSTEMS

Wilkie, DF, Ford Motor Company
Borcherts, RH, Ford Motor Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-17, 1973, 17 pp, 19 Fig, 25 Ref

Two fundamentally different approaches to achieving non-contact suspension for high speed (swung dash 300 mph) ground vehicles have been proposed and studied in the United States and other countries. One of the approaches utilizes magnetic repulsive forces (inductive system) and the other utilizes magnetic attractive forces (ferromagnetic system). The inductive system yields a suspension which is stable with constant levitation currents but is poorly damped, while the ferromagnetic system requires a feedback current control system just to achieve a stable levitation equilibrium. The control system requirements and resulting vehicle dynamics for both levitation approaches are discussed in this paper.

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American Society of Mechanical Engineers

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051400
SOME OPTIMAL CONTROL TECHNIQUES APPLICABLE TO SUSPENSION SYSTEM DESIGN

Hendrick, JK, Arizona State University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-55, Paper, Sept. 1973, 8 pp, 8 Fig, 11 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The need to develop new suspension systems for vehicles of the future has encouraged the application of modern optimization techniques to such proposed suspension designs as magnetic levitation and air cushion suspension. This paper presents an analytical approach to three suspension optimization problems: (a) the choice of the optimal parameters for a predetermined suspension configuration given a particular application; (b) the choice of the optimal passive suspension configuration for a given application; and (c) the choice of the optimal active suspension configuration for a given application.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051403
COMPRESSIVE BEHAVIOR OF A LINEAR INDUCTION MOTOR REACTION RAIL

Williams, JG, Langley Research Center
Haight, EC, Mitre Corporation
Hutchens, WA, Mitre Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-59, Paper, Sept. 1973, 9 pp, 14 Fig, 1 Tab, 5 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Analytical and experimental results are presented for the static structural response to axial compressive loading of a linear induction motor reaction rail. The study addresses problems concerning the installation of the track at the Department of Transportation's High Speed Ground Test Center near Pueblo, Colorado. Specific problems studied include determination of the critical buckling stress due to solar heating of the reaction rail and establishment of the lateral stiffness of the rail in the presence of applied axial stress.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051410
COMMUNICATIONS AND CONTROL IN GROUND TRANSPORTATION

Goldsmith, A, Office of the Secretary of Transportation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-81, Paper, Sept. 1973, 8 pp, 21 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Ground transportation is by far the most important segment of transportation, both from the usage and expenditure standpoints. Transportation requirements are expected to double in the next 20 years or less. Merely increasing the capacity of present modes of transportation is not the optimum way of meeting future needs. More efficient, safer, and less polluting means will have to be found. Telecommunications will play an increasingly important role. Because of time lag in implementation today's state-of-the-art technology will have to provide at least the short term solution. Described are a number of communication and control projects which have recently or will shortly be implemented to provide some of the answers. Some future innovations are also covered.

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ASME Journal of Mechanical Engineering

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051412
SIMULATION OF LATERAL DYNAMICS FOR A CONTACT POWER COLLECTION SYSTEM

Spenny, CH, Department of Transportation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-84, Paper, Sept. 1973, 11 pp, 10 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The mathematical model of a sprung mass moving along a simply supported beam is used to analyze the lateral dynamics of a power collection device as it slides along a power rail. A computer simulation of one-dimensional motion is used to demonstrate the phenomena of collector-power rail interaction. Parametric resonance in an undamped collector is shown to exist at several speeds below 300 mph. However, it is demonstrated that amplitude can be controlled at all of these resonant speeds with the proper use of damping.

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ASME Journal of Mechanical Engineering

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051415
PERFORMANCE OF MAGNETIC SUSPENSIONS FOR HIGH-SPEED VEHICLES OPERATING OVER FLEXIBLE GUIDEWAYS

Katz, RM, Mitre Corporation
Nene, VD, Mitre Corporation
Ravera, RJ, Mitre Corporation
Skalski, CA, Mitre Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-89, Paper, Sept. 1973, 15 pp, 17 Fig, 11 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper examines the performance of attraction (ferromagnetic) and repulsion (superconducting) MAG-LEV Suspensions suitable for use on high-speed ground vehicles. The effects of guideway roughness, guideway flexibility and of force nonlinearities are examined. It is concluded that for the particular cases examined here, MAG-LEV suspension systems for 300-mph vehicles which provide reliable tracking while meeting ride quality criteria can be designed. It is also apparent that a considerable effort is required to achieve MAG-LEV system optimization and refinement.

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051418
THE URBAN TRACKED LEVITATED VEHICLE

Ward, JP, LTV Aerospace Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-96, Paper, Sept. 1973, 8 pp, 12 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Presented is a brief summary of one of the newest concepts in transportation—the Urban Tracked Levitated Vehicle. Air levitated, magnetically guided, propelled by single-sided LIMs, it is a really new idea in mobility. It holds a practical hope of filling the transportation gap between the 60 mph of autos and the 500 mph plus of

aircraft.

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ASME Journal of Mechanical Engineering

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051421
MERGE CONTROL IN AUTOMATED TRANSIT SYSTEM NETWORKS

Brown, SJ, Jr, Johns Hopkins University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-109, Paper, Sept. 1973, 12 pp, 3 Fig, 2 Tab, 5 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Many small vehicle automated transit system concepts will require vehicles to negotiate intersections and merge with other vehicles while traveling through a network of guideways. Assuming that the longitudinal control of vehicles is accomplished by what is known as the moving-cell or point-follower approach, the merge control problem becomes one of determining necessary point-skip maneuvers to assure that points equi-distant from a merge junction are not simultaneously occupied by vehicles. This paper describes an original algorithm for intersection control which can satisfactorily resolve such merge conflicts 95 percent of the time for system traffic densities approaching 80 percent of capacity by monitoring the status of only twelve points on each line. The algorithm is suitable for programming in a small digital computer; one of which is conceptually located at each intersection.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051454
POSSIBILITIES OF APPLYING A LINEAR TRACTION MOTOR IN HIGH-SPEED TRANSPORT

MOEGLICHKEITEN DER ANWENDUNG EINES LINEARMOTORS FUER DEN SCHENLLTRANSPORT

Skobelew, V, Leningrad Polytechnical Institute

Technical University Dresden, Dresden, East Germany

Vol. 22, No. 1, 1973, pp 91-96, 8 Ref

For many years the linear asynchronous motor with a reaction rail placed along the track has been regarded as the railroad traction motor of the future to be used in high-speed cars of a new type as the most essential drive. This possibility of using the linear motor has been somewhat overestimated. As this paper shows, there exists a speed limit above which the use of this kind of linear motor becomes uneconomic due to somewhat low efficiency and performance factors or even impossible due to too low a traction power.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 057091

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051455
USE OF STATE OBSERVERS IN THE OPTIMAL FEEDBACK CONTROL OF AUTOMATED TRANSIT VEHICLES

Garrard, WL, Minnesota University, Minneapolis
Kornhauser, AL

ASME Journal of Dynamic Systems, Meas and Control (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

pp 220-227, 9 Ref

The theory of optimal control and the theory of observers is applied to the design of feedback systems for longitudinal control of vehicles in automated, high-capacity transit systems. The resulting controllers require only measurement of position and velocity errors and excellent dynamic response is achieved for mainline operations, for merging and demerging from stations, for maneuvering of intersections, and for emergency stopping.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056998

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051456
GEOMETRY OF AUTOMATICALLY CONTROLLED VEHICLE GUIDEWAYS FOR COMFORT

Balachandra, M, Minnesota University, Minneapolis

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 432, 1973, pp 12-24, 12 Ref

An analytical method is proposed for the design of guideway elements subject to jerk and acceleration limits. The method generalizes the limits on lateral jerk acceleration to the fore-aft and verticamodes. It is proposed that, under combinations of these modes, the magnitudes of the jerk and effective acceleration vectors must be limited. Equations describing the level of discomfort are derived for both constant and variable-speed motion along horizontal and vertical curves.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 058688

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051458
TRANSIT MODE COMBINING THE BEST OF BUS AND RAIL

Whitten, CF Hornung, HT alternative for urban automobile commuters. Called BTV (for Bi-modal Transit Vehicle), the concept consists of rubber-tired automated transit vehicles operating in trains on exclusive guideways. At designated stations, certain of the vehicles are detached and driven manually by transit operating personnel onto surface streets for neighborhood distribution and collection. Urban commuters thus incur no time-consuming intermodal transfer.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056427

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051461
VICS-120, A TUBE-VEHICLE SYSTEM TEST FACILITY

Marte, JE, California Institute of Technology

Institute of Environmental Sciences, 940 East Northwest Highway, Mount Prospect, Illinois, 60056

Proceeding, 1973, pp 448-459, 11 Ref

Institute of Environmental Sciences, 19th Annual Technical Meeting Proceedings, Anaheim, California, 2-5 April 1973.

A large test facility designated the VICS-120 has been designed, constructed and operated at the Caltech Jet Propulsion laboratory as part of the research in support of the aerodynamic and ventilation section of a handbook on subway design. Tests can be conducted under both equilibrium and non-equilibrium model velocity conditions. Design concepts, instrumentation, and an outline of construction details as well as operational procedures and models are described. The kinds of testing suitable for a facility of this type are discussed and examples of the various forms of data obtained are presented.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 057607

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051484
LINEAR INDUCTION MOTOR RESEARCH VEHICLE. SPEED UPGRADING TESTS

D'Sena, GO Leney, JE

AiResearch Manufacturing Company, 2525 West 190th Street, Torrance, California, 90509

72-8857, Final Rpt, 7206-7208, June 1973, 207p

Contract OHSGT-7-35399

See also report dated Oct 71, PB-212 041.

A series of linear induction motor research vehicle (LIMRV) runs were conducted at the High Speed Ground Test Center on the 6.2-mile test track. These runs were made primarily to evaluate the dynamic performance of the vehicle at speeds up to the maximum achieved, 187.9 mph. The vehicle was equipped with instrumentation that measured accelerations and displacements. Of particular interest were the motions of the trucks and suspension, and the LIM quidance system. The initial truck dynamics data evaluation indicates an increase in conicity resulting from a narrow band of wheel treadwear. Since the next series of tests will be conducted with new wheels, the problem at least initially will not be significant. Other tests run during this program provided acceleration and braking profiles. Also, some LIM electrical performance data was recorded and evaluated. (Author)

ACKNOWLEDGEMENT:
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051537
SLIM-SUSPENSION INTERACTION

Parker, JH, Ministry of Transportation and Communications, Can
Charles, RJ, Ministry of Transportation and Communications, Can

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-116, Paper, Sept. 1973, 8 pp, 6 Fig, 4 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

An attempt is made to quantify the interaction between suspension system and a single-sided linear motor (SLIM) that is due to the levitation force generated by the SLIM. The conventional type of suspension system is examined. The results reflect on the suitability of combining a SLIM propulsion with conventional suspension systems.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051557
OPTIMIZATION OF TRANSIT SYSTEMS BY PARAMETRIC MEANS

Goldmann, BW, Boeing Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-63, Paper, Sept. 1973, 8 pp, 8 Fig, 1 Tab

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The philosophy of this paper has been applied to the Personalized Rapid Transit (PRT) concept which utilizes a rubber-wheeled vehicle propelled by an electric motor travelling along a guideway. The design of a transportation system involves maximizing the beneficial aspects while at the same time minimizing parameters such as cost, energy consumed, or visual blight. For this study, the decision model developed is a computer program that incorporates the technology of transit vehicles. With a computer program one can do various trade-offs, sensitivities, and optimization in arriving at the optimal transit design with timeliness and credibility. The parameters that are influential in transit design, station spacing, vehicle and station size, vehicle speed, headway, etc., are perturbed and figure-of-merits are determined using several criterion and optimization techniques.

ACKNOWLEDGEMENT:
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051579
PRELIMINARY DESIGN STUDIES OF MAGNETIC SUSPENSIONS FOR HIGH SPEED GROUND TRANSPORTATION. VOLUME II, EXPERIMENTAL RIDE SIMULATION STUDIES

Borcherts, RH Wilkie, DF Davis, LC Reitz, JR

Ford Motor Company, Transportation Research and Planning Office, Dearborn, Michigan

Final Rpt, 7206-7306, June 1973, 31 pp

Contract DOT-FR-10026

See also Volume 1, PB-223 237.

The report describes an experimental program using human subjects to evaluate the ride quality resulting from specific suspension strategies, and to compare these with a standard ride. The study is part of a more general task to learn how to isolate guideway irregularities from high speed ground vehicles to insure passenger comfort.

The results of the study show the following: A ride evaluation by different individuals is a meaningful approach; the discomfort index criterion is roughly correct but has some limitations; the standard ride which was used for comparison, namely, the DOT ride quality specification, is not a particularly good ride; and magnetic suspensions operating on a moderately smooth guideway at 483 km/hr will require active control in order to produce ride quality approaching that of a jet aircraft on a quiet day.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224893/8

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051584
LIM GUIDANCE SYSTEM DYNAMICS. THEORETICAL STUDIES AND EXPERIMENTAL TESTS

Chi, CC

AiResearch Manufacturing Company, 2525 West 190th Street, Torrance, California, 90509

73-9065, Intrm Rpt, 7202-7301, Sept. 1973, 123 pp

Contract DOT-FR-7-35399

The linear induction motor research vehicle (LIMRV) is a test bed constructed to evaluate the LIM as a propulsion system. Satisfactory LIM guidance system performance is vital to the ongoing progress of this research program. The report describes preliminary theoretical studies of LIM guidance system dynamic behavior, and documents the experimental results obtained during the first phase of the LIMRV speed upgrading tests conducted at the DOT High-Speed Ground Test Center, Pueblo, Colorado. After the operational tests, additional analytical work was accomplished, leading to system modifications that provided better control of the LIM/reaction rail clearance (mechanical gap), statically, without adversely affecting dynamic behavior. Guidance system dynamics tests were later performed to confirm the theoretical work.

ACKNOWLEDGEMENT:
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051897
THE AERODYNAMICS OF HIGH SPEED GROUND TRANSPORTATION

Hammitt, AG

Western Periodicals Company, 13000 Raymer Street, North Hollywood, California, 91605

Book, 1973, 434 pp

This is a comprehensive book covering the topics of ground vehicle aerodynamics, tunnel or tube and air cushion aerodynamics. It is the first book to treat all these categories, and with the current interest in new transportation systems it should have immediate use by design engineers. The complexity and diversity of topics covered presents a thorough treatment of each item. Essential features are discussed and information necessary for preliminary aerodynamic design of ground vehicles is provided. Speeds up to 300 mph are currently being considered for ground transportation systems, and at these speeds the drag, lift, and side-forces can be of the order of the weight of the vehicle. The basic principles of air cushion vehicles are given and discussed. Both plenum and peripheral jet air cushions are considered along with the effects of forward speeds. A major difficulty with the air cushion vehicle is its stability, and the author gives an introduction to the static and dynamic stability associated with such vehicles. A significant portion of this book is devoted to the aerodynamics of vehicles in tunnels and tubes. At speeds in the range of 300 mph compressible flow analysis must be used to describe some of the flow fields caused by a vehicle moving at such speeds in the confined environment of a tunnel or a tube.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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051907
STUDY OF MAGNETIC LEVITATION AND LINEAR SYNCHRONOUS MOTOR PROPULSION

Atherton, DL

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada

#73-1, Dec. 1972

This report describes progress made during 1972 in an investigation into the use of superconducting magnets for the levitation and synchronous propulsion of high speed vehicles. Primary consideration has been given to engineering studies of the magnet and propulsion systems, including lift and drag calculations, levitation magnet and cryogenic system design, magnetic shielding, linear synchronous motor analysis, and the design of a large scale test facility. Numerical calculations of the lift and drag characteristics of our vehicle design have been made, and the effects of rounded magnet corners and finite conductor size have been determined. Levitation magnets have been designed, and it is shown that superinsulation with intermediate heat shields can efficiently minimize the cryogenic heat losses. Fringing fields in the passenger compartment have been calculated and shielding methods are discussed. A literature survey indicates that biological effects of low magnetic fields are not likely to be significant, although insufficient information precludes definite conclusions. Analysis of various aspects of linear synchronous motor propulsion indicates that it can be economically feasible, and that high efficiencies can be obtained for suspension heights up to 30 cm with sequentially powered track sections. Finally, a conceptual design for the test facility which will be constructed at Queen's next year is presented.

ACKNOWLEDGEMENT:
Canadian Institute of Guided Ground Transport

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051974
AUTONOMOUS AND GUIDED VEHICLES–SIMILARITIES, DIFFERENCES, AND LIMITS

SPURFREIE UND SPURGEFUEHRTE FAHRZEUGE–GLEICHHEIT, VERSCHIEDENHEIT, GRENZEN

Koessler, P

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2/3, 1973, 9 pp, 17 Fig, 13 Ref

With few exceptions, the technique of vehicles tied to the ground is subject to similar laws, and this applies, more especially, to autonomous and guided vehicles. The replacement of the wheel, as a support, by means of a suspended system, neither reduces the expenditure on performance and power, nor is there any considerable alternation to the interplay of forces between the vehicle and the track.

The speed limit depends essentially on economic factors. The suspension technique depends, for propulsion, on the linear motor, although, on the other hand, the wheel can be retained, in this connection, as a means of support and guidance.

ACKNOWLEDGEMENT:
International Union of Railways, 994

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052076
LEANWAY: A LEANING SUBWAY

Sottile, AL

Sottile (Antonine Lafata), P.O. Box 28292, Washington, D.C., 20005

1974, 70 pp, Tabs, Refs

This paper proposes a new type of subway. Surface stations and very deep tunnels would result in steep grades. The Leanway vehicle would have passenger pods that remain level on the grades. Gravity would accelerate and decelerate the vehicles, contributing to energy conservation. Fairly detailed projections are presented, and cost savings compared with contemporary rapid transit subways are claimed. Linear Induction Motors and Magnetic Levitation are considered.

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052079
CONTROL TECHNIQUES FOR PRT

Thomas, TH, Warwick University

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 3 pp, 3 Fig, 1 Tab, 1 Phot

Around the family of automatic guided transport now known as PRT, control systems have been developed to cope with complex service patterns and close headways. The author examines these techniques and concludes that while few have direct application to conventional rail, the same fundamental questions remain to be tackled in heavy rapid transit.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

052083
VAL MAY BE WORLD'S FIRST FULLY-AUTOMATED PUBLIC TRANSPORT

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 3 pp, Phots

On December 14, 1973 the authority responsible for the new town of Lille-Est decided to construct an 8 km fully-automated metro. Rubber-tyred trains with no crew on board running at 80 km/h will serve eight unmanned stations, and 60 sec headways can be maintained by a novel form of central control which enforces constant separation in time rather than a space interval.

ACKNOWLEDGEMENT:
Railway Gazette International

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052116
MAGNETIC OR ELECTROMAGNETIC? THE GREAT DIVIDE

Laithwaite, ER

Electronics and Power (Box 8, Southgate House, Stevenage, Hertshire, England)

Vol. 19, No. 14

Theory can show that electromagnetic machines become better as they get larger, whereas the opposite is true for purely magnetic machines. The relevance of this theory to high-speed-transport levitation is discussed in this article.

ACKNOWLEDGEMENT:
Engineering Index, EIX731200496

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052118
ACCELERATION OF AN AIR CUSHION VEHICLE UNDER THE ACTION OF A PROPULSOR

Doctors, LJ, New South Wales University
Sharma, SD

Journal of Ship Research (Society of Naval Architects and Marine Engineers, 74 Trinity Place, New York, New York, 10006)

Vol. 17, No. 2, June 1973, pp 121-128, 15 Ref

Presents the solution for the motion of an air-cushion vehicle (ACV) starting from rest under the action of a propulsor of given thrust-speed characteristics. The wave resistance is based on linearized potential theory, while the aerodynamic drag components are assumed to be strictly quasi-steady. The problem is treated in two different ways: calculating the wave resistance in a truly unsteady manner, and on the simplified quasi-steady basis. The results show that the shape of the propeller characteristics has only a minor effect on the velocity pattern. However, the effect of overloading the ACV is shown to have crucial effects on its ability to surpass the critical depth hump.

ACKNOWLEDGEMENT:
Engineering Index, EIX731200413

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053726
AERODYNAMICS OF TUBE VEHICLE SYSTEMS

Hammitt, AG, TRW Systems Group

High Speed Ground Transportation Journal (Planning Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 4, No. 3, Sept. 1970, 20 pp, 6 Fig, 2 Tab

A general description of the aerodynamic aspects of tube vehicle systems is presented. The particular features of the flow field peculiar to tube vehicles are discussed. An assessment is made of the present state of understanding as well as future requirements from both the theoretical and experimental viewpoint.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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053744
NUMERICAL STUDIES OF FLOWS IN A PERIPHERAL-JET-TYPE AIR-CUSHION

Kawaguti, M Moritoh, Y

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 3 pp, 7 Fig

The flow in a peripheral-jet-type air-cushion is calculated numerically on the basis of the exact equations of fluid mechanics (Navier-Stokes equations). As the results, the distributions of streamlines, equivorticity lines and pressure are obtained, which indicate that numerical calculations of the exact equations are applicable to the flow of such complex configurations as air-cushions.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053996
COEFFICIENT OF FRICTION OF ICE AT HIGH SPEED–APPLICATION TO A HIGH SPEED TRAIN

Eisenstadt, MM, Puerto Rico University
Riley, JD, Stanford University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

70-WA/RR-3, Aug. 1970, 5 pp, 6 Fig, 1 Tab, 7 Ref

The frictional forces caused by ice sliding on aluminum at speeds between 150 and 360 mph were investigated for normal pressures from 0.25 to 0.46 psi. This information then was applied to a high-speed train concept by placing a block of ice under a train at a station so that, as train and ice block slide on the track, the melting ice provided a lubricating layer. Ice thicknesses required for train runs of various distances at different speeds were determined, for example, an ice thickness of 24 in. was required for a 300-mile trip at 350 mph. The concept appears to be feasible. Heat-transfer effects between the track and the ice were not included in this work.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054004
"PROJECT 21" RAPID TRANSIT SYSTEM. SYNTHESIS OF THE SYSTEM AND VALIDATION OF THE GUIDEWAY

Edwards, LK Donnell, LH

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

ASME #74-RT-6, Jan. 1974, 17 pp, 14 Fig, Apps

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the ASME-IEEE Joint Railroad Conference, Pittsburgh, Pa., April 3-4, 1974

Project 21 is a complete new railroad system, particularly adapted for elevated rapid transit in medium-density cities. It features (a) low cost and esthetic acceptability of guideway and stations; (b) prefabricated, reusable guideway and station elements to allow quick installation and flexibility of relocation; and (c) a practical switch for two-way traffic. Trains carry some 35 to 150 passengers and operate generally like streetcars. This paper covers synthesis of the Project 21 concept and structural/dynamic analyses to validate the guideway design.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054323
TRACKED AIR CUSHION RESEARCH VEHICLE–DYNAMICS SIMULATION PROGRAM USER'S MANUAL

Magnani, E Coppolino, R Lee, R

Grumman Aerospace Corporation, Bethpage, New York, 11746 PMT-B4-R72-07

Oct. 1972, 206 pp

A digital computer program was generated for use on the IBM 370/165 to evaluate the dynamic characteristics of the tracked air cushion research vehicle. The manual provides a summary review of the analytical basis, the construction of the computer program and the necessary instructions for the use of the program. The analytical model is formulated with the primary objective of obtaining vehicle ride qualities. The major vehicle components (body, chassis, guidance cushions and levitation cushions) supported by the vehicle suspension system are represented in a dynamic mathematical model with a maximum of twenty degrees of freedom. The non-linear response of this model to rigid and flexible guideway excitations, turn and superelevation excitations, and aerodynamic forces are obtained using numerical integration.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-219984/2

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054324
TOWING TANK TESTS ON A RAM WING IN A RECTANGULAR GUIDEWAY

Boccadoro, YA

Massachusetts Institute of Technology, Aerophysics Lab, Cambridge, Massachusetts, 02139 FRA-RT-73-34

DOT-TCS-FRA-73-9, Final Rpt, 7106-7210, July 1973, 113 pp

Contract DOT-TSC-239

The object of the study was to set the theoretical and experimental basis for a preliminary design of a ram wing vehicle. A simplified one-dimensional mathematical model is developed in an attempt to estimate the stability derivatives of this type of vehicle. Although very basic, the approach that was taken allows for any geometry of both the model and the guideway. A survey is made of various possible testing techniques. The experimental results obtained using the towing tank technique are reported and compared with the computed estimates.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-222476

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054327
PRELIMINARY STUDY OF A ROTOR DRIVEN BY LEADING-EDGE BLOWING

Reba, I

IIT Research Institute, 10 West 35th Street, Chicago, Illinois, 60616 IITR-J6128-FR

Final Rpt, Jan. 1969, 61 pp

Contract DOT-7-35512

The report summarizes a preliminary experimental study of a new propeller concept. The propeller blades were symmetrical 33-percent-thick air foil sections. Rotational speed was provided by a sheet of air ejected through a spanwise slit cut near the leading edge (Coanda effect). The study was performed at static conditions (zero advance velocity) and at a velocity of advance of 28 fps. At static conditions the 21-in.-diameter rotor produced lift augmentation up to 2.6 and up to 7.95 lb thrust per air horsepower. Lift coefficients of the blades as high as seven were measured. The actual test data yielded a figure of merit of 0.218 max. Upgrading based on limited experimental data indicate that M approx.=0.6 may be attained. At dynamic conditions, this rotor produces higher thrust coefficients and operates at higher advance ratios than a conventional propeller. Thus, a blown foil propeller is capable of generating higher disk loadings while operating at lower rotational speeds. The presently encountered propulsive efficiencies are low, but an extrapolation of data indicates that at least in the range of low advance velocities (at low efficiency regime) the propulsive efficiency of a blown foil propeller may be comparable to that of conventional propeller. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-185511

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PB-185511

054342
END-EFFECT OF HIGH-SPEED LINEAR INDUCTION MOTOR

Iwamoto, M

IEEE Transactions on Industry Applications (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 1A-9, No. 6, Nov. 1973, pp 632-639

This paper presents a new theory of the end-effect (the effect of shortness of stator length) of a high-speed linear induction motor, an experimental proof of the theory, and several countermeasures to eliminate the end-effect. The theory is developed on the basis of a 2-dimensional solution of electrodynamic equations and compared with the experimental results. The experiment has been made by use of a rotary-type test facility; the maximum test velocity is 450 km per hour. It is found that the theory agrees well with the experiment and that the end-effect exercises a very adverse influence on motor performance. A parallel-connected linear induction motor is proposed as a measure to compensate the end-effect, and its performance is studied.

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054353
ELECTROMAGNETIC FLIGHT

Kolm, HH Thoruton, RD

Scientific American (Scientific American Incorporated, 415 Madison Avenue, New York, New York, 10017)

Oct. 1973, 9 pp, 10 Fig

The article gives a simplified description of electromagnetic flight, reviewing the physical principles of magnetic levitation and the experimental projects in the German Federal Republic and Japan. It goes on to explain the Magneplane system studies at MIT. The vehicle is lightweight (50 to 100 seats in the preliminary project) and levitation is about a foot above the guideway by superconducting coils distributed over the semi-circular underside of the vehicle body. It is supported and guided by a C-shaped trough and propulsed by a linear synchronous motor. The authors explain how the principle of levitation and propulsion offers the possibility of very lightweight vehicles which can operate at short intervals (1 minute) and reach speeds of 300 miles an hour. The authors think that air transport has reached its limits in both speed and passenger capacity. They demonstrate Magneplane's superiority over air transport and its advantages in relation to conventional rail transport.

ACKNOWLEDGEMENT:
International Union of Railways, 1261

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054475
SUPERCONDUCTING LEVITATION OF HIGH SPEED VEHICLES

Arp, VD Clark, AF Flynn, TM

National Bureau of Standards, 14th Between E Street and Constitution Avenue, NW, Washington, D.C., 20231 NBS-2750101

Final Rpt, 1973, 13 pp

Published in Transportation Engineering Journal; Vol. 99, No. TE4; pp 873-885; Nov. 1973.

The current status (December 1972) of worldwide research on high speed ground transportation techniques is reviewed. Particular attention is given to studies of magnetic levitation using superconducting magnets, including comparison with alternative magnetic techniques and with air suspension systems. Superconducting levitation appears to be a strong contender in the U.S. Department of Transportation hopes to select in the late 1970's the best of the possible levitation techniques for subsequent advanced development. Cryogenic engineering research needed in support of major development of a superconducting levitated system is identified. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-60206/3

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054551
HSGT SYSTEMS ENGINEERING STUDY, TRACKED AIR CUSHION VEHICLES

TRW Systems Group, Washington Operations, McLean, Virginia

Final Rpt, 67-69, Dec. 1969, 606 pp

Contract DOT-C-353-66

The tracked air cushion vehicle is one of several advanced ground transportation systems being studied as a possible means of providing safe, high-speed, high-capacity transportation along densely populated areas such as the Northeast Corridor. Based on requirements and constraints chosen for an operational system, subsystem alternatives are evaluated and the selected subsystems are synthesized into a TACV system. Cost and performance are estimated over a range of parameters, such as design cruise speed (150 to 350mph) and vehicle capacity (50 to 150 passengers per vehicle). The configuration defined consist of trainable, electrically powered TACV's which collect power from trackside power rails mounted on the side of a channel guideway. Propulsion is by linear induction motors with variable frequency speed control. Control of the vehicles, singly or in trains, is automated and centralized. The vehicles are supported on and guided by peripheral jet air cushions with high pressure air provided by electrically driven axial flow compressors. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-190939

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PB-190939

054552
AUTOMATED HIGHWAY SYSTEMS

TRW Systems Group, One Space Park, Redondo Beach, California, 90278

06818-W006-RO00, Final Rpt, Dec. 1969, 572 pp.

Contract DOT-C-353-66

Report on High-Speed Ground Transportation Systems Engineering Study. Sponsored in part by Office of High Speed Ground Transportation, Washington, D.C.

The report provides an examination of the status of automated highway systems evolution and the applicability of this class of transportation to high-speed, intercity service. The report deals with the problem in two principal ways. The first is from an evolutionary point of view; what has been done to date, where can we go in the future, and how do we get there. The second effort involves the hypothecation of a system which would be representative of an AHS if it were actually developed for service. The purpose of this effort was to determine the technological feasibility of a total AHS. Although a few areas of critical research have been identified, AHS is a technically feasible transportation alternative to existing systems. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-191696

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054557
DESIGN OF A GENERIC CONTROL SYSTEM FOR DETERMINISTICALLY CONTROLLED GROUND TRANSPORTATION SYSTEMS. VOLUME II. SUPPORTING ENGINEERING

TRW Systems Group, Washington Operations, McLean, Virginia

06818-W043-RO-00, Final Rpt, 7009-7202, Feb. 1972, 282 pp

Contract DOT-C-353-66

See also Volume 1, PB-210 868.

A preliminary design of a controls system applicable to a wide range of automated ground transportation systems is specified and discussed. The design covers the functions of safety assurance, navigation, space allocation and communications. A four-level hierarchy control system is described which includes hardware and software for the network control center, local controllers, a distributed control and communications line for guideway installation, and vehicle control equipment. The three volume report discusses in detail the rationales involved in the major tradeoff decisions. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-210869

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PB-210869

054558
DESIGN OF A GENERIC CONTROL SYSTEM FOR DETERMINISTICALLY CONTROLLED GROUND TRANSPORTATION SYSTEMS. VOLUME I. SUMMARY AND SPECIFICATIONS

TRW Systems Group, Washington Operations, McLean, Virginia

06818-W043-RO-00, Final Rpt, 7009-7202, Feb. 1972, 256 pp

Contract DOT-C-353-66

See also Volume 2, PB-210 869.

A preliminary design of a controls system applicable to a wide range of automated ground transportation systems is specified and discussed. The design covers the functions of safety assurance, navigation, space allocation and communications. A four-level hierarchy control system is described which includes hardware and software for the network control center, local controllers, a distributed control and communications line for guideway installation, and vehicle control equipment. The three volume report discusses in detail the rationales involved in the major tradeoff decisions. Application notes are furnished. Discussions of reliability, maintainability and availability appear as well as those relating to the relative safety and capacity of a deterministically controlled system. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-210868

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PB-210868

054594
AERODYNAMIC ANALYSIS OF TUBE VEHICLE SYSTEMS

Hammitt, AG, TRW Systems

AIAA Journal (American Institute of Aeronautics and Astronautics, 1290 Avenue of the Americas, New York, New York, 10019)

Vol. 10, No. 3, Mar. 1972, 9 pp

A general description of the aerodynamics of tube vehicles is presented. The advantages of dividing the flowfield into a far flowfield away from the vehicle and a near flowfield close to the vehicle are discussed. Solutions for the near flowfields and asymptotic short— and long-time solutions for the far flow are presented. Combined flowfield solutions are then presented along with predictions of thrust and power requirements. The effects of the vehicle propulsion system and of flow velocities reaching $M = 1$ about the vehicle are shown to be of fundamental importance.

ACKNOWLEDGEMENT:
American Institute of Aeronautics and Astronautics

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054648
GUIDED TRANSPORT IN THE NORTH AMERICAN CORRIDORS

Parkinson, TE

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 128, No. 5, May 1972, 4 pp

Current U.S. research programmes—and the investment decisions which will follow—are bound to have repercussions on high speed guided transport in other parts of the world. Certainly there are major problems to be overcome in pushing guided ground transport over the 200 mile/h mark, and the author concludes that rail will continue to play an important role in inter-city travel at more modest speeds.

ACKNOWLEDGEMENT:
British Railways

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054653
THE AERODYNAMICS OF VEHICLES PASSING THROUGH TUNNELS

Hammitt, AG

BHRA Fluid Engineering, Cranfield, Bedford, England

No. C3, Paper, 1973, pp 45-68, 20 Fig, 5 Ref

Presented at the International Symposium on the Aerodynamics and Ventilation of Vehicle Tunnels, sponsored and organized by BHRA Fluid Engineering. Held at University of Kent, Canterbury, England, April 10-12, 1973.

The problem of a vehicle entering and passing through a tunnel is considered. It is shown that the incompressible approximation provides the basic solution and the modifications from this basic solution caused by the compressible wave effects. The effect on the aerodynamics of different propulsion systems is described. The effects of vehicle length, tunnel entrance configurations, and air shafts on vehicle drag and tunnel flow field are considered. The conditions under which the waves generated by the vehicle might escape from the tunnel exit to cause an "exit boom" are determined.

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BHRA Fluid Engineering, Cranfield, Bedford, England, Repr PC: Req Price

054954
HIGH SPEED SURFACE TRANSPORT. THE WORK OF TRACKED HOVERCRAFT LTD

Fellows, TG

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 3, No. 2, Feb. 1974, 10 pp, 15 Fig, 5 Ref, 1 App

This paper reviews the origins of Tracked Hovercraft Ltd and its achievements over the period 1967-1972. The principal topics to be discussed are: the role of new technology in inter-city and urban transport, the inter-action of system components and the relative importance of track cost on the economics of operation, the development of the single-sided linear induction motor and the unsolved question of the choice of primary suspension. The paper concludes with a look at future trends, those areas where there is now some convergence of view internationally and those still requiring further study.

ACKNOWLEDGEMENT:
Railway Engineering Journal

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056756
MODERN TRANSPORTATION SYSTEMS

Hearn, DL, Rohr Industries, Incorporated
Van Dorn, NH

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

Preprint, Feb. 1974

Rohr Industries is committed to developing multiple ground technologies to satisfy transportation's varied needs. This paper discusses the company's diversification from aerospace into ground transportation, starting with rapid transit systems and leading to advanced transportation systems. The two most promising advanced transportation developments include an aerotrain, a tracked air cushion vehicle, and the Romag, a magnetically levitated and propelled vehicle. This paper reviews these events and describes in detail the two new developments.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504621

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056773
ARAMIS PRT SYSTEM

Maury, JP, MATRA, Transportation Division

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

N740143, Preprint, Feb. 1974

The ARAMIS system is an intermediate capacity transportation system. It provides, at the same time, a high traffic capacity (up to 15,000 passengers/hour/day) and a direct service capability. It is now developed jointly between MATRA and the Paris Metro Authority and the first commercial line will be in operation in late 1977 in the Paris suburbs. Its investment cost is moderate, due to the limited civil engineering required and the operating costs are in the range of the conventional subway.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504578

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056774
ACT FORD'S AUTOMATICALLY CONTROLLED TRANSPORTATION SYSTEM

Logan, JS, Ford Motor Company

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

N7403226, Preprint, Feb. 1974

This paper contains a technical description of the Ford Motor Co.'s ACT system which has been designed to meet transportation needs in a wide variety of urban applications. The discussion covers the systems design features and operation of the driverless rubber-tired vehicles, the guideway, and the system's ability to meet expanding needs by a modular approach to the command and control design. Descriptions of Ford's new Cherry Hill Test Track and the first installations at the Fairlane Town Center in Dearborn, Mich., and the Bradley International Airport, Hartford, Conn., are also given.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504622

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056775
AUTOMATIC URBAN TRANSPORTATION IN BRITAIN

Baker, RC, Hawker Siddeley Dyn, Ltd
Groves, HW

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

Preprint, Feb. 1974

For several years the British Government's Transport and Road Research Laboratory has been working on advanced, automatic, urban transportation systems. Further to this in July 1973, the British Government placed its first contracts with industry for studies leading to the development of these new forms of PRT-like systems. This paper describes the work of one main contract, intended to lead to a public demonstration system in Sheffield. A description is given of the scenario to which this Minitram system must relate, and the organization and institutional situation in Britain is outlined. A brief history of affairs leading to the placing of the contracts, including the Transport and Road Research Laboratory and Hawker Siddeley participation in the Autotaxi and Cabtrack PRT projects, is given.

ACKNOWLEDGEMENT:
Engineering Index, EIX740502006

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056777
HOUSTON AIRPORT'S LOW COST PEOPLE-MOVER

Puckett, HK, Lockwood, Andrews and Newman, Incorporated
Williamson, JC

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE1, Paper, Feb. 1974

A description is given of the new automatic, electric powered transportation system linking the two airport terminals and hotel. It replaces a first generation, battery powered system. Six trains, 36 passengers each, operate continuously on a 6,000-ft loop, providing service at each of eight stations every 3 min. Overall airport traffic circulation, including the role of the train system, is considered.

ACKNOWLEDGEMENT:
Engineering Index, EIX740500646

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056778
PERSONAL RAPID TRANSIT SYSTEM IN MORGANTOWN, WEST VIRGINIA

Crowley, RT, Boeing Aerospace Company

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

N740229, Preprint, Feb. 1974

A unique personal rapid transit system is currently being installed at Morgantown, West Virginia. The system consists of small, automatically controlled vehicles operating on a dedicated guideway either on a scheduled basis or on a passenger-demand basis. The rubber-tired, electric-powered vehicles will carry up to 21 people. The transportation system will connect the business district of Morgantown and the widely separated areas of the West Virginia University campus. The overall project is being built in phases, with the first phase being the construction of approximately 2. 1 miles of guideway, five vehicles, three stations, and a maintenance facility. Final installation will be approximately 4.0 miles of guideway, 70-100 vehicles, six stations, and an expanded maintenance facility.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504624

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056779
RUBBER TIRE VS. STEEL WHEEL TRADEOFFS

Harrison, MC, Tudor Engineering Company

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

N740228, Preprint, Feb. 1974

The choice of rubber tired or steel wheeled vehicles for a mass rapid transit (MRT) system or for a personal rapid transit (PRT) system involves a number of considerations. For the PRT system, the rubber tired vehicle possesses advantages in its ability to utilize steeper grades and shorter radius curves. The rubber tired vehicle can, if required, operate without a fixed guideway. It is more economical than the steel wheeled vehicle for PRT application. The steel on steel system seems to have little application to PRT as PRT is defined in this paper. For MRT systems, the advantages of the steel on steel system seem quite evident. Capacity, operating speed, and passenger comfort are increased with the steel on steel system. Energy requirements and the need for environmental control are decreased with the steel wheeled system. Capital costs for the infrastructure and the systemwide elements of the system decrease with the use of a steel wheeled MRT system, as do maintenance and operations costs.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504623

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056785
DYNAMIC WHIP OF ELASTICALLY RESTRAINED PLATE STRIPS TO RAPID TRANSIT LOADS

Wilson, JF, Duke University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/Aut-4, Paper, Nov. 1973, 7 Ref

A plate strip of infinite length and constant width is cantilevered on a uniform elastic support along one edge and free along its opposite edge. A normal line load of constant intensity applied across its width travels along the strip at a constant speed. Using plate theory, steady state solutions for the flexural waves are derived in terms of the generalized Fourier integral. Superposition is used to simulate responses to distributed transit loads. Results are applicable to the design of cantilevered guidance panels for air cushion vehicles and also in the design of the metal plates for the linear induction motors sometimes used to power these vehicles.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304675

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056788
ELECTROMAGNETIC LIFT AND DRAG FORCES ON A SUPERCONDUCTING MAGNET PROPELLED ALONG A GUIDEWAY COMPOSED OF METALLIC LOOPS

Hoppie, LO Chilton, F Coffey, HT Singleton, RC

Applied Superconductivity Conference, Int (5th)

Proceeding, 5 Ref

An exact solution to the problem of a single constant current magnet (or group of magnets) moving uniformly along a guideway of metallic loops has been obtained and programmed for computerized results: single layer, double layer, or ladder tracks can be analyzed. The actual current in the loops as well as the actual lift and drag forces are obtained.

ACKNOWLEDGEMENT:
Engineering Index, EIX740202966

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056796
MAGNETIC LEVITATION OF HIGH SPEED GROUND VEHICLES

Coffey, HT Chilton, F Hoppie, LO

Applied Superconductivity Conference, Int (5th)

Proceeding, 30 Ref

Two nonsuperconducting and four superconducting magnetic levitation systems are studied to determine the technical feasibility of levitating a 100,000-lb vehicle. Each of these systems is found to be technically feasible but each has widely varying characteristics that makes a definitive choice between them impossible without additional information. The system using superconducting magnets on the vehicle and a conducting sheet guideway appears to be the best choice based on the information available, and the characteristics of this system are studied in detail. The cryogenic requirements and the design of a completely stabilized superconducting magnet are emphasized and are found to be technically feasible and quite reasonable.

ACKNOWLEDGEMENT:
Engineering Index, EIX740202959

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056799
INTEGRATED SYSTEMS FOR MAGNETIC SUSPENSION AND PROPULSION OF VEHICLES

Danby, G Powell, J

Applied Superconductivity Conference, Int (5th)

Proceeding, 11 Ref

Integrated magnetic suspension and propulsion system characteristics are discussed. It is concluded that repulsive suspension with linear synchronous motor drive are the most promising. In addition, preliminary results are given for a novel suspension concept which appears to provide strong lifting and restoring forces, large clearance and low drag.

ACKNOWLEDGEMENT:
Engineering Index, EIX740202967

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056802
NEW DATA ON THE OPERATION OF A MAGNETIC SUSPENSION RAILROAD

NEUE ERKENNTNISSE FUER DEN BETRIEB DER MAGNETISCHEN SCHWEBEBAHN
Hochhaeusler, P

Elektrotechnische Zeitschrift, Ausgabe B (VDE Verlag GmbH, Bismarckstrasse 33, Berlin Charlottenbur, g, West Germany)

Vol. 25, No. 3, 2 Ref

Mode of operation of a railway which requires neither magnetic support, nor guide rails, nor contact rails for power supply is detailed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740301831

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056804
MAGNETIC PROPULSION FOR MAGNETICALLY LEVITATED TRAINS

Melville, PH, Goettingen University

Cryogenics (IPC Science and Technology Press Limited, IPC House, 32 High Street, Guildford, Surrey, England)

Vol. 13, No. 12, Dec. 1973, pp 716-717, 9 Ref

Repulsion from superconducting magnets can be utilized to levitate and propel trains. Contacts are to aluminum track, which conduct the current, and to the wheels which contact the ground only when the train is stationary.

ACKNOWLEDGEMENT:
Engineering Index, EIX740300209

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056805
PROPOSED PROPULSION SYSTEM FOR MAGNETICALLY LEVITATED GUIDED GROUND TRANSPORTATION

Atherton, DL

Applied Superconductivity Conference, Int (5th)

Proceeding, 11 Ref

A propulsion system, using a controlled variable-speed linear synchronous motor, is proposed for magnetically levitated guided ground transportation systems. The motor may be integrated with the magnetic levitation system which will use superconducting magnets for high speed systems. The motor concepts are described together with its local, remote or preset control features and inputs.

ACKNOWLEDGEMENT:
Engineering Index, EIX740202965

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056806
PERFORMANCE CHARACTERISTICS OF A TRANSLATORY, MAGNETIC SUSPENSION SYSTEM

Forgacs, RL, Ford Motor Company

Review of Scientific Instruments (American Institute of Physics, 335 East 45th Street, New York, New York, 10017)

Vol. 44, No. 10, Oct. 1973, pp 1485-89, 11 Ref

An experimental study is undertaken to investigate the performance characteristics of a translatory magnetic suspension utilizing low-loss permanent magnets for vertical support and servo-controlled electromagnets for lateral stability. The information obtained, such as the importance of individual drag contributors, control power requirements and stability factors have potential interest in fields ranging from instrument design to high speed transportation.

ACKNOWLEDGEMENT:
Engineering Index, EIX740302301

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056808
OPTIMIZATION OF AN EQUIPOLAR MAGNET ARRANGEMENT FOR A MAGNETICALLY SUSPENDED TRANSIT SYSTEM

OPTIMIERUNG EINER GLEICHGEPOLTEN MAGNETANORDUNG ALS ABSTUETZUNGS-SYSTEM FUER EINE MAGNETISCHWEBEBAHN

Henning, G

Krupp Techn Mitteilungen, Forschgs ber u Werksber (Krupp (Friedrich) GmbH, Postfach 10, 43 Essen, West Germany)
Vol. 31, No. 1, June 1973

For a magnet arrangement consisting of one row each of equipolar vehicle and rail magnets, equations are given for calculating magnetic forces, taking into consideration all interactions between the magnets which exceed a predetermined lower limit. Conditions are determined under which the lowest rail costs are obtained. The results of this optimization are presented graphically.

ACKNOWLEDGEMENT:
Engineering Index, EIX740101430

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056816
ROLE OF SUPERCONDUCTING MAGNETS IN TRACKED MAGNETIC CUSHION VEHICLES FOR HIGH SPEED TRANSPORTATION

Reitz, JR

Applied Superconductivity Conference, Int (5th)
Proceeding, pp 317-323, 16 Ref
Proceedings of the 5th International Conference.

Magnetic levitation as a suspension mechanism for high speed vehicles is reviewed. Important parameters are magnetic lift per unit magnet weight, lift-to-drag ratio, and suspension height. The effect of vehicle-track clearance on ride quality is discussed, and the advantages of a large clearance are demonstrated. Superconducting magnets, because of their high-field-strength per unit weight, are particularly suited to this application. Specific problems resulting from the use of superconducting magnets are discussed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740202958

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056841
OPTIMIZATION OF LINEAR VEHICLE SUSPENSIONS SUBJECTED TO SIMULTANEOUS GUIDEWAY AND EXTERNAL FORCE DISTURBANCES

Young, JW, California University, Davis
Wormley, DN

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017
N73-Aut-0, Paper, 1973, 1 Ref

The optimum linear suspension for a vehicle traveling over a guideway with random irregularities and subjected to random external force disturbances is derived. The optimization is based upon a performance index which weighs mean square vehicle acceleration (a measure of passenger comfort) and mean square relative displacement between the vehicle and guideway (a measure of required suspension dynamic excursion). The form of the optimum suspension is not restricted to a specific mechanical, magnetic or fluid suspension configuration. Performance curves and numerical design examples are presented to illustrate the influence of both guideway and external force disturbances upon optimum suspension performance capability.

ACKNOWLEDGEMENT:
Engineering Index, EIX740304686

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056904
THE TRACKED RAM AIR CUSHION VEHICLE (TRACV). A SYSTEM DEFINITION STUDY

Fraize, WE Barrows, TM

Mitre Corporation, Westgate Research Park, McLean, Virginia, 22101

MTR-6554-Rev-1, Tech Rpt, 7211-7311, Nov. 1973, 224p
Contract DOT-FR-30015

Recent progress in the study of aerodynamic levitation for high speed ground transportation vehicles (the so-called 'ram wing') has led to the concept of a Tracked Ram Air Cushion Vehicle (TRACV). In this study, the TRACV concept is viewed as an air-supported alternative to the tracked air cushion vehicle, and is seen to be a viable tracked levitated vehicle (TLV) system candidate that offers potential advantages of technical simplicity. The basic principles of dynamic air cushion levitation and guidance and the features of system components are described. Fluid and electromagnetically propelled vehicles are evaluated in terms of a system with 100 passenger vehicles with a 300 mph cruise capability, with emphasis given to the technically more attractive fluid propulsion system. Areas requiring further analysis and development are discussed.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230485/5

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PB-230485/5

056942
THE ASSESSMENT OF AN AIR-SUPPORTED AND PROPELLED URBAN TRANSPORT SYSTEM

Slevin, R

Cranfield Institute of Technology, Cranfield, England

Cranfield-CTS-1, Final Rpt, Dec. 1972, 115p

The results are reported of a one-year study intended to assess the usefulness of a new transport technology; that of an urban air-supported and propelled system. The technology is described and its qualitative and quantitative assessment is reported in both absolute and comparative terms. It is concluded that the proposed system has several features which make its application unlikely; in particular there are safety problems, and there is no positive evidence that overall costs would be lower than existing competing modes in conventional circumstances. As a result it is not recommended that any further development of the technology should take place. The report is written as an account of the work undertaken. In this way it provides a guide to the process for future studies of this type. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, N74-18610/7

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N74-18610/7

056943
CORRELATION OF SIDE-FORCE AND YAWING-MOMENT DATA FOR TACV CONFIGURATIONS AT LARGE ANGLES OF SIDESLIP

Ruetenik, JR

Kaman AviDyne, Burlington, Massachusetts

Final Rpt, 7109-7206, Jan. 1974, 70p

Contract DOT-TSC-171

Methods developed by Woolard and Ruetenik and Zartarian for predicting the side force and yawing moment on TACV configurations due to side winds are compared against available data from wind-tunnel tests. The predicted side force based on slender-body theory is found in good agreement with the data from moving-ground plane tests for sideslip angles less than 5 degrees. Above 5 degrees, fair agreement is found by incorporating viscous-cross flow effects in the theory, although characteristic differences are observed from previous correlations for missile-type bodies. The measured yawing moment is 15 to 35% less than the slender-body prediction, and it differs markedly from viscous-flow predictions. (Modified author abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230000/2

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PB-230000/2

056944
STUDY OF REACTION FORCES IN A SINGLE SIDED LINEAR INDUCTION MOTOR (SLIM)

Stickler, JJ

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-FRA-73-10, Final Rpt, 7207-7306, June 1974, 82p

SLIM reaction forces were measured on a laboratory model having aluminum and aluminum-iron secondaries and the results were correlated with the theoretical forces derived for different idealized SLIM models. The first part of the report discusses wave solutions for single—and multi-region secondaries utilizing the Maxwell Stress Tensor to evaluate the thrust and normal forces. The second part of the report presents data of thrust and normal forces as a function of the stator excitation frequency for different SLIM configurations. The results are helpful both in providing an insight into improved SLIM design and in defining those applications in which the SLIM possesses certain advantages over its double-sided counterpart, as for example, in the application of the LIM to levitated high-speed vehicles. (Modified author abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230268/5

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PB-230268/5

056948
TRACKED AIR CUSHION RESEARCH VEHICLE (TACRV). AIR CUSHION EXPERIMENTAL/THEORETICAL CORRELATION

Freelin, JR

Mitre Corporation, Westgate Research Park, McLean, Virginia, 22101

MTR-6535, Final Rpt, Oct. 1973, 48p

Contract DOT-FR-30015

A modified version of the exponential theory of peripheral jet operation was selected by the manufacturer of TACRV for the prediction of the steady state performance of the TACRV air cushions. Air cushion performance observed during subsystem development tests indicate further modification is required to match the theory to test results. Subsequently, a slightly more concordant set of equations according to Burgess-Barratt were modified to account for the geometric effects of the TACRV nozzle. The resulting theory and test data appear to be in good agreement. The revised predictions of the pressure/flow/height performance of the TACRV levitation and guidance cushions present a more accurate estimation of their behavior. Further verification of the revised theory, based on data from the TACRV test program, will provide information for improved design of future TACVs. It should be noted that since the publishing of this report, the Tracked Air Cushion Research Vehicle (TACRV) has been renamed the Tracked Levitated Research Vehicle (TLRV).

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231076/1

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PB-231076/1

056958
DEVELOPMENT OF METHODS FOR PREDICTING AIRLOADS ON TACV CONFIGURATIONS DUE TO STRONG CROSSWIND GUSTS

Ruetenik, JR Zartarian, G

Kaman AviDyne, Burlington, Massachusetts

KA-TR-76, Mar. 1972, 106p

Contract DOT-TSC-171

Equations for predicting the transient side force and yawing moment on TACV cars due to a strong side gust are developed. The protection afforded by side rails is estimated. The equations account for transient slender-body effects and growth of vortices on the lee side. For a vehicle speed of 150 mph, the analysis indicates a side gust of 60 mph would produce a transient peak in side force of 1x the steady-state value for the first car to 4.3x for the third car. An unresolved uncertainty of a factor of two in predicting the steady-state side force on TACV models in wind-tunnel tests with a moving ground plane is attributed to flow effects between the vehicle bottom and the ground plane. Because of questions regarding ground-plane simulation in wind-tunnel tests, effect of side rails on gust airloads, and the airloads due to passing trains, the feasibility of developing a facility for measuring forces and moments on moving models is explored. (Modified author abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229995/6

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056959
TRANSIT EXPRESSWAY REPORT: PHASE II

MPC Corporation, Pittsburgh, Pennsylvania UMTA-PA-06-0009

June 1973, 284p

See also report on Phase 1, PB-174 757 and shorter version dated 20 Feb 67, PB-231 021.

Transit Expressway envisions a system operating on fixed guideways with continuous headways as close as 90 seconds. The system is based on operating compact, minimum weight vehicles to provide economy of operations in off-peak hours and still maintain high frequency service. The all electric fully automated vehicles resemble buses and run on 4 pairs of driven pneumatic tires. The project is comprised of 9,360 foot long main guideway, principally on an aerial structure with a short section of at-grade guideway. Forms complete loop with stations at north and south ends. Rolling stock is 3 vehicles operated simultaneously or singularly. Specific discussion of test includes spur roadway with 10% grade, emergency walkway, grounding. Conclusions and recommendations are delineated. Appendices contain a glossary and summary of Phase I report.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231022/5

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PB-231022/5

056996
COMMAND AND CONTROL STUDIES FOR PERSONAL RAPID TRANSIT, PROGRAM STATUS, 1973

Hinman, EJ

Applied Physics Laboratory, 8621 Georgia Avenue, Silver Spring, Maryland, 20910 UMTA-MD-06-0018

APL/JHU-CP031/TPR027, Tech Rpt, Dec. 1973, 133 pp

Contract DOT-UT-30010

The report reviews the APL effort on command and control systems for circulation and distribution applications. A brief history of the program is given, together with the results of the work and its effects on system performance. The discussion is divided into an investigation of vehicle management (the controlling of a fleet of vehicles in terms of scheduling, dispatching, empty vehicle allocation, and station operation) and an investigation of vehicle regulation (the controlling of an individual vehicle either alone or within a string of vehicles). A bibliography of the reports, papers, and significant memoranda relating to this work is included, as well as summary descriptions of the major digital computer simulations that have been developed in support of these investigations. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231681/8

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PB-231681/8

057158
THE COUPLED DYNAMICS OF TRANSPORTATION VEHICLES AND BEAM-TYPE ELEVATED GUIDEWAYS

Richardson, HH, Massachusetts Institute of Technology
Wormley, DN, Massachusetts Institute of Technology

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 1-30, 11 Fig, 64 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

The importance of elevated guideway/vehicle dynamics to the design of advanced high-performance ground transportation systems is discussed and the general coupled vehicle-suspension guideway interaction problem is described. Simplifying assumptions valid for many practical dynamic analyses are described including the Bernoulli-Euler beam assumptions, support conditions and simplified vehicle models. It is shown for high-performance systems where passenger compartment accelerations are less than about 0.05 g and vehicle unsprung to sprung mass ratios are small that guideway deflections can be accurately computed assuming the vehicle exerts on the guideway constant suspension forces which traverse the guideway at the vehicle forward velocity. Dynamic motions of the vehicle can then be computed by standard transfer function methods using the guideway deflection as a known input to the vehicle suspensions.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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057159
DYNAMIC CONSIDERATIONS IN THE DESIGN OF A CABLE-STAYED GUIDEWAY

Weidlinger, P, Weidlinger Associates
Meisenholder, SG, TRW Systems

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 31-48, 16 Fig, 29 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

This paper describes the dynamic considerations in the design of long span (200 to 600 feet) cable-stayed guideways for tracked air cushion vehicles (TACV's). A design approach is described in which a cable-stayed guideway structure can be synthesized to simulate the behavior of a beam on elastic foundation. This result is achieved by the "cable' tuning" approach, in which the cable stays are selected to achieve an equivalent uniform elastic foundation. A tower configuration is then selected to minimize the effect of tower structural compliance, relative to the vertical deviation of the vehicle as it traverses the span. Therefore, the live load deflection of the trackway structure is manifested as a traveling wave which moves horizontally at the same speed as the vehicle. This approach satisfies the dynamic requirements for acceptable passenger ride comfort and minimal vehicle/guideway dynamic interaction.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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057161
DYNAMICS OF MAGNETIC LEVITATION SUSPENSION SYSTEMS FOR HIGH SPEED GROUND VEHICLES

Milner, JL, Mitre Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 79-86, 2 Tab, 25 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

During the past decade there has been a marked increase in the attention devoted to achieving noiseless, smooth and efficient suspension systems for use on high speed ground vehicles. The technology of magnetic levitation offers great promise for use in such suspensions; as a result two distinct types of non-contracting magnet systems have been proposed: 1. An attraction system, which suspends a vehicle by means of the attractive force generated between a controlled electromagnet and a ferromagnetic rail. 2. A repulsion system, which utilizes the repulsive levitation force generated by the current induced in a normal conducting guideway as a result of the motion of a superconducting coil carried onboard the vehicle. Each of these techniques has several forms and adaptations which are discussed, the advantages and disadvantages of the various systems are described as appropriate and the present state of various experimental vehicles and test programs is reported. A bibliography is included to help the interested reader obtain information about specific research programs and technical problems.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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046133
WHAT HAPPENS WHEN LNG SPILLS?

Crouch, WW, Phillips Petroleum
Hillyer, JC, Phillips Petroleum

Chemical Technology (American Chemical Society, 1155 16th Street, NW, Washington, D.C., 20036)

Apr. 1972, pp 210-215, 15 Ref

The worldwide shortage of natural gas, largely methane, has led to widespread activity in setting up projects to transport liquefied natural gas (LNG) from producing countries to gas-hungry population centers. There is some concern that transportation of LNG may lead to accidents that will release the liquefied product and endanger lives and property. This paper reviews the development of LNG technology, cites a number of misconceptions regarding LNG, and reviews information on the behavior of LNG during and after spills.

ACKNOWLEDGEMENT:
American Chemical Society

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046566
EVALUATION OF THE HAZARD OF BULK WATER TRANSPORTATION OF INDUSTRIAL CHEMICALS. A TENTATIVE GUIDE

National Academy of Sciences, Committee on Hazardous Materials, Washington, D.C., 20418

Sept. 1972, 55 pp

Contract DOT-OS-00035

A report prepared by the Evaluation Panel of the Committee on Hazardous Materials, Division of Chemistry and Chemical Technology, NRC, for the Coast Guard under Task Order 13.

This study rates 337 industrial chemicals that are bulk shipped by water transportation. The rating system used to determine their hazardousness is in keeping with their objective to provide the Coast Guard with technical information that can be used as a guide for establishing safety regulations. The ratings are designed only toward water transportation of these chemicals and are not valid when used in any other manner. The rating system is designed for reclassification when new information becomes available. Thus the report originally printed in 1966 was updated in 1969, 1970 and this 1972 edition.

ACKNOWLEDGEMENT:
National Research Council

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051339
TOKYO UNDERGROUND STATION AND ITS DISASTER PREVENTION SYSTEM

Ejima, A, Japanese National Railways

Japanese Railway Engineering (Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan)

Vol. 14, No. 2, 1973, pp 9-14, 8 Fig, 2 Phot

Here is outlined the newly constructed Tokyo Underground Station and its disaster prevention system, which is to play an important role in the underground railway.

ACKNOWLEDGEMENT:
Japanese Railway Engineering

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051359
OSHA FACTORS

Carliss, OS, Eaton Corporation
Olsen, WW, Eaton Corporation

ASME Journal of Mechanical Engineering (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

Dec. 1973, 18 pp

The Occupational Safety and Health Act has provided the engineer with a serious and important challenge—designing safety into the product and seeing that it is used and maintained properly. Although it appears that the Act is directed toward the user of the equipment, the designer must not be lulled into a sense of false security in assuming that this relieves him of responsibilities, when in fact, the opposite is true. This article outlines the major areas of concern and challenge for the designer of materials handling equipment.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051401
SYSTEM SAFETY AND RAPID TRANSIT PROJECTS

Hackley, PF, Kaiser Engineers of Pennsylvania, Incorporated

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-56, Paper, Sept. 1973, 8 pp, 8 Fig, 7 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper is a brief review of Systems Safety and its relationships to transit projects. Hopefully, it will lead to a better understanding of the unique problems presented by the transit industry. System Safety is now and will continue to play a significant role in the transit industry. Its value, in proper perspective, is obvious. However, its success in the future will depend on how well we keep in mind the relative importance to society of pursuing the elusive goal of a perfect safety record versus accomplishing the mission at hand, which is to review the vehicular congestion of our urban areas.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051404
BART SCALE MODEL SAND BUMPER ARRESTOR TESTS

Krachman, HE, Developmental Sciences, Incorporated
McCutchen, WR, Bay Area Rapid Transit District

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-75, Paper, Sept. 1973, 8 pp, 6 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Scale model tests were performed to evaluate the effectiveness of an end-of-track sand bumper arrestor. The tests were conducted using a 1/15 replica of the BART A car at scale speeds to 80 mph. A second dummy car was used to model a two-car train and scale speeds to 60 mph were tested. The results indicate that a 24-ft sand bumper would be effective to approximately 20 mph with a two-car train and speeds below that with longer trains. Increasing the bumper length will improve the stopping power, but beyond 50 ft the first car has risen above the 3-1/2 ft high sand bumper and is unstable. A scale model sled-sand braking system was tested with a single BART car and was found to be effective up to 80 mph.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051413
EQUIVALENT SAFETY AND HAZARDOUS MATERIALS TRANSPORTATION

Danahy, PJ, United States Coast Guard
Gathy, BS, United States Coast Guard Academy

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-86, Paper, Sept. 1973, 11 pp, 7 Tab, 4 App

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper proposes a methodology to assess hazards, safety, and safety requirements in the marine transportation of hazardous materials. The basic approach is to quantify on a relative basis rather than on some absolute scale. The authors suggest that each hazardous commodity can be graded on a numerical scale indicating the relative hazard while the vessels can be graded on a numerical scale for relative safety provided by the design, operation, etc. By combining the commodity relative hazard rating with the vessel relative safety rating an overall transportation safety rating may be obtained. Different commodities carried in vessels of differing designs could have the same transportation safety rating if equivalent safety had been obtained. The paper also suggests a method to quantify, on a relative basis, the safety requirements for waterways (including ports and terminals). By relating the transportation safety rating to the port safety requirement, one can determine what vessel design features are required to transport a specific hazardous commodity to a specific terminal over a specific water route.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051465
EVACUATION AREAS FOR TRANSPORTATION ACCIDENTS INVOLVING PROPELLANT TANK PRESSURE BURSTS

Siewert, RD

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio, 44135 E-7597

NASA-TM-X-68277, 1972, 19p

Conf-Presented at the 1972 Jannaf Propulsion Meeting, New Orleans, 27-29 Nov. 1972.

Evacuation areas are defined for those transportation accidents where volatile chemical propellant tanks are exposed to fire in the wreckage and eventually explode with consequent risks from fragments in surrounding populated areas. An evacuation area with a minimum radius of 600 m (2000 ft) is recommended to limit the statistical probability of fatality to one in 100 such accidents. The result was made possible by the derivation of a distribution function of distances reached by fragments from bursting chemical car tanks. Data concerning fragments was obtained from reports or tank car pressure bursts between 1958 and 1971. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, N73-29987/7

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N72-29987/7

051469
ENHANCEMENT OF TRAIN VISIBILITY

Hopkins, JB

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-FRA-73-1, Final Rpt, 7211-7212, Sept. 1973, 84p

The report describes a study of the most effective and practical means of enhancing the conspicuity of the trailing end of trains, in order to reduce the possibility of train–train collisions. There are five elements: (a) Definition of a usable number of categories of target, background, and ambient conditions which include the great majority of situations actually encountered; (b) estimation of the stimuli required for each category to increase significantly the detection probability for typical observers; (c) examination of all potentially feasible visibility aids in terms of these criteria; (d) determination of estimated costs, lifetime, and power consumption of techniques which appear promising in terms of effectiveness, and (e) delineation of alternative systems, consistent with one another, comprising a hierarchy of effectiveness and cost. Special deficiencies, advantages, and implications for policy which may be associated with particular realizations are indicated. The devices suggested as optimal include large areas of fluorescent material arranged in a distinctive pattern, retroreflectors at each corner, and flash lamps of moderate intensity. Detailed specifications are given for such aids.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-223899/6

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PB-223899/6

051574
THE TRANSPORTATION OF HAZARDOUS MATERIALS: TRANSPORT OF BENZENE BY TANK CAR

Lippian, JM

Army Materiel Command, Intern Training Center, Texarkana, Texas

USAMC-ITC-3-73-8, MS Thesis, May 1973, 94 pp

The research is an investigation of the problems involved in the transportation of hazardous materials with emphasis placed on the transport of benzene by railroad. Specific recommendations on the identification and labeling of the hazards associated with benzene are discussed and a risk rating model is suggested for general use in the transportation of hazardous materials. Through use of a gross hazard analysis and a fault free analysis, the basic parameters involved in the transport of benzene are determined. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-771105/4

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AD-771105/4

051576
RAILROAD ACCIDENT REPORT. TEXAS AND PACIFIC WORK EXTRA 523/MISSOURI PACIFIC EXTRA 1902 EAST HEAD-ON COLLISION, TAFT, LOUISIANA, FEBRUARY 21, 1973

National Transportation Safety Board, Bureau of Surface Transportation Safety, Washington, D.C.

NTSB-RAR-73-6, Oct. 1973

35 pp

The report describes and analyzes a head-on collision which occurred at Taft, La., on February 21, 1973. At 3:30 a.m., westbound Texas and Pacific Work Extra 523 passed beyond its planned stopping point on an industrial siding, made an unauthorized entry onto the main track, and was struck by eastbound Missouri Pacific Extra 1902 East. The three locomotive units of Extra 1902 East, the locomotive unit of Work Extra 523, and 16 cars were derailed as a result of the collision. Three crewmembers on Extra 1902 East were killed, probably in a fire which engulfed the locomotive units; two other crewmembers were injured. The National Transportation Safety Board determines that the probable cause of the collision was the unauthorized intrusion of Work Extra 523 onto the main track, which resulted from the engineer's failure to brake the train in time to stop on the siding. Contributing to the collision were (1) the absence of protective devices to guard against the unplanned intrusion of a train from another track onto the main track and (2) operating practices and work patterns which did not adequately control switching movements. The absence of crash-injury protection in the locomotive units and caboose of Extra 1902 East contributed to the fatalities and injuries.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225080/1

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PB-225080/1

051582
RECLASSIFICATION OF MATERIALS LISTED AS TRANSPORTATION HEALTH HAZARDS. SUPPLEMENT

Back, KC Thomas, AA MacEwen, JD

Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio, 45433

Final Rpt, 7206-7306, Sept. 1973, 24 pp

Contract DOT-AS-10028/2

See also PB-214 270.

In a previous report the toxicity of several compounds of interest to the Department of Transportation was discussed. This was done in the light of a reexamination of existing data or the determination of acute toxicity data on those compounds where no previous data existed. The information so gathered was used to help reclassify these compounds into categories which may help to define shipping and handling requirements concomitant with the hazard associated with each compound. The classifications assigned are not official regulatory classifications and are presented for technical information only. Seven new compounds were examined in this same light to provide additional information to the Department of Transportation. These compounds are as follows: mixed cresols, allyl isothiocyanate, methyl isothiocynate, methyl isocyanate, ortho-nitroaniline, ethyl chloroacetate and phenyl isocyanate. Portions of this document are not fully legible.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225283/1

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PB-225283/1

051588
HAZARD CLASSIFICATION OF EXPLOSIVES FOR TRANSPORTATION– EVALUATION OF TEST METHODS. PHASE II

Lasseigne, AH

General Electric Company, Hazards Evaluation, Research and Engineering, Bay St Louis, Mississippi

GE-HERE-FR-009, Final Rpt, May 1973, 148 pp

Contract NAS8-27750

See also report dated May 72, PB-223 769.

The report correlates proposed explosives testing with proposed testing for the classification of other related types of hazardous materials-inorganic oxidizers, organic peroxides, and flammable solids. The work also provides information relative to additional hazard classification testing, further refinements in hazard classification test methodology and expanded hazard classification test criteria. Portions of this document are not fully legible.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225422/5

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051900
HAZARDOUS MATERIAL TANK CARS–TANK HEAD PROTECTIVE "SHIELD" OR "BUMPER" DESIGN

Federal Railroad Administration, 400 7th Street, SW, Washington, D.C., 20590

Final Rpt, Aug. 1971, 117 pp, Figs, Tabs, 6 App

Contract DOT-FR-00035

The objective of this study program is to design a railroad tank car head protective device which will reduce the frequency of head punctures in accidents. Accident data were reviewed in detail for the years 1965 through 1970 to correlate head damage frequency and severity with various types of tank cars, to determine distribution patterns of damage over tank car head surfaces, and to assess the costs to the railroad shipping industry of head punctures. Full scale head impact tests, previously run were also reviewed. From these two reviews, design criteria were established and used to reduce an initial compilation of 74 concepts to a group of 15, which when applied to various classes of cars, comprised a semi-final total of 42 combinations, or schemes, as referred to in this report.

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051913
ASSEMBLY AND ANALYSIS OF FRAGMENTATION DATA FOR LIQUID PROPELLANT VESSELS

Baker, WE Parr, VB Bessey, RL Cox, PA

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas, 78228

NASA CR-134538, Contr Rpt, Jan. 1974, 235 pp, 54 Fig, 19 Tab, 48 Ref, Apps

Contract NAS 3-16009

Project Managers: C. David Miller and R.D. Siewert, Aerospace Safety Research and Data Institute, Lewis Research Center.

The objective of this work was to assemble and analyze fragmentation data for exploding liquid propellant vessels. These data were to be retrieved from reports of tests and accidents, including measurements or estimates of blast effects, fragment velocities, masses, shapes, and ranges. Correlations were to be made, if possible, of fragmentation effects with type of accident, type and quantity of propellant, blast yield, etc. A significant amount of data was retrieved from a series of tests conducted for measurement of blast and fireball effects of liquid propellant explosions (Project PYRO), a few well-documented accident reports, and a series of tests to determine autoignition properties of mixing liquid propellants. The data were reduced and fitted to various statistical functions. Comparisons were made with methods of prediction for blast yield, initial fragment velocities, and fragment range. Reasonably good correlation was achieved. Methods presented in the report allow prediction of fragment patterns, given type and quantity of propellant, type of accident, and time of propellant mixing. However, more work must be done before the results of this study can be easily applied to estimation of damaging effects of fragments from exploding liquid propellant vessels.

ACKNOWLEDGEMENT:
National Aeronautics and Space Administration

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051939
LOW-SMOKE CABLE MADE FOR SUBWAYS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 3, Feb. 1973, 1 p, 2 Phot

The Okonite Corporation has started production of its new Okonite-Okoprene VFR/LS (Very Flame Resistant/Low Smoke) jacketed control cable. The cable uses the standard Okoprene insulation, retaining the physical and electrical characteristics of regular railroad signal cable. Smoke emission from either the control or power cable is reduced by approximately 55%, compared with the standard design, when subjected to external flame. The small amount of smoke given off is white and translucent but seems to be of sufficient density to actuate smoke detecting equipment. The new organic jacketing approximately doubles the time required to short-circuit a control cable during flame testing. The new cable is also noted for not showing any candlewick effect.

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052108
HOW SAFE WERE THE MOTOR TRAINS?

Prosser, RS

Traffic Quarterly (Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880)

Vol. 27, No. 4, Oct. 1973, pp 601-618, 1 Tab

This article is a facet of a comprehensive study on the rise and fall of motor trains in the United States. The term "motor train" is used in this article because "motor car" has been used loosely in the railroad literature to designate "motor trains," maintenance-of-way cars, and automobiles and buses. For the purposes of this article, a "motor train" is a passenger train of one, two, or three cars, which is not pulled by a locomotive, but has a self-contained power plant in a vehicle partially devoted to revenue space.

ACKNOWLEDGEMENT:
Traffic Quarterly

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Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880, Repr PC: Req Price

052163
HAZARDS CLASSIFICATION OF FLAMMABLE AND OXIDIZING MATERIALS FOR TRANSPORTATION. EVALUATION OF TEST METHODS (PHASE II)

Hough, R Lasseigne, A Pankow, J

General Electric Company, Hazards Evaluation, Research and Engineering, Bay St Louis, Mississippi

Final Rpt, Apr. 1973, 83 pp

Contract DOT-AS-10058

This report contains the Phase II results of a two-phase investigation of a recommended system for classifying solid flammable and oxidizing materials for transportation, and a preliminary evaluation of flammable liquids classification. Specifically, this report resolves specific discrepancies in the above test methods, contains data for classifying additional materials, and provides preliminary evaluation on hazards classification tests of flammable liquids.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227019/7

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PB-227019/7

052166
REVIEW OF SAFETY RELATED STATUTORY AUTHORITY ADMINISTERED BY THE DEPARTMENT OF TRANSPORTATION

Glater, DS Accola, N

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-OST-73-45, Intrm Rpt, 7307-7309, Oct. 1973, 39 pp

The report is an overview of the legislative authority giving the Department of Transportation responsibility for transportation safety. These responsibilities are summarized by mode and modal administration with special emphasis on the R and D role. Legislation dealing with environmental protection which has only incidential impacts on safety has been omitted, as had legislation administered by the Secretary of Transportation for the protection of common carrier employees. Appropriate legislative and regulatory authorities are cited which identify the authorization to perform the R and D in support of the safety responsibilities.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226894/4

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PB-226894/4

053754
TRANSPORTATION FIRE HAZARDS BY NATIONAL FIRE PROTECTION ASSOCIATION

National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts, 02210

Book, 40 pp

The 40-page soft-cover publication aims to focus on the cause and effects in transportation fires, including the problems of intermodal transfers. Separate chapters are devoted to movement of hazardous materials and to fire safety involving aircraft, motor vehicles, ships, and railroads. Not only the vehicles but their particular environments are discussed.

ACKNOWLEDGEMENT:
Railway Locomotives and Cars

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts, 02210, Repr PC: $2.25

053867
A PRELIMINARY STUDY OF HEAD-ON AND REAR-END COLLISIONS INVOLVING LOCOMOTIVES

Hawthorne, KL

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

V-804-74-01, Jan. 1974, 48 pp, 10 Fig, 7 Tab, 7 Ref

Control of hazards to occupants of locomotive cabs is the primary goal of the FRA-B of LE-UTU-AAR Locomotive Control Compartment Committee. The study reported herein is intended to provide further clarification of head-on and rear-end collisions, particularly in regard to structural damage and fatalities to cab occupants. Recommendations for further study are made where additional knowledge is needed.

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AAR, Repr PC: Req Price

053872
FAILURES AND SAFETY IN THE CASE OF RAILWAY SAFETY SYSTEMS

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

A118/RP3, Report, Oct. 1972, 38 pp, 8 Fig, 7 Ref

The final object of the above study is to find an answer to the following questions posed by the UIC. Can electronic components be used in railway safety installations? If so, which, and under what conditions? The above report, which is the 3rd, is divided into two parts. In the first, it is shown that research into safety necessarily implies the establishment of a system of detection of failures. In this part, an analysis is contained of the effects of failures in the case of railway safety systems. An examination is carried out of the basic mechanisms required for the detection of the probable effects of failures prior to the appearance of a danger to railway operation. Details are also shown of the ability of a system to react when it detects a failure. In the second part, a description is given of a method of calculation using the Markov process, and enabling an evaluation to be made of the availability, the reliability and the safety of a system. This description is accompanied by a study of the concept of the "probability of an accident", taking into account not only breakdowns of the equipment, but also in its surroundings (e.g., the effect of the human factor).

ACKNOWLEDGEMENT:
International Union of Railways, 1122

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International Union of Railways, BDC, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
56 N3

054413
SPECIAL STUDY. BROKEN RAILS: A MAJOR CAUSE OF TRAIN ACCIDENTS

National Transportation Safety Board, Department of Transportation, Washington, D.C., 20590

NTSB-RSS-74-1, Spec Rpt, 62-72, Jan. 1974, 21 pp

The report identifies broken rails as the largest single cause (in 1972) of train accidents and suggests that the problem will magnify. The study analyzes the current means for controlling rail failures, such as rail manufacture, use, inspection, research, and regulation. Recommendations are directed to the Federal Railroad Administration to revise accident reporting methods, to determine the reason for the drastic increase in train accidents resulting from broken rails, to promulgate additional regulations prescribing rail use and maintenance, to develop criteria for rail inspection, and to initiate research of rail and rail flaw detection methods. Recommendations also are directed to the railroad industry to initiate rail research, to accumulate rail failure statistics, and to institute track maintenance policies that will reduce the number of train accidents resulting from broken rails.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227631/9

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PB-227631/9

054446
LIQUIFIED NATURAL GAS TECHNOLOGY

National Bureau of Standards, Cryogenic Data Center, Boulder, Colorado

B-1075, Bibliogr, Oct. 1973, 54 pp

The report contains a bibliography of the applications, storage, handling, production, economics, and safety engineering relative to liquefied natural gas.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10324/3

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $7.00, Microfiche: $1.45
COM-74-10324/3

054479
LNG: WATER EXPLOSIONS

Katz, DL

National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, D.C., 20418

Final Rpt, Mar. 1973, 63 pp

Contract DOT-CG-11775

The report directs attention to a proposed solution of a puzzling problem that has been a cause of concern in the shipment of liquefied natural gas—a type of flameless explosion encountered under certain conditions when liquefied natural gas is spilled into water. The report suggests further research to improve understanding of the phenomenon.

ACKNOWLEDGEMENT:
National Technical Information Service, AD-775005/2

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AD-775005/2

054512
THE INCIDENCE OF HAZARDOUS MATERIAL ACCIDENTS DURING TRANSPORTATION AND STORAGE

Steele, WA Bowser, D Chapman, RE

National Bureau of Standards, Technical Analysis Division, Washington, D.C., 20036 NBS-4314426

NBSIR-73-412, Final Rpt, Nov. 1973, 41 pp

This report is one of a series describing background research concerning the incidence of abnormal loading. The report is organized in terms of modes of hazardous material transportation and storage. These modes–pipeline, water, motor vehicle, and railroad transportation systems–are addressed in four sections with Storage Systems discussed in a fifth. The sections depend on the amount of available data, rather than the risk involved in an accident. A summary of the results is presented in the last section. On the whole, there is little empirical evidence to substantiate a threat to buildings from hazardous materials transport. However, trends in volumes shipped in proximity to structures of interest raises the prospect of future incidents.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10512/3

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COM-74-10512/3

054684
LEAD POISONING PERILS CREW RAZING EL

Brody, J

New York Times (New York Times Company, 229 West 43rd Street, New York, New York, 10036)

May 1974, p 33

The men who are doing work as part of the demolition of the Third Evenue elevated line in the Bronx have run into a danger they had not anticipated–lead poisoning. As they burned through the huge beams coated with an 83-year accumulation of lead-containing paint, the workmen have been apparently inhaling large amounts of lead fumes.

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New York Times Company, 229 West 43rd Street, New York, New York, 10036, Repr PC: Req Price

056880
A SYSTEMATIC APPROACH TO RAILROAD SAFETY

Hawthorne, KL, Association of American Railroads
Harris, WJ, Jr, Association of American Railroads

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

1973, 16 pp, 9 Fig, 7 Ref

The American railroad industry, with the cooperation of its suppliers and the Federal Railroad Administration, is currently pursuing an accelerating research program. Those parts of the program which are directed toward hazard abatement and control represents a major fraction of the overall program. These are complementary to programs directed toward improving railroad efficiency and effectiveness and reducing the environmental impact of the industry. This paper describes a systematic approach to railroad hazard abatement and control research. Several current and planned research programs are cited as examples of the methodology.

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056906
RISK ANALYSIS IN HAZARDOUS MATERIALS TRANSPORTATION. VOLUME I

Jones, GP
Barrow, RW Stuckenbruck, LC Holt, EL Keller, RP

University of Southern California, Institute of Aerospace Safety and Management, Los Angeles, California, 90007

RAPO-73-7, Final Rpt, 7206-7303, Mar. 1973, 297p

Contract DOT-OS-20114

A contracted research project was undertaken by the University of Southern California for the Office of Hazardous Materials, Department of Transportation, on the subject topic. The results are as follows: (1) A risk analysis model is developed which is provided with input from existing data bases with some minor extensions and revisions and is logically consistent and satisfying. In fact, several agencies are already employing like models in analysis and operations; (2) Twenty examples are shown which demonstrate the procedure, its flexibility in accepting different levels of detail of data, and the type of results which are obtainable. In this phase several specific recommendations for data input needs and procedural development are made; and (3) The petition evaluation shows a clear dominance of one alternative over the other in terms of risk, bodily injury, deaths (equal), normal and total cost.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230810/4

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PB-230810/4

056907
RISK ANALYSIS IN HAZARDOUS MATERIALS TRANSPORTATION. VOLUME II. BIBLIOGRAPHY

Jones, GP Barrow, RW

University of Southern California, Institute of Aerospace Safety and Management, Los Angeles, California, 90007

RAPO-73-8, Final Rpt, 7206-7303, Mar. 1973, 425p

Contract DOT-OS-20114

See also PB-230 810.

This is the second of two volumes prepared under the Risk Analysis in Hazardous Materials Transportation contract awarded by OHM/DOT. It is divided into two major sections. Section 1 contains relevant bibliographic entries and abstracts from among Department of Defense publications and Governmental Research Abstracts. Section 2 is merely a concise listing of all bibliographic entries gathered over the course of the entire project. All of the entries in this section have been previously shown in Monthly Progress Reports between June and December 1972.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230811/2

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056950
REAR-END COLLISION OF TWO SOUTHERN PACIFIC TRANSPORTATION COMPANY FREIGHT TRAINS, INDIO, CALIFORNIA, JUNE 25, 1973

National Transportation Safety Board, Bureau of Surface Transportation Safety, Washington, D.C. SS-R-25

NTSB-RAR-74-1, Mar. 1974, 27p

Railroad Accident Report

The report describes and analyzes a rear-end collision between two Southern Pacific Transportation Company freight trains in the SP yard at Indio, California, on June 25, 1973. Extra 8992 West, after having entered the yard, struck the rear of Extra 8659 West, which was standing on the westbound main track. All five locomotive units of Extra 8992 West were destroyed, and 25 cars of the two colliding trains were derailed. The engineer and the front brakeman of Extra 8992 West were killed. Eight cars of a train on an adjacent track were also derailed. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the crew of the Extra 8992 West to stop their train, which was being operated at an excessive speed by an engineer under the influence of alcohol. Contributing to this failure was the ineffectiveness of the Southern Pacific in assuring compliance with its operating rules and procedures which were specifically designed to prevent an accident if a crewmember failed to perform his duties.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231134/8

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PB-231134/8

057162
STRUCTURAL PROBLEMS ASSOCIATED WITH THE PREDICTION OF VEHICLE CRASHWORTHINESS

Saczalski, KJ, Office of Naval Research

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 87-108, 13 Fig, 2 Tab, 66 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

The magnitude of problems associated with employing destructive testing as a means to determine vehicle structure crashworthiness in the early design stages, coupled with the availability of modern computing systems and a host of promising numerical methods, has resulted in the development of a number of vehicle structure crash simulation computer programs. This paper delineates the problems associated with the theoretical prediction of large deformation dynamics of crash impacted vehicular structures, assesses the prediction capabilities and technical approaches of the recently developed vehicle crash simulation programs, and identifies areas of research needed to improve current crash simulation capabilities.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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057164
BIOMECHANICS AND HUMAN IMPACT TOLERANCE

Patrick, LM, Wayne State University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

1973, pp 109-122, 4 Fig, 54 Ref

Presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, Nov. 11-15, 1973, sponsored by the Applied Mechanics Division and the Automatic Controls Division. Papers presented at this meeting are compiled in "Surveys of Research in Transportation Technology", AMD-Vol. 5.

Human tolerance to impact is discussed with different degrees of trauma identified according to the Abbreviated Injury Scale (AIS). Quantitative values of human tolerance are presented in common engineering terms which permit logical safety system designs based upon the physical laws of mechanics. Tolerance levels for the head and chest in terms of acceleration in g units are used in examples to illustrate design techniques for establishing required deceleration distances. Analytical and graphical analyses are included. Injury criteria for interpreting injury potential from complex deceleration records are included.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051389
TOWARDS THE ALL-ELECTRIC RAILWAY

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, pp 457-458, 1 Fig

A reduction in diesel traction might be possible if British Rail's work on sodium-sulphur batteries to complement electrification of main lines proves successful.

ACKNOWLEDGEMENT:
Railway Gazette International

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051532
THE DYNAMICS OF HIGH SPEED SLIDING POWER COLLECTION SYSTEMS FOR ELECTRICALLY PROPELLED VEHICLES

Bain, JA, General Electric Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-98, Paper, Sept. 1973, 9 pp, 3 Fig, 7 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Methods for estimating the contact force variation are presented. Particular attention is given to third rail waviness and flexibility and their effects on contact force at high speed. Waviness measurements of a commercial third-rail are given in power density form. Conclusions are drawn concerning the feasibility of power collection at 300 mph as affected by waviness, rail flexibility, and brush wear.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051927
ENERGY CONSUMPTION ON ELECTRIC RAILWAYS

Modern Railways (Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England)

'The Energy Crunch' has suddenly become a widely used and fashionable term. There are various predictions as to when our existing reserves will run out but what is rarely questioned is that energy will be more expensive in the future than it is today, always assuming that it is still available, and therefore there will be the greatest need to use it in the most efficient way. Rail transport is by far the most efficient means of moving people and goods overland. Road transport is appreciably less efficient while air transport lags far behind again. The actual figures to move one ton-mile of freight are in the ratio of 1:4:60, according to the Oak Ridge National Laboratory in the USA. In theory transport by water is slightly more efficient than rail but obviously for inland movements it can only be used in very particular circumstances. In all forms of transport, however, the actual figures for energy consumption can vary over a very wide band-width depending on many factors-some controllable by the operator, others not. First of all the ways in which energy is used by a railway are examined. There are three main categories, namely: to accelerate the train from rest; to overcome resistance to motion (tractive resistance) when it is moving; and to supply auxiliary services.

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Modern Railways

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051973
ELECTRIFICATION OF THE RAILWAYS–AN ECONOMIC NECESSITY FROM THE POINT OF VIEW OF POWER?

ELEKTRIFIZIERUNG DER EISENBAHNEN–EINE ENERGIEWIRTSCHAFTLICHE NOTWENDIGKEIT?
Ural, A

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

No. 3, 1973, 3 pp, 1 Fig, 1 Tab, 16 Ref

The necessity of electrification depends on the relationship between the electric energy produced and the production of mineral oil (power factor "e"), as well as on the relationship between the cost of electric energy and that of diesel energy (cost factor, "p"), the relationship between stocks of mineral oil and annual requirements (life factor, "d"), the relationship between the length of the railway lines and the surface of the ground (traction factor, "g"), and the relationship between the length of electrified lines and the total length (electrification factor "l"), and the reciprocal value of the annual rebuilt-km (factor taking into account the extension of the railway system, "k").

ACKNOWLEDGEMENT:
International Union of Railways, 978

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052075
A REVIEW OF FACTORS INFLUENCING RAILROAD ELECTRIFICATION

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

36 pp

The Task Force on Railroad Electrification was established to review and consider the major factors associated with electrification and to propose government and industry policy as to the development of railroad electrification. The Task Force has arrived at these conclusions. Railroad electrification is the only available alternative to diesel-electric operations on high-density, long-haul railroad lines. Electrification offers the only feasible means to utilize coal or nuclear power for intercity movements of general freight and passengers. Modern rail electrification technology is available for application. While electrification has been shown to have a positive rate of return on the projected investment, electrification of high-density lines have not been widely adopted by American railroads because of more pressing capital requirements or more attractive investment opportunites.

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Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590, Repr PC: Req Price

052094
CONCRETE TRAINS SPEED BR MAIN LINE ELECTRIFICATION

Tiffen, CE

Railway Engineering (Thomson Publications SA (Pty) Limited, P.O. Box 8308, Johannesburg, South Africa)

Vol. 17, No. 6, Dec. 1973, 1 p, 1 Phot

Concrete trains are being used by construction crews to speed up foundation work for the London-Glasgow electrification programme. Other special work trains are used for erecting the masts which can weigh between a quarter of a ton and four tons, according to size. Another economy is the introduction of head-span wires to support the conductor wires over multi-track layouts instead of steel portal structures across the lines. Overall the use of these new methods and materials has reduced the cost of overhead equipment by 25 percent.

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Thomson Publications SA (Pty) Limited, P.O. Box 8308, Johannesburg, South Africa, Repr PC: Req Price

053731
POWER SUPPLY FOR RAILWAYS IN CITY REGIONS. I. BASIC CONSIDERATIONS

Breyer, W, Austrian Federal Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 1, Jan. 1973, 9 pp, 7 Fig., Tabs., 8 Ref.

On the occasion of the last symposium in Vienna in 1968, attention was drawn to the difficulties arising from current collection and power supply for high-speed running. These problems were taken up by ORE and are at present being tackled. In the meantime, it had to be recognised that problems of a partly similar and partly different nature are also encountered, and must be solved, in respect of current collection and power supply for high-frequency train services in large conurbations. Here, the first step must be to analyse the problems themselves and to assess the range where the difficulties are liable to occur within a near future. It should be pointed out that the present paper is exclusively concerned with conventional railway systems and well-known systems of current supply to motive power units.

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053738
SHORT-CIRCUIT CURRENT BASED ON RECTIFIER CIRCUIT AT DC. SUBSTATION

Fujimura, T Honda, S

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 6 pp, 13 Fig

On D.C. electrical railways in urban commuter service sections, an increase in electric load on equipments is so remarkable that in case of a short-circuit fault in the feeder circuit the short-circuit current reaches tremendous magnitude. So far, the exact calculation method for it hasn't been established. Tried was calculation of transient impedance of D.C. feeder circuit consisting of many lines as well as rails, and demonstrated that this can be calculated by treating it as transient phenomena of polyphase rectifying circuits with such impedance on D.C. side. Also proposed is a simplified calculating method that proved the sufficient practical equivalency of the method.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053981
DEVELOPMENT WITH CARBONS FOR CURRENT COLLECTION

Dixon, DL

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 5, Sept. 1973, 14 pp, 25 Fig, 5 Ref, 3 App

This paper reviews the history and development of electric power collection systems for railway vehicles. Particular attention is paid to carbon collector surfaces. Various types of pantographs are covered.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

054331
RAILWAY ELECTRIFICATION IN THE TWENTIETH CENTURY

Warder, SB, British Railways Board

Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England

Vol. 181, Pt3F, 1967, pp 4-16, 1 Fig., 11 Ref., 1 App

Proceedings of a Technical Conference sponsored jointly by the British Railways Board and the Institutions of Civil, Mechanical, Electrical, Locomotive and Railway Signal Engineers, 25-26 October 1966.

In this paper the author, having been responsible for the recommendation that 25,000 V single-phase electrification at industrial frequency should be adopted as standard for Great Britain, completes the story first unfolded at the previous Electrification Conference in 1960. The paper is of a general character and reviews the evolution of the art and the contribution made by British Railways and industry, giving historical reasons for the present position. Reference is made to electrification schemes outside the London Midland scheme, and because of the author's subsequent extensive travel abroad, it has been possible to include some interesting comparisons. Remarks are also presented on the peculiar situation of Great Britain, geographically located between countries East and West who hold divergent views on motive power policy, and the future of the industry at home and abroad is considered. The importance of the British solution assumes greater proportions. (1) Reduced clearances, now proved to be technically acceptable and resulting in immense savings in cost of providing clearances as well as permitting the use of cheaper equipment. (2) P.t.f.e. insulation, now proved to be technically acceptable and resulting in large savings in cost of overhead equipment. (3) Simple catenary equipment for 100 mile/h, technically proved to supersede compound and stitched catenary equipment, resulting in large savings in cost of overhead equipment. (4) Redesigned pantograph, technically proved and now only one necessary per locomotive with consequent saving in cost. (5) Nose-suspended axle-hung motors for locomotives, technically proved that special designs incorporating full suspension are an unnecessary expense. (6) New rectifier manufacturing techniques, technically proved to lead to the elimination of auxiliary apparatus prone to failure and thus ensuring more reliable and cheaper equipment.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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054332
ELECTRIFICATION OF THE LONDON MIDLAND MAIN LINE FROM EUSTON

Emerson, AH, British Railways Board

Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England

Vol. 181, Pt3F, 1967, pp 17-50, 16 Fig, 3 Tab, 33 Ref, 4 App

Proceedings of a Technical Conference sponsored jointly by the British Railways Board and the Institutions of Civil, Mechanical, Electrical, Locomotive and Railway Signal Engineers, 25-26 October 1966.

The paper describes the lines on the London Midland Region of British Railways new electrified at 25 kV, 50-cycles, single-phase a.c. After discussing the commercial and other factors affecting the decision to electrify, the equipment is briefly described, followed by a more detailed account of the planning and execution of the installation work and the creation of the maintenance organization. The difficulties which have arisen with the equipment and the way in which they have been overcome or are being tackled are then described. The paper concludes by discussing factors which may influence the prospects of future a.c. elecrification in this country.

ACKNOWLEDGEMENT:
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054333
CIVIL ENGINEERING WORKS OF THE EUSTON MAIN LINE ELECTRIFICATION SCHEME

Butland, AN, British Railways Board

Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England

Vol. 181, Pt3F, 1967, pp 51-64, 17 Fig

Proceedings of a Technical Conference sponsored jointly by the British Railways Board and the Institutions of Civil, Mechanical, Electrical, Locomotive and Railway Signal Engineers, 25-26 October 1966.

This paper discusses, with illustrations, some of the civil engineering problems encountered on a main-line electrification scheme on British Railways. These tasks are as follows: the provision of adequate clearances beneath bridges and through tunnels; the design of overhead structures and their foundations; the provision of inspection, maintenance, and repair sheds for electric stock and locomotives, sub-station buildings, signal boxes, and relay rooms. A scheme of this magnitude also requires (a) a thorough modernization of the track formation, ballasting, drainage, soil stabilization work, and the introduction of continuous welded track; (b) route rationalization, reducing the requirement of operating facilities to a minimum; (c) station modernization and rebuilding; and (d) strengthening and improving the type of bridges carrying the lines.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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054354
PERFORMANCE OF ELECTRIFIED RAILWAYS

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

Pt2, #50, Conf Pub, 1968, 185 pp, Figs, Tabs

For individual papers of Part 1 see RRIS #054355-#054375.

The discussions recorded in this volume refer to contributions published in Conference Publication No. 50. Throughout this volume all comments applicable to the appropriate contribution have been grouped together and are followed by the author(s) collective reply. At the beginning of each section, an index of relevant contributions is given.

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Institution of Electrical Engineers

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Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England, Repr PC: Req Price

054360
REVIEW OF RAILWAY ELECTRIFICATION IN SOUTH AFRICA

Gosling, AJG, South African Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 32 pp, 8 Fig, 4 Tab, 4 Ref

The progress of railway electrification in South Africa from its inception in 1925 up to 1947 was comparatively slow, but from the latter date onwards, expansion of electrification has taken place at an accelerated rate, ultimately reaching an average rate of conversion of 286 track miles per annum. This development has been due to the necessity to provide improved facilities for handling a greater volume of railway traffic, brought about by the considerable increase in industrial activity which has taken place during the last two decades. South Africa is not an oil producing country, but possesses vast reserves of coal, consequently it is in the interests of the national economy to utilize, as far as possible, the available fuel resources in the form of electric energy for the operation of trains when a change from steam traction becomes necessary.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054361
750 V. D.C. THIRD RAIL ELECTRIFICATION ON BRITISH RAILWAYS

Sykes, WJA, British Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 28 pp, 16 Fig, 3 Tab, 22 Ref, 2 App

The choice of a low voltage d.c. system was determined after consideration of the state of technical knowledge and experience available on d.c. and a.c. systems at the time; the conductor rail was cheap and simple to install in the complicated track networks characteristic of city transport systems, and 25 Hz rotary convertor substations feeding d.c. traction motors on the trains were a well proved and satisfactory combination. The advisability of retaining the low voltage system was reviewed at various times; its position was finally consolidated by the B.T.C. 1956 report on electrification which recommended its retention for the completion of electrification on the S.R.

ACKNOWLEDGEMENT:
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054362
THE SUBURBAN ASPECTS OF BRITISH RAIL 25 KV A.C. ELECTRIFICATION

Maguire, CMS, British Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 30 pp, 15 Fig, 8 Tab, 36 Ref, 2 App

This paper deals with the electrified lines of the Eastern Region London suburban network, the Scottish Region Glasgow suburban network and the A.C. electric multiple unit stock aspect of the London Midland Region. These lines are shown on the maps.

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054363
MAIN LINE 25 KV 50 HZ A.C. ELECTRIFICATION ON LONDON MIDLAND REGION OF BRITISH RAIL

Emerson, AH, British Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 15 pp, 13 Fig, 7 Tab, 6 App

This paper covers the performance of the main line electrification scheme operating between Euston, Manchester and Liverpool. The locomotives which are used on this route are of a mixed traffic design and are used to haul all categories of trains including the 100 mph maximum 12-car 425 ton express train sets, 900 ton 75 mph maximum freightliner trains and conventional freight trains up to 950 tons.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England, Repr PC: Req Price

054364
THE ELECTRIC TRACTION OF THE NETHERLANDS RAILWAYS

Ankersmit, JEJ, Netherlands Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 9 pp, Tabs, 11 Ref, 4 App

The experience obtained with a modern railway electrification network with diesel traction in addition may result in some reflections on the technical and economical merits which are the subject of this paper.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054365
ELECTRIC TRACTION IN JAPANESE NATIONAL RAILWAYS

Nogi, T, Japanese National Railways
Kuroiwa, M, Japanese National Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 14 pp, 11 Fig, 12 Tab

In modernizing its motive powers, JNR is pushing ahead the electrification and dieselization. The following chapters give an account of the present state, plans, effect and systems of the electrification of Japanese National Railways, and compare the economies of the electrification and dieselization.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054367
HISTORICAL SUMMARY, PERFORMANCE AND FUTURE OF PENN CENTRAL COMPANY RAILROAD ELECTRIFICATION. (FORMERLY PENNSYLVANIA RAILROAD COMPANY)

Kelley, WE, Penn Central Transportation Company

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 14 pp, 30 Fig, Refs

This paper provides a descriptive history of the Pennsylvania Railroad (now Penn Central) electrification. It covers the routes, the power supply and overhead systems, the locomotives, and the multiple unit trains. A route map, a bibliography, and photographs are included. Also included are wiring diagrams, and graphs of performance, energy costs, and maintenance costs.

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054368
SOME DISADVANTAGES FOR RAILWAY ADMINISTRATIONS WITH ELECTRIFICATION

Frostberg, J, Swedish State Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 9 pp

This paper reviews some of the disadvantages of electrification, including: long term committment to fixed assets, relative inflexibility of transport capacity expansion, clearance limitations imposed by the overhead, problems of high speed power collection, the risk of accidents, and the impracticability of exchanging locomotives with other railways or regions unless the electrifications are identical.

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054371
RECENT DEVELOPMENTS IN ELECTRIC ROLLING STOCK DESIGN ON INDIAN RAILWAYS

Kanjilal, SK, Indian Railways

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 16 pp, 3 Fig

This paper discusses recent developments in locomotives and multiple unit cars on the Indian Railways, including: increased capacity, track limitations, locomotive designs, rectifiers, traction motors, trucks, and multiple unit cars.

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054374
THE ELECTRICAL EQUIPMENT OF LINES N.1 AND N.2 OF THE MILAN METROPOLITAN RAILWAY

Cirenei, M, Milan, City of, Italy

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 19 pp, 4 Fig, Refs

This paper provides general information on the electrical equipment used by the Milan Metro lines. Coverage includes power supply and power collection, signaling and train control, communications, and auxiliary equipment. A description of the rolling stock is also presented.

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054611
THE ELECTRIFICATION OF THE CZECHOSLOVAK STATE RAILWAYS IN STEP WITH THE DEVELOPMENT OF ELECTRIC TRAINS

DIE ELEKTRIFIZIERUNG DER TSCHECHOSLOWAKISCHEN EISENBAHNEN IM ZUGE DER ENTWICKLUNGSTENDENZEN ELEKTRISCHER BAHNEN
Jansa, F, Hochschule fuer Verkehrswesen, Zilina

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 2, Feb. 1974, p 41

The first lines of the CSD network were electrified with 3000 V d.c. Around 1960, it was decided to adopt 25kV, 50 Hz single-phase a.c. Substations, overhead systems and motive power units of both systems are described. To solve the problems resulting from two kinds of current systems in one national railway network CSD decided to develop dual-system motive power units. In conclusion, aspects of energy economy are discussed.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054638
ELECTRIC TRACTION IN FRANCE, OR THE GRATUITOUS RESULTS OF RESEARCH

Tessier, M

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Vol. 93, Jan. 1974, pp 33-38

After a brief look backwards, the author puts the speed of developments in his particular field into its true perspective; he dwells on the objectives of research, the state of mind in which it should be carried out which is not always that of pure logic; he shows that the results obtained were not always those sought and have often been unexpected and full of consequences which were originally unforeseen. However, two conditions must be fulfilled to achieve this: knowledge of the potentialities of a new technique and awareness of new requirements. Mr. Tessier then quotes four such examples in the following areas: single-phase traction and adhesion, semi-conductor power rectifiers and multi-current locomotives, electric traction and thermic traction. And he concludes by stating that there is no doubt that technical resources will contine to provide the railway industry with the elements that are necessary to maintain its vitality.

ACKNOWLEDGEMENT:
British Railways, 30116

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054645
AUTOTRANSFORMER FEEDING ADOPTED AS STANDARD

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 128, No. 2, Feb. 1972, 2 pp, 1 Fig, 2 Phot

Successful operation between Yatsushiro and Kagoshima has resulted in a wider spacing of supply points in Japanese electrification schemes.

ACKNOWLEDGEMENT:
British Railways, 72/87

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054663
BM & LP: FIRST 50-KV ELECTRIFICATION

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 5, Mar. 1974, p 9

The Black Mesa & Lake Powell Railroad formally opened on March 15, 1974 although it has been operating for several months. The 78 mile railway cost $54 million and has a maximum capacity of 17,000 tons of coal/day. Linehaul and unloading operations are automated. The railway is the first in the world to be electrified with 50,000 volts A.C.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054917
GOVERNMENT WILL HAVE MAJOR ROLE IN ANY U.S. MAINLINE ELECTRIFICATION

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 7, Apr. 1974, p 31

A report was issued recently (1974, spring) by the Federal Railroad Administration entitled "A Review of Factors Influencing Railroad Electrification". The report indicated that the government will play a major role in planning, research and financing electrification for high density freight and passenger railroads in the U.S. The report discussed why electrification of U.S. railroads hasn't occurred since 1940 and lists several recommendations for proposed electrification projects.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054935
ELECTRIFICATION IN THE BLACK FOREST

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, 2 pp, 2 Fig, 2 Phot

Having completed electrification of its trunk lines, DB is now converting the busier secondary routes. Numerous tunnels, sharp curves and tight clearances are posing special problems on the section between Offenburg and Villingen, due for completion next year.

ACKNOWLEDGEMENT:
Railway Gazette International

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056807
PANTOGRAPH OF THE AUTOMATICALLY CONTROLLED SYSTEM FOR ELECTRIC ROLLING STOCK

Belyaev, IA, All-Union Railway Research Institute

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

Vol. 4, No. 8, Aug. 1973, pp 874-878, 2 Ref

The ER-200 d.c. electric train is being developed in the USSR, the operating speed being 200 km/h. A special pantograph was designed for this train to provide for a satisfactory and reliable current collection. The main task put before the designers of the pantograph consisted in the fact that the effective mass of it should not exceed 2.5 kg. sec/sec/m in case of current collection up to 1700 A and of the operating range of height of the contact wire equal to 1500 mm. This problem was solved by means of using automatic control. Unlike the widely spread symmetric (four–and two-armed) and asymmetric (single-armed) designs, an automatically controlled pantograph has two systems of movable frames–upper and lower ones. The upper system of movable frames is a pentahedron, the arms of which, however, unlike the arms belonging to serial Soviet designs, were shortened approximately two-fold. The lower system is made as two parallelograms, the upper horizontal sides of which are the base on which the rotatable shafts of the upper system are located. The fact that the given operating range of heights of the contact wire suspension does not influence the value of the pantograph effective mass (it influences only the length of the levers (arms) of the lower movable system) allow to consider that the use of the automatically controlled pantographs may be a solution of the problem of current collection.

ACKNOWLEDGEMENT:
Engineering Index, EIX740200327

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056817
60 YEARS OF THE LOETSCHBERG RAILROAD

60 JAHRE LOETSCHBERGBAHN

Behmann, U, Bundesbahnoberrat

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 8, Aug. 1973, pp 184-192, 15 Ref

The railroad of the Alpine region in Switzerland is discussed. It is claimed to be one of the most interesting railroads. With a minimum of manpower it plays an important role in the European transit of the Alpine region. From its inception in 1913, it has been electrified and supplied by 16 2/3-Hz, 15-kv system. A brief historical sketch is included.

ACKNOWLEDGEMENT:
Engineering Index, EIX740306235

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056851
FAULT DETECTION ON DIRECT CURRENT RAPID TRANSIT SYSTEMS

Stewart, J Waldron, JE

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Presented at the IEEE Ind. Appl. Soc., 8th Annu. Meet.

Due to the similarity between fault currents and load currents, it has been difficult to adequately protect a dc transit system, particularly against low current, arcing faults. The electrical characteristics of these systems are reviewed and analyzed to develop the basic design requirements for their proper protection. An analysis is made of a new device designed specifically for protection against low current faults. Test results are reported, and application guidelines are formulated.

ACKNOWLEDGEMENT:
Engineering Index, EIX740303827

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056872
ELECTRIFICATION GETS CHEAPER ALL THE TIME

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 179-182, 3 Fig, 1 Tab, 4 Phot

With oil now causing severe foreign exchange problems, many countries taking another look at electrification are finding the fixed installation costs have fallen dramatically. Although development in Britain and France was focused on improving high speed current collection, one result has been major economies in overhead equipment design for less busy lines operating up to 100 km/h. The cost of erecting high-voltage medium-speed catenary could be as low as 5000 Pound Sterling per track-km under favourable conditions.

ACKNOWLEDGEMENT:
Railway Gazette International

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056873
ELECTRIFICATION AT THE RIGHT PRICE

Campbell, IM, British Railways Board

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 176-178, 1 Fig, 3 Phot

Determined not to repeat the cost over-run problems which threatened completion of the London-Manchester/Liverpool electrification in the 1960s, strict monitoring of costs and engineering progress was maintained with re-estimation at half-yearly intervals to cater for increased material and other prices. Sound planning and investment allocation for future projects which optimise railway and contractors' resources will enhance the significant savings in costs achieved as a result of experience on the West Coast scheme.

ACKNOWLEDGEMENT:
Railway Gazette International

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057182
ELECTRIFICATION OF BR WEST-COAST MAIN LINE COMPLETED

Cobbett, DJ, British Railways

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 162-164, Phots.

May 6, 1974 saw both the end of the 74 million pound sterling project to electrify and re-signal the West Coast main line between Glasgow and Weaver Junction, just north of Crewe, and the beginning of the best ever rail services between Scotland and England. The massive and complex task of electrifying and resignalling the line between Glasgow and Crewe was authorized by Parliament in February 1970.

ACKNOWLEDGEMENT:
Rail Engineering International

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Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr. PC: Req. Price

054721
THE IMPACT OF THE PHILADELPHIA–LINDENWOLD RAPID TRANSIT LINE ON AUTOMOBILE

Allen, WB, Pennsylvania University, Philadelphia

Traffic Quarterly (Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 05880)

Vol. 28, No. 1, Jan. 1974, pp 21-35, 2 Fig, 2 Tab

This paper examines new data now available and concludes that there has definitely been a decrease in peak-hour bridge usage by automobiles. The paper further considers what would be the impact on automobile bridge traffic if the line were to shut down, noting that there has been considerable growth in the Jersey suburbs since the line was completed.

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Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880, Repr PC: Req Price

054739
IMPACT OF RAPID TRANSIT ON SUBURBAN RESIDENTIAL PROPERTY VALUES AND LAND DEVELOPMENT. ANALYSIS OF THE PHILADELPHIA–LINDENWOLD HIGH-SPEED LINE

Boyce, DE Allen, B Mudge, RR Slater, PB Isserman, AM

Pennsylvania University, Philadelphia, Wharton School of Finance and Commerce, Philadelphia, Pennsylvania, 19104

Intrm Rpt, Nov. 1972, 368 pp, 62 Fig, 83 Tab, Refs

Phase One Report presented to the Office of the Secretary, Department of Transportation, Washington, D.C.

This report is an extensive evaluation of the impact of the Lindenwold Line on the property values and land development in the area it serves. Much data is presented in the report by means of tables, charts, etc.

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056881
COMMUTER PERCEPTIONS OF PUBLIC TRANSPORT WORK JOURNEYS

O'Farrell, PN Markham, J

Environment and Planning (Pion Limited, 207 Brondesbury Park, London NW2 5JN, England)

Vol. 6, No. 1, Jan. 1974, pp 79-100

Commuter perceptions of certain public transport peak-hour performance characteristics are quantified for samples of car-owning public transport users and car users in six randomly selected areas of the Dublin conurbation. The existence of roadside survey data (for buses) and timetables (for trains) permitted an analysis of the degree of distorted perception of in-vehicle times, waiting times, and costs. Results show that the use of objective performance data on public transport modes in urban transportation planning models needs to be questioned, because actual times and costs seldom reflect the subjective images of commuters.

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056882
MASS TRANSIT: WHAT ARE THE LIMITS?

Cornehls, JV Taebel, DA

Consulting Engineer, 217 Wayne Street, St Joseph, Michigan, 49085

Vol. 42, No. 3, Feb. 1974, pp 128-135

The reconfiguration of urban design, the reduction of pollution, and the democratization of the transportation system can be achieved by mass transit. However, there are other urban problems that would remain largely unaffected. These include economic ills, the nature of urban politics, fiscal problems, urban crime, and urban education. The means of transportation—autos, buses, trains—have no value in themselves. Their value is merely functional. The same can be said of the city. The city and the transportation network in combination can be considered as a communications system.

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056946
JOURNEY TO WORK PATTERNS OF TRANSPORTATION CONSUMERS AMONG THE URBAN DISADVANTAGED

Piovia, ES Hill, RB Leigh, W

National Urban League, Incorporated, Research Department, Washington, D.C.

Final Rpt, 7201-7301, Dec. 1973, 12p

Contract DOT-OS-10191

See also PB-230 704.

The primary objective of this study of journey-to-work patterns of transportation consumers among the urban disadvantaged was to determine the problems these workers have in getting to their jobs. Cost, time and mode of transportation of low-income workers in selected cities were analyzed by race, earnings, occupation and industry. The impact on employment opportunities of the suburbanization of industry in the metropolitan areas of these cities has also been assessed. The 12 cities selected for study were: Atlanta, GA; Buffalo, NY; Dayton, OH; Denver,CO; Houston, TX; Louisville, KY; Miami, FL; Milwaukee, WI; Portland, OR; San Francisco, CA; Washington, DC; and Wichita, KS. Ethnic data are also included.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230703/1

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PB-230703/1

056947
JOURNEY TO WORK PATTERNS OF TRANSPORTATION CONSUMERS AMONG THE URBAN DISADVANTAGED

Piovia, ES Hill, RB Leigh, W

National Urban League, Incorporated, Research Department, Washington, D.C.

Final Rpt, 7201-7301, Dec. 1973, 184p

Contract DOT-OS-10191

See also PB-230 703.

The transportation problems of the disadvantaged residents of poverty areas are particularly acute, since they do not either live or work in the CBD's. The central business district is often encompassed by census tracts defined as poverty or low-income areas.

Moreover, because disadvantaged poverty area residents constitute a relatively small segment of the total metropolitan area population, their transportation needs are often overlooked. In order to place the transportation needs of the urban disadvantaged in proper perspective, the report examines the extent of suburbanization of industries in metropolitan areas in order to assess their impact on future employment opportunities of disadvantaged workers in the central cities. It then seeks answers to some critical questions.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230704/9

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PB-230704/9

056951
TEST AND EVALUATION OF DATA FROM THE STANDARD PACKAGE OF CENSUS DATA FOR URBAN TRANSPORTATION STUDIES

Howell, K Davenport, A

Middle Rio Grande Council of Government, 505 Marquette Avenue, NW, Albuquerque, New Mexico, 87101

Final Rpt, Apr. 1973, 192p

Contract DOT-FH-11-7930

The census data consist of 1970 census of population and housing data which were specifically selected and assembled for use in the urban transportation planning process. It is based on the 15 and 20% census count data which were assigned to locally used small areal identifiers such as traffic zones. The socioeconomic data is assembled into zone of residence and zone of work tables. In addition, there is a home-to-work trip table by mode of transportation. Phase I of this project tests the validity of the zone of residence data by comparing it to local data and other census sources. Phase II of this project determined the usability of the Standard Package in the transportation planning process. The analysis of the Standard Package led to a number of recommendations and conclusions about its contents. These include comments on the usability of the current package, recommendations to the user, and suggestions for improving it.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231168/6

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PB-231168/6

056992
LINEAR CITY: RAPID TRANSIT AS A DETERMINANT OF URBAN FORM. A STUDY BY THE DEPARTMENT OF ARCHITECTURE

Texas University, Arlington, Department of Architecture, Arlington, Texas, 76010 UMTA-TX-11-0001

Sept. 1973, 51 pp

The purpose of the study was to forecast and describe some of the physical planning implications of implementing innovative types of public transportation in the Dallas-Ft. Worth region. In this context, the authors have sought to document conclusions about some of the physical implications of the use of rapid transit to structure new forms of urban development and to depict impressions of the increased quality of life possible in these transit-structured communities. The study approach consisted of developing generalized concepts for structuring new urban growth based upon transit, and then particularizing these concepts by applying them to specific parts of the Dallas-Ft. Worth region.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231540/6

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056993
ACCESSIBILITY OF THE METROPOLITAN WASHINGTON, D.C. PUBLIC TRANSPORTATION SYSTEM TO THE HANDICAPPED AND ELDERLY

Kinley, HJ

ABT Associates, Incorporated, 55 Wheeler Street, Cambridge, Massachusetts, 02138

AAI-1546, Final Rpt, 7110-7208, Feb. 1974, 250 pp

Contract DOT-OS-20022

Two hundred and fifty handicapped and/or elderly citizens from throughout the Metropolitan Washington, D.C., area were interviewed to determine their travel experiences. The survey findings, together with findings from an extensive search of research literature and demonstration programs concerning the travel problems of the elderly and handicapped, provided information about their travel needs and experiences and served as a basis for developing performance standards and guidelines applicable to the design of transit systems that are accessible to the handicapped and elderly. Two computer programs were developed that could be used as design decision tools in transit planning. Portions of this document are not fully legible.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231815/2

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PB-231815/2

056994
SUBURBANIZATION AND ITS IMPLICATIONS FOR URBAN TRANSPORTATION SYSTEMS

Ward, JD Paulhus, NGJ

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

DOT-TST-74-8, Final Rpt, Apr. 1974, 52 pp

Revision of report dated Jan 74.

The urban fringe in major metropolitan areas is changing in character, evolving from low density residential communities clustering around a well-defined central city to a collection of regional subcenters. These centers, generally linked by belt or arterial highways, may include concentrations of malls, high-rise office buildings, industrial parks, and apartment complexes. Many functions formerly served by the center city have migrated to the suburbs, resulting in the evolution of a multi-nucleated city form, with more diffuse travel patterns, and more trips in which one end is in low density suburbs and the other in a high density activity center. Cars are poor at the high density ends of the trip. Fixed route buses are poor at the low density end. The only alternative is a mix of systems: good low density systems (car, taxi, or other demand responsive), interfacing at some point with less land hungry systems that are good for high density traffic (PRT, bus, rail). Each element must be selected for and tailored to the area or neighborhood it serves, interfacing pleasantly and efficiently with other elements to provide good connectivity throughout the urban region.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231819/4

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PB-231819/4

057033
SUBWAYS AND LAND USE

Capoza, D, University of Southern California

Environment and Planning (Pion Limited, 207 Brondesbury Park, London NW2 5JN, England)

Vol. 5, No. 5, Sept. 1973, pp 555-576, 10 Fig, 4 Tab, Refs

This paper develops a general equilibrium model of a city with two transportation modes. One mode is land intensive, that is, roads, while the second is land economizing, that is, subways. The effects of subway construction on land values and land uses in a metropolitan area are discussed. An important implication is that, if a subway system is worth constructing, it will have a suburbanizing effect on the city. In addition there will be considerable impact on housing prices and land values, but these changes will not totally offset each other.

ACKNOWLEDGEMENT:
Environment and Planning

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057170
HIGH SPEED TRANSPORTATION–LONG DISTANCE AND URBAN

Twigg, DJ

Highway Engineer (Whitehall Press, 27 Earl Street, Maidstone, Kent ME14 1PE, England)

Vol. 21, No. 4, Apr. 1974, pp 10-16

The paper examines the impact of population growth and increased quality of living on the transportation problem, on a national and global basis. It assesses existing trends and considers future problems of long distance and urban transportation. Evidence is adduced showing that the road system in urban areas is at full stretch with the consequence that it is virtually impossible to implement an "all roads" policy. Modern developments, such as high speed rail and hovercraft vehicles, are considered in the belief that they could make an effective contribution towards a more comprehensive transportation strategy.

ACKNOWLEDGEMENT:
Journal of Institution of Highway Engineers

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061149
IMPACT STUDIES: NORTHEAST CORRIDOR TRANSPORTATION PROJECT. VOLUME IV. PART A. INTRA-I SUMMARY

Putman, SH
Greenman, EH Libson, ST Marshall, DL Rapport, S

Consad Research Corporation, Pittsburgh, Pennsylvania

Tech Memo, Dec. 1969, 118p

Contract DOT-O-104-66

See also Rept. NECTP-209, PB-190 929.

The report contains the Northeast Corridor socio-economic impact model and the results of sensitivity tests on the model. More specifically, the report consists of concise descriptions of the model structure, the calibrated equations, and the solution methodology. The report also contains the result of a partial validation of the model. Several sensitivity tests on the model were conducted with respect to changes in passenger and freight impedance changes. In terms of the impact effects, geographical redistributive effects on population were more sensitive to passenger impedance changes. While the magnitude of the predicted geographical redistributions must be interpreted with caution, the predicted patterns of changes appear realistic. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-190938

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061261
IMPACT STUDIES: NORTHEAST CORRIDOR TRANSPORTATION PROJECT. VOLUME IV, PART B. INTRA-II SUMMARY

Putman, SH Libson, ST Lo, F Steger, WA Tobey, S

Consad Research Corporation, Pittsburgh, Pennsylvania

Final Rpt, Feb. 1970, 229p

Contract DOT-O-104-66

See also Volume 4, Part A, PB-190 938.

The report describes the conceptualization and implementation of an intraregional location model component of the Northeast Corridor Project regional impact estimation model system. The purpose of this model system, as its predecessor version is to forecast, subject to alternative Northeast Corridor transportation systems, the population, personal income, land use, and economic activity by industrial sector for each of the Corridor's 131 districts. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-191224

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048121
OUTLOOK FOR ENERGY IN THE UNITED STATES TO 1985

Winger, JG
Emerson, JD Gunning, GD Sparling, RC Zraly, AJ

Chase Manhattan Bank, 1 Chase Manhattan Plaza, New York, New York, 10015

June 1972, 55 pp

Although a total lack of energy is not a realistic prospect for the United States, there is an actual and growing potential for an inadequate supply. And a lasting shortage or even a temporarily interrupted supply can have a devastating impact upon the nation's economy, its standard of living, and its defense posture. It is imperative therefore that the future energy needs of the United States and the potential for satisfying them be known. And it has been the purpose of this study to measure as precisely as possible both the needs and the supply prospects for the period ranging from 1970 to 1985.

ACKNOWLEDGEMENT:
Chase Manhattan Bank

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051351
ENERGY REQUIREMENTS FOR THE MOVEMENT OF INTERCITY FREIGHT RAILROADS

Creswick, FA

Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio, 43201

Topic Rpt, Dec. 1972, 5 pp, 8 Ref

In August 1971, Battelle-Columbus completed a report to the Association of American Railroads in which the current and future environmental impact of intercity freight traffic was examined for both rail and motor-truck transportation. This report includes estimates of direct engine-exhaust emissions. It should be recognized that this emissions-analysis methodology can be used also as a basis for estimating the energy requirements for freight movement and that, in view of recent concern for national expenditure of nonreplaceable energy resources, it is appropriate to conduct such an analysis. This brief report is submitted in response to AAR's request for such an analysis.

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051361
SYSTEM ENERGY AND FUTURE TRANSPORTATION

Rice, RA

Technology Review (Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139)

Vol. 74, No. 3, Book, Jan. 1972, pp 31-37

The author examines carefully the country's future energy needs for transportation and finds that air and auto transportation could consume 82 percent of transport energy in 1990. Limitations on petroleum supplies and energy-caused atmospheric pollution may keep this percentage lower, however, and comsumption of fuel per delivered passenger or per delivered ton will assume increasing importance, and here the high-yield systems continue to be the waterways, the pipelines, the railroads, and passenger buses. Highly innovative systems of transportation (hovercraft, helicopters and the SST) produce low yields, and this will likely discourage heavy use of these systems. The evaluation of human propulsion (walking, cycling) and mass transit for urban areas should encourage consideration of these means of travel where possible and feasible.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Technology Review, Room E19-420, Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139, Repr PC: $1.95

051382
LONG-RANGE PLANNING AND THE ENERGY CRISIS

Foley, G

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, pp 453-456, 2 Fig, 2 Tab, 8 Ref

It is now generally accepted that projected rates of growth in oil consumption cannot be met. Major investment decisions for motive power typically involve time scales of 20 to 50 years, and Gerald Foley points out that peak oil production will be achieved well within this period. A powerful case can be made for electrification of all but the least important lines, and this is reinforced by the much higher mechanical efficiency of rail transport compared to road.

ACKNOWLEDGEMENT:
Railway Gazette International

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051383
CANADIAN DIESELS FUELLED FROM ATHABASCA TAR SANDS

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, p 458

With pressure mounting on conventional sources of crude oil, the two major Canadian railways and the National Research Council of Canada have been studying the possibility of using fuel extracted from the Athabasca tar sand deposits in northern Alberta to power diesel locomotives. Since February Canadian National has been purchasing 70,000 gal/day of gas oil sidestream for over 100 locomotives fuelled at Edmonton and Jasper, and latest reports indicate that the two-stroke engines used are quite unaffected by the change, with no increase in maintenance costs.

ACKNOWLEDGEMENT:
Railway Gazette International

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051414
DEMAND FOR ENERGY BY THE TRANSPORTATION SECTOR AND OPPORTUNITIES FOR ENERGY CONSERVATION

Malliaris, AC, Transportation Systems Center
Strombotne, RL, Department of Transportation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-87, Paper, Sept. 1973, 12 pp, 1 Fig, 8 Tab, 15 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The existing automobile and truck populations account for about 76 percent of the energy consumed within the transportation sector of the economy. Consumption of energy by aviation is relatively small but is growing rapidly. The authors discuss the structure of demand for transportation services and energy both historically and as projected to the year 2020. In the near-term, improvements and modifications to existing automobile and truck types offer an opportunity to reduce relative energy consumption. For the long-term, novel fuels and electric energy may provide a way to reduce the dependence of surface transportation upon petroleum. The authors also discuss some nontechnological actions which potentially offer energy savings within the transportation sector. Estimates of energy savings are provided and several important factors are discussed through numerous examples.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051422
UNITED STATES ENERGY REQUIREMENTS TO THE YEAR 2000

Dupree, WG, Jr, Department of the Interior

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-105, Paper, Sept. 1973

Total U.S. consumption of energy resources, by major consuming sector and energy source, is forecast to the year 2000. Supply limitations on energy sources are discussed. The outlook is for continued growth in the demand for fossil fuels during the rest of this century. Domestic resources for natural gas and petroleum will require supplementation.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051424
AN ENERGY PLANNING ACTIVITY

Blum, HA, Southern Methodist University
Estes, JM, General Dynamics Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-Pet-19, Paper, Sept. 1973

The nature of our energy problem is such that the individualized energy planning activity will be a necessary part of the solution. This activity for all energy users has the common elements of establishing the nature of the problem, making an energy situation study, developing goals and strategies, implementing the plans, and finally evaluating and controlling the operations. Economic analysis includes income as well as cost effects. What is an unwelcome problem could also become an opportunity.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051445
ENERGY USES IN TRANSPORTATION. WHAT DOES THE FUTURE HOLD?

Shure, LI Milton, JT Spriggs, JO

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

730708, Preprint, 1973, 9 pp

Prepared for meeting 20-23 August 1973.

The report states that aircraft could emerge as the dominant user of fuel supplies in the future, that an assured supply of economical JP type fuel will be required beyond the year 2000 as a change in aircraft fuel is unlikely in the foreseeable future, and that accurate prediction of future modal mix and intermodal shifts requires that the total transportation system be modeled. It is particularly the latter that is needed. Inputs to the model would consist of such items for major traffic corridors as current and projected modal capacity requirements, network structures, and the efficiency and effectiveness of alternate means of transportation (auto, rail, truck, air, ship). With such a model, investment and development strategies can be worked out for the future.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056418

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051570
ENERGY RESEARCH AND DEVELOPMENT OPPORTUNITIES FOR HEAVY DUTY TRANSPORTATION

Federal Council for Science and Technology, Committee on Energy Research and Development Goals, Washington, D.C.

July 1972, 152 pp

A study was conducted of the heavy-duty (air, ship and rail) transportation system to determine where opportunities exist for R and D that could substantially reduce future energy requirements and fossil fuel dependence. The results of this assessment indicate that a substantial reduction can be made while still accommodating the demand and intermodal shifts which are projected. The pivotal issue will be the extent to which air cargo will displace the traditional and more energy conservative modes of shipment. From six major efforts selected, programs for a national initiative have been formulated which fall into three major categories: Improved efficiency through advanced vehicle and engine concepts; improved effectiveness by providing options in intermodal shifts that are more energy conservative with the introduction of new vehicle concepts; and fuel diversification which would decouple the heavy-duty system from petroleum dependence by introducing new vehicle and engine concepts. Characteristically these categories, on a technology basis, require vehicle and engine R and D since these are the areas of the transportation system for which new technology exerts greatest leverage.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224883/9

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051571
RESEARCH AND DEVELOPMENT OPPORTUNITIES FOR IMPROVED TRANSPORTATION ENERGY USAGE. (REDOTEUS)

Federal Council for Science and Technology, Committee on Energy Research and Development Goals, Washington, D.C.

July 1972, 101 pp

The document is a draft of the final report of the Transportation Energy Panel (TEP) prepared for the Office of Science and Technology. The report attempts to assess the relevant technology for improving the usage by the transportation sector of the energy resources of the nation. In pursuit of its study, TEP sponsored several workshops, briefings, and coordination meetings which had personnel from a variety of federal, academic, and industrial organizations. Emphasis was given both to transportation demands and to relevant technology assessment.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224880/5

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051889
RESOURCES AND MAN

National Academy of Sciences-Natl Research Council, Division of Earth Sciences, Washington, D.C., 20418

Book, 259 pp, Figs, Refs

Completed with the cooperation of the Division of Biology and Agriculture, NAS/NRC.

This report, by an NAS committee, covers the relationship of natural resources to our ecosystem. Sections of interest to the railroad community include food production, mineral resources, and energy resources. It would appear that petroleum production in the U.S. has peaked, that coal will last for several centuries, and that nuclear power holds the hope for the future.

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051922
BROWN OUT AND SLOW DOWN

Saltonstall, R, Jr Page, JK, Jr

Walker and Company, 720 Fifth Avenue, New York, New York, 10019

Book, 1972, 181 pp, 6 Tab, Refs, 2 App

This book provides a broad general coverage of the energy situation and its relationship to the environment. The various energy sources are examined, and then their impact on the environment is examined. A section of the book is devoted to transportation, with short portions to rapid transit and to railroads.

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052092
HIGH TEMPERATURE SOLID LUBRICANTS, PART 1: LAYER LATTICE COMPOUNDS AND GRAPHITE

Sliney, HE, Lewis Research Center

ASME Journal of Mechanical Engineering (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 96, No. 2, Feb. 1974, 5 pp, 6 Fig, 1 Tab, 19 Ref

A state-of-the-art review of solid lubrication for temperatures up to 1600 F. Lubricating characteristics, stability in various environments, and relevant machine design considerations of the layer lattice compounds: MoS_2, WS_2, graphite, and graphite fluoride $(CFx)_n$ are discussed. High temperature polyimide polymer, and calcium fluoride based coatings and composites will be covered in Part 2.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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052097
RUNNING QUICK-RUNNING DIESELS ON HEAVY FUEL OIL

Gallois, J

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 1, Jan. 1974, 4 pp, 7 Fig, 3 Tab

S.E.M.T. successes with bench test and commercial-service running in excess of 5,000-h with its 1,500 rev/min PA4 engine at 1,200 hp shows that heavy fuel oil may be accepted as a normal practice despite sulphur contents of 2.5 percent. Cast-iron pistons, nitriding of liners and high-content chrome-alloy combustion inserts indicate very good life may be attained. Tests with the S.E.M.T. PA6 of very high specific-output using water-cooled injectors shows equally good results.

ACKNOWLEDGEMENT:
Rail Engineering International

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053749
OIL AND THE FUTURE OF PERSONAL MOBILITY

Pole, N

ECO Publications, Cambridge, England

Pamphlet, 64 pp

The implications of the worsening oil situation for surface passenger transport in Britain are set forth clearly and coolly. This alone in the present spate of hasty and confused topical writing makes Mr. Pole's pamphlet a ready source of facts and of plausible estimates—as might be expected from the Director of the Cambridge University Conservation Society's transport research project. In considering passenger transport that does not use fuel oil the author stresses the advantages of electrifying conventional railways, both urban and main-line. In a continued oil shortage the electric APT will have an importance not until recently foreseen, as will new and revived urban electric railways including the Tyneside rapid transit system, shop window for vehicle (Metro Cammell) and other British technology. In view of constant additions to concepts and plans for less conventional guided passenger transport systems (most of which disregard the problems of mass passenger movement at peak periods) the summary of these as substitutes for oil-consuming road vehicles is as comprehensive as can be expected.

ACKNOWLEDGEMENT:
Modern Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
ECO Publications, Cambridge, England, Repr PC: Req Price

053755
ENERGY STATISTICS—A SUPPLEMENT TO THE SUMMARY OF NATIONAL TRANSPORTATION STATISTICS

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

The report, prepared as part of DOT's continuing effort to increase the availability of transportation-related statistics, emphasizes the importance of transportation in the energy supply network and on transportation as a consumer of energy.

ACKNOWLEDGEMENT:
Railway Locomotives and Cars

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $3.10

053988
ENERGY INTENSIVENESS OF PASSENGER AND FREIGHT TRANSPORT MODES: 1950-1970

Hirst, E

Oak Ridge National Laboratory, Post Office Box P, Oak Ridge, Tennessee, 37830

ORNL-NSF-EP-44, Apr. 1973, 39 pp, 8 Fig, 12 Tab, 26 Ref, Apps

IA NSF 40-237-70

Previous work at ORNL evaluated the energy consequences of changes in freight and passenger traffic levels and shifts in modal mix for the period 1950 to 1970. The research reported here extends this work to include an analysis of changes in energy intensiveness for individual modes during this period. Examination of individual modes shows that airplanes are energy-intensive and that cars and trucks are less so. Buses, mass transit, railroads, pipelines, and boats are relatively energy-efficient. Railroad energy intensiveness dropped sharply during this 20-year period because of the shift from steam engines to diesel engines. On the other hand, airplane energy intensiveness increased rapidly because of increased speed. Other modes generally showed slight increases in energy intensiveness. Energy intensiveness of inter-city freight declined during this period because of the large drop in railroad energy intensiveness. However, passenger transport became more energy intensive because of shifts to airplanes and autos and because of a general increase in energy intensiveness for all passenger modes. Results derived here are summarized in a number of ways to highlight important shifts in energy use patterns for transportation.

ACKNOWLEDGEMENT:
Oak Ridge National Laboratory

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Oak Ridge National Laboratory, Oak Ridge, Tennessee, 37830, Repr PC: Req Price

054301
TRANSPORTATION ENERGY USE AND CONSERVATION POTENTIAL

Hirst, E

Science and Public Affairs (Educational Foundation for Nuclear Science, 1020-24 East 58th Street, Chicago, Illinois, 60637)

Vol. 29, No. 9, Nov. 1973, 7 pp, 3 Fig, 4 Tab, 12 Ref

Recent history shows a steady growth in transportation energy use at a rate more than double the population growth rate. However, oil scarcities and increasing dependence on petroleum imports, coupled with rising environmental concern, could reverse these historical trends. It is technologically feasible to slow transportation energy growth by increasing transportation energy efficiency. Policies to achieve such goals would involve some life-style changes and important institutional decisions, but they do not imply a return to 'caves and candles'.

ACKNOWLEDGEMENT:
Science and Public Affairs

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054592
ENERGY AND TRANSPORTATION–BOTH NEED A LOOK

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 1, Jan. 1974, 3 pp

Our plentiful energy era is at an end. Such energy problems as the accelerating demand for fuel and electricity, the increasing cost and instability of our foreign sources, the failure of nuclear power to develop as rapidly as has been expected, and the strong constraints on the mining and burning of coal are mentioned. The energy problems will persist for at least a decade but two great untapped resources are in coal and in rail transportation. New mines, new rail facilities, and new technology will foster new energy but governmental policy changes will be needed.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

054599
FUEL CONSERVATION AND TRAIN HANDLING

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 4 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

Several measures of fuel conservation are presented: (1) When charging a train the Revving-Up should not be done unnecessarily or for too long a period of time; (2) Fuel is wasted by excessive use of stretch or power braking; (3) Fuel consumption can be reduced by lowering the train speed, reducing the speed when operating trains consisting of open top equipment, and shutting down diesel engines during layovers.

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Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054731
POLITICS, ECONOMICS, AND WORLD OIL

Adelman, MA, Massachusetts Institute of Technology

American Economic Review (American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 73212)

Vol. 64, No. 2, May 1974, pp 58-67, 23 Ref

Presented at the 86th Annual Meeting of the American Economic Association, New York, N.Y., December 28-30, 1973.

This article points out that petroleum production costs outside North America have been declining, not rising, and that scarcity is the pressure of demand on supply. The article indicates our government has surrendered to the Arab oil threats, and that the threats can be broken. It recommends the sound policy outside the U.S. is do nothing and say nothing, while inside the U.S. reducing dependence on Arab oil will weaken the Arab hand.

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American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212, Repr PC: Req Price

054732
INTERNATIONAL ENERGY SUPPLY. THE POLITICAL ECONOMY OF WORLD PETROLEUM

McKie, JW, Texas University, Austin

American Economic Review (American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212)

Vol. 64, No. 2, May 1974, pp 51-57, 8 Ref

Presented at the 86th Annual Meeting of the American Economic Association, New York, N.Y., December 28-30, 1973.

World oil is a mixture of economics and politics. Economic factors indicate competition among producers will again become effective provided the consuming nations do not capitulate in advance. Saudi Arabia is the dominant producer. Efforts on the supply side to develop additional reserves will only shift the exhaustion curve toward the present. Exponential growth in consumption has serious long run implications.

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American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212, Repr PC: Req Price

054758
TOWARD MORE TRANSPORTATION WITH LESS ENERGY

Rice, BA

Technology Review (Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139)

Vol. 76, No. 4, Feb. 1974, pp 45-53

Proposals for shifting intercity and urban traffic to modified systems with better energy efficiency are developed. With these, per capita transportation could be maintained or increased and door-to-door travel convenience could be maintained or improved within the hypothesized constraint. A table shows how the author would provide under what he calls a "semi-austerity" transport energy budget nearly twice the total of passenger–and ton-miles of transport by 1995 with no increase in petroleum consumption. The plan calls for considerable increase in the traffic carried by intercity passenger buses and trains, urban buses, and railway piggy-backing of road trailers. Two new developments are projected–a sizable fleet of urban passenger automobiles and a fleet of intercity passenger-carrier autotrains to give these urban automobiles intercity capability.

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054766
ENERGY. A CRISIS IN POWER

Holdren, JP, Lawrence Radiation Laboratory
Herrera,, Time Incorporated

Sierra Club, 250 West 57th Street, New York, New York, 10019

Book, 1971, 252 pp, Figs, Refs

America's appetite for energy–and particularly for electric power–is voracious. Some resource planners predict the production of power will continue to double every ten years just to meet the demand. But at what cost to the U.S. environment when fossil fuels pollute the air, hydropower plants destroy rivers and the "nukes" pose hazards that continue to be debated in every nuke-served community? Energy explores this dilemma on two levels. First, a scientist examines the sources and consumption of energy in the United States and describes how the production of power inevitably leaves its mark upon the environment. Then a journalist takes over, reporting on the remarkable efforts of concerned citizens to protect the environment from the ravages of power-triggered air, water and landscape pollution. Together, their observations raise hope that the United States can find a rational solution to its energy crisis.

ACKNOWLEDGEMENT:
Sierra Club

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Sierra Club, 250 West 57th Street, New York, New York, 10019, Repr PC: $2.75

054772
SCIENCE: ENERGY ISSUE

Science (American Association for Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C., 20005)

Vol. 184, No. 4134, Periodical, Apr. 1974

This issue of this journal is devoted entirely to the energy situation. Articles cover the end of low cost energy, impact on the social system, the public response, industry conservation of energy, individual self sufficiency, the failure of our institutions, energy R&D programs, growth policies, energy in food production, the import-export situation, input-output analysis, prospects for expanded crude oil production, coal use and coal gasification, and a timetable for expanded energy availability.

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054796
THE ENERGY-SAVING RAILWAY

DIE "ENERGIEFREUNDLICHE" BAHN
Lehmann, H

Die Bundesbahn (Hestra-Verlag, Darmstadt, West Germany)

Vol. 49, No. 11, 1973, 2 pp

78% of the DB's traffic volume uses its 9,500 km of electrified lines. The remaining percentage is shared between diesel traction (17%) and steam traction (5%). In 1973, the DB consumed 6.3 thousand million KWh of electrical energy, 10% of which was supplied by hydraulic power stations, 22% by transformation of the three-phase current from the national grid, and 68% by 7 thermal power stations. The DB consumed 480,000 tonnes of diesel oil and 65,000 t of fuel oil (in an oil-fired power station). In 1954, the DB's energy needs were equivalent to 10 million tons of coal, while in 1972, with 40% more traffic, they were equivalent to 4 million tonnes. In the German Federal Republic, the railway uses less than half the energy in Kcal per passenger-kilometre, while road vehicles are responsible for 60% of air pollution through dust and exhaust fumes.

ACKNOWLEDGEMENT:
International Union of Railways, 14

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
14

054797
EXPERIMENTAL STUDIES FOR SIMULATING THE OPTIMUM ENERGY SAVING CONTROL OF TRAINS

EXPERIMENTELLE SIMULATIONSSTUDIEN ZUR ENERGIEOPTIMALEN ZUGSTEUERUNG
Horn, P

DET-Die Eisenbahntechnik (VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany)

1973, 11 pp, 3 Fig

Theoretical and experimental studies of the punctual and energy-saving control of individual train journeys include a new access to setting up an (energy-) optimum algorithm of regulation and its practical trial by means of simulation. On the basis of the theory of optimum processes, in particular of Pontryaghin's maximum principle, such experimental studies proved to be advantageous because they make it possible to examine a new type of regulation principle, to save costs, to study man-machine problems, and to train students with respect to practical aspects.

ACKNOWLEDGEMENT:
International Union of Railways, 119

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119

054798
LONG-RANGE PLANNING AND THE ENERGY CRISIS

Foley, G

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 12, Dec. 1973, 4 pp, 4 Fig

Major investment decisions for motive power typically involve time scales of 20 to 50 years and the author points out that peak oil production will be achieved well within this period. A powerful case can be made for electrification of all but the least important lines, and this is reinforced by the much higher mechanical efficiency of rail transport compared to road.

ACKNOWLEDGEMENT:
International Union of Railways, 16

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056751
DEVELOPMENT OF ENERGY NEEDS FOR PUBLIC TRANSPORTATION IN A LARGE CITY AND TECHNICAL MEANS FOR SATISFYING THEM

L'EVOLUTION DES BESOINS EN ENERGIE DES TRANSPORTS EN COMMUN D'UNE GRANDE VILLE ET DES MOYENS TECHNIQUES EMPLOYES POUR LES SATISFAIRE

Guieysse, L

World Energy Conference, 8th, Bucharest, Romania

Power requirements of the different transport systems in Paris, France, such as bus routes, urban metro and regional express metro, are discussed, along with technical developments related to their growth. Special features of autonomy, safety and automation of the metro power supply network are considered. Prospects of the various methods used for power conversion are described.

ACKNOWLEDGEMENT:
Engineering Index, EIX740505279

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056754
ENERGY CONSUMPTION IN JAPANESE NATIONAL RAILWAYS. IN COMPARISON WITH OTHER MEDIA OF TRANSPORT

Kogawa, T Ishihara, T

World Energy Conference, 8th, Bucharest, Romania

Explanations are given on the energy consumption of various motive power systems adopted by Japanese National Railways (JNR) for traction and also on the high efficiency of electric traction which consumes less energy even compared with airplane and motor transportation. Advantages resulting from the use of railroad transportation are discussed, particularly those beneficial to the environment, such as lower traffic congestion, noise, and air pollution.

ACKNOWLEDGEMENT:
Engineering Index, EIX740505283

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056767
CHANGE IN USSR RAILWAY FUEL AND ENERGY BALANCE AND ITS COORDINATION WITH THE NATION FUEL AND ENERGY BALANCE

Perzovsky, LM

World Energy Conference, 8th, Bucharest, Romania

5 Ref

The change in fuel and energy balance of the USSR Railway System during the 1950-1970 period is considered. During this period the consumption of energy resources was reduced by 24% with a four-fold increase of the volume of traffic. This is the result of the replacement of steam traction by electric and diesel traction, beginning in 1955. It is forecast that in the near future steam traction will be completely replaced by new types of traction. Based on studies, it is concluded that under conditions prevailing in the USSR it is economically expedient to increase the volume of traffic hauled by electric traction.

ACKNOWLEDGEMENT:
Engineering Index, EIX740505281

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056768
CHANGES IN THE APPLICATION AND UTILIZATION OF ENERGY ON THE RAILWAYS

Kniffler, A

World Energy Conference, 8th, Bucharest, Romania

A status report is presented pertaining to the West German Railroad System. Achievements attained because of conversion from steam traction to modern methods using oil or electric traction are discussed. A comparison was made with other European railroad systems.

ACKNOWLEDGEMENT:
Engineering Index, EIX740505280

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056824
STEAM-HYDRAULIC LOCOMOTIVE. (A PRACTICAL MEANS OF RE-EMPLOYING COAL AS A TRANSPORTATION INDUSTRY FUEL)

Cover, TL

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/RT-7, Paper, Nov. 1973

A unique concept in locomotives is presented. The design is that of a 6000-hp steam turbine-hydraulic locomotive fueled by a suspension of coal in oil. Combined-fuel firing is employed to permit using combinations of more available or more economical fuels while meeting air quality standards, and to take advantage of modern automatic firing equipment for liquid and suspension fuels. A modern packaged watertube steam generator is used for the steam source, taking advantage of the packaged boiler concept which requires that the boiler meet railroad loading gauges for rail shipment. In keeping with present-day stationary practice, firing and feedwater regulation would be automatic. In general arrangement and in operation over the road this locomotive would resemble present diesel-electric locomotives. However, the locomotive described in this paper would reduce oil requirements by one-third.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104845

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057152
THE ENERGY CRISIS IN THE UNITED STATES

Gambs, GC, Ford Bacon and Davis, Incorporated

Defense Transportation Journal (National Defense Transportation Association, 1612 K Street, NW, Washington, D.C., 20006)

Vol. 29, No. 6, Nov. 1973, pp 22-25, Tabs

The present energy crisis in the United States is a complex mixture of insufficient electric generating capacity and an insufficient supply of fossil fuels. Over 15 percent of our total energy requirements are imported now and our dependence on outside sources of energy is rapidly increasing and will reach 40 to 50 percent by 1980-1985. The predictions for the future of the U.S. because of the energy crisis are grim but there are a number of actions which should be taken immediately in order to prevent the situation from becoming worse than it already is. These actions are presented by the author along with an action plan.

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National Defense Transportation Association, 1612 K Street, NW, Washington, D.C., 20006, Repr PC: Req Price

057184
THE IMPACT OF THE MOTOR CAR ON OIL RESERVES

Leach, G, Sussex University

Energy Policy (IPC Science and Technology Press Limited, IPC House, 32 High Street, Guildford, Surrey, England)

Vol. 1, No. 3, Dec. 1973, pp 195-207, 3 Fig., 4 Tab.

The rising demand for oil in the industrialized world is already being driven to some extent by the very rapid growth of car ownership. This is particularly true of the USA, where 50% of crude oil consumption (compared to only 17% in Europe) goes into fuels for road vehicles, mostly automobiles. The situation will be greatly exacerbated if the world car population grows as fast as some forecasts indicate, and if present patterns of fuel consumption per vehicle persist. The real question highlighted is not so much whether the world will run short of oil because of the growing number of motor vehicles, nor whether technical developments can avert such a crisis. The real question is how governments and communities generally will act in this situation.

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IPC Science and Technology Press Limited, IPC House, 32 High Street, Guildford, Surrey, England, Repr. PC: Req. Price

057185
THE U.S. ENERGY CRISIS: A SCIENTISTS VIEW

White, D, Massachusetts Institute of Technology

Energy Policy (IPC Science and Technology Press Limited, IPC House, 32 High Street, Guildford, Surrey, England)

Vol. 1, No. 2, Sept. 1973, pp 130-135, 4 Tab.

The U.S. energy crisis has been defined and analyzed in many different ways: some have even dismissed it as an illusion or a fabrication. Here, Professor White, Director of the recently-formed Energy Laboratory at MIT argues that the crisis is a political and an economic one, and that growing energy consumption, dwindling domestic reserves and environmental disruption are merely symptoms.

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IPC Science and Technology Press Limited, IPC House, 32 High Street, Guildford, Surrey, England, Repr. PC: Req. Price

046427
LARGE NO-BREAK SYSTEM AND EMERGENCY-POWER PLANT INSTALLED AT NETHERLANDS RAILWAY'S COMPUTER CENTRE

Boers, GH

Holecpost (Smit Nijmegen Electrotechnische Fabrieken N.V., Groenestraat 336, Nijmegen, Netherlands)

Vol. 8, No. 2, Dec. 1972, pp 52-55

The computer center is equipped with an extensive installation for emergency power supply, to satisfy the requirements as regards quality and continuity of the electric energy supply. Two 200-kva parallel-operating Heemaf diesel no-break sets (to be extended to three units) were installed to guarantee pure and uninterrupted power supply to the consumers in the computer room. Also installed were three 400-kva parallel-operating emergency-power generating sets for the power supply to the crucial auxiliary computer equipment during line failure. Normal operation when line voltage is available is discussed, along with emergency operation when line power fails. The return to normal operation when line voltage is available again is also considered.

ACKNOWLEDGEMENT:
Engineering Index, EI 73 016575

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046720
RAILWAY FREIGHT INFORMATION SYSTEM

Matsui, R Nukui, N

Sperry Technology (Sperry Rand Corporation, 1209 Avenue of the Americas, New York, New York, 10019)

In spite of the spectacular growth of the Japanese economy, railway freight tonnage in that country has leveled off in recent years due to an increase in competitive trucking services. To remedy this situation, the Japanese National Railway (JNR) has embarked on an extensive modernization program to streamline its methods of controlling the flow of freight traffic and to create a total freight information system through computerization. Much of this has been achieved through the use of special-purpose commodity cars, the introduction of advanced container shipping methods, and the creation of an inter-block express information system. The latter is designed to provide immediate space-available information for securing sales, automatic printouts, the forwarding of waybills to receiving stations, and, eventually, data on the location and movement of the trains.

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Sperry Rand Corporation, 1209 Avenue of the Americas, New York, New York, 10019, Repr PC: Req Price

046896
CIMSYS HAS THE ANSWERS

Container News (Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001)

Vol. 8, N7, July 1973, p 42

The Philadelphia-based Lavino Shipping Company opted for electronic data processing three years ago to simplify documentation for the 16 steamship companies the firm represents, four of them container lines with an inventory of more than 20,000 boxes. Working from the basic document, the bill of lading, the computer produced two types of printed manifests that met all carrier and government requirements. Today the process has been refined to perform all freight calculations and to select rates from tariffs set by various conferences. It also keeps track of containers and chassis en route or in storage. Called Computerized Intermodal Management System (CIMSYS), the computer keeps the current status of all containers and chassis and controls equipment assignments.

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Communication Channels, Incorporated, 461 8th Avenue, New York, New York, Repr PC: Req Price

046991
AAR OK'S TRAIN II

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 4, N7, July 1973, p 27

TRAIN II, the railroad industry's more advanced and sophisticated national freight car information system was approved by the Association of American Railroads' board of directors at its May 25 meeting. TRAIN II, successor to the present TRAIN (Tele-Rail Automated Information Network), is expected to provide major benefits in these areas: —Car use, quality of service, car distribution, clerical and administrative costs, and railroad data systems.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

047407
MOPAC WORKS ON CAR CONTROL SYSTEM

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 4, No. 8, Aug. 1973, 1 p

Missouri Pacific is well on its way toward a transportation control system to provide optimum control of its freight car fleet. D. L. Manion, vice-president operations, described MoPac philosophy and outlook for its TCS operations at the winter meeting of the Transportation Data Coordinating Committee.

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047408
FACSIMILE HELPS BN SERVE ITS CUSTOMERS

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 4, No. 8, Aug. 1973, 1 p

An integral part of BN's COMPASS is a facsimile communications system which consists of dex facsimile terminals manufactured by Graphic Sciences, Inc. BN uses the dex facsimile units to connect its remote yards and industrial service centers for the transmission of switching orders, car checks and work completed reports. This information is processed into the company's computers where it is available for instantaneous car checks. Through this system, the BN keeps accurate and real-time control of cars and car movement on its railroad system and this promotes more effective utilization of its cars and equipment.

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047409
GRAND TRUNK WESTERN WILL INSTALL SYSTEM-WIDE ACI NETWORK

Railway System Controls (Simmons-Boardman Publishing

Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 4, No. 8, Aug. 1973, 2 pp

Grand Trunk Western has embarked on a two-year, $7.5 million program to provide for a most advanced and comprehensive computer network. Plans for the electronic information system, which will locate and identify all of the railroad's freight cars and trains at a moment's notice, were revealed. "Grand Trunk Western will be the first railroad in North America with a completely integrated automatic information system on car movements, operations and revenues."

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047508
"CYBERNETIC ISLAND HANOVER": A LARGE-SCALE TEST FOR THE RAILROAD TRANSPORT CONTROL

KYBERNETISCHE INSEL HANNOVER EIN GROSSVERSUCH ZUR EISENBAHN-TRANSPORTSTEUERUNG
Wunderlich, WS

Siemens Review (Siemens-Aktiengesellschaft, 8520 Erlangen 2, West Germany)

Vol. 45, 1971, pp 100-103

Special Issue, Bahntechnik.

The German Federal Railway employs in the large-scale test "Cybernetic Island Hanover" data processing installations for integrated transport control. In the data acquisition, the required information is immediately fed into an EDP, the consignment note including the calculated costs is printed out, and the transport order given to the Traffic Operating Department. A second EDP "makes up" or "splits up" the respective trains. In the west-east-system of the marshalling yard Seelze, 42 departure yards are involved. The third EDP controls the circulation of trains on the line, among others in dependence on the splitting-up yard requirements. This large-scale test is expected to prove that automation by means of data processing installations forms the basis of a quick, frictionless and rational transport service.

ACKNOWLEDGEMENT:
Engineering Index, EI 73 027041

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047730
SCL GOES TO OPERATION CONTROL

Railway System Controls (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 2, N5, May 1971, pp 23-26

Seaboard Coast Line's Railroad Operations Control System-(ROCS) receives waybill information and advance train consist while providing car scheduling. It maintains 4 on-line disk files: Station Audit Master, Equipment, QTAM Queue, and Move Suspense. The current system does not provide actual control of freight operations. The initial goal of SCL's Railroad Operations Control System is centralized control of freight transportation and maintenance, which is comprised of the following functions: schedule empty cars, schedule loaded cars, schedule power, schedule crews, dispatching, yard operations control systems interface, train calling, dynamic train scheduling, dynamic blocking strategy, dynamic train classification, schedule locomotive maintenance, schedule car maintenance, and schedule roadway maintenance. Auxiliary functions include: performance statistics, performance evaluation, adaptive processor, status monitor, exception reports, query/response and decision processor.

ACKNOWLEDGEMENT:
Association of American Railroads

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047786
CURRENT POSITION OF CENTRALISED FREIGHT TRAFFIC MANAGEMENT AT THE SNCF

OU EN EST LA GESTION CENTRALISEE DU TRAFFIC MARCHANDISES
Plantureux, J

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Nov. 1972, pp 700

In this article, Mr. Plantureux, Ingenieur en Chef at the SNCF Transport Management, recalls what is meant by "Centralised Management" on which subject the RGCF devoted its March 1971 issue; he then explains the three stages planned for its introduction and reviews the position as at 1 July 1972. The third stage, which will mark the extension of new methods to the whole SNCF system, is now in progress and should be completed in the first half of 1974. In conclusion, the author states that studies on the Centralised Management of Passenger Traffic have just begun but the work is difficult and the first stage is to prepare an involved specification so that data on train formation can be placed in store for the automatic reservation of accommodation later on.

ACKNOWLEDGEMENT:
International Union of Railways

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047788
INFORMATION PROCESSING AT THE SERVICE OF RESEARCH

L'INFORMATIQUE AU SERVICE DE LA RECHERCHE
Tessier, M

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Nov. 1972, pp 730

The author, Ingenieur General, Head of the SNCF Research Department, explains the conditions under which information processing is used in his Department and how it differs from business information processing: scientific information processing and operational information processing are the two headings explored. Mr. Tessier describes the applications of both, their respective theoretical, technical and economic spheres, the methods employed; he gives numerous examples of the variety of uses to which they are put and closes by stating the potential and needs of information processing: ever-growing resources opening new paths for research.

ACKNOWLEDGEMENT:
International Union of Railways

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047789
SNCF SUPPLIES DEPARTMENT SPECIAL ELECTRONIC DATA PROCESSING CENTRE

L'ENSEMBLE ELECTRONIQUE SPECIALISE DU SERVICE DES APPROVISIONNEMENTS
Dreyfus, H

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Nov. 1972, p 726

The author, Ingenieur General, Assistant to the Head of the Information Processing Department, explains the field of computer data processing in this Department and the very high number of multiple operations involved. He shows how since 1960 the Department has studied the problem by building up a file, then renting a B 3500 computer from the Burroughs Company (third generation); he then gives details of the varied tasks carried out with this computer and developments in processing methods. This is a good example of the progressive integration of processing by computer and business management incorporating most varied operations with a commercial background. New extensions are already planned.

ACKNOWLEDGEMENT:
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047790
BUILDING FOR SNCF ELECTRONIC DATA PROCESSORS

LE BATIMENT DES ENSEMBLES ELECTRONIQUES
Humbertjean, R

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Nov. 1972, p 711

Mr. H. Dreyfus, Assistant to the Head of the SNCF Information Processing Department, introduces these two articles. He explains the difference between the airways and the railways reservation systems, the former issuing the passenger a complete ticket immediately; he reveals the complexity of the problem and also the advantages of finding a solution to it quickly. In the first article, the authors, who are Ingenieurs Principaux at the Transport Management and Information Processing Department, after giving a short historical account, explain the studies carried out and the objectives of the electronic reservation of accommodation, as well as the methods followed to achieve them; they underline the efforts made to widen, by improving them in both quality and quantity, the conditions of use and the services provided customers, as well as to raise the efficiency of rolling stock management. In the second article, Mr. Humbertjean, Chief Architect at the Equipment Management, explains the importance of the equipment of all types that will be required for the operation of the electronic seat reservation computers. He refers to the precautions of all kinds that have to be taken when installing such equipment and as a consequence, the special conditions that have to be observed when designing and constructing, and subsequently managing, the important building for housing it adjacent to Paris-Pont-Cardinet station; he gives its characteristics, the construction methods used and the special technical arrangements made, more particularly for telecommunications.

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047791
THE DEVELOPMENT OF INFORMATION PROCESSING FOR TRACTION

LE DEVELOPPEMENT DE L'INFORMATIQUE DANS LE DOMAINE DE A TRACTION
Vicaire, P

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Nov. 1972, p 719, 9 Fig

The author, Head of the Rolling Stock and Traction Department of the SNCF Western Region, explains the studies carried out on the application of information processing to problems involved in the preparation of rosters (a specific and combinative problem) and by the daily implementation of these rosters (an extremely aleatory problem). He underlines the importance of these studies from the technical, management, psychological and human standpoints because on one side there are the tractive units and their operation, and on the other the staff and the social considerations. Mr. Vicaire gives details of the methods employed when using a computer, the limits of the programme and the results obtained. He concludes by stating that ten years of effort are leading to actual applications and the present situation is such that worthwhile developments in the near future are ensured.

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047792
INFORMATION PROCESSING AT THE SNCF

L'INFORMATIQUE A LA SNCF
Fioc, A

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Nov. 1972, p 684, 2 Fig

The author, Director of General Studies, Head of the Information Processing Department, recalls the different articles published on this subject since 1961 in the Revue Generale and refers to the ones appearing in the special issue on information processing. After giving a brief historical background, he makes a number of more general and more synthetic reflections than those found in the articles on the important place now taken by information processing in the management of the SNCF, as well as in the most varied and advanced research on railway techniques. He mentions that ideas and achievements have evolved rapidly in a rather "explosive" atmosphere; he deals in turn with SNCF information processing equipment and its conditions of use, material and staff, the teleprocessing network, and finally the very diverse information processing applications: ordinary business management, operational research, applications of the technical, scientific and cybernetics kind. He then considers the international aspects of railway information processing and describes the new SNCF information processing organisation, which became operative on 1 January 1972 and marks the end of the first stage, as well as the objectives. In conclusion, he explains the many important lessons learnt by the S.N.C.F. from its experience, one of the major ones being that the undertaking must remain master of such a powerful tool with so large potentials.

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047814
INFORMATION RETRIEVAL ON-LINE

Lancaster, FW, Illinois University, Urbana
Gallup, E, Computer Sciences Corporation

Melville Publishing Company, 11661 San Vicente Boulevard, Los Angeles, California, 90049

Book, 1973, 500 pp

This text treats current developments in the design, operation and evaluation of information retrieval systems operating in an on-line, realtime, time-shared, interactive mode. Look for coverage of—characteristics and advantages of on-line systems; equipment; searching techniques; description of existing systems; operating experience; evaluation of on-line systems; indexing and cataloging on-line; on-line support to personal files; and human factors aspects of on-line retrieval systems.

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Melville Publishing Company, 11661 San Vicente Boulevard, Los Angeles, California, 90049, Orig PC: $15.95

047815
THE ANALYSIS OF INFORMATION SYSTEMS

Meadow, CT, Atomic Energy Commission

Melville Publishing Company, 11661 San Vicente Boulevard, Los Angeles, California, 90049

Book, 1973, 448 pp

This text requires virtually no mathematical background and a modest knowledge of computers and programming. It emphasizes how information is organized, stored and retrieved with the aid of computers. It recognizes information retrieval as a communications process between man and computer and describes the basic nature of this communication, along with the various languages used for non-machine communication, how retrieval is done, how information is structured and how computers are used in the process. It also describes basic file processes, data access systems, interactive information retrieval, programming language considerations and generalized data management systems.

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047816
INFORMATION PROCESSING AND COMPUTER PROGRAMMING: AN INTRODUCTION

Hill, HC, San Diego Junior Colleges

Melville Publishing Company, 11661 San Vicente Boulevard, Los Angeles, California, 90049

Book, 1973, 408 pp

A simply written, but authoritative book for the beginning student in logic and principles of computers and their use. It introduces concepts with an actual machine language program and presents in a progressive manner, their relationships with various aspects of computers, including modern data processing devices and programming languages. A student involvement study supplement at the end of each chapter gives students an opportunity to learn by doing, with practical problems. The Case Study Problem Statement is introduced early so students can work solutions for problems as they progress through each chapter and visualize the logical relationships of each step in the solution. All computer concepts, programming illustrations and study problems are IBM System/360 oriented.

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Melville Publishing Company, 11661 San Vicente Boulevard, Los Angeles, California, 90049, Repr PC: $9.95, Orig PC: $12.95

047826
COMPUTERS–WHO NEEDS THEM?

American Association of Railroad Superintendents, 18154 Harwood Avenue, Homewood, Illinois, 60403

1973, 246 pp

Proceedings of the Seventy-Sixth Annual Meeting, American Association of Railroad Superintendents, Chicago, Illinois, 13-15 June 1972.

It is hard to imagine a single phase of railroad operations that could not be improved through computerization. The number of programs that can be developed for operational use is limitless but can only be realized by the urging of curious and dedicated operating officers with a thirst for proficiency. The computer now provides the superintendent with advance consists and their car-classification information, and an instant-car-location capability. This information allows him to effectively deal with all car supplies in his division. Computer assistance in dispatching, programming for maintenance, and adjustments for malfunctions will significantly increase the effectiveness of power distribution for a superintendent. The entire concept of service is dependent on the efficient use of manpower, equipment, power and their coordination. The increased use of the computer will provide the superintendent with the necessary information to coordinate his resources to avoid costly delays to both railroads and industry.

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047937
SOME COMPUTER APPLICATIONS IN RAILWAY MANAGEMENT

Shea, RA, Canadian Pacific

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

Transportation companies have been involved for many years with computers and many have, by any standard, very large installations. However, when one looks at the uses one can see that they are generally being used to carry-out what were clerical functions. Even advanced systems such as car tracing are really clerical functions. The computers are admittedly now being used to produce summary data on movements, commodities being handled, gross revenues, etc., all of which is very useful information. First, what is the nature of the management function? The textbook answer to this is: 1) formulate plans, 2) assign the resources, and 3) measure results. Most of what is presently being done by the computer is to measure results. In many instances we attempt to measure results but we have no way of associating these results with particular decisions or actions on our part. As far as formulating plans, we have made little use of the computer. We are improving in this area and one such application is described. As far as assigning resources is concerned, we may or may not use the computer. An application in this area is described in this paper.

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047955
MOPAC'S TRANSPORTATION CONTROL SYSTEM. A SYSTEMS APPROACH TO ACHIEVING SERVICE RELIABILITY

Sines, G, Missouri Pacific Railroad

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

Missouri Pacific is undertaking the development of a large on-line real-time information and control system identified as the Transportation Control System (TCS) whose paramount design objective is to improve service reliability. This objective will be achieved through the design and implementation of a subsystem called car scheduling. TCS is also a large comprehensive system embracing other significant design objectives that will strengthen MoPac's position in the rail transportation sector.

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050465
TOPS TAKES OVER IN THE WEST OF ENGLAND

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 10, Oct. 1973, 4 pp, 3 Phot

On September 30 British Rail brought into use the first phase of its computer-based rolling stock control scheme, due to cover the whole country by 1975. By adapting Southern Pacific's TOPS with the minimum of alteration to suit British conditions, BR has been able to implement the scheme very quickly and hopes as a result to improve the finances of its freight business by at least 10 million English pound a year.

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050616
KEEPING YOUR SYSTEM 'UP'

Stevens, RT, Mitre Corporation

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, No. 11, Nov. 1973, pp 76-81, 6 Fig, 1 Tab, 3 Ref

When guaranteed real-time access and reaction are required of a critical system, an uninterruptible power system is a must. Most large-scale computer and control systems used in such critical applications as airline ticket reservations, air traffic controllers, and chemical processing plants are provided with redundant elements, automatic reconfiguration, or other safeguards to assure that data processing is not interrupted by computer element failures. But despite such precautions, these systems are still subject to commercial power system problems. Regulating transformers and similar devices can help a data system coast over short power transients but, for full protection, an uninterruptible power system (UPS) is needed.

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050652
SECURITY STANDARDS FOR DATA PROCESSING

Woolridge, S Corder, CR Johnson, CR

Wiley (John) and Sons, Incorporated, 605 Third Avenue, New York, New York, 10016

1973, 186 pp

An Anglo-American effort, incorporating the latest security techniques, to determine the existing risks and establish practical measures for the protection of computer installations.

ACKNOWLEDGEMENT:
Science News

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Wiley (John) and Sons, Incorporated, 605 Third Avenue, New York, New York, 10016, Repr PC: $14.95

050678
A PROFITABILITY MEASUREMENT INFORMATION SYSTEM AS A MANAGEMENT TOOL FOR OPTIMIZING RAILROAD PERFORMANCE

Bocher, HW, Penn Central Transportation Company
Fink, CE, Penn Central Transportation Company

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973, 3 pp

Profitability, defined in general terms of revenue and cost, is shown to be meaningful to managers of both publicly and privately owned railroads when taken out of the purview of its economic definition. In the "going concern" rationale, profit is a means of evaluating competing operational alternatives as opposed to competing business alternatives (i.e. investment opportunities, sources of funding, competition, geographical location, stockholders interests, etc.). While economic profit can be used to measure the abstract behavior of a railroad system, operational profit best describes real behavior on a continuing basis. Railroad profitability is thus presented in a simplified format to facilitate comprehension of the general before attempting to understand, categorize and measure the necessary specifics. Successively lower, more detailed elemental levels are delineated as components of railroad profitability which must be uniquely identifiable. This approach to system design, though referred to as a Profitability Measurement Information System (PROMIS), is in no way offered as a complete system. Rather, it is suggested as a conceptual framework for development of profitability measurement systems. The PROMIS concept emphasizes progression from the general to the specific in system design while requiring built-in flexibility to permit post-implementation enhancement of the system. PROMIS further demands clearly detailed definition of even the most elementary components and thorough, continuing care that only identically defined components are combined or related in any way. It is the responsibility of the system designer to insure application of these concepts in the development, in cooperation with railroad management, of a meaningful profitability measurement information system.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050679

OPTIMIZATION OF THE CENTRALIZED MANAGEMENT OF FREIGHT TRAFFIC IN INDIVIDUAL WAGONS UIC-METRA STUDY

Revol, B, French National Railways
Gochet, M, Belgian National Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, 8 pp, 4 Tab

In 1966, the UIC Committee of Chief Operations Managers decided, with the assistance of an external research office (METRA INTERNATIONAL), to order a thorough study of the possibilities afforded by Operational Research for the optimization of the management of freight traffic in individual wagons. The initial phase revealed the need for dividing the system studied into a certain number of more manageable sub-systems; a plan of action describing the connection and sequence of these sub-systems has been prepared, and the various processing expedients necessary have been defined. In the second phase, the construction and perfecting of the various processing expedients were undertaken, and covered: (1) a marshalling yard simulation model; (2) an analytical model for the optimization of the transport system; (3) a general simulation model representing the inter-yard network; and (4) an analytical model for the optimization of the distribution of empty wagons between zones. In each case, the model was applied to a firm problem, in order to verify its validity and controlability. This paper describes the various models and gives the results obtained. These latter show that operating problems concerning the forwarding of individual wagons can be dealt with using modern expedients such as computer-based models. The paper concludes with certain considerations regarding the advantages and disadvantages presented by the joint study of such problems and recourse to an outside firm.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050681

THE SYSTEM OF CENTRAILSED FREIGHT OF THE BELGIAN NATIONAL RAILWAYS (SNCB)

Dekempeneer, J, Societe Nationale des Chemins de fer Belges

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, 5 pp, 3 Fig

The need for improving the output of the means of action, i.e. fixed installations, rolling stock, staff, etc., also the quality of service, led the SNCB to introduce a modern system for the centralized freight traffic control. The SNCB chose a decentralized three level system, based essentially on a chain of process computers, situated in marshalling yards and connected to the peripheral points of the operational centres on the one hand, and to a powerful central computer on the other. This paper sets out the reasons for this choice, describes the technical and information processing infrastructure of the system, and explains its functioning. In particular, it covers the applications of the system, both at local and regional level and at central level, on a short, medium and long term basis, and demonstrates the advantages which it affords, both to the operating and to other departments. In conclusion, it gives certain considerations on the economic aspects of this achievement.

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050682

THE SJ SYSTEM FOR CAR TRACING AND OPERATING CONTROL

Rosqvist, G, Swedish State Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 1, Sept. 1973, 3 pp

The Swedish State Railways have since August 1966 in operation a computerized system which is: (1) a full scale trial system intended to facilitate car tracing and also; and (2) an information system for the actual decisions and for future development. The basic input to the system are the train consists reported over the SJ teletype network and fed by way of paper tape to a computer of the type IBM 360/30. The information updates a card-file stored on disc memories. From this card-file information about the geographical position and actual task of every freight car in Sweden can be obtained. Every day information about 300-400 is distributed. This type of information can be given in a more sophisticated way for any number of cars with certain qualities in common (category, destination arrival time etc.). It can also be transformed to a daily report about the utilization of standard cars within the different traffic areas as a basis for distribution of empties. According to European rules for international traffic freight cars should be given periodical maintenance, in general every fourth year. Since December 1969 the ordering of freight cars to workshops for maintenance in Sweden is done automatically. This routine has also made it possible to distinguish certain car categories which can be given longer periods between overhauls. All information collected in the system is stored in such a way that it can be computed statistically later. Thus a data bank has been created that can produce information on demand regarding: (a) traffic flows; (b) turn round times; (c) mileage and production of different car types; (d) car utilization within the traffic areas; and (e) train utilization. This routine is also used to produce the basic information for the per diem calculations.

ACKNOWLEDGEMENT:
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050683

CRITICAL CHARACTERISTICS OF TOTAL OPERATIONS PROCESSING SYSTEMS (TOPS)

Germany, JW, Southern Pacific Transportation Company

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973, 4 pp

TOPS is an on-line real time computer information and control system. It was designed to provide a real time control over the movement of equipment and to supply up-to-the-minute information to various user departments, including Operating, Transportation, Accounting and Marketing. The system uses two IBM Model 370/165 computers located in San Francisco. One of these is one-line at all times and is in constant communication with approximately 500 input/output terminals located throughout the railroad and at certain off-line major marketing locations. The other computer is used for back-up purposes, off-line processing of data and for testing future programs. The basic characteristics of TOPS is that as an event occurs in the field, it is reported to the computer, which updates the appropriate files and makes the information therefrom available, either upon request or automatically. It includes a highly disciplined set of monitoring logic to insure a high degree of data base reliability. An average day will comprise approximately 55,000 messages ranging from basic car inquiries to the more detailed train and car movement reportings. The CPU is geared to handle 1.5 messages per second and has a core storage capacity of 1.5 million bytes. It also has nine 2,314

disk storage units associated with it, each of which has a capacity of 232 million bytes. Some of the critical characteristics of TOPS will follow in more detail.

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Rail International

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051301
INFORMATION FLOW IN THE BART CONTROL COMPUTER SYSTEM

Matteson, LG, Westinghouse Electric Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-32, 1973, 4 pp

The control system for San Francisco's Bay Area Rapid Transit (BART) consists of several levels of control: a primary level operated by equipment at each passenger station and a secondary level accomplished by the central computer control system. This paper describes the control capabilities of each level of control and the ways in which the two work together to control and optimize the movement of trains on the system.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051344
DEVELOPMENT AND USE OF COMPUTER SIMULATION METHODS BY THE SNCF

UTILISATION ET DEVELOPPEMENT A LA S.N.C.F. DES METHODES DE SIMULATION SUR ORDINATEUR

Meyer, JL

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

No. 92, Oct. 1973, pp 549-560, 6 Fig

In this article, the author, who is an Ingenieur Principal Hors Classe at the SNCF Research Department, explains that the difficulties encountered in achieving the optimum organization of complex undertakings, such as railway systems, have led to the design of simulation models. By taking advantage of the high capacity of modern computers, such models enable the functioning of these systems to be reproduced and followed in time, thereby providing an intermediate research stage between mathematical theory and full-scale tests. A number of such models have been developed by the SNCF; it is likely that their already wide scope of use will be considerably extended. The author considers the definition and purpose of simulations (concept of systems and models), and gives some specific examples of rapid research development at the SNCF and simulations already carried out. In conclusion he states that two main families of railway simulation can be distinguished: research simulation and real-time simulation, for which he feels there is a great future.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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051921
SECURITY FOR COMPUTER SYSTEMS

Farr, MAL Chadwick, B Wong, KK

National Computing Centre, Limited, Quay House, Quay Street, Manchester M3 3HU, England

Book, 1972, 172 pp

Except where security has been very obviously of major importance it has, in the past, often been largely ignored by designers of computer systems. This situation is rapidly changing, but a great deal still needs to be done to establish recognized codes of good practice. This publication lists threats to computer systems and suggests possible safeguards. It is intended to give initial guidance to those concerned with securing their own installations. The book provides a review of security techniques, putting each one into broad categories of cost and effectiveness. The range of such techniques covers not only the functions of computer operating systems and hardware but also personnel management problems and physical security. A cost-effectiveness matrix in the appendix highlights the effects of various security techniques as applied to different types of risks with negligible, low or high cost.

ACKNOWLEDGEMENT:
British Railways, 29859

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052070
A FIVE YEAR PLAN FOR IMPROVED DATA PROCESSING AND OPERATIONS CONTROL

Chicago Transit Authority, Merchandise Mart Plaza, P.O. Box 3555, Chicago, Illinois, 60654

49 pp, Figs

With the long-range development plans of CTA, effective and timely reporting of all operations to management becomes increasingly significant. Moreover, with clerical costs rising the adoption of advanced data processing techniques becomes more essential. This report summarizes the results of a review initiated and conducted by CTA and Arthur Andersen & Co. The review was basically a high-spot evaluation of management reports and clerical activities in the scheduling, purchasing, accounting and related departments. A potential for improvement exists in almost every area of the present accounting operations and in many related clerical activities.

ACKNOWLEDGEMENT:
Chicago Transit Authority

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052081
COMPUTER SIMULATION AIDS TRAIN SERVICE PLANNING

Stewart, JM, British Railways Board Research Department

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 3 pp, 1 Fig, 1 Phot

In addition to testing various patterns of train service to ensure that they are practicable, simulation programs can be devised to show the effect of a disturbance to normal workings so that alternative correction stratigies can be compared.

ACKNOWLEDGEMENT:
Railway Gazette International

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052115
RAILYARD AUTOMATION

Brosvic, J, Honeywell Industrial Division

Honeywell Computer Journal (Subscription Service, P.O. Box 6000, Phoenix, Arizona, 85005)

Vol. 6, No. 3, 1972

Automation of a key rail terminal of the Santa Fe System at Argentine, Kansas is described, with an aim to expansion and modernization. A basic objective of expansion was to double the capacity of the yard to handle 6000 railroad cars arriving or departing on a single day. A secondary, but significant justification, was the minimization of freight car idle time and of damage to physical loads that can be caused by manual switching.

ACKNOWLEDGEMENT:
Engineering Index, EIX731201524

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053762
MANAGEMENT AND PLANNING OF FREIGHT TRAFFIC

Ruckel, R, German Federal Railway

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 4 pp, 9 Ref

Presented at Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C. This paper was also published in the November-December, 1973 issue of Rail International, which is available from E.S.L.

In its "Report relating to the stabilizing of the economic situation on the DB", the Board of Management of the latter undertaking again made a clear distinction between an administrative concept satisfied with maintaining the status quo, and the dynamic concept of a management prepared to carry out a policy acknowledging changes. Contrary to the management of a private economy undertaking, the leadership of a State railway undertaking does not exercise its functions within the management process independently. In the transport programme relating to freight traffic, it is necessary to plan the complete chain of production activities at the level of the undertaking organization. Here, the management must optimize the transport in relation to viability, capacity of output and profitability. Today, the DB already possesses, as modern means of planning, concrete information from the wagon flows concerning the entire rail network and from the electronic processing of information. To ensure that it is possible not only to control the existing offer by means of this data after the event, but also to be in possession of data for orienting the planning of future transport operations, it is necessary to employ modern methods of operational research to assist the management in its decisions relating to the optimization of the transport programme. The utility and application potential of planning models, still partly in the course of development, will differ depending on the level of management and the period covered by the planning exercise. The new concept of planning for freight trains means that cybernetics must be employed: both for optimizing the structure of the services and production methods, and in connection with the output from integrated transport management and automation.

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053763
FS TRIALS AND PROGRAMS IN CONNECTION WITH THE APPLICATION OF CYBERNETICS TECHNIQUES FOR THE MANAGEMENT OF FREIGHT TRAFFIC

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Although at the three previous symposiums the FS presented no description of firm applications, they have nevertheless attached very great importance to the application of cybernetics techniques. For ten years the FS have been engaged in a vast reorganisation exercise in connection with electronic development. This activity is concentrated in the "Electronic development plan" which extends up to 1977 and is designed to achieve a modern system of information based on the following six sub-systems: passenger control; freight customer control; staff control; rolling stock control; workshop control; stock control. The "Plan" gives special attention to the results of the trials undertaken on other Railways discussed at previous symposiums, also the exchanges of information which have taken place at the UIC Building between the information processing specialists of various Railways. A general description of the "Plan" and of the results envisaged are given with particular reference to the way in which the system can help in solving freight traffic problems by integrating: the transport demand and the availability of the resources. The investment statement is discussed from the point of view of possible management savings but, in particular, from that of the influence on customers, with an increasing transport demand in mind.

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053764
AIMS, METHODS AND POSSIBILITIES OF LONG TERM, MEDIUM TERM AND OPERATIONAL MANAGEMENT OF FREIGHT RAILROAD TRANSPORT

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Ovcharov, S, Ministry of Transport, Bulgaria

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Presented at Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

This report deals with the problems involved in the management of freight transport using complex computer-aided systems. The three phases of management are defined for this purpose as: 1) Long-term, based mainly on economic or mathematical models, covering a time-interval of several years. In this area, the man-machine interface involves considerable participation by specialists selecting empirically appropriate values for the variables in the models. 2) Medium-term, based on definite forecasts with increasing use of "rolling" plans. This area can include a wide range of time-scales (day, month, or year). 3) Short-term, based on precise information and following very closely the actual transport operations. These three phases are considered as an inter-connected system in which the assured values of variables at the higher levels control but are also corrected by the more detailed analysis at the lower levels. The theoretical presentation of the subject is illustrated by reference to the Bulgarian Railway Transport Organisation. This is part of an over-all system comprising 4 modes of transport but has a large amount of economic and operational independence. Current applications of projects developed so far are discussed as well as the basic problems involved in future development and application of the main principles.

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053765
USE OF CYBERNETICS FOR ORGANISATION OF FREIGHT TRANSPORTATION, AND A COMPLEX AUTOMATED SYSTEM OF RAILWAY TRANSPORT CONTROL IN THE USSR

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On the USSR railways electronic computers at the computer centers of the 26 railways and the Ministry of Railway Transport are used to solve a considerable number of production problems, namely, long-term and operative planning of the transportation process, engineering, economical, statistical and book-keeping problems. At present the first stage of a complex automated system of railway control is being completed. It consists in the introduction of cybernetic methods and electronic computers for solving the most important problems on all the railways according to single typical methods and machine programs with integral processing of the main documents. The automated system of railway control includes 19 functional subsystems carrying out definite control functions, including technical and economical planning of the operation and development of the railways, control of the transportation process, commercial operations, the operation, maintenance and repair of locomotives, cars and of the railway track, accounting and statistical reports, purchases and stores, and control of the personnel. All the tasks of every functional subsystem are considered as mutually related within it and with the interacting tasks of the other subsystems, a common data file being created at each level of the automated system of railway control. When introducing a system of reading information from moving rolling stock, the main part of the data file of a railway computer center should be formed by a dynamic model of the transportation process with detailing up to every car and, possibly, consignment. To ensure functioning of the automated system of railway control, a three-level complex of equipment is created consisting of a main computer center (ministry level), the railway and the terminal centers connected by a data transmission network, and also the corresponding information and mathematical base.

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053766
LONG RANGE PLANNING MODEL

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The Corporate Planning System was developed to provide Southern Pacific Company management the financial consequences of its long-range plans. From forecasts of revenues, expenses, and capital expenditures, CPS furnishes statements over fifteen annual periods of: Summary of Income and Cash Flow, Balance Sheet, Net Income, Cash Flow, Income Taxes and Relevant Financial Measures. Depreciation, taxes, interest, financial ratios and other calculations are automatically handled by the program. An important option enables the user to specify the desired end-of-year cash position from which the model then determines the amounts of financing required by an "automatic financing" algorithm. CPS is executed in a time-sharing mode. It consists of two models—a subsidiary model and a consolidation model. After individual subsidiary companies have generated a final plan, they authorize it to be accessed by the consolidation model, which furnishes consolidated results for any desired combinations of subsidiaries. The system evolved over a two-year period, with successive phases being identified through use by the Executive Department of Southern Pacific Company. It is written in FORTRAN IV, level G with the subsidiary model requiring 384K of core on an IBM 360/67 with approximately 5000 executable statements, and the consolidation model requiring 312K and having 3000 executable statements.

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053767
FREIGHT MANAGEMENT INFORMATION SYSTEM (SIMULATION MODEL)

Kambayashi, K, Japanese National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Of late, JNR has developed a simulation model for the prediction and evaluation of freight management policies with a view to helping the decision-making of top management. Taking into account the national economic trends and conditions of JNR's competition with other means of transport, the model forecasts JNR freight transport demand and calculates revenues and expenditures, and thus, consistent processes are modelized. It is so arranged that various proposed policies can be taken up in the process for comparison as to their effect on revenues and expenditures. The features of this model are as follows: 1) Management policies like the following can be evaluated: (a) service requirements such as tariff rates and train speed; (b) buildup of through train service system; (c) closure of small stations and improvement of base stations; (d) planning for installation and labour saving investments. 2) The modelizing of JNR's internal resources was carried out with them classified in detail. In particular, transportation problems are grasped in the context of a railway network very much like the actual routes so that the inter-region freight flow can be adequately traced. The effects of policies, therefore, can be estimated by region, commodity item and kind of train and they can be consequently evaluated. 3) In order to make it easy to produce such a complex model as is peculiar to transportation problems, a *simulation control program with special language* for wide application has been developed and under this the simulation performed. It can thus be said that the way is now open for development of a comprehensive model covering all aspects of JNR managment.

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053768
A PROFITABILITY MEASUREMENT INFORMATION SYSTEM AS A MANAGEMENT TOOL FOR OPTIMIZING RAILROAD PERFORMANCE

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Fink, CE, Penn Central Transportation Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Profitability, defined in general terms of revenue and cost, is shown to be meaningful to managers of both publicly and privately owned railroads when taken out of the purview of its economic definition. In the "going concern" rationale, profit is a means of evaluating competing operational alternatives as opposed to competing business alternatives (i.e. investment opportunities, sources of funding, competition, geographical location, stockholders interests, etc.). While economic profit can be used to measure the abstract behavior of a railroad system, operational profit best describes real behavior on a continuing basis. Railroad profitability is thus presented in a simplified format to facilitate comprehension of the general before attempting to understand, categorize and measure the necessary specifics. Successively lower, more detailed elemental levels are delineated as components of railroad profitability which must be uniquely identifiable. This approach to system design, though referred to as a Profitability Measurement Information System (PROMIS), is in no way offered as a complete system. Rather, it is suggested as a conceptual framework for development of profitability measurement systems. The PROMIS concept emphasizes progression from the general to the specific in system design while requiring built-in flexibility to permit post-implementation enhancement of the system. PROMIS further demands clearly detailed definition of even the most elementary components and thorough, continuing care that only identically defined components are combined or related in any way. It is the responsibility of the system designer to insure application of these concepts in the development, in cooperation with railroad management, of a meaningful profitability measurement information system.

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053769
PROFITABILITY ANALYSIS OF TRAFFIC (PAT) ON THE ST. LOUIS–SAN FRANCISCO RAILWAY COMPANY

Bacon, BD, St Louis-San Francisco Railway Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The primary objective of this computer system is to measure the profitability of all carload and TOFC linehaul traffic handled by the Frisco system. It utilizes data from a number of computer systems, including revenue data from the Revenue Accounting System, operating and equipment data from the Frisco Management Information and Control System NMICS), equipment utilization and cost data from the Equipment Accounting System, and cost data from the Cost Accounting System. *Costing is unique, as the system links actual* physical activities and equipment requirements to each carload or trailerload of freight handled. For example, each load costed reflects the actual. a) empty return ratio; b) equipment turnaround; c) Frisco liability for equipment hire; d) linehaul costs for actual route moved, including backhauls and out-of-route moves; e) switching costs, by terminal and function; f) TOFC terminal costs, by terminal and function; g) tare weights of equipment; and h) net weight of contents. After processing to determine profitability, all data is stored on magnetic tape. Users can secure an analysis of any traffic movement, defined as broadly or as narrowly as desired. Primary uses are in pricing decisions, analysis of equipment utilization and profitability, and meeting information requirements in regulatory proceedings. Concept, design, and development of the system were entirely by Frisco Railway personnel. The system was implemented late in 1972.

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053770
FRISCO'S TRAIN MEET CALCULATOR

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Traditionally, the Frisco and many other railroads have determined the location and length of passing tracks by rather unsophisticated means, usually based on intuition and experience. This computer simulation model offers the ability to weigh alternatives and to predict the probable consequences of decisions more precisely in the operations planning of a single-track railroad concerning (a) operating policy and procedures, and (b) physical plant. It is run on an IBM 360/50 and contains all of the dispatching logic deemed necessary. The model permits running trains on schedule, if desired, but all runs to date have made maximum use of the randomization of events based on history. These include (but are not limited to) train generation, departure times, delays (all types), and length of delay (if incurred) for each segment of track. The ability to isolate delays by type and measure their effects on a system by type has proved to be a valuable tool. This simulation effort was conceived, designed and developed entirely by Frisco Railway personnel beginning in mid-1970. The program was validated to the complete satisfaction of both line and staff operating personnel in early 1972. Since that time it has been used continuously and all decisions concerning passing track placement and lengthening, train schedules, priorities, and power and train configurations are based on analysis of the output.

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053771
FAMILY OF MODELS FOR OPERATIONAL PLANNING AND CONTROL

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Hudson, C, Canadian National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Within the planning time frame of a year and less and with most capital planning effectively fixed, the choices open are restricted largely to alternatives in the deployment of existing resources. CN have developed a family of models focussed on operations planning, from detailed dynamic models for service design to generalized models, which interface with the financial planning processes described in another paper. This paper describes the objectives, structure, interaction and use of these models in the planning process. As new traffic forecasts become available existing policies on car leasing, shipping programs and assignments are evaluated, and the need for new policies determined, with the aid of the fleet planning model. The updated traffic flow feeds a range of transportation models. The most generalized measures the impact of changes on the fixed plant and other resources whereas the most detailed, the network model simulates operations dynamically and aids the evaluation of carload service train services and the utilization of resources. The network model, among other sources, feeds a motive power model designed to evaluate powering policies, regional allocation of power and specific assignment rules.

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053772
THE PRACTICAL APPLICATIONS OF SIMULATION AND OTHER AIDS IN IMPROVING TRAIN OPERATIONS AND SERVICE

Alward, SA, Seaboard Coast Line Railroad

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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This paper presents the practical use made by a major U.S. railroad of a large scale network simulation model. This model of the traffic flow over the entire railroad network of major yards and connecting trackage has been designed and developed in close coordination with the Operating Department of the railroad. Examples of its use in forecasting the feasibility and impact of changing train schedules, pre-blocking and new run-through train operations will be described. Other computer aids including on-line monitoring of car movements to automatically divert and re-route cars according to customer instruction, along with on-line techniques to assist in the control of empty equipment by automatic re-routing to distribution points will be described.

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053773
AN OPTIMIZING NETWORK MODEL FOR THE CANADIAN RAILWAYS

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Fullerton, HV, Queen's University

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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A network model of the mainline operation of a railroad has been developed. This model predicts the optimal routing of traffic and the congestion at each yard and over each track section in the model. Input to the model is the required origin-destination flow of railcars, together with a set of physical parameters which describe each yard and the connecting track sections. Time delays in the yards are derived from queueing models of the actual system. Also, an expression has been developed which describes the over-the-road running time as a function of the traffic intensities. Output of the model gives details of the flow pattern that minimize the total car-hours required to accomplish all desired origin-destination movements, together with the delays encountered at each yard, and running times over each road section. The concept of the model is described, the component parts of this model are explained, and some potential applications in transport planning are indicated.

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053774
A MINI-NETWORK COMPUTER SIMULATION MODEL FOR RAILROAD PLANNING

Drucker, RW, Chessie System
Jewell, BL, Chessie System
Borden, RP, Chessie System

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Operating management of a large railroad must frequently deal with problems which effect major segments of the railroad or possibly even the entire railway system. These types of problems include train scheduling, routing, major track and signal improvements, as well as changes in operating policies. The Chessie System has developed the Mini-Network Model as a tool for aiding management in evaluating the impact of these types of problems and the effect of

proposed solutions on operations. The Mini-Network Model is a computer simulation model which has the ability to duplicate over-the-road train operations on single and multiple track territories. The modifier, Mini, is used because, unlike other network models, simulation is performed at the train rather than the car level. When required for the specific application, yard and terminal functions can also be simulated. On single track territory, the model will arrange meets and passes with due consideration given to train priorities, track occupancy and trackwork configurations. The major application of the model has been in preparing for the federal (USA) 12-hours of service law. Under this rule, train crews cannot exceed 12 hours on continuous duty between call and relieve times, which represents a change from the 14 hours previously permitted. The model was used on certain regions of the Chessie System to project what will happen under the new law if schedules and facilities remain unchanged. The effect of proposed additional main tracks, yard improvements, and schedule changes to relieve the operating difficulties imposed by the constraint on crew service hours were also simulated. The end product was a recommendation for train schedule revisions providing satisfactory operations under the new law. The model has also been used to aid in the scheduling of a new train service over an already busy territory and it is currently proposed to use the model in studying the effects of single tracking of a multiple main track territory.

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053775
THE OPERATIONAL PLANNING OF TRAIN SERVICES IN THE CATCHMENT AREA OF LARGE MARSHALLING YARDS WITH THE AID OF EDP. DEVELOPMENT OF AN ANALYTICAL MODEL

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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In closely meshed railway networks with many access points and with sections and junctions carrying heavy traffic, the preparation of transport processes assumes great importance. For some time already, the Deutsche Reichsbahn have therefore tried to improve their technological planning by using methods of operational research and electronic data processing. For this purpose, a model system is being gradually developed; the design, problematics and realisation of this system are outlined in the present paper. One part of this model system is the analytical model known as "train formation plan, local zone, dependent on the time of day". Its objective is to minimise the times (measured in wagon hours) spent by goods wagons in the local zone as well as the traction requirements (measured in locomotive hours). This results in the timing of train trips for the collection and distribution of goods wagons within the catchment area of the marshalling yard, based on the numbers of goods wagons arising at different times of the day and taking into account the capacity of the installations available. In the process, the number, composition and time of day (within an appropriate tolerance limit) are calculated for the envisaged local goods train relations as a basis for the compilation of the timetable. After successful test calculations, the model has been introduced into the practical operation of the Deutsche Reichsbahn. The first practical applications to the junctions in one Reichsbahn Region have shown that the costs are acceptable and that the results are favourable inasmuch as the quality of the goods services is improved and their costs are reduced. At present, organisational measures are being taken for the gradual application of the system to catchment areas of all the marshalling yards within the network of the Deutsche Reichsbahn.

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053776
THE DISTRIBUTION OF EMPTY WAGONS BY MEANS OF COMPUTER. AN ANALYTICAL MODEL OF THE SWISS FEDERAL RAILWAYS

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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In order to improve the manual method of distributing empty goods wagons, the Swiss Federal Railways (SBB), in co-operation with a firm of consultants, have developed a mathematical model aimed at maximising demand satisfaction and minimising shunting operations and empty wagon kilometrage. In this model, all the important types of wagons, all possibilities of substitution and all the other limiting conditions are taken into account. A comparison with the manual distribution method shows that the computer programme is able to achieve better results throughout; this applies, in particular, to the greater satisfaction of demands. Memory capacity and computer times are such that the model can be used daily (even more than once) in practical operation. In this way, the model becomes part of an integrated goods traffic control and information system at present being developed. The objectives of the new method, the concept of the chosen solution and the mathematical model are explained. It is also shown what results have been achieved and how far the work for the practical application of the model has progressed. As far as is known, this is one of the few, if not the only, wholly mathematical solution designed to optimate the problem of goods wagon distribution.

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053777
PLANNING LOCOMTIVE AND CABOOSE DISTRIBUTION

McGaughey, RS, Southern Railway System
Gohring, KW, Southern Railway System
McBrayer, RN, Southern Railway System

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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This paper describes an application of network flow theory to the planning of locomotive and caboose distribution. A model was developed originally to help plan locomotive distribution and later modified for use in planning caboose and motor truck distribution.

Details of model input, structure and output are discussed in addition to applications of the model. The model accepts inputs describing train schedules and related parameters. These schedules are used to develop a time-location network. The out-of-kilter algorithm is used to find an optimal flow through the network. The network is constructed such that the optimal flow through the network results in a minimum number of units of power being required to operate the schedules. An analysis of the optimal flow produces usage plans, a daily power assignment list and inventory graphs for each terminal. To extend the locomotive distribution model to cabooses, consideration had to be given to terminal operating policies. This involved analyzing inbound and outbound directions of connecting schedules and structuring the network to reflect variable connection times at some terminals. Applications of the model for locomotives were concerned primarily with development of cycling plans for different classes of power. The extensions to handle caboose distribution and motor trucks enabled fleet size determinatons and recommendations concerning equipment acquisition. The paper includes details on how the networks are developed and solved. Displays include input data and output reports.

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053778

COMMENTS ON THE USE OF OPTIMISATION TECHNIQUES IN PLANNING FREIGHT TRANSPORT OPERATIONS

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Application of computers to the planning of freight operations is a very difficult task because of the necessity to deal simultaneously with a very large number of objects and processes inter-dependent in time and space. Freight transport processes are difficult to define in respect of the great number of descriptive parameters, constraints and non-linear character of cost function. There is a general lack of effective mathematical methods enabling us to define phenomena precisely enough and to solve the optimisation models of medium and short-term planning. There are two general approaches to cope with the problem: 1) to build up purely mathematical models, which can be solved with existing algorithms, disregarding the fact that the results will be far from reality or 2) to build up cybernetic models in a heuristic way, defining reality relatively well by using various optimisation techniques, decision making rules, simulation and common sense. This way supplies us with acceptable solutions, which in general are near to optimum. Over ten years of theoretical and experimental research have brought the author to the conclusion that the second approach is the only one applicable practically to complex problems. The latter part of the paper explains the general concept of a medium and short-term planning system concerning routing, train formation and marshalling yard operations, with related inter-connections between particular subsystems, viz. medium term train routing, train formation, wagon routing, empty wagon distribution, timetabling, daily corrections to the plans, marshalling yard operations ultra short term planning and consequent implications. To illustrate the approach to the problem raised, there follows a description of an experimental system of medium term train routing, train formation and wagon routing plan. This system was tested in 1971-72 on a network of PKP. The system takes into account all the essential factors and constraints concerning trains, lines, stations and yards. A further example is a system of empty wagon distribution dealt with on a weekly and daily basis, with respect to eight hours shifts. Both systems take advantage of the theory of graphs, but to obtain satisfactory results it was necessary to employ additional decision rules and the Monte-Carlo method.

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053779

OPTIMIZATION OF THE CENTRALIZED MANAGEMENT OF FREIGHT TRAFFIC IN INDIVIDUAL WAGONS. UIC-METRA STUDY

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In 1966, the UIC Committee of Chief Operations Managers decided, with the assistance of an external research office (METRA INTERNATIONAL), to order a thorough study of the possibilities afforded by Operational Research for the optimization of the management of freight traffic in individual wagons. The initial phase revealed the need for dividing the system studied into a certain number of more manageable sub-systems; a plan of action describing the connection and sequence of these subsystems has been prepared, and the various processing expedients necessary have been defined. In the second phase, the construction and perfecting of the various processing expedients were undertaken, and covered: a marshalling yard simulation model; an analytical model for the optimization of the transport system; a general simulation model representing the inter-yard network; an analytical model for the optimization of the distribution of empty wagons between zones. In each case, the model was

applied to a firm problem, in order to verify its validity and controllability. This paper describes the various models and gives the results obtained. These latter show that operating problems concerning the forwarding of individual wagons can be dealt with using modern expedients such as computer-based models. The paper concludes with certain considerations regarding the advantages and disadvantages presented by the joint study of such problems and recourse to an outside firm.

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053780
INTEGRATED APPLICATION OF INFORMATION TECHNIQUES ON THE RAILWAYS

Schmitz, HW, German Federal Railway

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 5 pp, 2 Fig

Presented at Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

The railway system as a whole is an integrated system. It consists of a systematically organised medley in which work is divided between men and technical equipment. As railway systems are complex, the application of computers can only be fully successful if the railway information problems are solved as parts of an integrated and complete cybernetic model. Commands applicable to transport are in the last analysis mass, space and time instructions (MST instructions). Their safe and reliable implementation has to be practiced with a cybernetic system with the aid of information techniques. In parallel with the movement of masses, the accounts have also to be moved, i.e. the commercial functions have to be taken care of. From this standpoint, the DB has undertaken extensive cybernetic studies and experiments. As an example of computer controlled handling of production and sales, i.e. of the movements of the respective mass and accounts, the author has developed an integrated transport control system, the functional capability of which was proved by representative trials in the greater Hanover area, by the setting up of the "Cybernetic Island". All the systems developed by the DB should be regarded as parts of a comprehensive cybernetic railway model describing an integrated transport system. Bearing in mind the gigantic computer hierarchy required for the solution of cybernetic tasks arising from production and sales in a railway system the idea suggests itself that all other fields of railway activities should also be integrated into the whole computer system. Of course adequate analytical methods have to be provided to ensure that all fields are apparent. For this purpose a functional block diagram is established. For the exchange of data between men and machines a suitable information technique is required which merges conventional telecommunications with modern data handling techniques. This will permit the creation of electronic computer systems within a hierarchical structure which, in association with up-dated data-banks, are suitable for both real-time and batch processing.

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053781
CHICAGO RAILROAD TERMINAL INFORMATION SYSTEM, INCORPORATED

Brophy, LA, Chicago Railroad Terminal Information System, Inc

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 4 pp

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The Chicago Railroad Terminal Information System furnishes to the railroads operating in Chicago information on train and freight car movements as the activity is occurring to these trains operating within the Terminal. The method of data collection, processing and information disbursement is accomplished by the installation at trackside of 109 automatic car identification scanners at 40 different sites in the Terminal. These optical scanning devices read and transmit over dedicated data lines the initial and number identifying each unit of equipment scanned on the train as it passes the scanning device. Located at the headquarters of Chicago Railroad Terminal Information System, Inc. (CRTIS) is a computer that is interfaced by the means of the dedicated data lines with the trackside scanning devices. This computer is also interfaced by means of dedicated data the data provides each railroad with accurate, detailed and timely output information useful for its operating, recordkeeping and analytical purposes.

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053782
TRAIN II

Morris, MA, Association of American Railroads

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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In January of 1970 the American railroads inaugurated TRAIN, a computer/communication network linking Class I railroads with the AAR in Washington, D.C. The system was intended to improve the car distibution decisions of the AAR's Car Service Division (CSD) by providing up-to-date information on the railroad location and flow of the car fleet. TRAIN II, scheduled for installation in January of 1975, is intended to provide for further improvement in car use through expansion of inputs and data base. Whereas input to TRAIN consists solely of car interchange reports, TRAIN II input will also include reports of crossings of Car Service Regional Boundaries, waybill data, loadings, unloadings, arrivals at destination, placements and reports to and from bad order, storage and hold status. Editing and updating of the car movement and waybill data will be performed on a batch basis at intervals of approximately on hour. At end of day, the system will scan the disk resident Freight Car Master File to develop statistical data on the use and disposition of the fleet. The Car Service Division will have access to the newly expanded data base via video display. There will also be a variety of printed reports, some fixed in format and prepared regularly and others produced on demand with content and format determined by the needs of the moment. Services for the railroad will include a broad inquiry service and message switching for road to road communications.

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053783
CRITICAL CHARACTERISTICS OF TOTAL OPERATIONS PROCESSING SYSTEM (TOPS)

Germany, JW, Southern Pacific Transportation Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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TOPS is an on-line real time computer information and control system. It was designed to provide a real time control over the movement of equipment and to supply up-to-the-minute information to various user departments, including Operating, Transportation, Accounting and Marketing. The system uses two IBM Model 370/165 computers located in San Francisco. One of these is on-line at all times and is in constant communication with approximately 500 input/output terminals located throughout the railroad and at certain off-line major marketing locations. The other computer is used for back-up purposes, off-line processing of data and for testing future programs. The basic characteristics of TOPS is that as an event occurs in the field, it is reported to the computer, which updates the appropriate files and makes the information therefrom available, either upon request or automatically. It includes a highly disciplined set of monitoring logic to insure a high degree of data base reliability. An average day will comprise approximately 55000 messages ranging from basic car inquiries to the more detailed train and car movement reportings. The CPU is geared to handle 1.5 messages per second and has a core storage capacity of 1.5 million bytes. It also has nine 2 314 disk storage units associated with it, each of which has a capacity of 232 million bytes,. Some of the critical characteristics of TOPS will follow in more detail.

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053784
MANAGEMENT INFORMATION CONTROL SYSTEM ON THE ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY

Odom, PE, St Louis-San Francisco Railway Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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MICS is a tool, designed and maintained by Frisco people, for use by Frisco people to assist in attaining Frisco's overall objectives. These concepts and philosophies established the framework for MICS as it exists today: 1) We used to fullest advantage many years' experience with a decentralized data gathering network, merged yard office and freight agency forces, punched card car inventory system, centralized many function at the operating headquarters and established the nucleus for a data base. 2) We built a system that: Established a data bank for all known requirements, with activities of equipment linked to way bills and to trains; provided maximum concentration on integrity of data, both field reporting points and through computer edits; held input from the field to minimum by extensive use of on-line master files to supply constant data; and made maximum use of computer to produce information from the data bank. MICS is the "back-bone" of many subsystems utilized in monitoring and controlling Frisco's operations.

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053785
PENN CENTRAL TRANSPORTATION AND WAYBILLING SYSTEM

Sims, MD, Penn Central Transportation Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Penn Central's transportation and waybilling system (TABS) focuses on the solution of a data gathering problem which is primarily business oriented and secondarily, trasportation oriented. The two essential functions of car reporting and billing of customers for services rendered are critical to the operation of a railroad system. Both of these functions are initiated by the origination of a freight waybill which is the legal contract for supplying transportation services. The system design criteria of TABS formulates methods of obtaining control of the waybill information describing the services to be rendered and provides this information to responsible management who must conduct the operation of the railroad system.

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053786
A PROGRESS REPORT ON CHESSIE'S AREA CONTROL SYSTEMS/ HEADQUARTERS CONTROL SYSTEM

Prinn, WC, Chessie System
Laden, HN, Chessie System
Drucker, RW, Chessie System
Fuller, GL, Chessie System

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Chessie has implemented the initial phases of its Area Control Systems/Headquarters Control System (ACS/HCS)—a Company-wide, interdepartmental, computer-based, communications-dependent information system for all levels of management. The channels of information flowing into and out of existing automated data systems have been substantially reorganized. Automation of clerical work has been significantly extended. ACS/HCS captures data about car and locomotive moves in years and terminals not previously available to management in a timely way, processes this data, and makes it available in a form and time frame useful for planning, scheduling, measuring and controlling operations in the terminal and over-the-road. ACS/HCS facilitates performance of customer service functions, transportation operations and associated clerical, accounting and administrative activities. ACS/HCS geographically distributes powerful computer support to local management. Each area represents a logical grouping based upon type and mix of traffic, physical characteristics, effective span of control, etc. The Area computer functions as a communications switcher, data concentrator and processor, and filter for its Area. Area computers are connected by high speed communications lines to headquarters computers which serve headquarters data processing needs as well as relay transmissions between areas. All yards, agencies, docks, traffic offices or other facilities in the Area are tied to the Area computer. Each customer handles service requirements with a single, Company-oriented, clerical organization for his Area which relies on its Area computer. HCS provides more timely, accurate and accessible information for systemwide functions. It enables headquarters to improve coordination between Areas. It supports those tasks depending on car and train movement data including forecasting and planning work on a system basis, measuring utilization of equipment, measuring quality and cost of freight train service and simulating proposed changes in facilities and operations. HCS also includes those system-wide applications now performed at headquarters such as revenue accounting and car accounting.

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053787
SOUTHERN RAILWAY APPROACH TO REAL-TIME FREIGHT CAR CONTROL

Jones, JL, Southern Railway

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Southern Railway has had an operational on-line computer system for control of freight car and train movements since mid-1965. While the system has been refined over the more than eight years it has been operational, it still embodies the original basic design concepts which are quite distinctly different from the concept of an initial total system design. These design concepts place great emphasis on utilizing the most straightforward and modular approach possible, specifically aimed at providing only the basic essential information and, avoiding in the original implementation, any enhancement of questionable usefulness. Large scale integration of design is avoided to not only ease implementation but to facilitate later maintenance and more importantly permit the inevitable changes required by experience of use and advancing technology to be accomplished at much lower cost. The paper discusses these concepts with some specific examples of their application.

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053788
THE SYSTEM OF CENTRALISED FREIGHT TRAFFIC OF THE BELGIAN NATIONAL RAILWAYS (SNCB)

Dekempeneer, J, Societe Nationale des Chemins de fer Belges

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The need for improving the output of the means of action, i.e. fixed installations, rolling stock, staff, etc., also the quality of service, led the SNCB to introduce a modern system for the centralized freight traffic control. The SNCB chose a decentralised three level system, based essentially on a chain of process computers, situated in marshalling yards and connected to the peripheral points of the operational centres on the one hand, and to a powerful central computer on the other. This paper sets out the reasons for this choice, describes the technical and information processing infrastructure of the system, and explains its functioning. In particular, it covers the applications of the system, both at local and regional level and at central level, on a short, medium and long term basis and demonstrates the advantages which it affords, both to the operating and to other departments. In conclusion, it gives certain consideration on the economic aspects of this achievement.

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053789
THE SJ SYSTEM FOR CAR TRACING AND OPERATING CONTROL

Rosqvist, G, Swedish State Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The Swedish State Railways have since August 1966 in operation a computerized system which is: a full scale trial system intended to facilitate car tracing and also; an information system for the actual decisions and for future development. The basic input to the system are the train consists reported over SJ teletype network and fed by way of paper tape to a computer of the type IBM 360/30. The information updates a car-file stored on disc memories. From this car-file information about the geographical position and actual task of every freight car in Sweden can be obtained. Every day information about 300-400 is distributed. This type of information can be given in a more sophisticated way for any number of cars with certain qualities in common (category, destination arrival time etc.). It can also be transformed to a daily report about the utilization of standard cars within the different traffic areas as a basis for distribution of empties. According to European rules for international traffic freight cars should be given periodical maintenance, in general every fourth year. Since December 1969 the ordering of freight cars to workshops for maintenance in Sweden is done automatically. This routine has also made it possible to distinguish certain car categories which can be given longer periods between overhauls. All information collected in the system is stored in such a way that it can be computed statistically later. Thus a data bank has been created that can produce information on demand regarding: traffic flows; turn round times; mileage and production of different car types; car utilization within the traffic areas; train utilization. This routine is also used to produce the basic information for the per diem calculations.

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053790
CONCEPT AND APPLICATION OF THE INTEGRATED SYSTEM OF CENTRALIZED MANAGEMENT OF FREIGHT TRAFFIC ON THE FRENCH NATIONAL RAILWAYS (SNCF)

Plantureux, J, French National Railways
Henri, R, French National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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In his statement, the author begins by presenting the "Centralized Management of Freight Traffic" on the SNCF, and decribes an actual example: that of the first wagon which was chosen in May, 1971 by the computer to be dispatched for "Periodic Overhaul". This firm example makes it possible to describe how the various problems arising on the railway with the loading of wagons are dealt with, and to demonstrate the essential characteristics of this organization. It is of a very integrated nature, the same data acquisition being used successively for the following requirements: accounting, operating, stock control and statistics. A preliminary reorganization begun in 1956 enabled the methods to be reviewed and standardized. Three phases of progressive implementation were planned, each concerned the whole of the SNCF, and the last two were preceded by tests of limited geographical scope. The quality of input is very advanced, particularly due to the use of key digits wherever possible. Due to the fact that systematic attention was paid to the fact that only profitable organizations were introduced, it was possible to effect savings to the extent of 3000 staff, in addition to all the other advantages normally resulting from the existence of an automated system.

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053791
GOODS TRAFFIC INFORMATION SYSTEM WITH THE AUSTRIAN FEDERAL RAILWAYS (OBB)

Pucher, J, Austrian Federal Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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In order to speed up their goods services, the Austrian Federal Railways intend to use EDP plants for a central control system. The main problem is the collection of exact data at all the operating centers concerned with the actual transport process. It is therefore first of all intended to create, in several stages, the conditions for the development of a central data library for wagons and consignments; this process is being initiated from 1973 as part of the project for the "goods traffic information system". During a first stage, computers with appropriate input and output periphery are installed at major key stations. This is in order to achieve a methodical treatment of the operating processes required at these stations by means of programme-controlled data input, to mechanise the documentation still required for this purpose, and to permit the automatic exchange of messages between the adjacent yards thus equipped so as to avoid the time-wasting repeated collection of the same data. The further objectives of this "island" type of operation are mainly: to try out the computerisable operating processes in practice and, if necessary, to modify them for the final stage; to ascertain the suitablity of hardware and software for the following stages; to carry out a systematic training of the existing staff at the yards concerned and to gather experience for a gradual introduction of automation; to obtain the greatest possible interim advantages right from the outset. For economic reasons, priority will be given to the equipment of long sections of line with heavy traffic. In the final phase, computer equipment will be provided for about 5% of all stations which are, however, responsible for about 50% of all originating wagon trips and about 70% of the through traffic. In a second and third stage to be realised later, it is planned to inter-link all these station equipments by means of a data transmission network, permitting not only the direct transmission of operating and wagon data directly from the station of origin to the station of destination of the train but ultimately also the continuous feeding of "on-time" data to a central high-capacity computer plant.

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053792
THE NS-INFORMATION SYSTEM FOR WAGONLOAD TRAFFIC

Beusekamp, JR, Netherlands Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Netherlands Railways (NS) are facing strong competition in freight business. In order to improve the total process, i.e. the organised inter-actions of men, methods and means in all phases of the process, NS are developing a system which will finally lead to the optimal partition of tasks between men and equipment and to improvement of their management. This final situation cannot be reached in one step; the system has to be implemented in successive phases, models must be developed etc. NS decided—as a first step—to implement an information system for wagonload traffic, thus meeting the demands of the Operating Department and of various other managers. This first phase—on line, real time—of the system became operational in 1971. The next step, planned for 1976, will consist of enlarging the scope of the system (e.g. including data for the Finance Department) and of evolving a certain degree of process-control. The paper describes the above mentioned first phase of the system, its objectives, scope and degree of mechanisation/automation and the reasons for which it was thus conceived and realised.

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053793
IMPROVEMENT OF THE QUALITY AND PRODUCTIVITY OF FREIGHT TRAFFIC BY CENTRALIZED MANAGEMENT AND OPERATING CONTROL CENTRES

Sitzmann, E, German Federal Railway

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The increasing requirements imposed by economy on rail freight traffic are obliging the railway to attach ever-increasing importance to the quality of the transport service offered. In the face of increasing competition, transport development must be attended by increased productivity and profitability. The objectives for the development and planning of production must be established on the basis of customer requirements. In this connection, data processing in conjunction with automation opens the way to new forms of operating and to an improvement in the quality of transport, while reducing costs at the same time. These advantages have led the German Federal Railway to prepare a concept relating to an "Integrated system of transport control", to supervise and direct the progress of transit with effect from dispatch of a consignment until arrival at destination, incorporating certain operative tasks. In the first stage of this integrated transport control, it is intended to introduce the charging and accounting of freight traffic, a system of information and advice concerning vehicles, as well as supervision of train running extending to the entire network and taking in important passenger and freight trains. Within the overall framework of freight traffic, the marshalling yards, their output capacity and their situation on the network, play a decisive part in the quality of the freight transport. For this reason, it is necessary to include the increase of marshalling yard output in any attempt to improve the quality of transport. In this field special cybernetics measures in the form of optimising processes must be applied, particularly when any action is taken. The report demonstrates the relationships which exist between a centralised control of freight traffic and the operating control centres when seen as modern railway operating systems. The operating control centre is both a technical electronic processing centre and an operating centre (supervision, control), a section of which is devoted to the direct control of operations in a largely automated marshalling yard. The centralised control and automation of freight traffic in marshalling yards leads to increased output of about 20%, stress being laid on the operations and the taking of action at the operating control centres. By making use of the installations and methods quoted in the report, it is possible to give the leadership a clear idea of the transport operations for planning and operational purposes.

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053794
THE FS INFORMATION SYSTEM FOR THE OPERATIONAL CONTROL OF FREIGHT TRAFFIC

Burgio, A, Italian State Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The FS have decided to instal, during the 1973/75 period, an operating system to meet the need for information required for long, medium and short term decisions. The effort has been directed at achieving a system capable of acquiring information within the desired time, in a reliable manner and without omissions. With this in mind much attention has been given to the peripheral organization for the acquisition and transmission of the data, to the definition of the most suitable hardware and software redundancies from the economic point of view, to the definition and checking of the input data, to the training of station staff to be used at the terminal points, and to defining the programme concerning the gradual installation of the system over the whole Railway. It is anticipated that after 1975, it will be absolutely necessary to improve the system, particularly as regards data which is partly necessary for long and average term decisions. It is expected that during the nineteen eighties the development of the system will influence, and will itself be influenced by the solutions to certain operating problems now being studied, as follows: automatic scanning of vehicle registration numbers; automation of the largest marshalling yards, etc.

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053795
INTER-BLOCK EXPRESS FREIGHT SERVICE AND CONTAINER SERVICE INFORMATION SYSTEM

Asaga, H, Japanese National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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JNR developed an on-line real-time information system in 1968 for sales control of inter-block express freight transport which is one of its main freight transportation products. This system subsequently has been steadily expanded and improved, making it possible to establish a nation-wide inter-block express freight transport system linking the 660 main freight stations of JNR. Hence, it has become possible to accept applications for reservation of shipments including several yard relays, reciprocally process data on sales, freight dispatches and yards through control of freight train data, and exchange messages to organically combine sales and train operations. Based on the experience and results of the inter-block freight service information system, a container information system (EPOCS: Effectual Planning and Operation of Container System) is being developed to support container transport, the most promising JNR freight transportation product. The three main targets in the development of EPOCS are: (1) Receiving applications for reservations, issuing goods collection and delivery bills and control of container freight data, (2) providing collection and delivery data for door-to-door services to be initiated in coordination with the forwarding agents engaged in collecting and delivering and loading and unloading containers, and (3) automatic compilation and transmission of the plans to collect and distribute containers and container cars through the introduction of a simulation method. JNR decided to adopt this system on the premise that information control with computers is essential for the rapid expansion of container services centered on freightliners. Hence, this will be an integrated system embracing the commercial, managerial, organizational and operational fields.

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053797
BETTER EQUIPMENT-GREATER PROFIT

Detmold, PJ, Canadian Pacific
Klein, R, Canadian Pacific

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Presented at Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

This paper describes a series of models which predict the consequence upon profit of a wide variety of management decisions concerning the specification of motive power and cars, the performance and size of trains, the frequency and the reliability of services and the physical characteristics of railroad plant. These models may be accessed over a commercial computer network by a railway manager at some remote point who requires an assessment of the alternatives that confront him in making some decision. The paper describes five such models which may be used individually or in concert; they concern the computation of the total cost of distribution, the cost of railway movements, the allocation of motive power, the capacity of a single track railroad, and train performance. Practical examples are provided concerning each of these applications. It is envisaged that "on line" applications of these models will be of major assistance in the day-to-day control of major railway systems.

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053798
CONTROL SYSTEMS ASSOCIATED WITH CN'S ON-LINE TRAFFIC REPORTING AND CONTROL SYSTEM (TRACS)

Tivy, RH, Canadian National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Canadian National have under development and installation, a major new computer-based Traffic Reporting and Control System called TRACS. This is primarily an "on-line" "real-time" transaction based system although some of the control systems utilize off-line processing for such things as developing forecasts. The system utilizes two IBM System 370/165 main processors. One is at all times connected to the 350 field terminals at 150 locations across Canada by means of a CN operated telecommunications network while the second machine provides backup protection, handles development and testing of new programs and does off-line processing required by the system. The main purpose and effort behind the development has been to match computer and control technology to provide operating and sales management with adaptive and responsive control systems.

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053800
THE AUTOMATION OF THE COLLECTION OF PRIMARY DATA FOR EDP SYSTEMS IN THE OPERATIONAL CONTROL OF RAILWAYS, EXEMPLIFIED BY THE DEUTSCHE REICHSBAHN

Schlegel, D, Ministry of Transport, East Germany
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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 4 pp

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For many railways, including the Deutsche Reichsbahn, the collection of primary data has become the most important part of EDP planning. This is due to a number of special features in railway operation which give rise to complicated conditions in collecting the data. The demand for complex information and monitoring systems calls for a far-reaching automation of this process. To meet this aim, possible options are indicated; however, because of the costs involved, these can only be carried out gradually. At present, the actual collection of data with the Deutsche Reichsbahn is still predominantly based on manual methods. On the other hand, the data are transmitted through a railway-owned telex network which is not only error-detecting but also self-correcting. For a number of EDP projects designed to aid railway operating control, the data are processed in real-time operation. For the future, an automation of data collection is envisaged.

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053801
EQUIPMENT CONTROL (ECON)

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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ECON is a computer-based equipment management system that is concerned with what's transpiring today, reflecting on yesterday, and anticipating tomorrow. The program is committed to giving people an improved capability to perform equipment management functions. A comprehensive master file of "Special" Equipment is the heart of the system. The master in conjunction with our existing Management Information Control System (MICS) supplies all of the

necessary data for making the program operational. The philosophy that we have followed throughout the system is to develop measures of utilization and control by work units; i.e., each pool of equipment can be used as a stand-alone analytical entity. The goal of ECON is to aid the Frisco in improving the utilization of our rolling stock. For the first time we well have knowledge of how some of our equipment is precisely being used. We expect to gain additional efficiencies in the management of our on-line customer pools. ECON will also provide valuable inputs to our equipment planning and procurement procedures.

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053802
THE FS INFORMATION SYSTEM FOR THE COMMERCIAL MANAGEMENT OF FREIGHT TRAFFIC

Carbone, M, Italian State Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 5 pp, 1 Fig

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The teleprocessing of freight traffic is provided for in the FS electronic data processing system. The central electronic equipment for this application will consist of a Honeywell 6050 "dual processing" computer with a central unit of store capacity corresponding to 160 K alphanumerical characters, linked to peripheral units (card reader-printers-magnetic tape and disc units). One hundred and twenty peripheral points installed at 80 Accounting and Charging Centres spread throughout the Railways will be connected to the Centre. The system carries out in real time: 1) the telecharging of carriage forward consignments in domestic and international traffic; 2) the checking of the amounts calculated by the Accounting and Charging Centres for carriage paid consignments; the teleprocessing of accounting operations at stations; the teleinvoicing of deferred payment consignments; the integration of checks and accounts in conjunction with the FS Electronic Centre for the "Vehicle Running Control". The system supplies regularly operating and operational control returns, and carries out, at the same time, freight accounting for the various Railways concerned in the consignments. The paper explains the organisation of the new application, the configuration of the system, its basic functions, the structure envisaged for the records, and the logic of the processing operations.

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053803
YACS (YARD AUTOMATIC CONTROL SYSTEM)

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

JNR has two automated yards: Koriyama (1968) and Takasaki (1970). Two others are under construction: the Shiohama Yard of the linear motor type and the Musashino Yard of the target-shooting type. In this paper, YACS to be applied at the Musashino Yard will be first dealt with. The system will incorporate both a data processing system for planning automation and a route control system to set all the routes automatically in the yard. The former consists of four sub-systems: "Operation Planning" under which the work schedule is automatically drawn up, "Change Processing" under which changes are initiated whenever a change takes place, "Operation Confirmation" for control by computers over the progress of operations, and "Information Control" under which data required for yard operations are provided. The latter will incorporate three sub-systems: "Route Control of Humped Freight Cars", "Yard Shunting Route Control", and "Route Control of Arriving and Departing Trains". The particulars of each of the above-mentioned sub-systems are fully explained in this paper. Next, the characteristics of the freight car control in each yard (target-shooting, hydraulic unit, and linear motor types) are explained and compared. Finally, this paper outlines the computers and the operating system in each yard.

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053807
OPERATIVE PLANNING OF OPERATION OF RAILWAY TERMINALS AND CLASSIFICATION YARD AT A RAILWAY COMPUTER CENTER. TECHNOLOGY, MATHEMATICAL BACKGROUND AND EXPERIENCE GAINED

Buyanov, BA, Ministry of Railways, USSR

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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On the USSR railways operative (for several hours) plans of train and classification work for large classification yards are drawn up on electronic machines of the railway computer centers. The large-scale introduction of the calculations was ensured by a unified information supply system (codes of yards, commodities, consignees, etc.), a standard method for solving the problem and a standard mathematical background for its realization on computers. To take into consideration the technological features of separate yards, the problem is divided into a number of autonomous parts (modules). For each module several variants of the solution are worked out. A plan of yard operation includes the following tables: (1) the expected approached of trains with recommendations on the sequence of receiving the trains at the yard; (2) data on the distribution of the cars in the arriving trains by destinations made up at the yard with recommendations on the sequence of train humping; (3) the expected number of locomotives and locomotive crews for trains to be dispatched; and (4) a plan of completion of the accumulation of trains and of train departure. The use of the results of these calculations makes it possible to improve the organization of yard operation and to reduce the average detention of cars at yards by 0.5 hour.

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053809
SOUTHERN PACIFIC'S WEST COLTON CLASSIFICATION YARD

Williamson, WV, Southern Pacific Transportation Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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This railroad yard is one of the largest and most advanced in existence. It differs from other classification yards in that it has many innovations conceived and designed to move traffic faster, more dependably and more efficiently. Physical and data system design are closely coordinated so as to produce an integrated system. The entire system has been designed to abet an operating philosophy dedicated to meeting the needs of the shipping public. Included in the paper are: 1. A physical description with an explanation of the innovation in each section of the yard that contribute to an organized, relatively interference-free flow of cars, trains, engines and information. 2. An explanation of a different concept in design of the process control and management systems necessary to run an automated yard. 3. An explanation of the man-machine interface used in operation of the data system. 4. An explanation of inventory control and operational planning programs.

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053811
RESEARCH TO ASSIST THE FLOW OF FREIGHT TRAIN TRAFFIC THROUGH THE GAGNY RAILWAY COMPLEX

Meyer, JL, French National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 7 pp, 2 Fig, 2 Phot

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

The Gagny railway complex is situated on a line known as the "Outer Ring" encircling the Paris Region. It consists of a double track triangle linking together three SNCF Networks (North, East, South-East); each of the three junctions which form the points of the triangle is linked to either Bobigny, Vaires or Valenton stations situated at distances from the triangle varying from six to sixteen kilometers. Traffic over this railway complex largely consists of freight trains and involves 300 movements daily, with maximum peaks of 20 movements an hour. Since switching and crossing operations take place at the same level, many paths are incompatible with each other, and at times of heavy traffic this results in train delays which are liable to multiply and react unfavourably on the adjacent stations. It should be noted that the trains arrive at the triangle practically at random as far as the signalman responsible for obtaining the paths is concerned; in other words, the latter is unable to rectify conflicting incompatible movements merely by proceeding according to a prearranged plan. Thus conditions always resemble a position where it is constantly necessary to operate under conditions of disruption. The aim was to allow more traffic to pass over the triangle, while reducing the difficulties likely to arise therefrom, especially delays to trains. Conventional type solutions were possible, notably the construction of over or under passages for avoiding crossing movements at the same level. However, solutions based on the introduction of automatic control were considered. This research has covered several years and has resulted in the examination of three types of control system: (1) a system based on a cable-type simulator; (2) a computer-based system; (3) a system based on an active store (optimising controller). The programming of mock-ups of the central equipment of these systems with inputs and outputs demonstrated their feasibility and made it possible to define the size of the system to be introduced. A large computer was then used to carry out an overall simulation, with a view to comparing the traffic with or without free flow conditions, on the basis of the same criteria. This simulation showed that it would be possible to avoid stopping the trains, generaly speaking with delays of about one minute on the running line; it was also apparent that this fluidity would be maintained up to a very much higher level of traffic than at present.

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053812
LOCOMOTIVE SCHEDULING BY COMPUTER– "BASHPEAK"

Holt, J, British Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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British Rail have developed and applied a computer based system to assist in the scheduling of locomotives. The system commences with the selection of the area to be covered and the preparation of data relating to both the area and the train services involved. A suite of programs called "Bashpeak" are then run to produce schedules. These are subjected to manual edit if more than one type of locomotive is involved using a charting method. Finally, the men's schedules are added and the proposals implemented. The paper describes the system in some detail and the applications on British Rail which have led to substantial economies. The system is being developed further as a part of an integrated time-table production system which is briefly described in relation to "Bashpeak".

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053813
SHORT-TERM PLANNING OF TRAIN SERVICES BY COMPUTER–"AIRE-POWER"

Catterall, PV, British Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Merry-go-round trains operate between a large number of collieries and a small number of power stations. These trains convey specially constructed wagons which are automatically loaded and discharged while the train moves at slow speed. The variation of demand for movement is such that a new train plan is prepared each week. A computer system has been developed to assist this planning process and to improve its efficiency. The system requires the transmission of data relating to the tonnages to be moved via a data link between the Planning Office in Leeds and the computer center in Crewe. A program has been developed which will verify the data, examine all the alternatives available, and select the optimum based on theoretical costs, and prepare a plan which contains the requirements for individual trains, the locomotive, men's and wagon set schedules. The plan is transmitted back to Leed's where it is printed out to form the working document. The whole process from receiving the tonnage forecast to printing out the plan takes approximately three hours when producing a plan for a week and this is reduced when preparing plans for shorter timescales. The scheme (introduced in January 1973) is being further developed. The paper will describe the system in detail and its proposed development.

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053814
ILLINOIS CENTRAL GULF'S COMPUTERIZED MOTIVE POWER ACCOUNTING AND CHARACTERISTICS SYSTEM (MACS)

Boline, JJ, Illinois Central Gulf Railroad

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The computerized locomotive maintenance system, MACS (Motive Power Accounting and Characteristics System), used by the Mechanical Department of ICG was designed in 1969 to provide management at all levels with a tool to better maintain their fleet of locomotives. Line supervision all over the ICG system may inquire on any specific locomotive in their ownership (both former IC and GM & O units) using a Western Union Telex terminal, Model 32ASR Teleprinter, and access the on-line locomotive file. This file is maintained on over 1,065 diesel units and each record is approximately 600 bytes in length. The hardware presently used to support this system is an IBM 370/155 Main Frame with 3330 disk on-line storage. The Model 155 has 1,024,000 bytes of memory with another 155 used as back up and for batch processing in an OS environment. Time-sharing, using both an outside vendor and inhouse TSO (IBM's Time-sharing Option), is also being used to enhance or develop systems within the MACS framework. The overall effect of the MACS system, as well as providing better insight into locomotive maintenance and being a problem-solving tool in several areas, is that it has assisted in making the ICG's present locomotive availability one of the highest in the industry—averaging slightly over 89% for all types of motive power in the combined fleets.

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053815
TRAIN PREFORMANCE REPORTING

Clinkenbeard, GR, St Louis-San Francisco Railway Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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This program provides an analysis of train operations by revealing the differences between performances and schedules. The program produces a 3-section report entitled: (1) Compendium of Train Operations; (2) TPR Graphics; and (3) Evaluation by Location. These reports view a train schedule as being a string or series of schedule segments. Therefore, each segment, such as departure time at origin, time between two stations, dead time at a yard or station, and arrival at destination undergoes its own analysis. This approach permits the detection and isolation of repetitive situations where segment performance significantly varies from schedule. And at the same time the impact of segment operations on the over-all performance of the train can be gauged. The degree of variance that is tolerated before the deviation from schedule is deemed significant is controlled by a variable that is input to the program. By allowing a tolerance only exception performances are passed on to the manager for review. This method of information display will highlight which segment of a train schedule is experiencing a substantial scheduling or operational problem. The program utilizes records existing in the Frisco's Management Information Control System (MICS). Specific train numbers must be selected for inclusion in the report. Any train selected for evaluation automatically is included in all three sections. There is one master file that controls all three sections and it is maintained by the Transportation Department.

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053816
WORKING OUT OPTIMAL FREIGHT TRAIN MAKE-UP PLAN ON ELECTRONIC COMPUTER AND DISTRIBUTION OF CLASSIFICATION WORK ON LARGE RAILWAY NETWORK

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International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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The rational organization of freight train traffic requires the solution of two problems, namely, determination of the routes of the car traffic and the order of including cars into trains of different destinations. The routes of freight car traffic established from a number of considerations cannot be constructed in a computer on the basis of the principle of the shortest (most advantageous) route. It is therefore necessary to provide additional information characterizing the deviations from the optimal routes. The volume of classification work and the time spent by cars waiting for the accumulation of trains depend on the order of combining cars into trains (the train make-up plan). The reduction of the cost of this classification work and car detention to a minimum is connected with the solution of a problem of integer linear programming with many thousand unknowns. An effective solution of the problem is achieved by methods of improving the plan and searching for a better one. It is shown that the calculations can be reduced considerably if account is taken of certain features of the problem being solved. The program worked out according to the proposed method ensures the conducting of calculations for a railway network with hundreds of classification yards.

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053817
ON THE DETERMINATION AND PRACTICE-REFERRED TRIAL OF CONTROL STRATEGIES FOR COMPUTER-AIDED OPTIMIZED TRAIN OPERATION

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Kosemund, M, Hochschule Verkehrwesen Friedrich List, Dresden
Horn, P, Hochschule Verkehrswesen Friedrich List, Dresden

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 7 pp, 5 Fig, 8 Ref

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

This paper deals with new methods to determine and test control algorithms for: (a) optimally controlled train sequence on railway lines; (b) energy optimized individual train control. In the first case it is assumed that a process computer is coupled to the railway line for the self-acting tracing of train movements by comparing the actual and stored nominal positions. If a delay occurs, the computer shall automatically start an optimizing programme to calculate an optimally modified timetable within a given disposition interval. Suggested is a new mode of access based on the discrete form of Pontrjagin's maximum principle which yields an optimum solution by evaluating a sequence of bivalent decisions in a way that is favourable with respect to storage location and computing time utilization. The obtained control algorithm has been tested in a practice-referred mode by coupling a small process computer to the model railway system of the Dresden College of Transport. The second problem dealt with in this paper concerns the following task: With due consideration of constraints regarding travelling speed, tractive force and brake power, and within the scheduled or modified travelling time obtained under (a), a train shall be moved from the stations A to B with minimized energy consumption. Again Pontrjagin's maximum principle has been used to obtain an optimum solution for train movements on plans and gradients. Trials have been made by coupling a small control computer to an electronic running simulator. It can be shown that, compared to manually controlled train movement, energy consumption can be reduced by approx. 15%, and that adherence to timetables may be improved to quite a degree; especially under unfavourable conditions such as poor visibility, etc.

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053818
LOCOMOTIVE SIMULATOR

Culbertson, DL, Southern Pacific Transportation Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Training of railroad engineers requires a development of high levels of skill and judgment, which cannot be learned in a classroom environment. It also requires a simulator support program of classroom instruction. Simulator capability for training is available through use of a solid state, high speed, general purpose digital computer. To build a simulator requires a detailed knowledge of electronics, hydraulic and mechanical engineering, systems analyses and integration, mathematical modelling, human factors design, training psychology, and environmental control. A train simulator consists of: (1) an exact reproduction of a locomotive cab with controls and fixtures; (2) an instructor station and console with gages duplicating those of engine console, indicator lights for monitoring operation, and switches for setting up and controlling the training events and runs; (3) a visual system, using a multiple of projectors; (4) a motion system; (5) a sound system; and (6) a computer system. Realistic simulation provides the maximum amount of engineer interest and motivation necessary to efficient learning and retention of skills, and provides high transfer of learning from simulator to real train operation. The digital computer is given information specifying the number and types of engines in consist, number of cars and weights, numerical data on track gradient, curves, speed limits, and milepost locations. During simulation, the computer calculates a complete force balance for each car, up to 200 cars in a train, and up to 164 separate values on each car ten times a second, and determines amount and direction of slack action, coupler force, locomotive tractive effort, braking effort, train speed, wheel action, effects of sand on adhesion, plus other effects a real train would experience. This computational ability provides the real time reaction which allows the trainee to obtain in a few weeks, experience under a wide variety of conditions, which would otherwise require years to acquire.

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053819
MAN-MACHINE SYSTEMS ENGINEERING IN FREIGHT SERVICE

Iiyama, Y, Japanese National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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In recent years, JNR has constructively advanced the automation and modernization of its enormous traffic operations, and as a consequence, human judgement, manual data processing and manual work are being replaced by a more reliable total system with speedy processing capacity. In order, however, to make efficient use of this total system, it must not only be dealt with as a computer-using system, but also as a large and complex man-machine system so that a high-level total transport system may be realized. For the modernization of freight service, JNR has begun with the automation of terminal yards, and in the Koriyama Marshalling Yard the controlling of freight car movement from hump to classification tracks and a part of the data processing are already automated. However, in order to promptly perform the enormous data processing and various changes of work schedule, it is further necessary to analyze the flow of all sorts of information and the framework of decision making in the light of the various modes of the system and to give an optimum assignment to man and machine. In constructing the control center of the Musashino Marshalling Yard, the most modern automated yard

of JNR, studies were carried out based on the results obtained at the Koriyama Marshalling Yard and Shinkansen general control system. As a result, the information and decision-making systems of the new system and the characteristics of operations based on them were derived. Moreover, the requirements, concrete functions and role of the machines most closely connected to man at the control center were obtained, and in addition, an approach was made based on man-machine systems engineering so that the criteria for the qualifications of the operators and the number of staff required (for normal and emergency time) can be determined. This paper deals with automation in JNR, giving some examples of the application of man-machine systems engineering, and tells of how the experience and method used therein were used to draw out the various data needed in planning the control center construction for the Musashino Marshalling Yard.

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053820
MAN-MACHINE INTERFACE PROBLEMS

Rees, WS, Penn Central Transportation Company

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

Any interface problem between man and machine can affect the input and the resulting output. A key person in our elaborate railroad computer systems is the man at a remote yard or station reading a source document, converting the data into machine language and transmitting this data to a distant computer center that, in all probability, he has never seen. The terminal equipment he uses may be simple or complex. His attitudes, aptitudes, training, frustrations, environment and his supervisor's attitude can affect the manner in which he operates this equipment, thereby affecting the accuracy of his input. Machine designers, systems analysts and railroad management who are aware of this human and knowledgeable of his problems are in a much better position to find solutions, resulting in a more efficient computer system.

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053821
THE HUMAN PROBLEMS AND CHANGES IN MANAGEMENT TECHNIQUES INHERENT IN THE USE OF COMPUTERS FOR DECISION MAKING

Alexander, NJB, British Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

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Early applications of computers involved the mechanization of existing processes which were already well established and understood. The client had a clear understanding of the input, procedures and output involved and was able to provide a complete specification of his requirements. In recent years computers have been used more and more for applications in which the machine replaces human decisions by using various types of mathematical models. With these applications it is no longer easy to define the precise boundaries of the problem and in particular it becomes very difficult either for the client to express his decision criteria in appropriate terms or for the technician to explain the processes inherent in the model. Furthermore the power of modern computers is so great that their introduction to a particular problem area may so upset the balance of responsibility or span of control that a major change in management structure is required. All these factors create problems of confidence and communication which must be given particular attention during the development stages of a project. This paper describes some of these problems with specific reference to computer projects developed for the planning of the freight and train movements activities of British Rail.

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053822
DEVELOPMENT OF AN ADVANCED SIMULATOR FOR TRAINING OF LOCOMOTIVE CREWS

Wilson, JT, Canadian National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 4 pp, 2 Fig

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington,

The paper presents a review of progress made in a development project directed to provide a fully realistic simulator for training locomotive crews. The evolutionary approach to equipment realizations is described. Features of a basic simulator and design objectives for a more complex simulator are outlined.

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053823
THE MAN-MACHINE SYSTEM IN THE CONTROL OF TRANSPORT PROCESSES

Pierick, K, Carolo-Wilhelmina Technical University

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 5 pp

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C. This paper was also published in the October 1973 issue of *Rail International*, which is available from E.S.L.

Transport undertakings must, like all other commercial concerns, be organized in such a way that demand is met at minimum production cost by providing a service of quality. However, as they are public service undertakings in which the customer is directly involved in the production process, they must take special and more extensive measures to eliminate the element of risk in the transport process. This objective can be pursued by taking measures in the following spheres: (1) increase in reliability; (2) technical monitoring of failures; and (3) technical automation. In all, it can be stated that the quality of the solution to the task of safeguarding increases with the degree of automation applied to the safety system. The conditions for the safeguarding of transport processes merely serve to determine certain inviolate limits to the possibilities of movement in a transport network. There still remains a wide margin within which the actual optimization of production, i.e., the most profitable adaptation of the offered services to the demand, must be achieved. In solving the task of optimization, it is obviously necessary to select from among a multiplicity of possible solutions the one which meets a given criterion in the best possible way. It follows that the prospective results of a number of alternative decision options must be compared with each other. Depending on the nature of the task and on the speed at which a decision must be arrived at, the human brain can only deal with a very limited number of alternatives; on the other hand, relying on his knowledge of basic inter-relations and on his experience, the human decision-maker is able to eliminate from the outset a number of theoretically conceivable variants as being unsuitable. In contrast, electronic data processing plants are able to simulate in advance, at an extremely rapid speed, the consequences of certain decisions; but, especially in the case of transport optimization problems, the number of possible alternative decisions is so great that a sufficiently prompt decision cannot be obtained even with the aid of computers of the highest known capacity. While, in regard to the safeguarding of transport processes, it was possible to state that the basic task could best be solved by applying the highest possible degree of automation, it cannot be expected that the human operator can be completely replaced by the machine in the sphere of transport optimization.

ACKNOWLEDGEMENT:
International Union of Railways

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053824
RAILWAYMEN AND COMPUTERS: STUDY OF A SELECTION TEST FOR THE RECRUITMENT OF TERMINAL OPERATORS FROM WITHIN A RAILWAY NETWORK

Monti, M, Italian State Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 9 pp, 2 Fig, 3 Tab

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

Psychological research for determining the aptitudes required for certain work connected with information processing has been undertaken in numerous circles. In connection with the subject of Section IV of the Washington Symposium on "Human Aspects", the FS have carried out an experimental investigation associated with the study of certain mental functions such as intelligence, attention, memory and perfection, all of which are essential for the preparation of input data. The behaviour of a group of operators responsible for the transmission of input data has been studied, both from the point of view of their aptitudes and from the operational angle, with the conviction that an optimum man-machine relationship will still prove essential in a highly automated production system. The initial results of this investigation, which are limited for the time being to the work of card punching, demonstrate fully the value of extending the research to other work carried out by the staff at large electronic computer centers.

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International Union of Railways

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053825
HUMAN ASPECTS OF COMPUTER SYSTEMS

Urquhart, JB, British Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 5 pp

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

This paper draws from practical experience on British Railways. It discusses the more important human relations and people interface problems which have arisen with the development of computer systems in the Freight Traffic Field and refers to certain applications, including the American Southern Pacific TOPS, which have impacted significantly on attitudes and working relationships. It draws attention to the lesson learned from past shortcomings. Specific issues reviewed include the communication problem between Line Management and the Computer Specialist with suggestions for easement if not solution; the case for joint project management teams headed by the User Department; and the need to include Executive Management in training and education arrangements. Additionally some of the special problems relating to the recruitment, retention, and remuneration of computer personnel within the traditional framework of the highly formalized and unionized railway industry are discussed. Finally, the paper comments on the growing industrial relations influence on computer applications and concludes that future expansion is now more dependent on the solution of the human aspect problems rather than advancement in computer technology.

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International Union of Railways

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053843
BREAKTHROUGHS VIA THE COMPUTER

Alward, SA, Seaboard Coast Line Railroad

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 6, Nov. 1973, 5 pp, Phots

In 1972, Seaboard Coast Line Industries acquired 100% ownership of the L&N, and a "Family Lines" management concept was established, including not only L&N but also the two jointly owned L&N-SCL subsidiaries, Clinchfield and Georgia. Before 1972, the management information services departments of the two roads were performing strikingly similar services for the user departments of the two roads, yet the procedures and computer programs used to accomplish these similar functions were quite different. Today this duplication of effort has been eliminated. Common reporting formats and procedures exist. One telecommunication system computer controls the entire consolidated network. This network and the benefits realized are discussed in this article.

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054142
NATIONAL CAR INFORMATION AND CONTROL SYSTEM. REPORT OF THE TASK FORCE AND STEERING COMMITTEE

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

Apr. 1972

This extensive report investigated the need for a national car information and control system. The report gives the scope of the study, the benefits to be realized from such a system, and lays out the basic requirements of the system. Subcommittee reports included are: Car Service, Data Input, Automatic Car Identification, Communications, and Computer Systems. This report led to the expansion of TRAIN to TRAIN II.

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054415
INTERACTIVE GRAPHICS IN TRANSPORTATION SYSTEMS PLANNING AND DESIGN

Schneider, J

Washington University, Seattle, Seattle, Washington, 98105

Final Rpt, Jan. 1974, 96 pp

Contract DOT-OS-40012

Proceedings of a Seminar Held at the Battelle Seattle Research Center, 31 Oct-1 Nov 73 in Seattle, Wash. Also pub. as Transportation Systems Center, Cambridge, Md. Rept. no DOT-TST-74-10.

The report summarizes the content and findings of a three-day seminar designed to explore and assess the potential utility of interactive computer graphics for application in the transportation systems planning and design fields. The seminar was structured around the concept of finding good matches between existing technology in the interactive graphics field (capabilities) with high priority and suitable problems in the transportation planning and design fields (needs). The basic objective was to define and specify, as clearly as possible, some guidelines for the U.S. Dept. of Transportation that could assist the formulation of a DOT development and demonstration program strategy for using existing technology in the computer graphics area.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227264/9

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PB-227264/9

054555
PROGRAM CARDS FOR A COMPUTER PROGRAM FOR ESTIMATING COSTS OF HARD ROCK TUNNELING (COHART)

Wheby, FT Cikanek, EM

Harza Engineering Company, 150 South Wacker Drive, Chicago, Illinois

Final Rpt, May 1970, 3302 cards

Contract DOT-FR-9-00003

See also PB-193 272. Punched cards $36.00/deck of 3302 cards.

A computer performs all logic and computations customarily done by hand in preparation of engineer's estimates or contractor's bids on tunnel-shaft systems. The program described is based on construction methods, work forces and equipment selections corresponding to the current state of the art of tunneling. The program contains logic to permit the estimate costs of complicated tunnel-shaft systems. In any estimate, the program will accommodate a large number of values or changes in the values of the factors that affect costs, such as tunnel shape and size, shaft depth, rock characteristics, and construction method. To provide great flexibility, the user of the program is provided with the option of selecting lining type and thickness, profit and overhead margins and other input data. Suggestions for selecting an appropriate value for these inputs are contained in the report. Complete operating instructions and an illustrative example are presented. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-201834

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054674
COIN II GIVING UP MORE MANAGEMENT DATA

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 5, Mar. 1974, p 32

Union Pacific has just developed a computer management information system called COIN II (Complete Operating Information). Among other features, the program will expand train reporting capability and TOFC/COFC reporting capability and provide additional operating and accounting data. The system will be operated by an IBM 370/155 computer. The system will be introduced over a 53 week period until the entire Union Pacific system is covered.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054728
APPLICATION OF MATHEMATICAL PROGRAMMING TO THE RAILROAD FREIGHT CAR ASSIGNMENT PROBLEM

Hatch, RS, Decision Systems Associates, Incorporated

Logistics Research Conference, George Washington University, Washington, D.C., 20006

Paper, 740509

For further information write in care of the author.

The assignment of empty railroad freight cars presents a complex transhipment problem presently handled by most railroads on a decentralized basis. Empty cars are spread across the system by "tide" rules, and the ultimate car-order match decisions are made by the local agent. A sophisticated resource allocation technology evolved from development of large scale military personnel assignment models provided the approach. The problem formulation exploits highly efficient primal dual network flow algorithms capable of solving nonlinear as well as multiple objective problems. Sample results using actual data from the Southern Pacific Railroad will conclude the presentation.

ACKNOWLEDGEMENT:
Logistics Research Conference

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Decision Systems Associates, Incorporated, 5640 Wall Lane, Rockville, Maryland, Repr PC: Req Price

054741
ADAPTATION OF COMPUTER TECHNIQUES TO THE DESIGN OF MECHANICAL DYNAMIC MACHINERY

Chace, MA, Michigan University, Ann Arbor
Sheth, PN, Michigan University, Ann Arbor

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-DET-58, June 1973, 17 pp, 14 Fig, 20 Ref

Presented at the Design Engineering Technical Conference, Cincinnati, Ohio, September 9-12, 1973.

This paper is a perspective on the adaptation of computer techniques as a resource for the design of mechanical dynamic machinery. It describes generally two computer-aided design systems, DRAM and IMP, which have been developed for this design area and discusses some of the program features required for effective computer-aided design.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054771
OPTIMIZATION STRATEGIES FOR SIMULATION MODELS

Fromovitz, S, Maryland University, College Park

Logistics Research Conference, George Washington University, Washington, D.C., 20006

Paper, May 1974

For further information write in care of the author.

In most simulation models an attempt is made, often by a trial-and-error search procedure, to adjust the various policy parameters of the model in order to yield a "good" design or tactic. For many different reasons, the usual optimization algorithms available in the published literature can not be used for this purpose. A special algorithm specifically designed for this purpose has been developed. This algorithm requires that the user specify the following three operations for the cases that are generated by his model: Given any number of cases, specify an "average" case for them, given two cases, specify a third "reflected" case so that the second case becomes the "average" of the first and third case, and given two cases specify that either one case is "better" than the other or that they are both equally "good". This algorithm also allows for various forms of on-line user intervention.

ACKNOWLEDGEMENT:
Logistics Research Conference

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054916
RAILROADS AND THEIR COMPUTERS: WHAT COMES NEXT?

Welty, A

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 7, Apr. 1974, 4 pp

Computers have been around for about 20 years and yet railways haven't taken full advantage of them. Process control systems and computer-to-computer communications are two major areas that could be expanded. New advances in technology allow for more computer applications in regional offices because of the reduced size and cost of the new computers. A major reason for the slowness in adopting computers is the lack of money in railway budgets. In addition there is still reluctance by some personnel to computers.

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Canadian National Railways, Headquarters Library

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054931
CYBERNETICS: THE KEY TO FREIGHT EXPANSION

Ailes, S, Association of American Railroads

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, pp 129-131, 1 Phot

As delegates from five continents gather in Washington for the fourth international cybernetics symposium, the President of the AAR reviews progress over more than a decade of applying computer techniques to the control of freight movements and concludes that the effective marriage of cybernetics to rail transport has been an inevitable and imperative development.

ACKNOWLEDGEMENT:
Railway Gazette International

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054955
COMPUTER DEVELOPMENTS WITHIN BRITISH RAIL ENGINEERING LTD

Hudson, CJ

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 3, No. 2, Mar. 1974, 10 pp, 7 Fig, 1 Ref

Information, the primary resource of management, is obtained by the processing of data. Large companies therefore have two major problems: firstly maintaining the data in a reliable and consistent manner and secondly controlling the processing of the data to produce the desired information. In BREL, the data management problem is one of considerable magnitude.

ACKNOWLEDGEMENT:
Railway Engineering Journal

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056750
DATA PROCESSING FOR RAILROADS

DATENVERARBEITUNG BEI DER BAHN

Elektrotechnische Zeitschrift, Ausgabe B (VDE Verlag GmbH, Bismarckstrasse 33, Berlin Charlottenbur, g, West Germany)

Vol. 25, No. 26, Dec. 1973

Data processing applications to maintenance, to extending the rail network, to investigate wheel-rail problems as well as freight invoicing are described. A management information system is briefly

discussed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740503781

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056759
SIMULATION MODELS OF RAILROAD OPERATIONS: A REVIEW OF MAJOR EFFORTS

Folk, JF

Pittsburgh Conference on Model & Simulation, 4th, Pittsburgh, Pennsylvania

pp 589-592, 13 Ref

The author reviews major modeling efforts on several railroads dividing the review into two basic types of models, simulation and optimization models. Included is an overview of models used in studying a current and important problem to many railroads, namely plant rationalization.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504900

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056909
FREIGHT TRANSPORTATION INFORMATION SYSTEMS AND THEIR IMPLICATIONS FOR R AND D POLICY

Troup, KF, III

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-OST-73-10, Final Rpt, 7201-7210, Mar. 1974, 86p

The current use of computerized management information and control systems in intercity freight transportation is examined. Each of the four modes (railroad, motor carrier, maritime and air cargo industries) is investigated. In each case, computer information systems can help improve the operational efficiency of the mode and provide management (and regulators) with more accurate data for decision making. The intermodal data standard and exchange problem is also discussed. Appropriate recommendations for DOT research and development policy are made. These include development of a national railroad management system, development of terminal control systems for railroad yards and intermodal terminals, support to development of a maritime industry information system and increased effort in the area of data facilitation.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231049/8

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PB-231049/8

057155
RAILROAD INFORMATION PROBLEMS IN NORTH AMERICA

Deschief, H, Canadian National Railways, Headquarters Library

Canadian National Railways, 915 la Gauchetiere, West, Montreal, Quebec, Canada

Presented at the Aslib Conference, Southampton, England, April 22-24, 1974.

To understand today's problems in the acquisition and dissemination of railroad information in America, one should review how railroad institutions obtained and transmitted information in the past and the reasons that are causing a change in these methods. The most important change has come from the creation of the Railroad Research Information Service which grew out of the U.S. Federal Railroad Administration's need for information. Before RRIS becomes a viable service, one of the main problems to overcome is the lack of cooperation on the part of the railroads and supply industries in providing information of research projects and reports. This problem is common to all national information-gathering services which are not depositories and which do not receive their information from already organized information sub-units. If RRIS wishes to overcome this problem, it should help to set up document information centers in those organizations from which they seek information. A first attempt is being made in this regard in the Canadian National Railways. The RRIS Worksheet is being adapted by CN Library for recording CN internal documents. As far as possible, the RRIS classifications and descriptors will be used. It is hoped that this venture in cooperation will be adopted by other railroads and railway suppliers in America and in this way a viable coordinated railroad information network will develop.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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063338
A MULTIPLE-MODE TRANSPORTATION NETWORK DESIGN MODEL. VOLUME I. (CHAPTERS 1 THROUGH 2)

Morlok, EK Nihan, NL Sullivan, RF

Northwestern University, Evanston, Transportation Center, Evanston, Illinois

Final Rpt, Aug. 1969, 49p

Contract DOT-7-35524

Report on The Network Synthesis Model Developed as a Part of the Contract The Development of a Geographic Transportation Network Generation and Evaluation Model. See also Volume 2, PB-197 278.

The primary objective of the research upon which this report is based was to develop a model which would permit the efficient exploration of a wide range of policies regarding intercity transportation service and their implication for future transportation system investment and operations. There were two major thrusts to the research. One was to develop the components of a computer model which would synthesize transportation investment programs which meet policy objectives. This set of sub-models consists of a graph generator, designed to generate a wide range of transportation system link and mode investment alternatives, a multiple-mode network operations model, which identifies the most efficient manner in which to operate any given network of links and modes, and an investment staging model, which identifies the optimal sequence of investments. A major feature of these models is that the costs and travel demand on each mode is a function of the quality and quantity of service offered, and the effects of one mode upon another are directly considered. The second thrust of the effort was to attempt to define operational measures of policy. One outcome of this research was a comparison of the quality of services for all city pairs in the Northeast Corridor for 1940, 1950, 1960, and 1965, and an identification of cities which are poorly served. (OHSGT abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-197277

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PB-197277

063339
A MULTIPLE-MODE TRANSPORTATION NETWORK DESIGN MODEL. VOLUME II. (CHAPTERS 3 THROUGH 5)

Morlok, EK Nihan, NL Sullivan, RF

Northwestern University, Evanston, Transportation Center, Evanston, Illinois

Final Rpt, Aug. 1969, 225p

Contract DOT-7-35524

Report on the Network Synthesis Model Developed as a Part of the Contract The Development of a Geographic Transportation Network Generation and Evaluation Model. See also Volume 1, PB-197 277 and Volume 3, PB-197 279.

A description is given of the optimal multi-modal network operations model. The function of this model is essentially to accept as specified inputs certain characteristics of the fixed network of the transportation system, including characteristics of the common carrier terminals, highway interchanges, and highway and common carrier links. It then synthesizes an optimal plan of operation for the system, minimizing costs subject to achievement of the desired levels of effectiveness. The model internally predicts certain consequences of the actual choice variables, mainly related to the demand for transportation and the effect of changes in the transportation network upon the region served. Current estimates of unit costs and the sources of this cost information are outlined and explained. Three example applications of the Optimal Multi-Mode Network Operations Model are applied to situations in the Northeast Corridor. The purpose is to present information in sufficient detail so that an understanding of the model's features is obtained.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-197278

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PB-197278

063340
A MULTIPLE-MODE TRANSPORTATION NETWORK DESIGN MODEL. VOLUME III. (CHAPTERS 6 AND 7)

Morlok, EK Nihan, NL Sullivan, RF

Northwestern University, Evanston, Transportation Center, Evanston, Illinois

Final Rpt, Aug. 1969, 43p

Contract DOT-7-35524

Report on The Network Synthesis Model Developed as a Part of the Contract The Development of a Geographic Transportation Network Generation and Evaluation Model. See also Volume 2, PB-197 278, and Volume 4, PB-197 280.

The function of the model is the staging of network development. The purpose of this model is essentially to accept information on possible paths of development of the transportation network and then to identify optimal paths for such development. The problem is basically one of finding the optimal path through a network in which the vertices correspond to different states of the transportation system at various future times, and the connecting arcs correspond to possible state changes from one time period to the next. An algorithm for the automatic generation and classification of all possible graphs which might be defined on any given number of vertices. The motivation for this is to provide an exhaustive list of all the distinct network structures of transportation systems which might be used to connect any given number of vertices representing urban areas.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-197279

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PB-197279

063341
A MULTIPLE-MODE TRANSPORTATION NETWORK DESIGN MODEL. VOLUME IV. (CHAPTER 8 PLUS APPENDIX)

Morlok, EK Nihan, NL Sullivan, RF Olsen, WT

Northwestern University, Evanston, Transportation Center Library, Evanston, Illinois

Final Rpt., Aug. 1969, 295 pp

Contract DOT-7-35524

Report on The Network Synthesis Model Developed as a Part of the Contract The Development of a Geographic Transportation Network Generation and Evaluation Model. See also Volume 3, PB-197 279.

Illustrations are given of some of the difficulties facing transportation planning methodology with respect to very broad issues in the area of generating alternatives and evaluating these alternatives on the basis of their consequences. The focus, particularly in terms of examples, is on the analysis of high-speed ground transportation systems. However, most of the discussion is equally applicable to a number of other transportation planning and decision-making problems. Essentially, concern is with the question of how well existing methodologies are matched to the real world problems of analysis and decision making with respect to large scale transportation improvements. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-197280

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PB-197280

064907
MODELS OF INTERCITY TRAVEL DEMAND. PART I. THEORETICAL ASPECTS

Crow, RT Young, KH Cooley, T

Mathematica Incorporated, Princeton, New Jersey

Final Rpt, June 1971, 90p

Contract DOT-FR-0001

The report presents a broad overview of all of the passenger travel demand models developed for the Northeast Corridor transportation project of the U. S. Department of Transportation through early 1969. It attempts to bring together the various strands of the demand model work into one summary document. It also attempts, on the basis of the overview, to combine the best features of each of the existing models in order to construct models which will be conceptually superior and also yield improved forecasting reliability.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-201206

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PB-201206

046174
TECHNOLOGY AND ECONOMICS OF TRANSPORTING AND STORING LNG

Johnson, PC, Distrigas Corporation

American Institute of Chemical Engineers, 345 East 47th Street, New York, New York, 10017

Feb. 1972, 27 pp

An overview presents the technology involved in the various phases of LNG transportation from well head to user. The economic cost of each step in the process is presented to show why decisions are made. The impending energy crisis with natural gas in short supply requires trade-offs in cost considerations. This is further unbalanced by the newness of LNG transportation into many areas and environmental considerations concerning its handling and storage.

ACKNOWLEDGEMENT:
American Institute of Chemical Engineers

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American Institute of Chemical Engineers, 345 East 47th Street, New York, New York, 10017, Repr PC: Req Price

051903
AN ECONOMIC EVALUATION OF MERGERS IN THE RAILROAD INDUSTRY–THE C. & O./B. & O. CONSOLIDATION: A CASE STUDY

Kneafsey, JT, Ohio State University

Ohio State University, 1314 Kinnear Road, Columbus, Ohio, 43212

PhD Thesis, 1971, 222 pp, 3 Fig, 23 Tab, Refs

In general, this study should provide a more comprehensive and integrated view of the factors bearing on merger aspects in the railroad industry than has heretofore been available. Moreover, the study relates merger criteria to individual cases in order to demonstrate the extent of the consideration given to the pertinent and usable public interest factors. In addition, there is an attempt to indicate the time-lines of a review of three principal merger problems: (1) the determination of a precise concept of what is meant by the public interest in railroad merger proceedings; (2) the need for an appraisal of the criteria utilized by the I.C.C. in the proceedings; and (3) the importance of expediting the adjudication process. The brief review of the merger history traces major motivating factors in both past rail mergers and current proposals and outlines the present trends in this area.

ACKNOWLEDGEMENT:
Xerox University Microfilms, 71-22,498

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71-22,498

051920
THE IMPACT OF ENGINEERING SCIENCE ON THE ECONOMICS OF RAILWAYS

Jones, S

Physics in Technology (American Institute of Physics, 335 East 45th Street, New York, New York, 10017)

Vol. 4, No. 1, 1973, 10 pp

Engineering may be described as the art of applying science to the advantage of some business purpose. The opportunities offered by modern science have been variously grasped by different industries and railways are generally held to be among the more backward in this respect. The situation in British Railways has advanced considerably in recent years as this article sets out to explain. In a number of respects, perhaps most notably in the design of rolling stock, understanding of the technical problems has increased considerably with every promise of economic advantage to the business.

ACKNOWLEDGEMENT:
British Railways, 29779

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052082
BRITISH RAIL PREPARES INCREASED CAPITAL SPENDING

Hope, R

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 2 pp, 2 Tab

Pressure from environmental lobbies and the oil shortage forced the government to announce in November a big increase in rail investment at the expense of urban road building. Subsequent cutbacks in public spending have jeopardised these good intentions, but the author examines the ways in which BR intends to spend its new-found wealth and indicates the areas where pressure will be applied for additional investment over and above the 1000 million English Pounds budgeted for 1974-78.

ACKNOWLEDGEMENT:
Railway Gazette International

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053734
ECONOMIC BALANCE SHEET

Baumgartner, JP, Swiss Federal Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 1, Jan. 1973, 14 pp, Figs, Tabs

To improve rail passenger services in the large conurbations, it is necessary to undertake certain operations, or carry out certain projects. The term operation (or project), is understood to mean an investment and operational programme. The economic balance sheet must enable a reply to be given to the following questions: (a) Financial justification of the operation: is the operation envisaged worth the trouble, or is it worth-while from an economic point of view? (b) Choice of the optimum date for carrying out the operation: should, from the economic point of view, the proposed investment be made immediately, or at what date in the future? (c) Choice between various alternatives for an operation: of a number of alternatives for the same operation which arise, which is to be preferred from an economic point of view? (d) Classification of several operations which it is possible technically to carry out simultaneously, which are those to which preference should be given from an economic point of view?

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053799
THE SYSTEM OF CENTRALISED CALCULATION OF FREIGHT CHARGES, ITS BENEFITS TO COMMERCIAL MANAGEMENT AND OPERATION

Mohl, K, German Federal Railway

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 6 pp, 2 Fig

Presented at Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C. This paper was also published in the October 1973 issue of Rail International, which is available from E.S.L.

More than 60% of all traffic revenue of the German Federal Railway is derived from goods traffic. That is why, from an early stage already, the planning for the application of computers has been orientated towards this most important activity of the undertaking. Beginning in 1962 with wagon load traffic within the network of the German Federal Railway, and ending in 1973 with the inclusion of international transports, an integrated data processing system for the calculation and invoicing of charges for the entire goods traffic has been created. On this basis, the German Federal Railway is at present introducing a freight charges calculation centre where the computer centre at Frankfurt-on-Main assumes the functions of the original calculation of the charge rather than the checking of a charge already calculated. Prerequisite to this system, and likewise already realised, are the collection of data close to their source in terms of space and time, the vetting of input data during their introduction into terminals capable of being programmed, and a high-speed data transmission network converging at the computer centre. As part of the centralised computation of freight charges, the mechanical division of charges among different railway administrations in Germany and abroad as well as the mechanised compilation of tariffs are already in practical use. Beyond the improvements in economic efficiency already realised, the system has led to a great gain in information. The individual data stored in the computer are selectively processed for the following purposes: the up-to-date presentation of traffic trends; ad-hoc information to the requirements of the commercial department; rapid presentation of production data for the different requirements of the various levels of management. Without incurring additional costs, the goods traffic data are evaluated for the planning of operation through: presentation and analysis of goods traffic flows; investigation of the goods wagon turn-round times; special, selective investigations for the solution of specific operating problems.

ACKNOWLEDGEMENT:
International Union of Railways

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054116
PROFIT CENTER ANALYSIS FOR RAILWAY BRANCH LINES

Macdonald, JA, Canadian Institute of Guided Ground Transport
Roggeveen, VJ, Stanford University

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 4, 1973, 14 pp, 4 Tab

A new technique for analyzing a railway branch line as a profit center within a larger railway enterprise is presented. It makes possible continuing managerial evaluation and control of a line's financial performance. This is in contrast to present methods of cost analysis, used in the preparation of capital budget proposals for extensions to or abandonments of fixed plant. Numerical examples of present and proposed methodologies are compared. The applicability of this technique, and its possible extensions to an entire railway operation, are discussed.

ACKNOWLEDGEMENT:
Railway Management Review

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054117
A NATIONAL FREIGHT CAR POOL

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 4, 1973, 70 pp

A Symposium was held on the subject of a National Freight Car Pool, and the proceedings are presented here, consisting of several papers and some discussions. One paper reviews the proposed solutions. A four person panel discusses the pros and cons of such a Pool. A paper covers the financing of the National Freight Car Pool. A three person panel discusses the benefits of such a pool. Another paper discusses the operation of an industry-wide car pool, and a final paper covers the steps in creating such a pool.

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054137
THE ECONOMICS OF RAIL TRANSPORT OF COAL

Morris, RN Boyce, AR Sward, JD Peterson, TD

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 32 pp

The energy crisis will create tremendous new markets for coal, and railroads must not impede these markets. Unit trains are a necessity since competing modes of transportation are emerging such as pipeline. Car utilization is critical to low costs. Unit trains are a management concept rather than a technology. Lack of standardization in freight car design leads to higher first costs and higher maintenance costs.

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054138
COMPETITION FOR RAIL TRANSPORT OF COAL

Meece, LH Craw, DA

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 16 pp

This paper states there is very little direct waterway competition with railroads for coal traffic. Competition is more likely between a water served mine and a railroad served mine. Barge operators have been very successful in establishing what their costs are. The future may offer opportunities for rail-barge cooperation. Pipeline transportation of coal must be geared to the consumer. Pipelines have lower operating costs, and where no railroad exists, they have lower first costs.

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054277
WHAT IS PRODUCTIVITY, AND WHO BENEFITS?

Stewart, JM, National Commission on Productivity

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 11 pp, 3 Fig

On the macro level, the inter-industry level and the intra-plant level: (1) not enough is known about the economics or the measurement of productivity, (2) frequently, the measures that do exist are not accepted; (3) it is very difficult to relate measures to existing managerial measurement such as profit, market share, and employee satisfaction; and (4) although productivity goes up only 3% a year, the national expectations require a rate higher than 3% for goods and services, along with a shorter work week, and a smaller workforce.

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054278
PRODUCTIVITY FROM THE ANALYST'S POINT OF VIEW

Hanscomb, JW, Smitners (FS)

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 4 pp

The railroads have increased labor productivity substantially in recent years by substituting capital for labor. Yet the railroads haven't met the essential test of capital productivity. The real need is to improve the return on capital or face the day when additional capital will no longer be available.

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054279
TRANSPORTATION INDUSTRY PRODUCTIVITY

Gomberg, W, Wharton School of Finance and Commerce

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 8 pp

The biggest problem to be faced in increasing productivity in the transportation sector only partially lies in the improvement of technologies. The problem is how do we make use of an improved set of social arrangements in order to take advantage of the technology made available by our engineers. The trucking industry, the airline industry, the railroad industry, and the maritime industry are given as examples to illustrate this point of view.

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054299
SPECIAL REPORT: RAILROADS

Dixon, J

Distribution Worldwide (Chilton Company, Chilton Way, Radnor, Pennsylvania, 19089)

Vol. 72, No. 4, Apr. 1974, 17 pp

This four part article deals with the railroad situation in the Northeast that involves Penn Central and other bankrupt carriers and with the new Conrail. It also deals with the reorganization of branch lines as Short Line Railroads. It discusses the steps that must be taken to provide viable railroads and good service, and it covers the car shortage. The article is written somewhat from a shippers' point of view.

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054343
HOW MANY PEOPLE PAY THEIR TRAM FARES?

Jagers, P

American Statistical Association, Journal of (American Statistical Association, 806 15th Street, NW, Washington, D.C., 20005)

Vol. 68, No. 344, Dec. 1973, pp 801-804

Many experimental situations lead to inverse sampling schemes with some random or non-random stopping rule, since at each experiment only a bounded number of observations can be made. This note discusses the problem of estimating the unknown probability in the underlying geometric distribution of such schemes. The author encountered this problem in a very special context, that of estimating the proportion of non-fare-paying passengers in a local transportation system. The methods derived were used on material collected during 1 month by the non-uniformed ticket controllers of the Gothenburg, Sweden, transportation system. Some 3,079 cars and 40,786 passengers were checked; 982 free passengers and 132 stowaways were found, yielding the estimates.

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054345
FINANCING MASS TRANSIT: MOBILITY IS AMONG THE ASSETS

Miller, DR

Technology Review (Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139)

Vol. 76, No. 2, Dec. 1973, pp 44-51

Federal and local roles in underwriting urban transportation systems are discussed. Mechanisms to subsidize capital cost, and output-related cost are analyzed. So far it has not been possible to devise a formula for giving out operating subsidies that are equitable, that will keep transit firms solvent and enable them to increase the mobility of city dwellers, that are efficient (in the economic sense of not leading to distortions in resource allocation), that will encourage innovation, and that can be administered at a reasonable cost. In curing the congestion problem, the issue is primarily resource allocation in the transportation sector. A program is needed to test service innovations to solve the mobility problem.

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054450
EVALUATION OF A NO-FARE SYSTEM OF PUBLIC TRANSIT

Rhode Island Statewide Planning Program, Providence, Rhode

Island

RISPP-TP-73-37, Tech Rpt, Sept. 1973, 30 pp

Sponsored in part by Federal Highway Administration, Providence, R.I.

The paper evaluates the operation of public transit services in Rhode Island on a 'no-fare' basis. The concept of a no-fare operation was selected as meriting further study since it combines aspects of several problems confronting both the Authority and the state as a whole: declining or stable ridership, costs of operation increasing more rapidly than revenues, congestion of principal arterials in and around central business districts, use of large amounts of land for off-street, non-structural parking within central business districts, and a range of environmental problems associated with increasing use of private automobile transportation.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227467/8

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054451
PROJECT FARE TASK I REPORT. URBAN MASS TRANSPORTATION INDUSTRY

Andersen (Arthur) and Company, 815 Connecticut Avenue, NW, Washington, D.C., 20006

July 1972, 84 pp

Contract DOT-UT-20008

In the past, it has not been possible to get an accurate measure of the operating deficit of the transit industry or to obtain comparable measures of the levels of service being provided by the various transit systems. Therefore, Project FARE (Financial Accounting and Reporting Elements) was initiated to develop and test a candidate reporting system to accumulate transit industry financial and operating data and to categorize it uniformly. An improved information base such as this is a prerequisite to effective planning and administration of financial assistance programs for Federal, state and local government agencies. It will aid transit industry associations in monitoring performance. Individual transit systems will be able to compare their effectiveness with other systems portraying similar characteristics.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227964/4

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054633
CONGRESS PONDERS NEW RAIL BILL

McConnell, RM

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 2, Jan. 1974, p 59

Congress is presently considering action on the Transportation Improvement Act of 1974 (TIA). The bill will provide for $2 billion in Federal loan guarantees governing rail operation; make it easier to abandon unprofitable rail lines; revise taxation, accounting and rate making procedures; authorize $35 million to design a national rolling stock scheduling to control system that will improve car utilization. The TIA is being described as a method to improve the regulatory climate and financial health of the whole rail freight system.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054664
UTAP: "ONE HAND GIVETH, AND ONE HAND TAKETH AWAY"

Railway Age (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 5, Mar. 1974, 4 pp

On February 13, 1974 the White House passed the Unified Transportation Assistance Program (UTAP). The program makes available $2.5 billion per year in three appropriations. The first part ($700 million) will be capital grants devoted to major mass transit projects. The second ($700 million) would be available for either capital investment or operating subsidies at local option. The third part ($1.1 billion in Highway Trust Fund money) would be available for urban highways, streets or mass transit capital projects at local option. However, critics of the bill are afraid that the following might happen: a) the $700 million transit capital grants would go to mass transit projects in the same way that UMTA money was distributed. But UMTA would have provided $1.2 billion in 1975. b) The $700 million transit operating and/or capital costs would be used by politicians to meet operating deficits and keep fares down. c) The $1.1 billion Highway Trust Fund would probably be taken over largely by the highway lobby. Many transit people believe that there is a better way to hand out transit funds. However, most agree that it is a step in the right direction.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054689
FINANCING TRANSIT: THE BOSTON EXPERIENCE

Cudahy, BJ

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 476, 1973, pp 4-7

Operational and economic administrational experiences of a transit system are described. The history of the present Massachusetts Bay Transportation Authority is presented, and its operating expenses, which are the source of the major problems, are discussed in detail. A brief discussion of statutory issues and proposed legislation conclude the paper.

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054690
ECONOMICS OF URBAN TRANSIT CAPITAL GRANTS

Tye, WB, Charles River Associates, Incorporated

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 476, 1973, pp 30-35, 7 Ref

Four arguments support the restriction of federal grants to public transit: The transit industry is "capital poor"; a capital grant restricts the power of transit unions to dissipate most of the grant through wage gains; a capital grant limits the federal government's liability by avoiding an open-ended commitment such as an operating subsidy support for labor costs; and a capital grant is a highly visible means of showing federal concern for transit. Each of these arguments is shown to be without merit. The uneconomic incentives inherent in a capital subsidy suggest that, if the arguments for a federal subsidy to transit operations are accepted, the funds should be allocated as a generalized subsidy to transit service rather than restricted to capital expenses.

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054705
THE POST-1945 BRANCH LINE RAILWAY IN CANADA: AN ANALYSIS OF THE CARRIER BENEFITS

MacDonald, JA

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada

This study was jointly funded by Canadian Institute of Guided Ground Transport and Central Mortgage & Housing Corporation of Canada.

This research develops and applies a methodology for the determination of the level of a railroad's net income derived from the operation of a branch line. It is based upon post-1945 northern Canadian branch railways, to avoid any possible confusion with the completely different case of the pre-1945 grain gathering lines. Since new northern railways will continue to be important, a study of them is worthwhile. The performance of a sample of five branch lines is assessed using the author's methodology. Each line, representing major capital projects with the potential to significantly affect the development of the regions served, exhibits a different degree of governmental participation in its financing. The methodology is composed of: (1) a profit center model of the branch line, which separates the branch and system costs and revenues; (2) a procedure, which adapts known costing techniques to a typical branch operation; (3) a set of cost data, representative of actual northern railway operations. It was found that branch net contribution margins decreased with increasing governmental involvement. The returns on the railroads' committed capital did not follow the same ranking. This was due to the low railroad investment in the federally-subsidized rail projects, and the resulting high computed return on carrier investment. It is concluded that present governmental policy of subsidizing the construction of development railways, and the rail carrier policy of operating them, is sound. A continuing monitoring of branch performance by railroad management using the author's model is recommended.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

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054733
TRANSPORT PRICING REFORM

Roberts, MJ, Smith (Wilbur) and Associates

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 3, 1973, pp 5-15, 2 Tab, 7 Ref

The missing dynamism in transportation pricing is fully expectable with price stability or even rigidity virtually an explicit policy goal of both private management and of regulatory authorities. Avoiding waves which threaten to shake up the pricing process is sometimes rationalized as necessary to protect shippers' interests. We should recognize but not be intimidated by the cost of change. Urgently needed are pricing policy criteria based on principles which are relevant for present market conditions and thus more responsive than traditional rates to current market requirements. Essentially resisting the postwar forces of dynamic changes characteristic of the economy as a whole, transport pricing has manifested rather the dreary repetition of a set of knee-jerk reactions marked by alternative phases of general increases and selective reductions.

ACKNOWLEDGEMENT:
Transportation Journal

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054737
THE EFFECTS OF ECONOMIC FLUCTUATIONS ON U.S. FREIGHT TRAFFIC

Snow, CR, Auburn University

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 3, 1973, pp 29-38, 8 Tab

This study was undertaken to analyze the effects of changes in national economic activity on the traffic activity of the five modes of freight transport during the period 1950-66. Rail tonnage, for example, which reflects considerable sensitivity, has coal, primary metals, and transportation equipment accounting for approximately 35 percent of the total. That all transport series reacted, however, is evident even when that reaction was represented by a reduced rate of increase rather than an outright decline.

ACKNOWLEDGEMENT:
Transportation Journal

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054743
RAILROADS AT THE CRITICAL JUNCTION

Berton, L

Financial World (Macro Publishing Corporation, 17 Battery Place, New York, New York, 10004)

Vol. 141, No. 21, May 1974, 5 pp

This article looks at the railroad industry from the investors viewpoint. The article considers inflation and wage and rate increases. It looks at increased fuel and material costs. The article gives rates of return for the major lines for the last five years, and comments on the profitability of the various carriers.

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054746
EVALUATION OF RAIL RAPID TRANSIT AND EXPRESS BUS SERVICE IN THE URBAN COMMUTER MARKET

Boyd, JH Asher, NJ Wetzler, ES

Institute for Defense Analyses, 400 Army Navy Drive, Arlington,

Virginia, 22202

Oct. 1973, 270 pp

This study analyzes and evaluates public transportation alternatives for serving the commuter market. The two main alternatives, rail rapid transit and integrated express bus service, are analyzed from the standpoint of full costs (both supplier and user time costs). User time costs of the two alternatives are roughly equal; however, the supplier costs of the integrated bus service are much lower than those of rail rapid transit. Quantitative data on fuel consumption and emissions are presented, and the effects of political, regulatory, and institutional constraints are discussed.

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054799
TRANSPORT MODES AND TECHNOLOGIES FOR DEVELOPMENT

United Nations, Department of Economic and Social Affairs, New York, New York, 10017

ST/ECA/127, Brochure, 1970, 150 pp, 1 Fig, 31 Tab

Report on the economic aspects of various transport modes, and the advisability of using them, according to the problems to be dealt with. The report begins with a discussion of the two contradictory theories, relating to the economic advisability of development, either by means of solutions with a strong capitalistic factor through high rates of employment and productivity, or through a weak capitalistic factor and low productivity. A review is then made of the various transport modes: 1) railways; 2) road transport; 3) air transport; 4) pipelines; 5) waterborne transport; 6) passenger transport and research according to technologies, investment costs, operating characteristics of each, conditions regarding competitivity, and the cases in which each is most suitable.

ACKNOWLEDGEMENT:
International Union of Railways, 23

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054939
BEFORE AND AFTER BENEFIT-COST ANALYSIS IN URBAN TRANSPORTATION

Peterson, E Mittelbach, FG

California University, Los Angeles, Graduate School of Management, Los Angeles, California

Sept. 1972, 77 pp, Figs, 18 Tab, Refs, 1 App

This report was produced as part of a program of Research and Training in Urban Transportation sponsored by the Urban Mass Transportation Administration of the Department of Transportation.

The conceptual and practical aspects of benefit-cost analyses are reviewed, followed by a study of a Los Angeles freeway where before and after benefit-cost data became available.

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057166
THE DECLINE AND FALL OF THE AMERICAN DOLLAR

Segal, R

Bantam Books Incorporated, 666 Fifth Avenue, New York, New York, 10019

Book, June 1974, 187 pp, Figs, Tabs

This book is about inflation. After a short history of inflation from ancient times to the present, the book looks at the present problems. The book identifies several principle causes of present inflation: more and more Americans are involved in manipulating wealth rather than in creating wealth, multinational corporations can thwart national economic policies, and the money supply has been too abundant.

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061152
PROSPECTIVE COSTS OF CAPITAL IN THE NORTHEAST CORRIDOR

Edie (Lionel D) and Company, New York, New York

Final Rpt, Dec. 1969, 187p

Contract DOT-FR-9-0039

The objective of the report is to present the initial results of a study on prospective costs of capital for Northeast Corridor transportation systems. The first chapters discuss assumptions and methods used, including the construction use, and outlook of funds through 1980, along with flow-of-funds analysis and influence on interest rate differentials. One chapter presents methods for predicting interest rates. Another chapter surveys six major econometric models of the United States which are currently operational The survey focuses on the financial sections of the models. A survey of debt instruments, the financial position of the major carriers in the NEC, and the revenue, expenditures and borrowing needs of the state and local governments in the NEC area are covered. (Author)

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065322
FULLY ALLOCATED COST OF RAIL PASSENGER SERVICE BETWEEN NEW YORK AND WASHINGTON. PHASE I. 46 CONVENTIONAL TRAINS DURING 1968

Peat, Marwick, Mitchell and Company, Philadelphia, Pennsylvania

PMM-50, Final Rpt, Dec. 1970, 115p

Contract DOT-FR-00025

See also Phase 2, PB-202 049.

Costs applicable to passenger operations are analyzed and allocated according to the following cost classifications: Stations, joint facilities, transportation, maintenance of equipment, maintenance of way and structure, and taxes. Eastern region and system overhead are added to each cost classification. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-202048

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051895
TRANSPORTATION PLANNING IN 1875: THE AMERICAN SOCIETY OF CIVIL ENGINEERS AND THEIR PLAN FOR RAPID TRANSIT IN NEW YORK CITY

Tarr, JA, Carnegie-Mellon University

High Speed Ground Transportation Journal (Planning-Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 2, June 1973, 24 pp, Figs, 12 Ref

This paper is concerned with an early example of urban transit planning. During much of the period before the Civil War, American cities were restricted in their spatial growth by the absence of a system of public transit. Cities such as Boston, Philadelphia, and Pittsburgh were essentially "walking cities" with very high densities in their core areas. In the 1840's and 1850's, however, the development of omnibus lines, of streetcar systems, and of commuter railroads allowed a number of middle and upper class urbanites to move from the central city to less congested residential areas. Increased distance separated workplace and residence, and journey to work patterns by public transit developed. The omnibus and the horsecar, however, due to their relatively slow speed, did not solve the transit problems of large cities. New York City, especially, which more than doubled in population from 1840 to 1860, suffered from high population densities and congestion. The result of this situation was a plethora of proposals for rapid transit, some of which provided for subways, others for depressed roadways, and many for elevated roads. The profusion of plans for a New York rapid transit system motivated the American Society of Civil Engineers to appoint a committee in 1874 to investigate the question and to make recommendations. The ASCE committee examined seventy-five proposals and recommended the building of an elevated system, one line to run along Third or Fourth Avenue east of Central Park and one to run along Seventh, Eighth, or Ninth Avenues west of the Park. The report had a large impact on the deliberations of the New York Rapid Transit Commission of 1875 which authorized the building of New York City's first successful elevated rapid transit lines. These lines penetrated relatively unpopulated areas, allowing the city's population to spread beyond the previously built-up sections.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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057227
REUSING RAILROAD STATIONS

Educational Facilities Laboratories, 447 Madison Avenue, New York, New York, 10022

May 1974, 78 pp, Phots.

This project is supported by a grant from the National Endowment for the Arts in Washington, D.C.

Work on this report began with the simple notion that America's railroad stations are fine examples of architecture which might be preserved by reuse. But closer study revealed that stations, now tragically underused, are involved with a complex series of interlocking problems which touch many aspects of our history and of modern society. Completion of this report brought even stronger belief in the importance of reuse.

ACKNOWLEDGEMENT:
Educational Facilities Laboratories

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047662
ESSENTIAL UNITED STATES FOREIGN TRADE ROUTES

Maritime Administration, Department of Commerce, Washington, D.C., 20230

Dec. 1969, 81 pp

The fundamental concept behind the Merchant Marine Act of 1936 and other legislation providing for an adequate U.S. Merchant Marine is to promote and protect the trade of the United States. Essential U.S. trade routes are established by the Maritime Administration only after the most careful investigation of all the factors influencing our trade—commodities, producing and consuming centers, sources of essential materials, strategic military and political considerations, and growth potentials. By providing description and maps of the essential trade routes, and the listings of U.S. steamship lines and commodities moving over them, this booklet provides information basic to an understanding and appreciation of the importance of the contribution made by the U.S. Merchant Marine to U.S. Trade.

ACKNOWLEDGEMENT:
Maritime Administration

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047746
WEST COAST DEEPWATER PORT FACILITIES STUDY

Army Corps of Engineers, Department of the Army, Washington, D.C.

Vol. 1, June 1973, 7 App

This report by the Corps of Engineers considers the location of deep water port facilities for Washington, Oregon and California. Petroleum products processed in these states are sold in Nevada and Arizona and thus west coast offshore terminals affect prices paid in those states. The economic, engineering and environmental effects of off loading very large crude oil tankers on the West Coast are included in this study. Public reaction was not considered. The lack of deep water port facilities will increase petroleum costs on the West Coast as dependence on foreign and Alaskan crude oil increases. The environment will also be adversely affected if deep water port facilities are not developed. A great deal of cooperative planning between industry, state and federal governments is required if this area is to gain the economic and environmental benefits of deep water ports. The titles of the various subjects in this report are as follows: Volume I—Summary Report; Appendix A—Petroleum Consumption and Supply; Appendix B—Refinery Capacity, Location and Impact; Appendix C—Transportation Economics; Appendix D—Engineering; Appendix E—Environmental Assessment; Appendix F—Environmental Assessment, West Coast Deepwater Port Study by Battelle, Pacific Northwest Laboratories.

ACKNOWLEDGEMENT:
Army Corps of Engineers

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Army Corps of Engineers, South Pacific Division, San Francisco, California, Repr PC: Req Price

048124
ATLANTIC COAST DEEP WATER PORT FACILITIES STUDY EASTPORT, MAINE, TO HAMPTON ROADS, VIRGINIA

Army Corps of Engineers, North Atlantic Division, Philadelphia District, Philadelphia, Pennsylvania

Vol. 1, Intrm Rpt, June 1973, 117 pp

This Corps of Engineers' report examines the needs for an offshore loading facility to supply crude oil to refineries in the Northeastern United States. Various sites from Eastport, Maine, to Hampton Roads, Virginia, are considered and examined. The economic, engineering and environmental aspects of each location are considered and the results of public hearings is also presented. The economic and environmental dangers of not making provisions for very large crude carriers is also presented. The potential environmental impact on the area shows that greater dangers to the environment exist by a 9 to 1 margin if such a facility is not located in the area. The economic impact of no facility will be higher priced petroleum products than if a facility was located in the area. The public hearings produced such a negative response to the idea because of landside environmental impact that the study recommends against Federal participation.

ACKNOWLEDGEMENT:
Army Corps of Engineers

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Army Corps of Engineers, North Atlantic Division, Philadelphia District, Philadelphia, Pennsylvania, Repr PC: Req Price

048125
REPORT ON GULF COAST DEEPWATER PORT FACILITIES—TEXAS, LOUISIANA, MISSISSIPPI, ALABAMA AND FLORIDA

Army Corps of Engineers, Lower Mississippi Valley Division, Vicksburg, Mississippi

Vol. 1, June 1973, 1891 pp, 12 App

This study is a regional investigation of the coast of the Gulf of Mexico from Brownsville, Texas, to Tampa, Florida. The basic objectives of this report are to identify the advantages or disadvantages of using very large tankers to import foreign crude oil and to determine the most feasible deepwater port system for possible development. Long-haul distances, economies of scale in ship construction and operation, and reduced ship traffic all favor the use of very large crude carriers for transport of large quantities of crude oil direct to the Gulf. To accommodate ship sizes up to 500,000 deadweight tons in the Gulf, three deepwater port facility systems were investigated. Five onshore and eight offshore site locations were selected to analyze the engineering, economic, and environmental feasibility of deepwater port development. The titles of the various subjects in this report are as follows: Volume I—Summary, Appendix A—Congressional Resolutions, Appendix B—Environmental Guide for the U.S. Gulf Coast, Appendix C—Area Economic Assessment, Env. Impacts, Appendix F—Volume V of Appendix D—Gulf Coast Port Inventory, Appendix F—Volume I of V—Environmental Assessment Eastern Gulf, Appendix H—Public Involvement.

ACKNOWLEDGEMENT:
Army Corps of Engineers

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Army Corps of Engineers, Lower Mississippi Valley Division, Vicksburg, Mississippi, Repr PC: Req Price

048390
THE FUTURE OF ATLANTIC PORTS

Frankel, EG

Massachusetts Institute of Technology, Sea Grant Project Office, Cambridge, Massachusetts

72-18, July 1973

The first of the two-part study reviews the past and present capabilities of U.S. Atlantic coast ports and projects and the extent to which the ports will successfully meet future requirements. The purpose of the research effort is to satisfy the need for a comprehensive understanding of the numerous factors that influence the success of ocean transportation, and in particular the port trans-shipment. Significant aspects include: a) a review of the demand and supply of U.S. East Coast shipping port operations, themselves as well as the port interface with various modes of transportation; b) an estimation of commodity flows, advances in port technology and the development of standards of measurement of port capacity to assist in projecting future needs; c) the structure and use of multipurpose ports and the development of multiport models to analyze competitive effects among ports serving the same region or regional parts; and d) suggested requirements for change in physical form and use of U.S. Atlantic ports to meet future demands. The second report (to be published in 1973) develops and presents the methodology for multipurpose port and multiport analysis and planning.

ACKNOWLEDGEMENT:
Massachusetts Institute of Technology

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Massachusetts Institute of Technology, 77 Massachusetts Avenue, Room 5-331, Cambridge, Massachusetts, 02139, Repr PC: $5.00

051377
AN ANALYSIS OF FREIGHT NETWORKS

Breitenbach, RB, Oklahoma State University

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 4, June 1973, 7 pp, 5 Tab

The objective of this study is the analysis of freight networks emanating from major urban areas. Freight networks, as measured by the market share held by the major modes, are of interest to carriers, shippers, regional planners, and transportation economists. These groups are concerned not only with a description of the modal share of the market but also with the reasons why shares differ. With this information, comparisons of various urban areas can be made and the possibility of predicting future shares exists. The research reported herein attempts to add to the understanding of freight networks by analyzing 25 production areas.

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American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

051379
CARRIER SELECTION FROM ONE MODE

Bardi, EJ, Toledo University

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 13, No. 1, Sept. 1973, 7 pp, 1 Tab

Most works dealing with the problem of carrier selection are directed toward the evaluation of alternative modes of transportation. In this article, the problem of carrier selection from within one mode is considered; this is accomplished by determining the relative importance of carrier selection determinants in the carrier selection situation in which the decision is made from one mode. The movement of household goods by industrial firms was the commodity movement chosen for study. In addition, attention is given to the nature of the carrier selection decision and to a review of carrier selection determinants revealed in previous works.

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American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

051577
TRANSPORTATION CAPACITY: VOLUME V. OF STUDIES IN CAPITAL STOCK MEASURES FOR TRANSPORTATION

Scheppach, RC Faucett, JG

Faucett (Jack) Associates, 5454 Wisconsin Avenue, Chevy Chase, Maryland, 20015

JACK-FAU-73-72-2, Final Rpt, Aug. 1973, 170 pp

Contract DOT-OS-10195

The study discusses the various theoretical concepts of transportation capacity and the possible policy applications and other uses of statistical measures of capacity and capacity utilization. In specific terms, absolute, normal operating and economic capacity measures are discussed and empirical measures are presented for the four major transportation modes of water, rail, air and motor freight. These measures are given for the period 1950-70. Some discussion is also presented on the uniqueness of transportation capacity relative to that of other industries.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225004/1

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PB-225004/1

051580
THE ADMINISTRATION OF TRANSPORTATION MODELING PROJECTS

Drake, JW

Harvard University, Graduate School of Business Administration, Cambridge, Massachusetts, 02138 TRD-105

May 1972, 266 pp

Contract DOT-UT-381

The study examines the way in which modeling projects are administered, concentrating on the interactions between and characteristics of the decision makers and modelers. The objective is to learn which factors correlate with models which are considered useful by decision makers. Over fifty U.S. and European projects were studied, fifteen in detail. Both qualitative and statistical factors of operational use were investigated including recognition of the distinction between the roles of decision maker and analyst, the closeness of backgrounds, complexity of techniques used, the extent to which projects included consideration of social, economic and political factors, the degree of bureaucracy in the decision maker's environment and the relative usefulness of European versus U.S. models.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224846/6

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PB-224846/6

052072
IN PLACE OF CONGESTION

Bonwit, R

Loughborough University of Technology, Department of Transport Technology, Loughborough, Leicestershire, England

Book, 112 pp

The likely developments in freight transport technology in Britain during the coming 10-15 years are investigated by the author. Emphasis is placed on the need for careful planning to prevent further congestion. It is suggested that the distribution of freight in urban areas would be facilitated by the setting up of consolidation centers at strategic peripheral locations within urban areas, with the use of rapid transit routes in off peak hours. The author further subscribes to the widely held view that technology readily available at the present time could be more freely applied to the railways.

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Loughborough University of Technology, Loughborough, Leicestershire, England, Repr PC: $8.50

053841
ENERGY AND TRANSPORTATION...BOTH NEED A NEW LOOK

Fishwick, JP, Norfolk and Western Railway

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 1, Jan. 1974, 3 pp, Phots

A barebones, minimum-operating framework which the utility, coal and rail industries must have to obtain the additional financing needed to meet the energy demand through consumption of coal is presented: (1) the utility industry must be assured that strict stack emission standards will be moderated until engineering solutions to emission control are found; (2) the coal industry must be assured that reasonable standards of safety and environmental protection will be fairly interpreted and enforced; (3) the railroad industry must be assured that regulatory agencies will permit prompt and reasonable rate adjustments to absorb increased wage and material costs; (4) the railroad industry must be assured that its investments in equipment and track will receive a fair return and that it will not be required to contribute its investment to the public through enforced service at confiscatory rates; and (5) the railroad industry must be assured of adequate fuel and other materials so it in turn can haul fuel and materials for the economy in the most economical way. Any system of rationing must take into consideration the relationship of the industry involved to the welfare of the country as a whole.

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

053976
INTERREGIONAL ANALYSIS OF UNITED STATES FREIGHT SHIPMENTS

Polenske, KR, Massachusetts Institute of Technology

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

SP-389, Prog Rpt, Feb. 1974, 5 pp, 2 Tab, 11 Ref

The Office of University Research of the Department of Transportation, compiled this information under report No. DOT-TST-74-15.

This paper discusses the United States multiregional input-output model. The model is a flexible technique of analysis that can be used for many different regional economic studies. To illustrate its use, a description is given of the application of the model in an anlaysis of the regional and industrial interrelationships between the transportation and energy sectors of the American economy.

ACKNOWLEDGEMENT:
Society of Automotive Engineers

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Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001, Repr PC: Req Price

054115
THE ENERGY SITUATION–A RAIL VIEWPOINT

Banner, PH, Southern Railway System

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 4, 1973, 6 pp

This brief article presents a rail viewpoint of the energy crisis. Although much has been made of the energy crisis benefiting railroads, several facts must be considered. Higher crude oil prices have raised fuel prices for railroads. Railroads do not have the capacity to handle the bonanza predicted by some. Freight cars are scarce, and extra passenger cars simply do not exist. Some routes are limited in track capacity.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr. PC: Req. Price

054132
THE IMPORTANCE OF COAL IN THE CONTEXT OF THE NATION'S OVERALL ECONOMIC AND ENERGY REQUIREMENTS

Scollon, TR, Bureau of Mines

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 7 pp, 1 Tab

This paper discusses the place of coal in our energy supplies. It covers the advantages of coal from economic, national security, and balance-of-payments viewpoints and its disadvantages from an environmental viewpoint. It also discusses trends in price and production of coal and other fuels.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054133
RAILROADS–THE LOGISTICAL ARM OF THE COAL INDUSTRY

Bagge, CE, National Coal Association

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 11 pp

This paper begins with a 'systems approach' to the use of coal as an energy source, and considers the railroads an integral part of the process for providing energy for the nation from coal. The paper then turns to railroad problems, including the hopper car shortage, and to imported oil and conservation of energy.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054134
THE ECONOMICS OF COAL PRODUCTION

Wilson, WW

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 7 pp

This paper covers the economics of coal production, and points out the vital dependence on rail transportation. Economic factors include field location, type of mining required, and sulphur content of the coal. New safety regulations are a factor, and obtaining capital is a problem.

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054135
REGIONAL DIFFERENCES IN THE COAL TRANSPORTATION MARKET

Wooters, RB Gobrecht, JE Powe, GR

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 31 pp, 14 Fig

This paper reviews coal marketing factors, such as the location of coal fields, the location of users, and the transportation systems available including navigable waterways. Competitive fuels, such as oil for home heating and for electric power generation, have had a severe impact on coal consumption and on railroad coal traffic. Coal handling facilities at the railship interface are reviewed. Various other factors, such as mine size and hopper car design, are also covered.

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054136
THE MARKETS FOR COAL

Forbes, LT Cochran, NP

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 18 pp, 3 Fig

This paper quotes several forecasts for significant increases in coal markets by 1985. Time will be required to open the mines and time will be required to increase the railroad transportation capacity. Coal in the past has lost markets to oil for reasons of price and air pollution. In addition to time money will be required. Nuclear power has been slow in coming, and money is needed for coal research to close the gap.

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054139
COMPETITION OF OTHER FUELS

Jensen, JT, Little (Arthur D), Incorporated

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 20 pp, 12 Fig

Historically, coal has been under intense competitive pressure from oil and natural gas. However, from an energy point of view, we must have more coal since we are running short of oil and gas. This paper presents the U.S. energy supply-demand balance for 1971 and a projection for 1985. Costs of competitive fuels are presented. A big problem facing the nation is the difficulty of substituting one fuel for another. Petroleum and natural gas supply charts are presented, and charts of petroleum imports. World petroleum production and consumption is given for 1970 and projected for 1980.

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054140
APPLICATION OF THE COMPUTER TO COAL PRODUCTION

Kaas, LM, International Business Machines Corporation

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 17 pp, 16 Fig

This paper was presented at an RSMA seminar on Railroads and the Transportation of Coal. It deals with the use of computers in the coal industry. About 70 percent of the use of computers in the coal industry is for the traditional accounting related functions, and about 30 percent is engineering or production oriented.

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054141
NEW TECHNOLOGICAL DEVELOPMENTS AFFECTING THE TRANSPORTATION OF COAL

Cooke, ST, Jr, Ortner Freight Car Company
Carlton, K, Bechtel Corporation

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 22 pp, 17 Fig

This paper reviews progress in rail and related technologies for handling coal. It covers dumping of coal from railroad cars, hopper car design, loading facilities, and environmental protection. Brief mention is made of blending and weighing.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO: Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054434
AN ANALYSIS OF THE ECONOMICS OF TRUCK SIZES AND WEIGHTS IN RELATION TO STATE AND FEDERAL REGULATIONS

Voorhees (Alan M) and Associates, Incorporated, Westgate Research Park, McLean, Virginia, 22101

Final Rpt, Sept. 1973, 117 pp

A survey of the literature was performed to identify the state of the art with respect to the impacts of changes in truck weight and size limits. It was found that techniques for evaluating impacts on transportation and highway costs have been developed. Data were available which indicate accident frequency and severity as a function of vehicle weight. Impact of vehicle size and weight limits on the energy crisis was not documented. Two voids in the state of the art were found: impact on consumer prices and impact on environmental elements. Until these data are filled, it is doubtful that a cost-benefit analysis can be performed which will be sensitive to important issues of impact incidence.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227922/2

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054435
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS. APPENDIX T: FINANCIAL DATA. INLAND WATERWAYS AND DOMESTIC OCEAN CARRIERS

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-M, Apr. 1973, 124 pp

Contract C-2-36258

See also Appendix F, COM-74-10420. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report contains financial data on inland waterways and domestic ocean carriers and provides supporting data for the financial analysis of same. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10421/7

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COM-74-10421/7

054436
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: APPENDIX F. THE DATA BASE FOR MARINE MARKETING

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-L, Feb. 1974, 922 pp

Contract C-2-36258

See also Appendix C, COM-74-10419 and Appendix T, COM-74-10421. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report contains 1969 transportation tonnage data for water carriers, rail carriers, and non-exempt truck movements for all origin and destination regions (as defined by the Bureau of Economic Analysis, Department of Commerce) considered potentially susceptible to marine carriage. The data are summarized in 19 commodity groups and contain more than 12,500 origin region-destination region-commodity entries. Each lane is forecast in five year increments through the year 2000 based on BEA projections of employment by industry. Marine market share in the year 2000 is estimated. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10420/9

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COM-74-10420/9

054437
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: FINANCIAL ANALYSIS OF DOMESTIC OCEAN CARRIERS

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-E, Feb. 1974, 140 pp

Contract C-2-36258

See also Financial Analysis, COM-74-10415, and Appendix A, COM-74-10417. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report contains an analysis of the financial structure and health of maritime carriers operating on the domestic ocean. Financial information was derived from Federal Maritime Commission files and published Interstate Commerce Commission sources. Individual carrier data are not identified. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10416/7

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COM-74-10416/7

054438
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: FINANCIAL ANALYSIS OF INLAND WATERWAYS CARRIERS

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-D, Oct. 1973, 79 pp

Contract C-2-36258

See also Trade Area report, COM-74-10414, and Financial Analysis, COM-74-10416. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report contains an analysis of the financial structure and financial operating statistics of selected inland waterways carriers. The report also includes comparisons with other surface transportation modes and among sub-groups of inland waterways carriers. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10415/9

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COM-74-10415/9

054439
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: GREAT LAKES TRADE AREA REPORT

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-C, Final Rpt, Feb. 1974, 283 pp

Contract C-236258

See also Trade Area report, COM-74-10413, and Financial

Analysis, COM-74-10415. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report includes an assessment of the present and probable future market prospects for marine transportation in domestic service on the Great Lakes. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10414/2

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COM-74-10414/2

054440
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: APPENDIX B. FORECASTING METHODOLOGY

Little (Arthur D), Incorporated, Acorn Park, Cambridge, Massachusetts, 02140

G-048-J, Feb. 1974, 30 pp

Contract C-2-36258

See also Appendix A, COM-74-10417, and Appendix C, COM-74-10419. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

Shipments of commodity groups from one region to another have been forecast on the basis of economic activity in the commodity producing and consuming sectors by the originating and destination regions. Econometric models have been developed relating historic trade flows with variables such as distance, total employment, producing and consuming sector employment and location coefficients. Methodological aspects are presented. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10418/3

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COM-74-10418/3

054441
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: DOMESTIC OCEAN TRADE AREA

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-B, Final Rpt, Feb. 1974, 442 pp

Contract C-2-36258

See also Inland Waterways Trade Area report, COM-74-10412 and Great Lakes Trade Area report, COM-74-10414. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report presents an assessment of the present and probable future market prospects for marine transportation on the domestic ocean, consisting of coastwise and intercoastal service and service to/from Puerto Rico, Hawaii and Alaska. It includes a review of financial structure and prospects of carriers as a group. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10413/4

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COM-74-10413/4

054442
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: INLAND WATERWAYS TRADE AREA

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048-A, Final Rpt, Feb. 1974, 325 pp

Contract C-2-36258

See also Executive Summary, COM-74-10411, and Trade Area Report, COM-74-10413. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

An assessment of the present and probable future market prospects for domestic marine transportation on the inland waterways of the United States is presented. The report includes discussion of present and probable future commodity movements, marketing strategies for inland waterways carriers, financial and legal overview. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10412/6

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COM-74-10412/6

054443
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: EXECUTIVE SUMMARY

Kearney (AT) and Company Incorporated, Chicago, Illinois

G-048, Feb. 1974, 36 pp

Contract C-2-36258

See also Trade Area report, COM-74-10412. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The report presents the executive summary of the entire study effort which assesses the present and probable future market prospects for domestic marine transportation. It covers three trade areas: Inland waterways, domestic ocean (coastwise and intercoastal, Puerto Rico, Hawaii and Alaska) and the Great Lakes. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10411/8

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NTIS, Repr PC: $3.25, Microfiche: $1.45
COM-74-10411/8

054444
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: APPENDIX C. MODAL SHARE ESTIMATES

Little (Arthur D), Incorporated, Acorn Park, Cambridge, Massachusetts, 02140

G-048-K, Feb. 1974, 148 pp

Contract C-2-36258

See also Appendix B, COM-74-10418, and Appendix F, COM-74-10420. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

In the shipment of a commodity group from one region to another, the water mode's share of the total tonnage has been related to strategic variables: length of haul, circuity, total tonnage moving, bulk or non-bulk character, commodity value, and location of producing and consuming sites in the regions. Highly significant regression equations showed length of haul to be the most important of these variables. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10419/1

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COM-74-10419/1

054445
DOMESTIC WATERBORNE SHIPPING MARKET ANALYSIS: APPENDIX A. DEVELOPMENT OF THE FORECASTING DATA BASE

Little (Arthur D), Incorporated, Acorn Park, Cambridge, Massachusetts, 02140

C-048-I, Feb. 1974, 155 pp

Contract C-2-36258

See also Financial Analysis, COM-74-10416, and Appendix B, COM-74-10418. Paper copy also available from NTIS $59.00/set of 11 reports as COM-74-10410-SET.

The data development of the historical trade flows by water, rail, and highway in the domestic commerce of the United States is described. Commodity groups, geographic regions, regional economic projections, tonnage allocation procedures and export-import data bases are described. Eleven reports are available as part of this market analysis. That includes the Executive Summary, three trade area reports, two financial analyses, and appendices A,B,C,F,T.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-10417/5

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NTIS, Repr PC: $5.00, Microfiche: $1.45
COM-74-10417/5

054449
CASE STUDIES OF PRIVATE MOTOR CARRIAGE

Sutton, RM Weitz, DW Potter, RS

Sheahan (Drake)/Dougall (Stewart), Incorporated, New York, New York

Final Rpt, Nov. 1973, 109 pp

Contract DOT-OS-30017

The report is a study of ten selected users of private motor carriage for the purpose of providing the DOT with a better basic understanding of the reasons for private carriage, how it is entered into and carried out. Using the case study method the contractor was directed to focus on the following four points: (1) The motivations which shaped the decision to use private motor carriage, (2) The degree to which the decision to use private motor carriage reflects a consideration of all pertinent factors, (3) The manner in which the motor carriage alternative was implemented, once chosen, and (4) The results of the private motor carriage operations.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227710/1

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NTIS, Repr PC: $4.50, Microfiche: $1.45
PB-227710/1

054722
TRENDS IN RAIL FREIGHT TRANSPORT

Tihansky, DP, Environmental Protection Agency

Traffic Quarterly (Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880)

Vol. 28, No. 1, Jan. 1974, pp 101-117, 4 Fig, 5 Tab

This article focuses on the aggregate demand for rail freight transportation. Graphic analysis is employed to reveal temporal aspects of the demand. Wartime and economic cycles are major factors in rail freight demand. Relationship of GNP to demand is considered. Several methods of analysis were used, and each contributed something, but none proved entirely satisfactory.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880, Repr PC: Req Price

054736
A BEHAVIORAL MODEL OF MODAL SELECTION

Craig, T, Abbott Laboratories

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 3, 1973, pp 24-28, 2 Fig, 5 Ref

Transport control in its broadest sense, is the central task of present-day traffic management. It is concerned not alone with the price paid to or the service rendered by one or several carriers but also with the entire group of transportation costs and of service aspects that, taken as a whole, move the inbound or outbound product from some origin to a chosen destination. Handling methods, time in transit, packaging costs, disposal of unpackaging debris, warehouse or storagepile costs, cost of intra-plant movement and the avoidance of wastage or damage, all are part of this transport control task.

ACKNOWLEDGEMENT:
Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

054749
APPALACHIAN COAL INDUSTRY IN 1980–HOW IT LOOKS THROUGH THE EYES OF PROFESSIONAL FORECASTERS

Dunbar, FC, Charles River Associates, Incorporated
Greenwood, JE, Charles River Associates, Incorporated
Landis, RC, Charles River Associates, Incorporated

Coal Age (McGraw-Hill, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020)

Vol. 78, No. 10, Sept. 1973, 6 pp, 1 Fig, 1 Tab, 1 Phot

Recent government policy on mine safety, air pollution abatement, and surface mining has presented a difficult situation for coal producers. A study of how these factors and other factors will affect the future of domestic coal was recently completed. The study included an analytical model in the form of a computer package. This article presents highlights of the study.

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ESL, Repr PC: 3DOL+25¢/p, Microfilm: 3DOL+5¢/fr

054754
THE RAILROAD FUTURE. A STUDY OF PROSPECTS AND PROBLEMS THROUGH 1970

Banks (RL) and Associates, Incorporated, 900 17th Street, NW, Washington, D.C., 20006

June 1962, 130 pp, Figs, Tabs, Apps

This report, prepared for the Railway Progress Institute, although somewhat dated, may be of interest for the methods used.

This report forecasts the future of the railroad industry through 1970. It is intended to encourage individual railroad companies to prepare their own forecasts, but it is no substitute for these. The study provides projected traffic volumes and revenues in future years. However, it should be understood that these figures are merely intended to represent the expected trends from 1962 through 1965 to 1970; no attempt is made to predict the short term cyclical changes which will occur in the future as in the past. In making this forecast, trends in population and in various economic measures were examined and extended into the future, or an existing projection was followed. The relationship of volumes of transportation to such measures was then used to extend these data through the remainder of this decade. The resulting projections were modified by consideration of developments in technology, in business practice, and in regulation and promotion.

ACKNOWLEDGEMENT:
Banks (RL) and Associates, Incorporated

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Banks (RL) and Associates, Incorporated, 900 17th Street, NW, Washington, D.C., 20006, Repr PC: Req Price

054773
HIGH-SULFUR COAL FOR GENERATING ELECTRICITY

Dunham, JT, Bureau of Mines
Rampacek, C, Bureau of Mines
Henrie, TA, Bureau of Mines

Science (American Association for Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C., 20005)

Vol. 184, No. 4134, Apr. 1974, 6 pp, 3 Tab, 25 Ref

This article discusses the use of high-sulfur coal for generating electricity. It covers air pollution and various means of curtailing or preventing emissions at power plants.

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ESL, Repr PC: 3DOL+25¢/p, Microfilm: 3DOL+5¢/fr

056786
DETERMINE UNIT-TRAIN REQUIREMENTS

Buck, P, Federal Power Commission
Savage, N

Power (McGraw-Hill, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020)

Vol. 118, No. 1, Jan. 1974

A series of equations and a nomograph have been developed to help predict the number of unit trains needed to service a particular coal-fired central station.

ACKNOWLEDGEMENT:
Engineering Index, EIX740303201

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056894
BULK TRANSPORTATION OF HAZARDOUS MATERIALS BY WATER IN THE FUTURE–A LONG-RANGE FORECAST

National Academy of Sciences, Committee on Hazardous Materials, Washington, D.C., 20418

July 1973, 283p

Contract DOT-CG-11,775-A

Proceedings of Conference Held at College Park, Md., 9-10 Jul 73.

Contents: Future energy needs; trends in world shipping; railway transport of hazardous materials; highway transport of hazardous materials; water transportation of petroleum and petroleum products in the future; predicting ocean pollutants; vessels for special cargoes; new concepts for bulk cargo vessels; hull underwriting and the changing technology; future ports–onshore and offshore; experimental basis for control of vessels by satellite; control systems for vessels–open sea and harbor; floating superport; hazardous materials flow in intercoastal waterways–a case study of risk-exposure factors for the future of a specific area; human error in merchant marine safety; practical problems in technology assessment: a telecommunications example; future risk analysis techniques; institutional and technical problems in risk analysis; summary of conference.

ACKNOWLEDGEMENT:
National Technical Information Service, AD-776618/1

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $6.75, Microfiche: $1.45
AD-776618/1

056895
ANALYSIS OF INLAND WATERWAYS OIL TRANSPORT TRAFFIC DENSITY PATTERNS

Mendelsohn, RA Sheppard, WJ Kimm, CC

Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio, 43201 CG-734111.5.1

Final Rpt, 7306-7310, Oct. 1973, 119p

Contract DOT-CG-23,223-A

The report presents forecasts of oil traffic on 9 rivers and in 15 selected ports of the Mississippi River System. Included is crude oil, gasoline, distillate fuel oil, and residual fuel oil traffic moving on the inland waterways. A baseline forecast is developed using historical data and commodity volumes are projected for the years 1975, 1980, 1985, and 1990. These forecasts are revised on the basis of industry analysis, and converted to numbers of tow movements based on tow size projections. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-777025/8

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NTIS, Repr PC: $4.50, Microfiche: $1.45
AD-777025/8

056940
A STUDY OF EXPORT SHIPMENTS OF SELECTED AGRICULTURAL PERISHABLES

TRC Development Corporation, La Jolla, California

Final Rpt, Mar. 1974, 128p

Contract MA-3-36248

The purpose of the study is to consider the problem of time delays in the movement of certain perishable commodities for export, and the effect of delays in this movement on the export process, specifically from the viewpoint of the American Merchant Marine.

ACKNOWLEDGEMENT:

National Technical Information Service, COM-74-10792/1

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $4.75, Microfiche: $1.45
COM-74-10792/1

063071
FREIGHT AND COMMODITY NETWORKS

Peat, Marwick, Livingston and Company, Washington, D.C.

July 1968, 57p

Contract DOT-8-35049

Report on Northeast Corridor Transportation Project.

The movement of freight is vital to the economic well being of the Northeast Corridor; yet little is known about the magnitude of freight movement or the characteristics of this movement. The report relates information concerning the networks over which this movement takes place, as well as impedance data concerning the movement between specific Corridor areas. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-196667

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $3.00, Microfiche: $0.95
PB-196667

044632
FOREIGN OCEANBORNE TRADE OF THE UNITED STATES CONTAINERIZED CARGO ON SELECTED TRADE ROUTES CALENDAR YEAR 1970

Nale-Povic, JG

Maritime Administration, Department of Commerce, Washington, D.C., 20230

MA-STAT-522-73014, 1972, 33 pp

Paper copy available from Government Printing Office, Superintendent of Documents, as C39.233:970 for $0.35.

The document is one of a statistical series of reports on containerized cargo shipments released by the Maritime Administration for the information of industry and interested government agencies. The report is designed to cover those trade areas which have the highest concentration of container shipping. (Author)

ACKNOWLEDGEMENT:
Maritime Administration

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NTIS, Microfiche: $1.45
COM-73-50167

046587
REPORT ON RAIL AND MARINE INTERFACE AT THE PORT OF NEW YORK

Maritime Administration, Office of Ports and Intermodal Systems, New York, New York

MA-GEN-730-30, Mar. 1973, 43 pp

The report examines in detail the elements of cost, time and distance involved in the interface of marine terminal operations with those of the rail carriers for the New York/New Jersey port complex specifically as they related to the American operators. The purpose of the study was to analyze and evaluate the rail carrier/interchange of equipment and to recommend actions which would contribute towards a more efficient and economical intermodal transport system and assist in further enhancing the competitiveness of the American merchant marine.

ACKNOWLEDGEMENT:
Maritime Administration

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
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COM-73-10588

047667
THE MARINE CONTAINER INDUSTRY 1972-75

Gilbert Flexi-Van Incorporated, 330 Madison Avenue, New York, New York, 10017

Intrm Rpt, 1973, 4 pp

The starting point was the limited number of basic facts available in the few worthwhile studies that have been made. Because of the specialized or limited objectives of those studies, their data have been largely ignored as irrelevant or have been misinterpreted by less sophisticated students of the industry. Flexi-Van analyzed this limited data, unearthed acceptable formulas to convert the seemingly irrelevant facts into such industry standards as 20-foot equivalents (TFEs), annual container voyages, etc. And, finally, measured the results against current statistics gathered specifically for the purpose in personal interviews around the world. The result is the report on "The Marine Container Industry 1972-75". While it cannot be said that it is comprehensive, it is the first "state of the art" study developed solely as a logical progression using documented fact. In addition, Flexi-Van has commissioned a prominent international research organization to undertake an independent and truly comprehensive world-wide survey and analysis of every aspect of the container industry. To encourage full disclosure by industry members, statistics furnished by individual companies will be handled on a completely confidential basis by the researchers and will not be available to anyone, including the project's sponsor. Upon completion the report will be published and made available to all interested parties. Meanwhile this interim report should prove enlightening and encouraging to the industry.

ACKNOWLEDGEMENT:
Gilbert Flexi-Van Incorporated

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Gilbert Flexi-Van Incorporated, 330 Madison Avenue, New York, New York, 10017, Repr PC: Req Price

047700
CONFERENCE ON TANK CONTAINERS

Maritime Administration, Department of Commerce, Washington, D.C., 20230

Apr. 1973, 81 pp

Prepared by Office of Ports and Intermodal Systems, Maritime Administration.

This Conference was intended to bring together shipper and carrier representatives, along with equipment manufacturers and those government agencies concerned with tank containers used in intermodal transportation. The Question and Answer periods are documentated and truly as informative as the basic presentations. Papers were presented on the following subjects: Carrier Experience, Shipper Experience—Spirits, Shipper Experience—Chemicals, Shipper Experience—Food, Hazardous Material Regulation, Regulations for Portable Tanks, Standard Specificatons for Tank Containers, Tank Designs, and Optional Equipment.

ACKNOWLEDGEMENT:
Maritime Administration

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Government Printing Office, Superintendent of Documents, Washington, D.C., 20402, Repr PC: $1.00

047709
THE MARKET OUTLOOK FOR FREIGHT-CARRYING HIGHWAY TRAILERS, DOUBLE BOTTOM COMBINATIONS AND DEMOUNTABLE VAN CONTAINERS, 1967 TO 1985

Barloon, MJ, Case Western Reserve University

Aluminum Company of America, 425 Sixth Avenue, Pittsburgh, Pennsylvania, 15219

Mar. 1967, 87 pp

This market research effort focuses on the potential sales volume of trailer and container manufacturers. The growth prospects for the imaginative manufacturer appear bright in an expanding market. Using as a basis previous studies, where actual performance can be measured against projections, the market for semi-trailers and doubles appears to be expanding. Doubles may grow faster if certain states will permit their use. Marine and rail containers show a very rapid growth and are projected to show a rapid growth in the near future. Special design considerations may help an aggressive manufacturer capture a large share in this market.

ACKNOWLEDGEMENT:
Aluminum Company of America

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047739
AUTOMATION SYSTEM AT TAKASAKI MARSHALLING YARD

Fukui, T

Japanese Railway Engineering (Japan Railway Engineers' Association, P.O. Box 605, Tokyo Central, Tokyo, Japan)

Vol. 12, N1, 1971, pp 9-12, 7 Fig

A brief description of Takasaki automated marshalling yard situated at a distance of 200 km from Tokyo and dealing with 2,600 wagons per day, and a comparison with the equipment in Koriyama marshalling yard. The total equipment, commencing with the reception of the sorting instructions, up to the formation of the trains for departure, consists of:—a computer for the reception of the instructions, and the control of the retarders;—radar for detecting the running speed of the vehicles, with an anemometer; — electro-magnetic and hydraulic retarders, with a stop at the end of the track. This system has been in operation, without any breakdown since October 1970.

ACKNOWLEDGEMENT:
Association of American Railroads

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047743
AUTOMATION OF KORIYAMA MARSHALLING YARD AND THE HERRINGBONE TRACK

Miyakawa, N

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

May 1972, pp 300-320, 18 Fig, 5 Tab

A general description of the organisation of the fully automated Koriyama marshalling yard, together with commentaries on the tests carried out with the object of sorting wagons on two sets of herringbone sidings (type D and type S). In order to carry out this study, the whole of the operations involved in the marshalling of 3,300 wagons per day were controlled by two computers, one of which dealt with the sorting of the wagons in accordance with the description and destination of the loads, and the other dealt with all the marshalling and train-formation operations. The object of the study was:—to establish the average length of time during which the wagons were immobilised in the marshalling yard;—to study the rate at which the trains were formed;—to establish the optimum constitution of the rakes and trains in relation to the length of the sections of track in the two types of marshalling yard;—to ascertain the type of yard which is best adapted to a given method of train formation. The re-sorting of diverted and detached wagons was effected in order of priority. Ultimately, the two computers will work together, basing on the destination of the load. The above article also contains a description of the hardware and software of the whole of the installations, as well as of their uses.

ACKNOWLEDGEMENT:
Association of American Railroads

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047745
THE SIMULATION OF OPERATIONAL EVENTS IN A MARSHALLING YARD

Wunderlich, WH   Wiedenbein, R

Rail International (International Railway Congress Association, 17-21 Rue de Louvrain, 1000 Brussels, Belgium)

June 1972, pp 336-349, 6 Fig, 2 Tab

Development of a simulation programme for the analysis of the carrying out of the necessary operations involved in the formation of a train, and to establish the different elements to be used for the automatic management of a marshalling yard, with the help of a computer programme. The study comprised:—the simulation of the whole of the operations involved in the formation of a separate train, or one in a complete rake, and the special shunting of the wagons; (2) research into the optimum dimensions of a marshalling yard, together with the problems concerning fixed installations and operating. With the help of this study, programmed in ALGOL 60, it is possible to establish the correlation between the carrying out of marshalling operations and the actual results, and the coefficient of use of the shunting engines.

ACKNOWLEDGEMENT:
Association of American Railroads

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047965
ACI TO REDUCE CHICAGO TERMINAL DELAYS

Myers, ET

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 26, No. 4, Apr. 1971, p 57, 1 Phot

Twenty-three railroads are developing a consolidated automatic car identification (ACI) system for classification yards in Chicago. The system will be connected with the AAR's TRAIN computer in Washington and will assist in identification and provide advanced consist information. The General Managers Association preceeded the decision for this joint system with an economic evaluation and cost analysis showing the direct and related savings for the terminals. The four areas of direct savings will include: yard forces, clerical work, per diem, and car interchange. A 'domino effect' is expected as related terminal operations are indirectly affected by prior increases in train speed.

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Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

048307
THE CONTAINER MATERIAL STUDY: A TREATISE ON THE EVOLUTION AND CONTINUED PROGRESSION OF CONTAINERIZATION

Zwolinski, JA

Army Mobility Equipment R&D Center, Fort Belvoir, Virginia DA-1-G664717-DH-14

USAMERDC-2055, Final Rpt, 6905-7112, Mar. 1973, 75 pp

In the report, a large variety of materials of construction for containerization has been presented in order to establish preferred sidewall materials and appropriate overall construction techniques for dry-freight shipping containers. An elaborate comparative analysis matrix, which is user orientated, is presented to allow the avid reader to utilize the raw data presented. Eighteen attributes can be comparatively ranked such that an optimum material can then be determined. The evolution and continued progression of containerization including applicable interfacing systems are fully presented. Critical conclusions and remarks address future procurement practices as related to the latest Military Specification MIL-C-52661(ME) entitled, Container, Cargo. The entire military environment is presented. It is established that containers as currently constructed lack a basic design philosophy. Further, a rational basis noting in particular the sidewall materials and their relationship with the framing arrangement is offered for refrigerated, ammunition, and secondary usage type containers along with shelter concepts. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-762171

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AD-762171

048350
AN APPROACH TO THE OPTIMAL DESIGN OF A CONTAINER TERMINAL

Creton, JP

Massachusetts Institute of Technology, Department of Ocean Engineering, Cambridge, Massachusetts, 02139

MS Thesis, June 1973

The optimization of the design of a container terminal is approached using a G.P.S.S. simulation. The analysis of a container terminal points out the significant controllable variables used in the design. The model developed is static, discrete and stochastic, and has the structure of a queuing system. It is limited to the operational aspects of the transfer of containers from ship to hinterland transportation equipments and vice-versa. It is a two flow model: imports and exports. The literature does not present any specific method for the optimization of a stochastic queuing system. A methodology is developed using the computer simulation to implement the optimization process based on statistical outputs and a general search technique. This model allows the comparison of different types of designs while varying the number of facilities, performance of facilities, priority policies, volume of throughput and arrival patterns. This optimization technique could be refined and extended to more comprehensive designs.

ACKNOWLEDGEMENT:
Massachusetts Institute of Technology

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Massachusetts Institute of Technology, Department of Ocean Engineering, Cambridge, Massachusetts, 02139, Repr PC: Req Price

050684
SOUTHERN PACIFIC'S WEST COLTON CLASSIFICATION YARD

Williams, WV, Southern Pacific Transportation Company

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973, 4 pp

This railroad yard is one of the largest and most advanced in existence. It differs from other classification yards in that it has many innovations conceived and designed to move traffic faster, more dependably and more efficiently. Physical and data system design are closely coordinated so as to produce an integrated system. The entire system has been designed to abet an operating philosophy dedicated to meeting the needs of the shipping public. Included in the paper are: I. A physical description with an explanation of the innovation in each section of the yard that contribute to an organized, relatively interference-free flow of cars, trains, engines and information. II. An explanation of a different concept is design of the process control and management systems necessary to run an automated yard. III. An explanation of the man-machine interface used in operation of the data system. IV. An explanation of inventory control and operational planning programs.

ACKNOWLEDGEMENT:
Rail International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050685
IMPLEMENTATION OF A DISTRIBUTED COMPUTER COMPLEX IN SHEFFIELD YARD

Martin, JR, Southern Railway System
Durand, GC, Southern Railway System

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973, 3 pp

Southern Railway has built a moderate size (32 class tracks) hump yard at Sheffield, Alabama. This yard has both the process control functions and information systems functions implemented with a network of mini-computer and the processing is further distributed by virtue of being integrally linked via high-speed communications facilities to the on-line central computers in Atlanta, 235 miles away. Except under emergency conditions, there is no local data input into the distributed yard computer other than to indicate the initiation of actions to be performed (such as humping a certain train) or completion of an action (such as execution of a trimming operation at the pullback end). Input of advanced consists and other required data is from the Atlanta computer and automatically processed by the local computer as required. This approach allows the yard to operate with many fewer clerical personnel. The discussion will also include a general overall description of the yard and a thorough coverage of the operational methods that interface with the information system.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

051295
DOWTY OLEO RETARDERS GIVE STEADY CONTROL

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminister, London SW1, England)

Vol. 17, No. 5, Oct. 1973, 2 pp

The Dowty system of wagon control is to be tested at Kazerne Marshalling Yards and, if successful, it could be applied to any new marshalling yards the SAR will construct. Since the introduction of the Dowty Oleo (gas-oil) retarder in 1971 two new yards have been constructed on the all-retarder principle—the first with 19 sidings is fully operational in Britain and the second, with 31 sidings, at Forrestfield, Western Australia, involves some 7,500 retarders and is also in operation. The Dowty Oleo retarders will also be used at the proposed Musashino yard in Japan and in various private installations. For America and other markets, where heavy tare weights permit greater retarder thrust without danger of derailment, a high duty unit is undergoing trials and will be available later.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

051324
SBB AUTOMATES THE HUMPING PROCESS

Konig, H, Swiss Federal Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 417-420

Practical experiments confirm the results of theoretical studies which show that effective speed control of cuts descending from the hump is a complex and expensive process. Despite difficulties with mechanisms on the track, the operating philosophy adopted has proved satisfactory; with the technical problems solved, electrodynamic and screw retarders as well as car pushers are now being installed at the new Basle Muttens II and Zurich-Limmatal marshalling yards.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051325
COMPUTERIZED COLTON YARD WILL SPEED SP FREIGHT

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 420-422, Phots

Whereas Southern Pacific's other principal yards have had to be modernized within the constraints of local conditions, West Colton has been built on new land strategically located at the south end of the Palmdale-Colton cutoff 50miles east of Los Angeles.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

051328
CAROL AUTOMATIC RAILWAY DOUBLES ITS CAPACITY

Smart, CK, Iron Ore Company of Canada

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 434-437

Completion of double-tracking coupled with improvements to catenary and signaling have almost doubled the capacity of the Carol Lake automatic railway in Labrador. There is now enough rolling stock for seven 20-wagon trains to be in circulation on the 10 km line simultaneously, raising the daily capacity from 85,000 long tons of crude iron ore to 140,000 tons.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

051332
RAISING PRODUCTIVITY AT THE HUB OF EUROPE'S FREIGHT NETWORK

Wellinger, K, Swiss Federal Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 413-416

Productivity in freight movement has increased fourfold since 1945; SBB is investing heavily to cope with ever-increasing north-south transit traffic and to overcome staff shortages.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

051342
THE PORTS OF EUROPE

Container News (Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001)

Vol. 8, No. 6, June 1973, p 10, Phots

This article summarizes the facilities of the various ports of Europe, with emphasis on intermodal and container capabilities.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001, Repr PC: Req Price

051406
THE MEASUREMENT OF PRODUCTIVITY IN RAIL TRANSPORTATION

Banner, PH, Southern Railway

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-73, Paper, Sept. 1973, 5 pp

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Output per manhour in the railroad industry as measured heretofore contains an upward bias, primarily because of the output measure used, ton miles. A new measure of production is developed using car miles, carloads, and train miles. Manhours are then developed associated with each output measure and a weighted index developed. The results indicate a level of output per manhour lower than usually assumed, and lower than for industry as a whole.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051426
GOODS MOVEMENT ON URBAN TRANSIT SYSTEMS

Fruin, JJ

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 98, No. TE3, Paper #9139, Proceeding, Aug. 1972, pp 617-631

Recent technological innovations in goods transport, including containerization, improved materials handling, and computer assisted systems of storage, sortation, shipment routing and documentation, offer prospects that significant segments of center city goods movement could be incorporated into existing and proposed transit systems. Dual passenger and freight mode transit would be beneficial to the environment and improve the potential for important changes in urban structure. In initial stages the dual system would carry goods under governmental control, such as mail and refuse. System use would be further enhanced by locating large freight generators adjacent to transit stations. In its final stages, a comprehensive CBD pickup and distribution network would be required, supplemented by municipal franchise regulations to control and optimize all center city goods trips.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051439
BASIS FOR SIMULATION MODEL OF CONTAINER TERMINAL

Dunford, F

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 98, No. TE3, Paper #9099, Proceeding, Aug. 1972, pp 607-615

Some basic concepts for the construction of a generalized simulation model of a container terminal are developed. The model is intended as a design tool. A terminology is developed for describing the different types of container terminal which defines the terminal in two ways: first, by type of interface; second, by type of equipment used. An analysis on the use of simulation on this type of design problem is given with particular emphasis on the pitfalls. The form of a simulation model of a generalized container terminal is given. The specific model is not considered.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051568
WORLD CONTAINER PORTS

Container News (Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001)

Vol. 8, No. 12, Dec. 1973, 16 pp, Tabs

This article presents a tabulation of pertinent statistics of container ports in North America, Asia, Europe, and Australia.

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Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001, Repr PC: Req Price

051573
REPORT ON RAIL AND MARINE INTERFACE AT THE PORT OF HAMPTON ROADS

Maritime Administration, Office of Ports and Intermodal Systems, New York, New York

MA-GEN-711-74026, 1973, 29 pp

The report examines in some detail the elements of cost, time and distance involved in the interface of marine terminal operations with those of the rail carriers for the Hampton Roads port complex specifically as they relate to the U.S. operators. The purpose of the report was to analyze and evaluate the rail carrier/ocean carrier interchange of equipment and recommend actions to them which would contribute towards a more efficient and economical intermodal transport system and assist in further enhancing the competitiveness of the American Merchant Marine.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-73-50977/0

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NTIS, Microfiche: $1.45
COM-73-50977/0

051578
AN OVERVIEW OF URBAN GOODS MOVEMENT PROJECTS AND DATA SOURCES

Bolger, FT Bruck, HW

Massachusetts Institute of Technology, Urban Systems Laboratory, Cambridge, Massachusetts

June 1973, 146 pp

Contract DOT-OS-10058

A review of major efforts undertaken in American cities to study urban goods movement activity is presented. Study programs, methodologies and surveys are identified, described and classified. Selected cities are Chicago, St. Louis, New York, San Francisco, and Baltimore.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224997/7

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
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PB-224997/7

051891
A CONTAINERIZED AUTOMATED RAIL-HIGHWAY TRANSPORTATION SYSTEM

Lee, JL, Seaboard Coast Line Railroad
Vachon, RI, Auburn University

High Speed Ground Transportation Journal (Planning-Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 2, June 1973, 17 pp, 11 Fig, 7 Ref

The economic growth and health of the United States, as is the case with any nation, is dependent on ground transportation. High speed ground transportation is an increasing concern of transportation engineers. This study presents an optimized system, CART (Containerized Automated Rail-Highway Transportation) System, that combines the best features of high speed trains and local truck delivery with automated terminals. The study required the design of a high speed train for CART and the design of its supporting equipment. The CART System was designed using the following salient criteria: reduction of transit times, transportation of standard twenty and forty foot containers, and employment of standard structural members and available equipment where possible to reduce initial and operating costs. CART presents a competitive, economical transportation system commensurate with present and future demands.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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051959
FREIGHT HANDLING: NEW ZEALAND'S QUIET REVOLUTION

Small, TM, New Zealand Government Railways

Developing Railways (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

1974, 4 pp, 6 Phot

Steeply-graded and curved 3ft 6in gauge track, a restricted loading gauge, and concentration of a small population into coastal towns are just some of the handicaps facing NZR in its efforts to provide efficient and profitable freight service. Nevertheless, operating and financial statistics confirm the major change achieved in freight handling techniques.

ACKNOWLEDGEMENT:
Developing Railways

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IPC TRANSPORT PRESS, Repr PC: Req Price

051972
THE RAILWAY OPERATING TECHNIQUE OF YESTERDAY AND TODAY

EISENBAHNBETRIEBSWISSENSCHAFT GESTERN UND HEUTE
Sitzmann, E

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

No. 4, 1973, 4 pp

An outline is given of the responsibilities and objectives involved in railway operating, as well as of the latter's development. Details are also shown of the present position concerning this technique, and a description is given of the problems involved, which the German Federal Railway and it specialist organisations are endeavouring to resolve. The above article deals with time and motion studies, hump and running dynamics, operating costs, economic statistics, and systems planning.

ACKNOWLEDGEMENT:
International Union of Railways, 958

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958

052095
GERMANRAIL ACTIVE PARTNER OF HAMBURG VAN TERMINALS

Mohr, K

Container News (Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001)

Vol. 9, No. 1, Jan. 1974, 2 pp, 3 Phot

The Deutsche Bundesbahn, or German Federal Railway, has been described as the most important partner of the Port of Hamburg in the handling of intermodal containers. Here, in an exclusive interview with Kuno Mohr, president of the Deutsche Bundesbahn Direction in Hamburg, Container News explores the factors underlying this efficient and healthy partnership.

ACKNOWLEDGEMENT:
Container News

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052109
THE URBAN TRANSPORTATION PLANNING APPROACH TO URBAN GOODS MOVEMENT

Blaze, JR Halagera, RT Miller, MS

CATS Research News (Chicago Area Transportation Study, 230 North Michigan Avenue, Chicago, Illinois, 60601)

Vol. 15, No. 4, Dec. 1973, pp 1-7, 4 Fig

This report deals with what the Chicago Area Transportation Study (CATS) labels the Freight Mode of transportation. (There are three parts to the article.) The first describes the rationale for including a freight element as an addition to the Urban Transportation Planning Approach program (U.T.P.A.). The second describes the process being utilized to model the movement of commodities and their respective vehicles. The third section describes the manner in which the CATS intends to address real world investment problems.

ACKNOWLEDGEMENT:
CATS Research News

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Chicago Area Transportation Study, 230 North Michigan Avenue, Chicago, Illinois, 60601, Repr PC: Req Price

052162
ECONOMIC EFFECTIVENESS OF CONTAINER TRANSPORT

Eidast, A

Army Foreign Science and Technology Center, Charlottesville, Virginia

FSTC-HT-23-2398-72, Dec. 1973, 5 pp

Trans. of Morskoi Flot (USSR) n1 p13-14 1971.

The report briefly reviews the effectiveness of the operation of the merchant marine by broad introduction of container transport.

ACKNOWLEDGEMENT:
National Technical Information Service, AD-772456/0

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NTIS, Repr PC: $4.00, Microfiche: $1.45
AD-772456/0

052264
SCALES USED IN RAILWAY SERVICE

Dahlrot, JL

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 71 N, 625, Proceeding, Jan. 1970, pp 556-562, 6 Tab

A discussion of five coupled-in-motion weighing tests at five different installations to determine accuracies attainable in motion weighing is presented in this progress report on scales used in railway service.

ACKNOWLEDGEMENT:
Association of American Railroads

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052323
WEIGHING FREIGHT CARS BY THE TWO-DRAFT METHOD

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 63 N, 567, Proceeding, Nov. 1961, pp 243-249, 6 Tab

In this report on the two-draft method of weighing freight cars only the first method is covered: Two-draft gravity motion weighing uncoupled. Both of the methods are suitable for weighing standard two-axle-truck freight cars of 29-ft inside length or longer. Some of the advantages of this method are: Cars may be weighed at a rate of three cars per minute. Human errors in weighing are reduced. Besides determining if a complete car is overloaded, information concerning the overload by individual trucks is given at the time of weighing. Track scales with specifictions for two-section knife-edge railway scales equipped with reqular weigh beam and an automatic printer recorder adapted to motion must be used. The weigh beam is used for testing, checking the recorder, and static weighing. It is cut out when using the recorder for weighing in motion. Each truck weight of a car is automatically printed on a tape in 100-lb increments. Test information covering two-draft gravity motion weighing is tabulated.

ACKNOWLEDGEMENT:
Association of American Railroads

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053740
LINEAR-MOTORIZED YARD AUTOMATION SYSTEM

Usami, Y Fujie, J Ishihara, M Nakashima, H

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 7 pp, 14 Fig

A linear-motorized car retarder-booster (L4) which can control the speed of wagons with stability to external disturbances, utilizing the features of a linear induction motor has been developed. A yard automation system based on this device which is available for both retardation and boosting of wagons and is itself automatic will contribute to a safe, efficient yard work at small cost. The present paper purports to describe the development of L4 and its tentative application for automation of Toyama freightyard.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053743
STUDIES ON THE STRENGTH AND THE STRUCTURAL DESIGN OF LARGE SIZED TRAIN FERRIES

Shiraishi, T Yoshida, M

Railway Technical Research Institute (Ken-yusha, #1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan)

Vol. 14, No. 4, Quart Rpt, 1973, 10 pp, 20 Fig

The present paper in three parts deals with studies executed to solve structural strength problems inherent in large sized train ferries and thereby contribute to the rational design of hull structure of train ferry. In Part I the process and results of studies are described on the longitudinal strength of Seikan ferries; in Part II, on the strength design of each structural member of hull; and in Part III, on the problem of ship's contact with the quay-wall.

ACKNOWLEDGEMENT:
Railway Technical Research Institute

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053757
NEW CAR REPAIR SHOP HAS NO TRACKS

Railway Locomotives and Cars (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 147, No. 8, Oct. 1973, 4 pp, Phots

Safety Railway Service of Victoria, Tex., is the only trackless car repair shop in the nation. It also emphasizes its critical path scheduling and new fabricating techniques.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

053804
SOTTEVILLE: AN AUTOMATED MARSHALLING YARD

Huet, J, French National Railways
Weber, O, French National Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 6 pp, 1 Fig

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C. This paper was also published in the October 1973 issue of Rail International, which is available from E.S.L.

The marshalling yard at Sotteville was automated in 1973. A computer controls the speed of the wagons during shunting by means of two banks of track brakes, as well as the successive paths after recording of the shunting programme, by direct link with the data transmission network and the NSCF central computer and through an electronic switching point. It also governs, by remote control, the speed of backing movements by shunting locomotives, in relation to the length of the cuts of wagons and the paths they are required to take. The computer is of the CII 10,020 type. It is linked to conventional and special peripheral points. In addition to the primary and secondary brakes, these latter are provided with treadles which control the passage of the wagons and measure variations in speed, radar equipment which measures the speed in the braking area, devices for weighing the wagons, servo apparatus for the brakes, and a device for measuring the track occupation. The sequence of the wagons is governed in the system by scrutiny, and the measuring of speeds by interruption. The data is arranged in table form and used by the various software programmes.

ACKNOWLEDGEMENT:
International Union of Railways

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

053805
AUTOMATIC SPEED CONTROL OF CUTS IN GRAVITY MARSHALLING YARDS OF SWISS FEDERAL RAILWAYS

Konig, H, Swiss Federal Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 7 pp, 4 Fig, 5 Ref

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

The first part of the lecture deals with theory and general conception of humps. Means of speed control (master retarders, secondary retarders, car pushers) are shortly described as well as a deduction of necessary command algorithms (F*DELTV-method of master and secondary retarders, delayed switching-on of siding retarders, operation of car pushers in function of succession of cuts to achieve good spacing of cuts in the switching zone, optimal thread of cuts into the sidings and to keep clear the danger zone behind the siding retarder in due time). Repercussions on the equipment are mentioned (e.g. very short response time of master retarders, one-trolley car pushers etc.) The second part of the paper deals with the experimental installations built up to prove the validity of layout conceptions, theory, algorithms, and with the experiences made. These concern design shortcomings of the equipment used. The third part deals with yards under construction (e.g. Zurich-Limmattal) or planned (Biel, Olten), notably with the layout of humps, computer configuration, etc.)

ACKNOWLEDGEMENT:
International Union of Railways

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053806
THE COMPUTER-CONTROLLED SPLITTING OF TRAINS AT SEELZE, MANNHEIM AND MASCHEN MARSHALLING YARDS OF THE GERMAN FEDERAL RAILWAY

Delpy, A, German Federal Railway

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 10 pp, 3 Fig

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

In 1969/70 and 1971/72, respectively, the marshalling yards at Seelze (west-to-east system) and Mannheim (east-to-west system) were equipped with devices for the automatic splitting of trains. The new marshalling yard at Maschen south of Hamburg is at present under construction and is being equipped with two large computer-controlled hump installations and an operating system with a network transmitting advance information of all operating processes in the marshalling yard. Computer-controlled humping operation was commenced at the Sellze yard in 1970 and at the Mannheim yard in 1972, and has been gradually extended to cover the entire train splitting process. A Siemens 304 process computer with appropriate peripheral equipment controls the routes and speeds of humped wagons (Seelze) in accordance with the train splitting data obtained from the higher-level operating computer system. The computer commands act directly on the switches, on the two groups of retarders and on the conveyor installations in the sorting sidings. Later, the computer will also control the speed of the radio-controlled hump locomotives, a system which is at present in preparation. The computer reacts automatically to all failures and irregularities. The automation has led to an increase in the capacity of the yard, to an improvement in the quality of marshalling operations, and to a saving of labor for train splitting operations.

ACKNOWLEDGEMENT:
International Union of Railways

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053808
FS PROGRAMS AND TRAILS WITH THE AUTOMATIC OPERATION OF LINES AND MARSHALLING YARDS

Liverani, A, Italian State Railways

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 6 pp, 3 Fig

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

The great difficulties in the operation of certain lines, especially in the case of freight traffic, arising, among other things, from the introduction of high speeds and from increasing suburban traffic, makes it necessary to take action on a large scale in the "installation" and "control" sectors. The adoption of modern electric signal boxes and of automatic block has given really positive results, particularly on the Bologna-Milan line where two-way running has been introduced. On the basis of the absolutely satisfactory experience with the installation of centralized control in the Bologna railway complex more than 15 years ago, we are continuing in the same direction with a similar installation at Bologna-Prato, which has very heavy traffic, with remotely controlled two-way operation, for which advanced techniques are envisaged. In addition, it was decided to carry out two trials with the application of automatic processing in real time for solving problems of control which, in 3 years' time, should provide definite choices with a view to a program including the main Milan-Naples trunk route, with an initial four-track section between Rome and Florence and the principal complexes. Also, as regards marshalling, large installations have been approved and are in the course of implementation with the object of automating the whole marshalling cycle. The first installation to come into operation is that at Milan-Smistamento. A final evaluation is not possible for the present, even if the initial results are positive. On the basis of the initial achievements, new techniques have already been adopted as a valid means of solving traffic problems. However, it is first necessary to verify carefully the technical and economic limits of their use.

ACKNOWLEDGEMENT:
International Union of Railways

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053810
IMPLEMENTATION OF A DISTRIBUTED COMPUTER COMPLEX IN SHEFFIELD YARD

Martin, JR, Southern Railway System
Durand, GC, Southern Railway System

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 3 pp

Presented at the Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

Southern Railway has built a moderate size (32 class tracks) hump yard at Sheffield, Alabama. This yard has both the process control functions and information systems functions implemented with a network of mini-computers and the processing is further distributed by virtue of being integrally linked via high-speed communications facilities to the on-line central computers in Atlanta, 235 miles away. Except under emergency conditions, there is no local data input into the distributed yard computer other than to indicate the initiation of actions to be performed (such as humping a certain train) or completion of an action (such as execution of a trimming operation at the pullback end). Input of advanced consists and other required data is from the Atlanta computer and automatically processed by the local computer as required. This approach allows the yard to operate with many fewer clerical personnel. The discussion will also include a general overall description of the yard and a thorough coverage of the operational methods that interface with the information system.

ACKNOWLEDGEMENT:
International Union of Railways

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053836
INVESTIGATION OF SORTING AND TRAIN FORMATION SCHEMES FOR A RAILROAD HUMP YARD

Siddiqee, MW, Stanford Research Institute

International Sym, Theory Traf Flow & Trans (5th), California University, Berkeley, Berkeley, California

Proceeding, June 1971, 11 pp

Four schemes are investigated for systematically assigning the tracks and sorting various cars and batches to form new outbound trains in a railroad hump yard. The suitability and applicability of each scheme are discussed, and guidelines are recommended for improving the process of sorting and the formations of trains in a railroad hump yard.

ACKNOWLEDGEMENT:
Traffic Flow and Transportation

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American Elsevier Publishing Company, Inc, 52 Vanderbilt Avenue, New York, New York, 10017, Repr PC: Req Price
0-444-00128-X

053882
WAGON CONTROL ON INDIAN RAILWAYS

Khosla, GS

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 2, Feb. 1974, 3 pp, 2 Tab, 3 Phot

Although Indian Railways' freight traffic has increased by 180 percent over the last 20 years, the wagon fleet has grown by only 53 percent. G.S. Khosla identified improved communications, better motive power, and automation of marshalling yards as important factors in maintaining control of freight and achieving better utilization of rolling stock.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

053979
MOUNTAIN AND WINTER OPERATING CONDITIONS IN CANADA

Parker, CW

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminister, London SW1, England)

Vol. 2, No. 5, Sept. 1973, 15 pp, 21 Fig

This paper describes the effects of winter on railway operations in Canada, particularly in the mountain regions. Problems of snow and rock slides and snow removal are covered, as are problems with air brakes in cold weather.

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Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England, Repr PC: Req Price

053989
WEST COLTON... SOUTHERN PACIFIC'S NEW PIVOTAL YARD

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 5, Sept. 1973, 6 pp, Phots

The 560-acre yard, with a standing capacity of 6800 cars, is a brand new one that has drawn upon the best of previous yard and classification technology. A very detailed description of the yard is given in this article.

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Reg Price

054009
THE EVOLUTION OF AUTOMATIC CONTROL AND MANAGEMENT INFORMATION SYSTEMS IN CLASSIFICATION YARDS

Delvernois, P, WABCO

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Dec. 1973, 7 pp, 15 Fig

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Applications Society for presentation at the 1974 Joint ASME/IEEE Railroad Conference, Pittsburgh, Pa., April 2-4, 1974.

The need to "switch" or classify freight cars according to plan developed very early in railroading. The basic functions of Process Control and Management Information have not changed. What has changed over the years has been an evolutionary sophistication of methods to better meet the classification yard needs. The history of this change is described, along with a review of where we are today in Modern Automatic Classification Yards controlled by digital computers.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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054010
SHEFFIELD YARD–A DISTRIBUTED CONTROL SYSTEM

Means, JB, General Railway Signal Company

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Dec. 1973, 7 pp, 14 Fig

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Applications Society for presentation at the 1974 Joint ASME/IEEE Railroad Conference, Pittsburgh, Pa., April 2-4, 1974.

As technology results in the speed and capacity of small computers or mini-computers going up in size and down in cost, whole new applications become economically feasible. Perhaps one of the more interesting concepts revolves around the idea that by appropriately modularizing hardware and software design, one is able to devise a network distribution of mini-computers which provides great computational and logic capability at very low cost. Of course these distributed networks will function in a true multiprocessing environment, thereby providing, at least conceptually, high reliability. Such networks go against the normal trend toward increasingly larger, more sophisticated, highly integrated hardware and programs or software.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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054335
TRAINLOAD IRON-ORE TRAFFIC

Craigmite, P

Modern Railways (Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England)

Vol. 31, No. 307, Apr. 1974, pp 136-139, 4 Fig, 7 Phot

This article describes the Unit Trains used to haul iron ore in Britain. The cars are equipped with AAR type F couplers, with one end having a rotary coupler. Loading and unloading facilities are described.

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Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England, Repr PC: Req Price

054609
MODERN TECHNOLOGIES IN GERMAN FEDERAL RAILWAY REPAIR SHOPS

MODERNE TECHNOLOGIEN IM WERKSTATTENDIENST DER DEUTSCHEN BUNDESBAHN
Borneman, K

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 1, Jan. 1974, p 10

New vehicle designs and ever increasing service demands on the repair shops, but primarily the permanent rationalization efforts necessitate a continuous improvement of manufacturing techniques. Carrying out vehicle repairs with good technical results and also within a short time and at a favourable price is not so much a question of better machine tools of automation, but primarily a question of the most suitable technologies for solving the individual problems. That is true even more in view of the fact that lightweight vehicles and the steadily increasing intervals between inspections make demands on surface finish properties and qualities that were unknown previously and could frequently no longer be attained by conventional manufacturing methods and techniques. This was especially valid for the manufacturing branches concerned with surface preparation, surface coating, wear prevention and jointing. Using modern technologies, e.g. injection technique and airless spraying, dosed surface hardening and thermal spraying, metal bonding and some other methods, quite a number of problems could be solved. To this end, industrial fixtures and machines were improved so as to be suitable for the requirements arising in DB repair shops, and partly also new developments were necessary for solving typical railway problems. The new technologies resulted not only in better performance and longer life of the components, but also in partly considerable reductions of manufacturing effort and expanditure.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054613
MANAGEMENT OF TRAIN OPERATION AND TRAIN HANDLING

Air Brake Association, Railway Exchange Building, Chicago, Illinois, 60604

Reprint, Sept. 1972, 250 pp, 149 Fig, Phots

This book presents a broad view of the safe, practical and expeditious operation of modern freight trains. The basic principles of locomotive operation are covered. Train and locomotive air brake action are integrated with dynamic brake and power. This edition also contains information on passenger train operations.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Air Brake Association, Railway Exchange Building, Chicago, Illinois, 60604, Repr PC: Req Price

054624
WAGON SPEED CONTROL IN GRAVITY YARDS USING GROUPED HYDRAULIC RETARDERS

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 3, Apr. 1974, pp 141-144, 3 Fig

Standard Dowty-Oleo hydraulic retarders positioned in classification yards provide wagon speed performance required. Booster units become unnecessary with more consistant rollability due to roller-bearing axleboxes and desired speed-control achieved by gradient and retarders alone.

ACKNOWLEDGEMENT:
Rail Engineering International

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054660
SANTA FE MOVES TRAFFIC BY THE CLOCK

Railway Age (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 6, Mar. 1974, pp 42-43

Santa Fe has begun a new type of freight scheduling on its long distance trains. Formerly trains were dispatched on a fleet basis in which trains left once a day (for example Chicago—West Coast trains left in the late morning). As many sections were operated as traffic demanded. Now trains are dispatched at regular intervals (for example, every eight hours on the Chicago—Southern California run). This spreads out the work at the terminals over a larger period and empties the departure areas more frequently.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054691
DESIGN AND OPERATION OF REMOTE-CONTROLLED LOCOMOTIVES IN FREIGHT TRAINS

Parker, CW, Canadian National Railways

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminister, London SW1, England)

Vol. 3, No. 1, Jan. 1974, pp 29-38, 24 Fig

In the territory in which Canadian Pacific uses radio-controlled remote locomotives, the maximum train tonnage over the ruling grade has been raised from 7500 to 12,300 long tons and the time for the 2250 km (1400 mile) round trip of a coal train reduced from six to three days. In this paper the function of the radio control equipment is outlined briefly, the placement of remote locomotives in trains is described and, through examples of mishaps to trains, the correct methods of train handling in critical situations are discussed.

ACKNOWLEDGEMENT:
Railway Engineering Journal

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054706
EMPTY FREIGHT CAR DISTRIBUTION STUDY

Ouimet, GP Fullerton, HV

Queen's University, Kingston, Ontario K7L 3N6, Canada

This study was funded by the Transportation Development Agency of Canada.

As freight cars represent a very large investment for the railways, their efficient utilization is of prime importance for the profitability of operations. The dynamic behavior of empty car systems, as determined by the structure, the information flows and the procedures used, dictate for a large part the adequacy of such a system. Improper or untimely responses to changing conditions may amplify demand fluctuations, causing car shortages to be followed by acute congestion. In order to study the dynamic characteristics of empty freight car allocation systems, Industrial Dynamics simulations are performed on models of centralized and decentralized structures, and under various external conditions. It is found that the structure of the system itself is of secondary importance, but that such factors as the average lengths of the delays in the system, and the proper consideration of in-transit inventories have a large influence on the stability of a system. In the context of improving short-term car allocation between autonomous car service centers, an allocation package is developed, which uses the Ford-Fulkerson "Out-of-Kilter" algorithm as its basis. Such a program finds the optimal allocation of cars between service centers, given that forecasts of shortages or surplus of cars for each service center for the coming five days are available. An application of this technique is presented, using the Western half of the Canadian Pacific mainline network as a basis.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

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Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: Req Price

054745
RAILROADS ARE ACCUSED OF "DRAGGING FEET" IN DOMESTIC INTERMODAL CONTAINER MARKET

Thiele, CB

Traffic World (Traffic Service Corporation, 815 Washington Building, Washington, D.C., 20005)

Vol. 158, No. 9, 1974, 3 pp, 2 Phot

Shippers demand containers in domestic intermodal service, railroads have the potential for handling them—and yet their movement represents a very small percentage of current rail freight revenue, practically all from international shipments, members of the National Railroad Piggyback Association, meeting in Atlanta, were told.

ACKNOWLEDGEMENT:
Traffic World

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Traffic Service Corporation, 815 Washington Building, Washington, D.C., 20005, Repr PC: Req Price

054764
RAILROAD FREIGHT MOVEMENT—SOME NEW CONCEPTS AND CURRENT PLANS

Sargent, GA

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, No. TE2, #10562, Proc Paper, May 1974, pp 475-487

There are a number of techniques that have established trends away from the traditional single-car shipment concept. They are: (1) Trailer on flatcar; (2) container on flatcar; (3) minitrain; (4) unit train; and (5) volume movement. Several other techniques have established trends toward fewer switching yards in major urban centers. They are: (1) prior classification outside the destination area; (2) run-through trains; (3) consolidation and relocation of rail facilities farther from the city center; and (4) mergers and coordination between roads. As these techniques remove more and more of the large block movements from the switching load, and the volume of single-car shipments drops, it will be more and more difficult to give frequent service to these remaining single-car shipments on the one hand, and maintain train tonnages on the other. This may require more frequent switching or smaller trains.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054801
MEASUREMENT OF NUMERICAL POSITION AND CONTROL OF THE POSITIONING OF GANTRIES FOR CONTAINERS

MESURE DE POSITION NUMERIQUE ET COMMANDE DE POSITIONNEMENT DE PORTIQUES POUR CONTAINERS

Stahl, J Gradinger, B

Brown Boveri Review (Brown Boveri and Company, Limited, Publicity Department, Baden, Switzerland)

Jan. 1973, 6 pp, 6 Fig

Details of the NC605 system of electronic measurement and positioning equipment supplied by Brown Boveri for the control of the movements of 2 container gantries in the port of Rotterdam. Each gantry should enable between 20 and 30 containers to be handled per hour.

ACKNOWLEDGEMENT:
International Union of Railways, 130

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
130

054920
MEAT IS TRUCK-COMPETITIVE IN WESTBOUND PFE REEFERS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 8, Apr. 1974, pp 32-33

Mechanical refrigerator cars are expensive to buy and operate and yet because of the nature of the business loaded and empty car miles are often 50-50. However, Pacific Fruit Express has developed a service for the westbound movement of meat to balance the heavy eastward shipment of fruit and vegetables. By coordinating schedules, meat can be shipped westward in the same time as by truck and at a cost saving. Railroads are studying other methods for better utilization and better customer service features on mechanical refrigerator cars. A major problem with meat and other perishable shipments is L&D payments.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054922
MP BULLISH ON MEXICO-U.S.-CANADA TRAFFIC

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 8, Apr. 1974, pp 10-11

The Missouri Pacific Railroad predicts that there is great potential for Mexico-U.S.-Canada traffic. Trade between these three countries is increasing. Missouri Pacific is the only U.S. railroad that can offer single line service from Chicago to Laredo. A problem with this route is moving the freight over two international borders. Presently this requires a lot of paper work but this could change.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054933
CHANGING THE STRUCTURE OF JNR'S FREIGHT SERVICE

Yamamoto, Y, Japanese National Railways
Kamada, S, Japanese National Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, 4 pp, 2 Fig, 1 Phot

Faced with a decline in market share, Japanese National Railways is restructuring its freight handling into three complementary services. Bulk commodities move increasingly in trainloads between factories and distribution centres, and by 1976 most container traffic will be carried by 300 daily freightliner trains between about 50 special terminals. Now a start is being made on restructuring wagonload service.

ACKNOWLEDGEMENT:
Railway Gazette International

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054934
PRIVATE SIDINGS ENCOURAGE FREIGHT GROWTH IN EUROPE

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, 4 pp, 2 Tab, 4 Phot

A survey shows that more than half the freight traffic on Europe's railways originates or terminates in private sidings and the proportion is increasing. Siding to siding movement is seen by several governments as the most effective method of relieving urban road congestion, but the financial inducements and technical assistance given to customers to build private sidings vary widely from country to country.

ACKNOWLEDGEMENT:
Railway Gazette International

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054936
INCREASING LINE CAPACITY IN ASTURIAS

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 4, Apr. 1974, 3 pp, 1 Fig, 3 Phot

To meet the needs of an expanding industrial area, RENFE is carrying out improvements to its main line through the Cantabrian mountains to provide increased capacity on this busy single track.

ACKNOWLEDGEMENT:
Railway Gazette International

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056743
SOLVING SOME BOUNDARY PROBLEMS OF TRANSVERSE OSCILLATIONS BY MEANS OF A DIGITAL COMPUTER

K RESHENIYU NA ETsVM NEKOTORYKH KRAEVYKH ZADACH O POPERECHNYKH KOLEBANIYAKH

Konashenko, SI, Academy of Sciences, Ukraine
Repetya, VE

Prikladnaya Mekhanika (Akadamiya Nauk Ukrayins'Koi SSR, Ulitsa Repina 3, Kiev, USSR)

Vol. 9, No. 10, Oct. 1973

Reduction of a multipoint boundary problem of transverse oscillations to a Cauchy problem, with subsequent calculation of eigenvalues and eigenvectors by means of a digital computer, is considered. Generalized A.N. Krylov functions are utilized for a system of two connected differential equations of the fourth order with variable and singular coefficients. Natural frequencies and normal forms of oscillations are determined. Examples are considered which relate to the problem of transportation of lengthy loads by rail transport.

ACKNOWLEDGEMENT:
Engineering Index, EIX740502143

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056763
CONTROLLING THE UNLOADING OF A RAILWAY CAR BY MEANS OF A RAILWAY CAR TILTER

Smckhov, AA

Automation and Remote Control (Plenum Publishing Corporation, 227 West 17th Street, New York, New York, 10011)

Vol. 34, Pt2, Sept. 1973, pp 1473-82

This investigation concerns the special features of the control of a complex object, using as an example the unloading of a railway car by means of a railway car tilter. The mathematical model of the object is constructed and the optimality criterion is chosen. Dynamic programming in combination with gradient methods is recommended for the search for the optimal control.

ACKNOWLEDGEMENT:
Engineering Index, EIX740503354

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056780
BRITISH RAIL ENGINEERING MODERNIZES PRODUCTION

Astrop, AW

Machinery and Production Engineering (Machinery Publishing Company Limited, New England House, New England Street,

Brighton 1, England)

Vol. 123, No. 3181

A detailed review is presented of various machine tools and machining operations utilized for locomotive building and repair. Components and fabrication procedures covered include numerically controlled milling, turning and boring operations on slider blocks for signalling equipment, corner pieces for freight containers, and a wide range of forged and cast parts.

ACKNOWLEDGEMENT:

Engineering Index, EIX740300321

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056840
NOW, WEIGH YOUR CAR IN ABOUT 20 SECONDS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

N73-Aut-0, Paper, 1973, 1 Ref

A method was developed to tie the electronic-recording concept to the mechanical scale for coupled-in-motion weighing of freight cars.

ACKNOWLEDGEMENT:

Engineering Index, EIX740102155

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056843
PROGRAM FOR TIMETABLE COMPILATION BY A LOOK-AHEAD METHOD

Cherniavsky, AL, Institute of Control Science

Artifical Intelligence (North-Holland Publishing Company, P.O. Box 211, Amsterdam, Netherlands)

Vol. 3, No. 1, 1972, pp 61-76, 5 Ref

The problem of timetable compilation for a single-track railway is a job-shop scheduling problem but with differences that handicap the generation of feasible solutions. The paper states the problem and describes the algorithm and the experimental results. The idea of the algorithm is that a feasible solution is obtained by successive resolving of conflicts between trains, this process being interpreted as the generation of some tree T. The way to resolve a conflict is selected by a lookahead method which enables one to obtain good enough solutions by using a very rough estimate function. One specific feature of the algorithm is that the lookahead tree T is not a subtree of T; the other is the culs-de-sac on trees T and T. When it reaches a cul-de-sac, the algorithm augments the tree with additional nodes.

ACKNOWLEDGEMENT:

Engineering Index, EIX740203810

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056856
AUTOMATION, BY MEANS OF AN ELECTRONIC COMPUTER, OF TECHNICAL TRAFFIC CHECKS WITH REGARD TO EXCEPTIONAL GAUGES OR TRANSPORT LOADS

AUTOMATIZZAZIONE, MEDIANTE, ELABORATORE ELETTRONICO, DEGLI ESAMI TECHNICI CONCERNENTI LA CIRCOLAZIONE AGLI EFFETTI DELLA SAGOMA DEI TRASPORTI ECCEZIONALI
Pandolfo, A

Ingegneria Ferroviaria (Colleio Ingegneri Ferroviari Italiani, Piazza Croce Rossa, Rome, Italy)

No. 4, Apr. 1973, pp 307-317

The development of out-of-gauge loads, and the carrying out of the necessary controls connected with it, involving complicated procedures, pose new requirements from the technical and organizational point of view for a better satisfaction of client demand. The laboriousness and modalities of the examination of the possibilities of transit in relation to fixed-line installations have suggested recourse to the help offered by electronic technology in accordance with a specially studied program, which can be further developed. The new application, which is illustrated, permits the automation of these examinations, providing the running regulations that are to be observed with regard to the fixed obstacles and passing trains. It represents the beginning of new procedures which are much faster and simpler, corresponding to the requirements of the necessary development.

ACKNOWLEDGEMENT:
Engineering Index, EIX740103779

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056862
COMPLEX TRANSPORT SYSTEMS FOR MASS AND INDIVIDUAL FREIGHT

KOMPLEXE TRANSPORTSYSTEME FUER MASSEN-UND EINZELGUETER
Bahke, E

VDI Zeitschrift (VDI-Verlag GmbH, Postfach 1139, 4 Duesseldorf 1, West Germany)

Vol. 115, No. 13, Sept. 1973

A survey and evaluation of the present inefficient freight transport in Europe is given. Some new concepts are proposed to solve the slow transport by means of integrated transport system for quick moving of goods, with terminals for transfer to overseas routes.

ACKNOWLEDGEMENT:
Engineering Index, EIX740101777

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056941
REPORT ON RAIL AND MARINE INTERFACE AT THE PORT OF BALTIMORE

Maritime Administration, Office of Ports and Intermodal Systems, New York, New York

MA-GEN-711-74048, Nov. 1973, 21p

The report examines the elements of cost, time and distance involved in the interface of marine terminal operations with those of the rail carriers for the Baltimore port complex specifically as they relate to the U.S. operators. The purpose of the report was to analyze and evaluate the rail carrier/ocean carrier interchange of equipment and recommend actions to them which would contribute towards a more efficient and economical intermodal transport system and assist in further enhancing the competitiveness of the American merchant marine.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-74-50332/7

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NTIS, Microfiche: $1.45
COM-74-50332/7

057151
FLATBACK: ARE WE AWAKE TO THE POTENTIAL?

Roberts, R

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 4, Apr. 1974, pp 16-65

A recent report by the Task Force on Railroad Productivity produced several suggestions on how to improve the efficiency of railroads. The most important of these was the containerization of shipments, both TOFC and COFC, to streamline railroad operations. The report also examined the possibility of phasing out general purpose boxcars in favor of containerization. The study proposes that railroads should be permitted to become integrated transportation companies as it is the case in Canada.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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057153
OVER-THE-ROAD TRANSIT TIME FOR A SINGLE TRACK RAILWAY

Petersen, ER, Queen's University

Transportation Science (Operations Research Society of America, 428 East Preston Street, Baltimore, Maryland, 21202)

Vol. 8, No. 1, Feb. 1974, pp 65-74, Figs, 9 Ref

This paper develops an analytic model of the mean running time for trains on a single track railway. Trains operating at several different speeds in each direction are permited. Priority systems are included in the model to control train behavior when meets and overtakes occur and delay times due to implementing these priority schemes are calculated. It is assumed that the departing times for trains are independent random variables that are uniformly distributed over the time period of interest. The resulting mean running times, including delays, for each speed class in each direction are found by solving a set of linear equations.

ACKNOWLEDGEMENT:
Transportation Science

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057154
CONTAINER SYSTEMS

Rath, E

Wiley (John) and Sons, Incorporated, 605 Third Avenue, New York, New York, 10016

Book, 1973, 581 pp

Every possible facet of the intermodal concept is covered, ranging from detailed factual hardware data through analytic systems to projection–including the author's personal evaluations.

ACKNOWLEDGEMENT:
Container News

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Wiley-Interscience, Department 985, P.O. Box 4569, Grand Central Sta, New York, New York, 10017, Repr PC: $27.50

057172
IS DOMESTIC INTERMODALISM FAILING TO ACHIEVE ITS POTENTIAL?

Reebie, RS, Reebie (Robert) and Associates, Incorporated

Handling and Shipping (Industrial Publishing Company, 614 Superior Avenue, West, Cleveland, Ohio, 44113)

Vol. 15, No. 6, June 1974, pp 51-53

Intermodal piggyback has not made significant gains in its share of the market for the transportation of manufactured goods since 1964. Yet market share is a key measure of success in the introduction of any new product or service. TOFC-COFC holds inherent economic advantages. The article maintains that what is needed are retail outlets (trucks) servicing a wholesale network of inter-city TOFC-COFC. It cites three reasons for the lack of progress in this area.

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051364
RECOMMENDED APPLICATIONS OF SOLID FIBREBOARD GRAIN DOORS IN CLOSED CARS

Association of American Railroads, Freight Loading and Container Section, Chicago, Illinois, 60605

Nov. 1973

For copies of this document write in care of B. Williams, Chief Engineer, Freight Loading and Container Section, AAR.

This new publication, General Information Series No. 547, augments Closed Carload Pamphlet 36—Grain and Other Bulk Commodities. The purpose is to describe application of fiber grain doors in 6—and 7-ft doorway openings. The methods described, when they have received recognition throughout the industry, will probably be included in Pamphlet 36. Since the intent is to provide safe loading methods, it is desired that inspections of emptied cars be made in order that any problems might be detected.

ACKNOWLEDGEMENT:
Railway Locomotives and Cars

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
AAR, Repr PC: $0.30

051365
RULES GOVERNING LOADING OF COMMODITIES ON OPEN-TOP CARS

Bean, JH, Association of American Railroads

Association of American Railroads, Mechanical Division, Chicago, Illinois, 60605

Nov. 1973

For copies of this document write in care of the author, Mechanical Division.

New and revised pages, the tenth such revision to the original publication in 1960, are now available for the loose-leaf Rules of the AAR Mechanical Division. If complete books have not been revised through August 1972, the complete publication with all seven sections, binder and fastener is available for $12.00. If only the 1973 revisions are needed, the price of the loose-leaf pages to bring the entire book up to date costs $2.65.

ACKNOWLEDGEMENT:
Railway Locomotives and Cars

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AAR, Repr PC: $2.65

051411
RAILROAD THEFT AND VANDALISM—WHAT WE'RE DOING

Nelson, DL, Penn Central Transportation Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-82, Paper, Sept. 1973, 3 pp

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper reviews the high crime rates associated with the nation's railroads. It also discusses methods developed to alleviate the loss and theft by vandalism to property and shipments.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051530
THE RAILROAD SHIPPING ENVIRONMENT OF POWER TRANSFORMERS

Gadrix, VE, Westinghouse Electric Corporation
Patton, WG, Houston Lighting and Power Company
Stephenson, JG, Halliburton Company
White, D, Westinghouse Electric Corporation

Westinghouse Electric Corporation, 469 Sharpsville Avenue, Sharon, Pennsylvania, 16146

M7252, May 1973, 12 pp, 12 Fig, 2 Tab

Presented to Edison Electrical Institute, Electrical Systems and Equipment Committee, Grand Rapids, Mich., May 23, 1973.

An effective program to help prevent damage during shipment is essential to electrical equipment reliability, particularly to power transformers. The use of the most modern and cushioned equipped railroad cars is extremely important. Similarly, rail carriers that are to transport the equipment must be carefully selected on the basis of previous performance in the specific areas of train control, track conditions and yard handling procedures. The transformer itself must be loaded and braced effectively. All of these factors are indeed important. The real target, however, must be the continuing effort on the part of the electrical manufacturer to improve the transformer's ability to simply withstand the rail shipment problem.

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Westinghouse Electric Corporation, 469 Sharpsville Avenue, Sharon, Pennsylvania, 16146, Repr PC: Req Price

051564
ELECTRONIC SYSTEMS FOR CARGO SECURITY

Gasparotti, JJ, Mitre Corporation
Woodbridge, CL, Mitre Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-47, Paper, Sept. 1973, 8 pp, 16 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper was presented as a part of the session, "Developments in Transportation Security," at the Conference on Transportation, Oct. 31, 1972, that was held in conjunction with the IEEE Northeast Electronics Research and Engineering Meeting. The paper describes an intrusion detection system, characteristics of each subsystem and indicates the use of each type for the protection of cargo at a truck terminal. Only minor editorial changes have been made in the text as delivered.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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052071
VANDALISM SUPPRESSION BY HELICOPTER

Southeastern Pennsylvania Transportation Authority, 2028 PSFS Building, Philadelphia, Pennsylvania, 19101

T-142, Final Rpt, 16 pp, Figs, Phots

A Final Report on the Effectiveness of the 1973 Program in SEPTA Area on Penn Central and Reading Commuter Lines.

This is the final report on the 1973 program of helicopter surveillance of railroad facilities in the Philadelphia area. Both freight and commuter trains and facilities were protected by the coordinated efforts of a helicopter and the ground law officers. The effectiveness of the program is described.

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Southeastern Pennsylvania Transportation Authority, 2028 PSFS Building, Philadelphia, Pennsylvania, 19101, Repr PC: Req Price

053796
INTERFRIGO IN THE EUROPEAN RAILWAY CONTEXT

Carlier, R, INTERFRIGO

International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

Paper, Apr. 1974, 4 pp

Presented at Fourth International Symposium on Railroad Cybernetics, AAR/UIC/IRCA, 21-26 April 1974, Washington, D.C.

INTERFRIGO is a cooperative company, the members of which are all Railway Administrations. Its purpose is to cover all operations for obtaining and maintaining the optimum temperature for foodstuffs during coveyance. It operates through specialized rolling stock belonging to its members and through its own rolling stock. The data processing junction is based on messages emanating from the Railways, which are often transmitted on magnetic tapes. The two main objects of the Information Processing function within INTERFRIGO are: the continual improvement of the input of the information received from the Railways, in relation to the development of the latters' methods and equipment, and the gradual introduction of Centralized Administration of Freight Traffic, of which it must become an integral part; the rational operation of the data bank which it has established.

ACKNOWLEDGEMENT:
International Union of Railways

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International Union of Railways, BDC, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

054591
COPTERS CUT COMMUTER LINE VANDALISM–PROTECT LIVES

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 2, Feb. 1974, 2 pp

The MTA in New York, Illinois Central Gulf in Chicago, and SEPTA in Philadelphia have begun helicopter patrols of their commuter lines to reduce damage and injuries caused by vandals. A six month program by SEPTA has shown a marked decrease in vandalism once the helicopter program was started. The helicopters use loudspeakers, sirens and floodlights to discourage trespassers. The helicopters also maintain radio contact with ground patrol cars and police departments.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054656
LOSS AND DAMAGE

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 6, Mar. 1974, 16 pp

In a series of 3 articles the problems and future of loss and damage claims are outlined. In 1972, for the first time in a decade, loss and damage payments actually declined, although only slightly. In addition, the ratio of L&D payout to revenue has dropped for the third consecutive year to reach the lowest position since 1966. The three articles discuss why this has happened and what methods were used. Generally, the trend in L&D is towards a decline in payouts although there is a long way to go to achieve an ideal situation.

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Canadian National Railways, Headquarters Library

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054669
VOLUME SPELLS PROFIT–OR DOES IT?

Hoppe, CW

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 3, Mar. 1974, 3 pp

A computer model, called Train Dispatching Simulation (TDS) has been developed to determine the capacity in terms of trains per day of a recently constructed 360-mile railway in the Middle East. The TDS model can handle both double and single track, CTC and ABS operations, and is able to examine, among other things, the operational and economic impacts of various train sizes and electrification versus diesel operation. A potentially significant phenomenon that became apparent in the model was that as the capacity of a given line is approached train delays increase rapidly and become asymptotic. Thus many actual railway lines may be closer to capacity than it appears. Methods of increasing line capacity are discussed.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054734
DEMAND STIMULATION, COST CONTROL, AND THE LOGISTICS SYSTEM

Browne, WG, Oregon State University

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 3, 1973, pp 46-52

Starting in the late 1950's many new ideas and services were being introduced into the business community which subsequently changed the posture of upper management towards the logistics function. The general objective of any logistics system is to get the right product, to the right place, at the right time, at the right cost, and in the right condition. But what is right? A logistics system is the organization of the capital, management, and services used to move the goods from the source to the user.

ACKNOWLEDGEMENT:
Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

054742
ELECTRONIC SYSTEMS FOR ENROUTE TRUCK SECURITY

Larson, GS, Transportation Systems Center

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-ICTT-44, May 1973, 7 pp, 3 Fig, 10 Ref

Presented at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The truck "hijacking" problem is unique in the Cargo Security area in that high-value cargo is often carried in a manner which is particularly vulnerable to theft. Although truck hijacking accounts for only a small fraction of the national cargo loss, it appears that use of modern electronic technology can result in substantial reduction in losses. Real-world criteria are presented which have been developed by a User Committee representing truck, insurance, police and government experience. Present state-of-the-art electronic technology is assessed against these criteria and only a few candidate systems are found to be applicable to the problem. A development program is described which is presently sponsored by the U.S. Department of Transportation in close cooperation with truckers and New York Police. The program includes development and demonstration of helicopter and ground-based interrogators and truck-mounted transponders.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054744
MANAGEMENT OF PHYSICAL DISTRIBUTION AND TRANSPORTATION

Taff, CA

Irwin (Richard D), Incorporated, 1818 Ridge Road, Homewood, Illinois, 60430

Book, 1972, 520 pp

This fifth edition has been expanded in its treatment of physical distribution. Chapters on Inventory Control, Warehousing Managment, Material Handling, and Location Analysis have been broadened through increased utilization of qualitative and quantitative methods, and treatment of Industrial Packaging and Order Processing has been strengthened through separate chapters devoted to these functions. An additional chapter has also been included to provide a wider range of management principles and analytical tools in decision making. Such aids as forecasting, including time series analysis and input-output models, information flow, quality control, and others are covered.

ACKNOWLEDGEMENT:
Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Irwin (Richard D), Incorporated, 1818 Ridge Road, Homewood, Illinois, 60430, Repr PC: $11.95

054751
MATERIAL HANDLING SYSTEMS–PRESENT AND FUTURE

Rowan, MJ, Modern Materials Handling

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-MH-5, July 1973, 11 pp

Presented at the Joint Materials Handling Conference, Pittsburgh, Pa., Sept. 19-21, 1973.

This paper presents the development of materials handling as a service function. It is always performed for some end-result other than handling itself, the most common being service to product and distribution. There are three main categories of materials handling systems that exist in plant operations–systems for in-coming materials, systems for in-process materials, and systems for out-going materials. These are discussed.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054770
THE COMBINED TRANSPORTATION AND INVENTORY POLICY DECISION

Whybark, DC, Purdue University

Logistics Research Conference, George Washington University, Washington, D.C., 20006

Paper, May 1974

For further information write in care of the author.

In most organizations it is common that the determination of inventory policies and the choice of transportation alternatives are done independently. There is an interaction between these decisions, however, when the transportation alternatives have different speed, reliability and cost characteristics. This paper presents a methodology for jointly determining the reorder points, order quantities and transportation alternatives which provide minimum total transportation and inventory costs for a receiving facility. An effective heuristic procedure is developed and evaluated over a broad range of conditions. Some of the implications of the research are discussed.

ACKNOWLEDGEMENT:
Logistics Research Conference

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Purdue University, Krannert School, Lafayette, Indiana, 47907, Repr PC: Req Price

056997
SMALL SHIPMENTS. A MATTER OF NATIONAL CONCERN. ANALYTICAL ASSESSMENT

American University, School of Business Administration, Washington, D.C.

Final Rpt, 7207-7401, Jan. 1974, 295 pp

Contract DOT-OS-20211

The efficient and economical distribution of intercity small shipments is one of the most perplexing subjects facing the transportation industry today. The facilitation of small shipments bears a distinct relationship to the economic welfare of shippers, carriers, warehousemen, forwarders and receivers in various degrees. Small shipments move so universally that their effects are felt by almost every business and family unit within the United States. Their efficient and economical handling could contribute much to our national progress and welfare. An analytical assessment of major small shipment problem areas and a plan for alternative actions that will address this complex subject are presented.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231825/1

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $6.75, Microfiche: $1.45
PB-231825/1

051294
AMTRAK REVISITED

Thoms, WE, North Dakota University

Transportation Law Journal (Motor Carrier Lawyers Association, 57 Leuning Street, South Hackensack, New Jersey, 07606)

Vol. 5, No. 2, July 1973, pp 141-151

This article presents a review of the legal foundations and history of the National Railroad Passenger Corporation, popularly known as AMTRAK.

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Motor Carrier Lawyers Associatior, 57 Leuning Street, South Hackensack, New Jersey, 07606, Repr PC: Req Price

051326
NS BEGINS WORK ON SCHIPHOL LINE

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 433-434

Construction of a direct line from Amsterdam to Leiden will save 9 km over the existing route and give rail access to Schiphol airport. The Amsterdam end of the line is due for completion in 1977, but studies are still in progress to decide the means of entry into the urban area.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051329
RIDE AT DEN HAAG

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 432-433

Experience with signposting for passenger flow at stations and interchanges showed that further studies both in perception and presentation are needed to create a fully international alphabet of pictograms.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051331
COPENHAGEN PREPARES FOR MORE COMMUTERS

Maltby, CE, GEC Traction Limited

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 426-428

Rapid expansion of the electrified suburban network will place an extra burden on the congested line through the centre of Denmark's capital, and a prototype train with all axles motored is to be tried next summer to improve schedules. At the same time, one-man train operation with speed supervision will be introduced to ease staff shortages.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

051338
SHIN KANSEN, RESULTS OF EIGHT YEARS

Ishihara, T, Japanese National Railways

Japanese Railway Engineering (Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan)

Vol. 14, No. 2, 1973, pp 3-7, 7 Fig, 2 Tab

The Shinkansen, opened to traffic on October 1, 1964, to link Tokyo with Osaka over a distance of 515 km, was extended westward to Okayama on March 15, 1972, a distance of 161 km. In this article passenger traffic, train operations, and the financial situation of the Shinkansen since its inauguration are summarized.

ACKNOWLEDGEMENT:
Japanese Railway Engineering

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051340
RECENT SPEED-UP OF TRAIN OPERATION IN JNR

Takita, T, Japanese National Railways

Japanese Railway Engineering (Japan Railway Engineers' Association, 2-5-18 Otemachi, Chiyoda-ku, Tokyo, Japan)

Vol. 14, No. 2, 1973, pp 15-19, 6 Fig, 1 Tab

In the postwar reconstruction period, the trunk lines were electrified starting from 1947, and the year 1956 witnessed complete electrification of the Tokaido Trunk Line, upon which the limited express "Tsubame" ran at an increased schedule speed of 74.6 km/h, linking Tokyo with Osaka in 7 hours 30 minutes; at the same time the hauling capacity was increased from 450 t to 550 t. The better performance achieved was attributed to the introduction of an electric locomotive excelling in power the steam locomotive. This, extension of the electrified lines has vastly contributed to an increase in train speed and the growth in the transport capacity.

ACKNOWLEDGEMENT:
Japanese Railway Engineering

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051345
MODERNISATION OF PASSENGER STATION BUILDINGS AT CANNES, NICE-VILLE AND MENTON–TOWN PLANNING WORK IN ADJACENT AREAS

LA MODERNISATION DES BATIMENTS A VOYAGEURS DE CANNES, NICE-VILLE ET MENTON–TRAVAUX D'URBANISME EXECUTES AUX ABORDS

Trede, C

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

No. 92, Oct. 1973, pp 573-584, 11 Fig

In this article, the author, who is Manager of the SNCF Marseilles Region, describes the main development, or even reconstruction work which has been carried out on the buildings of these three important stations following the electrification of the Marseilles-Ventimille line; since they were opened, these stations had in fact only been added to or improved to a limited extent and were no longer suited for present traffic conditions. He also recalls some of the many schemes implemented in recent years involving railway installations on the French Riviera; he refers to the road and town improvement operations and the construction of car parks, which were or are being carried out concurrently, and explains how the SNCF is involved.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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051356
PROBLEMS STANDING IN THE WAY OF ACCOMPLISHING THE MOST ECONOMICAL MARKETING SYSTEM

Institute for Rapid Transit, 1612 K Street, NW, Washington, D.C., 20006

1973, 70 pp

Presented at the Institute for Rapid Transit, Annual Conference, 1973. Appeared in the IRT Annual Conference Digest.

This publication contains the paper presented at the IRT Annual Conference for 1973. The papers cover such topics as transit planning, rail car technology, the energy crisis and government planning.

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Institute for Rapid Transit, 1612 K Street, NW, Washington, D.C., 20006, Repr PC: Req Price

051357
THE WAY TO GO: THE COMING REVIVAL OF U.S. RAIL PASSENGER SERVICE

Southerland, TC, Jr McCleery, W

Simon and Schuster Incorporated, 1 West 39th Street, New York, New York, 10018

Book

Southerland and McCleery have produced a solidly interesting book that shows the tide now runs against America's automobiles after a 50-year spree, while railroads, long a national disgrace, have a new day a-coming. Their descriptions of the vastly superior passenger trains abroad—Japan's magnificent "bullet trains," the classy French Mistral, Capitole and Train Bleu, Britain's Flying Scotsman, and others—show how trains at least ought to be. But the cheerful news is that American travelers and commuters, if they put on the pressure, can enjoy by the 1980's a superb futuristic rail passenger service boasting high speed trains (300 mph and up) that will make the new New York-Washington and Boston-New York Metroliner and turbo trains look like turtles. The chapter on recent technological breakthroughs could make a train-buff of Aunt Emily.

ACKNOWLEDGEMENT:
Publishers Weekly

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Simon and Schuster Incorporated, 1 West 39th Street, New York, New York, 10018, Orig PC: $8.95

051363
A RAPID TRANSIT LINK FOR NEW CITIES DEVELOPMENT

Avery, JP

High Speed Ground Transportation Journal (Planning Transports Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

June 1973, pp 201-213, Refs

A new city concept, specifically the "village cluster" concept, is reviewed and presented as an alternative to the present trend toward urban sprawl and environmental deterioration. A fundamental requirement for the success of a new cities project is noted to be a rapid transit link between the new cities and an existing urban center.

ACKNOWLEDGEMENT:
Department of Transportation Library

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051380
SPECIAL REPORT: TECHNOLOGY '74

Christiansen, D

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 11, No. 1, Jan. 1974, 2 pp

This special report is a collection of state-of-the-art articles on many areas of technology, including communications, computers, energy, and rail transportation including rapid transit.

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051385
ENERGY CONSUMPTION AT HIGH SPEEDS

Gluck, H, German Federal Railway

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London therefore be given to streamlining and the effect of equipment mounted outside the bodyshell. The DB has recently carried out tests to prove the validity of train resistance formulae, and these can be used when planning high-speed passenger services to establish a relationship between journey speed and energy consumption.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

051405
DEVELOPMENT OF A FLEET MAINTENANCE POLICY

Kuhn, K, Sperry Rand Corporation
Berger, C, Sperry Rand Corporation

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-69, Paper, Sept. 1973, 8 pp, 10 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

The preventive maintenance program may be defined by the period between maintenance actions, the time the vehicle is removed from service for preventive maintenance work, and the cost of the periodic preventive maintenance. Total maintenance cost is the sum of the cost of parts, labor, and material used for scheduled preventive maintenance; and the costs of parts, labor, and material used for unscheduled repairs of vehicles that break down between scheduled maintenance actions. Level of service is more difficult to define quantitatively, and is discussed in detail.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051417
ECONOMY OF SCALE FOR MASS TRANSIT SYSTEM

Mittal, RK, Union College, Schenectady
Arora, SR, Minnesota University, Minneapolis

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-93, Paper, Sept. 1973, 12 pp, 8 Fig, 9 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

Mathematical models are developed for trips versus transit network length. It is shown that the number of trips captured per unit length of network is a highly nonlinear phenomenon, occurring because of four major factors. These factors are: interzonal travel, modal split, nonuniformity in trip generation, and future growth factors. Sensitivity analysis is presented to understand the impact of various controllable and noncontrollable factors economies of scale.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051436
FOUR-DAY WEEK AND TRANSPORTATION

Desimone, VR

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 98, No. TE3, Paper #9116, Proceeding, Aug. 1972, pp 705-714

The concept of the 4-day work week is reviewed. Potential impacts identified are: total travel, peak period travel and safety. Impact on total travel does not appear to be great. Although there will likely be a shifting in time, place and purpose of travel with 4-day. Peak period travel is subject to the greatest impact from 4-day. A freeway bottleneck and a major activity center were examined as case studies. Application of 4-day reduced both the duration of the time when demand exceeds capacity of a freeway bottleneck and the number of vehicles excess demand over capacity. In the major activity center examined, 4-day also redistributed travel demand to permit substantial additional persons to enter the cordon area during a day and peak period demand was also substantially affected. Safety could be affected as present patterns indicate a potential for increasing accidents.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051437
ASSESSING IMPACT OF URBAN TRANSPORTATION

Boyce, DE

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 98, No. TE3, Paper #9111, Proceeding, Aug. 1972, pp 645-662

Research studies on the impact of the Philadelphia-Lindenwold Rapid Transit Line, now in progress, are described. Principles and objectives of these impact studies are analyzed as a guide to future studies. The role of this research as a prototype study for larger impact studies is examined together with questions of model building, statistical hypothesis testing and data availability. Following a brief description of the High-Speed Line itself, two areas of research are described as illustrations of the principles and objectives of impact study research design. The first concerns a simple model of transit station choice and its empirical testing. The second describes several studies of land value and land use impact. The paper concludes with a review of the research designs in terms of the principles of such impact studies.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051438
AIRPORT ACCESS COST-EFFECTIVENESS ANALYSIS

de Neufville, R Mierzejewski, E

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 98, No. TE3, Paper #9141, Proceeding, Aug. 1972, pp 663-678

A cost-effectiveness analysis of alternative airport access systems is described. The purpose of this study is to help define a national policy for airport development. Based on an extensive assessment of costs and travel times, optimal modes are defined for different values of travel time for different kinds of cities, ranges of airport traffic volumes and of airport distance from the center city. Highway modes appear most cost-effective, whether private autos for those who have them, or busways, taxis or limousines for the other half of the traffic. High speed railroad and VTOL systems are seen to be cost-effective except for very special cases.

ACKNOWLEDGEMENT:
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051453
ENVIRONMENTAL CONTROL FOR THE CARACAS METRO

Bendelius, AG Metsch, WW

Experimental Mechanics (Society for Experimental Stress Analysis, 21 Bridge Square, Westport, Connecticut, 06880)

Vol. 15, No. 9, Sept. 1973, pp 47-54

New subway systems, such as the proposed Metro de Caracas, will benefit from aerospace technology which has led to innovations in rapid transit vehicle designs. Increased amounts of kinetic energy in the form of heat through car-mounted resistor grids during the braking are included in design. Rates of heat release generated by train operation and car air-conditioning systems are described.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 059239

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051459
PUBLIC TRANSPORT IN OSLO

I TRASPORTI PUBBLICI DI OSLO
Marini, R Ziccardi, G

Ingegneria Ferroviaria (Collegio Ingegneri Ferroviari Italiana, Piazza Croce Rossa, Rome, Italy)

No. 3, Mar. 1973, pp 239-248

The capital of Norway, Oslo, has a population of about half a million inhabitants, has an efficient public transport system represented by a metropolitan network, by a network of urban trams and buses and by some suburban railways and tram services. A description is given of the characteristics of the installations and rolling stock of these means of transport and of the service which they carry out in a harmonious manner, with particular regard to the planning and construction of the metropolitan network.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 057047

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051460
ELECTRIC EXPRESS MULTIPLE-UNIT TRAIN TYPE ET 403 OF THE WEST GERMAN RAILROAD SYSTEMS. OUTLINE OF A NEW DEVELOPMENT

ELEKTRISCHER SCHNELLTRIEBZUG ET 403 DER DEUTSCHEN BUNDESBAHN, GRUNDZUEGE EINER NEUEN ENTWICKLUNG
Rappenglueck, W

Elektrische Bahnen (Verlag R Oldenbourg, Rosenheimer Strasse 145, Munich 80, West Germany)

Vol. 44, No. 5, May 1973, pp 98-108

Technical details are presented of a new Intercity-Network system in West Germany. It connects densely populated regions with regular express trains running exclusively first class on electrified tracks. The service is designed for a maximum speed of 200 km/hr. The electric equipment and carriage structure are described.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056291

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051463
CONSEQUENCES OF SERVICE REDUCTION IN MUNICIPAL TRANSIT: SAN FRANCISCO'S MUNI

Lee, DB, Jr, California University, Berkeley

Transportation (Elsevier Publishing Company, P.O. Box 211, Amsterdam, Netherlands)

Vol. 2, No. 2, July 1973, pp 195-218, Refs

The "Muni", in an effort to reduce costs and meet its budgeted deficit, attempted to reduce service by ten to fifteen percent. From an analysis of the data which could be obtained, it appears that neither efficiency nor equity in the City would have been served by the proposed cutbacks. The analysis draws from a variety of sources and methods in exploring the interactions within the transportation system and within the city budget.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 056267

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051466
AIRPORT ACCESS/EGRESS SYSTEMS STUDY. VOLUME I. TEXT

Whitlock, EM Sanders, DB

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-OST-73-32-1, Final Rpt, 7207-7306, Sept. 1973, 178 pp

Contract DOT-TSC-462-1

Prepared by Smith (Wilbur), and Associates, New York. See also Volume 2, PB-223 842.

Studies of airport activities and user characteristics at 34 high volume U. S. airports indicate that disbursed trip origins cannot economically justify rapid transit corridor investments dedicated to airport access travel. Generally, airports have too much off-roadway parking in central terminal areas and this concentration of vehicular activities near terminal buildings congest internal roadways. The study proposes a number of low-capital improvement concepts to airport access/egress. These improvements are generally directed towards improving the traffic flow in the central terminal area through better flow controls, diversion of automobile traffic from the central terminal area, and changes in travel patterns. The latter can be changes in mode and/or time of travel. Three specific operational experiments are proposed to evaluate the effectiveness of the proposed concepts. The experiments are a remote parking experiment at Detroit Metropolitan Airport, bus-rail links from La Guardia and Kennedy Airports in New York and evaluation of a garage-baggage handling system at Seattle-Tacoma Airport. Cost of implementing all these experiments is estimated to be $1.444 million.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-223806/1

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PB-223806/1

051467
AIRPORT ACCESS/EGRESS SYSTEMS STUDY. VOLUME II. APPENDIXES

Whitlock, EM Sanders, DB

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-OST-73-32-2, Final Rpt, 7207-7306, Sept. 1973, 277p

Contract DOT-TSC-462-2

Prepared by Smith (Wilbur), and Associates, New York. See also Volume I, PB-223 806.

Contents: Airport survey questionnaire; Airport description; Remote parking questionnaire; Passenger counting record; On-bus survey questionnaire; Passenger count record; Automobile baggage check-in survey forms; Bibliography.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-223842/6

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
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PB-223842/6

051483
MBTA GREEN LINE TESTS-RIVERSIDE LINE, DECEMBER, 1972. VOLUME I. TEST DESCRIPTION

Neat, GW

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142 DOT-TSC-UMTA-74-1-V1

DOT-TSC-UMTA-73-9-V1, Final Rpt, Sept. 1973, 133p

The Urban Rail Supporting Technology Program emphasizes three major task areas; facilities development, technology development, and test program development. The test program development is composed of three sub-areas; vehicle testing, ways and structures testing, and track geometry measurement. The report presents the technical methodology, data samples, and results of tests conducted on the Massachusetts Bay Transit Authority (MBTA) Green Line in December, 1972 prior to initiation of the Green Line refurbishment effort. An instrumented revenue type car was used for the measurement of track geometry, ride roughness, and interior noise. Actual car speed was approximately the same as normal revenue speed. The objectives of the tests were to identify critical track sections for improvement to quantify the benefits produced by the track rehabilitation program, and to provide data for Transportation Systems Center's development of an advanced track geometry measurement system.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-224207/1

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PB-224207/1

051525
URBAN TRAVEL DEMAND FORECASTING

Highway Research Board Special Reports (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 143, Spec Rpt, 1973, 315 pp, Figs, Tabs, Refs

Proceedings of a Conference held at Williamsburg, Virginia, 3-7 December 1972.

This book is a collection of workshop papers on the subject of Urban Travel Demand Forecasting.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: $8.00

051529
TWO MEANS OF ALLEVIATING RUSH-HOUR CROWDING

Libove, C

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. TE4, #10144, Proc Paper, Nov. 1973, pp 845-861

Two means are suggested for increasing the rush-hour capacity of urban train systems already operating trains of maximum headway. They are: (1) Replacing some or all of the regular cars by standee-only cars; and (2) using double-length trains and, at the stations, having each train first stop with its front half alongside the station platform, and then advance to put its second half alongside the platform. A theoretical analysis shows that in some cases these methods can lead to a significant increase in the carrying capacity of a system. Formulas are presented for estimating the increase achievable in any particular case.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051533
PREDICTING TRANSPORTATION DEMAND

Hesse, JE, United Aircraft Research Laboratories
Dubin, AP, United Aircraft Research Laboratories
Gobetz, FW, United Aircraft Research Laboratories

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-103, Paper, Sept. 1973, 12 pp, 9 Fig, 7 Ref

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

A methodology for predicting passenger transportation demand has been developed. The approach consists of two steps. First, total transportation demand (passengers/year) is estimated using an n-body gravity model (which serves to resolve an order-of-magnitude discrepancy discovered in applications of the previously used simple gravity model). The second step is the prediction of the modal shares of the total transportation demand based on the statistical behavior of passengers in response to the perceived total costs of transportation by alternative modes. The perceived costs are represented by a quantity called "disutility," measured in dollars, which accounts for the value of travel time and allows for the quantification of other perceived costs of travel as related to the frequency of service and the requirement to obtain local transportation in the destination area in the case of a public mode. The modal share model is developed first for a two-mode situation involving competition between air and auto, and is then extended to a multi-modal case through successive representation of the disutility of several modes by a mean disutility.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051555
THE ROLE GROUND TRANSPORTATION CAN PLAY IN THE AIRPORT SITE SELECTION PROCESS

McGinnis, NF, TRW Transportation and Environmental Operations

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-70, Paper, Sept. 1973, 16 pp, 11 Fig, 7 Tab

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

This paper relates significant aspects of the mass transit system analysis activity associated with the recent South Florida Airport Site Selection Program. The configuration, performance, cost, and service characteristics of the quasi-conceptual ground access transportation systems continually represented one of the main decision factors as the Review Authorities deliberated on each candidate airport site. Discussion of the transportation system impact on these deliberations is essentially the prime objective of this presentation.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051575
TRANSPORTATION PLANNING: SURVEY AND SYNTHESIS

Beenhakker, HL

Iowa University, Iowa City, Institute of Urban and Regional Research, Iowa City, Iowa UMTA-IA-11-0032

TR-5, Tech Rpt, Aug. 1972, 52 pp

A conceptual framework for transportation planning is established by relating several existing bodies of knowledge, noting their deficiencies, and then focusing on the establishment of optimal implementation times of transport facilities. Suggestions for the quantification of incommensurable and imputed monetary impacts of transport facilities are presented. An approach which calls for employment of casuistic models in combination with subjective models is recommended for transportation investments requiring large capital outlays. The discussion includes examination of existing dynamic programming models as well as new approaches. A bibliography is included.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225317/7

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PB-225317/7

051585
AUTOMATIC FARE COLLECTION. SUPPLEMENTARY REPORT

Parsons, Brinckerhoff-Tudor-Bechtel, 814 Mission Street, San Francisco, California, 94103 UMTA-CA-06-0023

No. 2, Tech Rpt, 7209-7305, June 1973, 47 pp

Report on 'San Francisco Bay Area Rapid Transit District Demonstration Project'. See also PB-189 148.

The report describes the final version of the fare collection equipment, and its operational characteristics through the first nine months of BART revenue service operation, September 1972—May 1973.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226131/1

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051890
PASSENGER REACTIONS TO LONDON'S VICTORIA LINE

Robbins, M, London Transport Executive

High Speed Ground Transportation Journal (Planning-Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 2, June 1973, 4 pp

The London Underground's rapid transit Victoria Line, 13-1/2 miles long, which was opened in stages between 1968 and 1971, provides a new northeast-center-south link supplementing the network already existing (in the central area for over sixty years) in London. Two detailed surveys were mounted to assess the impact of the new line on passenger ride patterns and on generation of new traffic, and to monitor forecasts made at different dates during the preceding fifteen years.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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051892
A NOTE ON SURVIVAL RANGE OF RAILROAD PASSENGER SERVICE IN U.S.A.

Kumar, S, Illinois Institute of Technology

High Speed Ground Transportation Journal (Planning-Transport Associates, Incorporated, Box 4824, Duke Station, Durham, North Carolina, 27706)

Vol. 7, No. 2, June 1973, 6 pp, 3 Fig, 1 Tab, 10 Ref

Survival range for passenger service is defined as a range of parameters for which one transportation mode is competitive with the other alternates available. This range has been examined for the railroads as compared to auto and air transportation. Effective travel speed has been identified as the most important parameter which affects the survival range. It has been concluded that survival of intercity railroad passenger service at speeds below 50 mph is difficult. Survival range is estimated as a length of the trip for which railroads develop comparative advantage, while operating at various speeds. The ranges of the trip length for various speeds are: 60 mph—100-175 miles; 70 mph—100-250 miles; 80 mph 100-280 miles; 100 mph—100-375 miles; 150 mph—199-600 miles. A relationship between speed, survival range and passenger mile traffic has been developed. It has been shown that railroad passenger service needs to operate at effective speed above 70 mph for a resonable survival. For a healthy existence, it must operate at speeds above 100 mph. Significant federal and industrial effort is needed to achieve this.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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051896
MODERN RAPID TRANSIT

Tass, L

Carlton Press, Incorporated, 84 Fifth Avenue, New York, New York, 10011

Book, 1971, 191 pp, Figs, Refs

The purpose of this study is to cover the development and utilization of modern metropolitan rapid transit—which has evolved from the underground railway—with a view on the interest of the community. The author states that he does not intend to judge on grounds of which concepts are good or bad but that he wishes to be "reasonable with constructive intentions toward future city development" (preface). Further, he proposes to determine "the conditions that would satisfy most of the people in the most desired manner." Most important aspect of the study is regular movement of people, to, from and within cities. Speed and efficiency of operation are most important requirements of rapid transit, and these requirements must be considered in the wider concept of overall transportation planning and town planning. The book is divided into three major sections: Part I, "History," outlines the first steps and achievements of rapid transit; Part II, "Theory," deals with The Living City, Arteries for the Living City, and Rapid Transit and Town Planning; and Part III, "Practice," gives system examples (description and analysis) for the rapid transit systems of Berlin, Chicago, London, New York, Paris, Tokyo, and Toronto. At the end is a short section of conclusions, 23 pages of figures, and a five page bibliography. Several illustrations accompany the text.

ACKNOWLEDGEMENT:
High Speed Ground Transportation Journal

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051898
IMPROVED HIGH-SPEED RAIL FOR THE NORTHEAST CORRIDOR

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

Jan. 1973, 8 pp, Figs, 2 App

The Department of Transportation proposes that the Northeast Corridor (NEC) rail line be upgraded and new vehicles be acquired so that high-quality, frequent, high speed passenger train service can be provided between Washington and Boston and intermediate points. Track upgrading projects will include the complete installation of welded rail, signal improvements, increased banking on curves, additional crossovers, complete fencing, and electrification. The rail system has the capacity to carry substantially greater numbers of intercity passengers, while taking almost no land, creating less air and noise pollution, minimizing energy consumption, and providing a high level of safety. To seize upon this opportunity to provide a highly beneficial service to the region, however, requires Federal Assistance. The financial plan to make the improvements calls for Federal guaranteed loans of about $700 million. Financial projections for the program show that revenues will be sufficient to cover operating expenses, recover the capital, and create a surplus.

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051899
TRANSIT PROGRAM FOR HOUSTON

Voorhees (Alan M) and Associates, Incorporated

Sum Rpt, 1973, 41 pp, 2 Fig, 1 Tab

The preparation of this report has been financed in part through a grant from the U.S. Department of Transportation, Urban Mass Transportation Administration, under the Urban Mass Transportation Act of 1964, as amended.

The City of Houston organized the "Transit Action Program" to evaluate the feasibility of specific transit improvements in the Houston urban area. The work and report are a continuation of preliminary transportation and transit planning done by the Texas Highway Department and the Houston-Galveston Area Council. However, Transit Action Program work is the first in-depth investigation in recent times of short–and long-range mass transit needs. The new technical work has been complemented by a major effort to involve the community to a degree not commonly attempted, with significant and satisfying benefits from a better understanding of citizen attitudes and desires.

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051910
ANALYSIS OF PEAK PERIOD PASSENGER FLOWS ON THE LINDENWOLD RAPID TRANSIT LINE

Boyce, DE Murthy, BVA

Pennsylvania University, Philadelphia, 3400 Walnut Street, Philadelphia, Pennsylvania, 19104 UMTA URT 8(70)-71-02

June 1971, 23 pp, 9 Fig, 5 Tab

In February 1969, the Delaware River Port Authority initiated a new high-speed rail transit service connecting Lindenwold, New Jersey and Center City Philadelphia. Patronage of the High-Speed Line at the time of its opening was approximately 14,850 persons per day; usage has been increasing steadily and reached about 32,000 per day by April 1, 1970. At that time, traffic conditions were becoming extremely critical at some stations, mainly because the available number of parking spaces was not able to meet the demand. Because of the saturation of parking spaces at the suburban stations, patronage was leveling off, suggesting that access to stations was limiting the transit usage and preventing further growth of patronage. In response to this situation, during the summer of 1970, the Delaware River Port Authority undertook an expansion of parking facilities from 5896 to 8244 spaces, an increase of 40 percent. In order to analyze the effect of these improvements, before-and-after surveys were conducted on April 1, 1970 and November 18, 1970.

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051911
THE IMPACT OF RAIL RAPID TRANSIT SYSTEMS ON COMMERCIAL OFFICE DEVELOPMENT: THE CASE OF THE PHILADELPHIA-LINDENWOLD SPEEDLINE

Gannon, CA Dear, MJ

Pennsylvania University, Philadelphia, 3400 Walnut Street, Philadelphia, Pennsylvania, 19104 UMTA PA-11-0011-72-1

June 1972, 237 pp, 26 Fig, 46 Tab, Refs, 4 App

This report presents the results of a case study of commercial office development in the Philadelphia metropolitan region specifically as it relates to the Philadelphia-Lindenwold rail rapid transit facility. As such, the study represents an integral, though independent, part of a wider, long range and comprehensive investigation of the Lindenwold facility, and especially its impact on urban real estate development in Camden County, New Jersey, currently underway in the Department of Regional Science at the University of Pennsylvania. Notably, the study reported herein, is one of the first known completed attempts at identifying the impact of a modern rail rapid transit system on commercial office development.

ACKNOWLEDGEMENT:
Pennsylvania University, Philadelphia

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PB 212906

051912
SPATIAL AND TEMPORAL EFFECTS IN RESIDENTIAL SALE PRICES

Slater, PB, West Virginia University

American Statistical Association, Journal of (American Statistical Association, 806 15th Street, NW, Washington, D.C., 20005)

Vol. 68, No. 343, Sept. 1973, 8 pp, Tabs, 34 Ref

To assess the extent of the impact upon housing prices of the introduction of a modern suburban rapid transit service, a two-way unbalanced analysis of variance model is estimated with residential sales price data. Inflationary and time stable neighborhood effects are accounted for in this manner. The first term of the singular decomposition of the interaction matrix summarizes the interaction, and may indicate the nature of the impact. Since the residuals from the additive model are too dispersed and negatively skewed to be normally distributed, the application of outlier-editing and robust estimation procedures is discussed.

ACKNOWLEDGEMENT:
American Statistical Association, Journal of

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American Statistical Association, 806 15th Street, NW, Washington, D.C., 20005, Repr PC: Req Price

051914
TRANSIT STATION JOINT DEVELOPMENT

National League of Cities, 1612 K Street, NW, Washington, D.C., 20006
United States Conference of Mayors
Development Research Associates

Final Rpt, June 1973, Figs, Tabs, Phots, Refs, Apps

Contract DOT-OS-20021

Prepared for the Department of Transportation and the Department of Housing and Urban Development.

Following a survey of the problems and opportunities related to joint development around transit stations on the BART system in the Bay Area, on Chicago's rapid transit system, and on existing or proposed transit systems in Los Angeles, Boston, Buffalo, New York, and Washington, D.C., station sites in Oakland, Chicago and New York were selected as case study sites for more detailed examination. The objectives of the project were to assist representatives of local agencies in the preparation of draft applications to UMTA for funds to do joint development planning, and to provide a report identifying possibilities for and constraints to transit station joint development. This report includes the city applications and summarizes the major findings and conclusions regarding the status of transit station joint development.

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PB 223507/5

051937
CORRIDOR TRAINS FOR FLORIDA?

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 3, Feb. 1973, 2 pp

Right now, trains seem to have the inside track as an immediate and near future solution to the transportation problems of a corridor that extends from Tampa/St. Petersburg on the Gulf Coast, through Disney World and Orlando, and on to Daytona Beach on the Atlantic. Four alternatives are considered.

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051942
AUTOMATIC FARE COLLECTION FOR RAILWAYS

Kent, J

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 184, Pt3S, 1970, 4 Fig

Proceedings of the Symposium on Rapid Transit Vehicles for City Services 22-23 April 1971. Arranged by the Automobile Division of the Institute of Mechanical Engineers.

This paper reviews the various devices employed to meter passengers into or out of an automatic fare collection system, and discusses some methods of fare collection, with particular reference to the 'stored fare' system. It is suggested that the stored fare concept might be the most appropriate as it would not only be sufficiently adequate to fulfil the requirements of commuters in small--or large-scale networks but would also minimize fraudulent attempts at fare evasion. To effect a more rigid control over passengers in an automatic fare paying system, the paper also discusses certain modifications that will be necessary in station layouts.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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051943
DESIGN OF RAILWAY ROLLING STOCK FOR HEAVY URBAN SERVICE

Driver, SA, London Transport Executive

Institution of Mechanical Engineers Proceedings (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 184, Pt3S, 1970, 18 Fig, 11 Ref, 1 App

Proceedings of the Symposium on Rapid Transit Vehicles for City Services 22-23 April 1971. Arranged by the Automobile Division of the Institute of Mechanical Engineers.

With a total fleet of 4250 railway cars, London Transport convey over 2,220,000 passengers each working day on a rail network of 236 route miles. More than half a million passengers alight at central London stations between 7 a.m. and 10 a.m., and the reverse flow takes place between 4:30 p.m. and 7 p.m. This concentrated demand presents a major problem. It can be shown than an electrified railway system can provide the most efficient and reliable means of rapidly conveying large numbers of people in dense urban areas. Various figures have been published and from these it can be demonstrated that a modern subway system can give a passenger-carrying capacity, under tolerable loading conditions, of between 25,000 and 30,000 per hour in each direction, or equivalent to 10 or 12 lanes of motorway in each direction. The actual capacity, however, will depend on a number of factors, many of which are dictated by the amount of foresight displayed by the original planners and construction engineers of the line.

ACKNOWLEDGEMENT:
Institution of Mechanical Engineers

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051948
COMMUTER RAILROAD FEASIBILITY STUDY ON SELECTED LINES IN THE LOS ANGELES METROPOLITAN AREA

Englund, CR, Jr

Southern California Association of Governments, 1111 West Sixth Street, Los Angeles, California, 90017

Final Rpt, Jan. 1974, 65 pp, Tabs, Phots, Apps

The preparation of this report was financed in part through a grant from the U.S. Dept. of Transportation Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964, as amended.

The objective of this study was to explore the feasibility of installing and operating a limited scope rail commuter service over one Southern Pacific and two Santa Fe routes into Los Angeles. Various facets of the problems previously have been treated but they have not been pulled together in a single presentation. This report will provide as complete a package as is possible of data on the operational and physical characteristics of the rail lines under consideration plus the requisite statistical data. This approach will enable the SCAG staff to better work both with the railroads and the portion of the public sector interested in developing a rail commuter service.

ACKNOWLEDGEMENT:
Southern California Association of Governments

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Southern California Association of Governments, 1111 West Sixth Street, Los Angeles, California, 90017, Repr PC: Req Price

051949
THE FUTURE RAIL HIGH SPEED STRATEGY IN GREAT BRITAIN

Marsh, R, *British Railways Board*

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 12 pp, 7 Fig, 2 Phot

This editorial type article reviews the inter city travel market in Great Britain. It feels that the British Railways can hold their own share of that market, and reviews the need for the Advanced Passenger Trains and the High Speed Trains now planned. Maps of the APT and HST routes are given. The impact of the Channel Tunnel is also considered.

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051950
ENLARGED MEETING OF THE MANAGEMENT COMMITTEE OF THE IRCA. SECTION I: GENERAL PLANNING. GREATER LONDON: RAILWAYS IN THE CHANGING SCENE

Stott, PF, Greater London Council

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 9 pp, 4 Fig

This paper attempts briefly to present some aspects of Greater London, its region and its railways in the perspective of over-all social and economic planning. It gives a personal view of the context for railway operations and their significance not on a national scale but as related to London and its life and work.

ACKNOWLEDGEMENT:
Rail International

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051951
ENLARGED MEETING OF THE MANAGEMENT COMMITTEE OF THE IRCA. SECTION 3: OPERATION AND AUTOMATION. CAPACITY OF SURBURBAN LINES. THE MEANS TO BE EMPLOYED TO ADAPT IT TO THE DEVELOPMENT OF TRAFFIC

Charles, J, French National Railways
Meyer, M, French National Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 9 pp

The development of urbanisation, the manifold movements within the congested areas, the increase in distances between the town centres and their zones of influence, are characteristic phenomena of our times which one finds in every country of the world. They have, consequently; a growing importance for the railways, insofar as suburban traffic is concerned. It is thus that in respect of the SNCF, in the outskirts of Paris, where this traffic covers 950 km of lines, one has in the course of the last ten years recorded an increase of 22% in passenger carryings and of 40% in passenger-kilometers, and the demographic and urbanisation prospects lead to the estimation that this trend will continue in the years to come. To meet the new needs effectively, the existing nets often prove insufficient and inapt and the difficulties experienced in their operation could result in an extension of these nets by the creation of new tracks. But in an urban area this solution would require works the cost of which is considerable and must be reserved for the zones where the railway is still absent or when no alternative more economical solution can be found.

ACKNOWLEDGEMENT:
Rail International

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051952
ENLARGED MEETING OF THE MANAGEMENT COMMITTEE OF THE IRCA. SECTION 4: DESIGN AND EQUIPMENT OF FIXED INSTALLATIONS AND EXAMPLES OF COMPLETE REALISATIONS. BRUSSELS: TWENTY YEARS OPERATION WITH AN URBAN RAIL CONNECTION

Lefebvre, M, Belgian National Railways
Depaemelaere, D, Belgian National Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 15 pp, 7 Fig, Tabs

Situated in the centre of the network, Brussels, the capital of the country, represents the most important railway junction point in the country. Each day, the eight main lines carry a total of some 370,000 passengers into and out of Brussels. In the international context, the Belgian capital handles rail transit traffic from England to Switzerland and Germany, and from France to the Netherlands. In actual fact, the rail intersection point of Brussels has been operating with its present layout for some twenty years only, from the time the Nord-Midi Link line was opened.

ACKNOWLEDGEMENT:
Rail International

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051953
ENLARGED MEETING OF THE MANAGEMENT COMMITTEE OF THE IRCA. SECTION 5: ROLLING STOCK, ECONOMIC AND TECHNICAL CONSIDERATIONS AFFECTING THE DESIGN OF MULTIPLE-UNIT TRAINS FOR SUBURBAN SERVICES ON THE SWISS FEDERAL RAILWAYS

Winter, P, Swiss Federal Railways
Weber, H, Swiss Federal Railways
Germanier, R, S.A. des Ateliers de Secheron

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 18 pp, 21 Fig, 6 Ref

Up to a few years ago, it was not yet necessary, in Switzerland, to make a distinction between normal passenger services within the country, and specific suburban services. The aim was to use the same type of rolling stock wherever possible. In particular, the complete electrification of the network had exerted a decisive influence.

ACKNOWLEDGEMENT:

Rail International

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051954
DESIGN AND COMFORT CHARACTERISTICS OF SURBURAN ROLLING STOCK OF THE GERMAN FEDERAL RAILWAY

Stelter, W

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 2, Feb. 1973, 25 pp, 29 Fig, 6 Tab, Refs

In the mono-centred conurbation areas the traffic arteries from the suburbs and surrounding areas run radially towards a heart area. The rail services are directed into the city, and through it, in bunches so that a high commercial speed can be achieved. Such a system was developed in Berlin as early as the 1930's with the underground North-South S-Bahn and this is now being matched by the tunnel railways in the conurbation areas of Hamburg, Frankfurt, Stuttgart and Munich. A special development is the poly-centred conurbation area of the Rhine-Ruhr region. Different industrial centers and residential areas are connected by several main and secondary traffic routes and there is no one clearly defined core city. The main task of the DB is here to provide fast traffic links between the individual centres, some running on special track.

ACKNOWLEDGEMENT:
Rail International

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052068
BUS USE OF HIGHWAYS. STATE OF THE ART

Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

#143, Prog Rpt, 1973, 406 pp, Figs, Tabs

This report is primarily dedicated to bus transit, but one appendix contains material on bus terminals serving the rapid transit or commuter rail stations.

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Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: $16.00

052086
CHICAGO PUSHES REGIONAL-AGENCY PLAN

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 9, May 1973, 1 pp

The Chicago-area commuter railroads are taking a strong stand in favor of an authority with real authority, and they recently commissioned the Transportation Center at Northwestern University to study what public transportation now does and what it could do under regional organization. This study is briefly discussed.

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052087
AMTRAK: THE BEGINNING HAS BEGUN

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 9, May 1973, 3 pp, Tabs

Amtrak's ridership is up; its losses are down; it has a capital investment program for fiscal year 1974 bigger than that of most Class I railroads. The 13 contracting railroads are operating more Amtrak trains than they did two years ago. There are still problems: poor on-time performance and the 13 railroads are not always anxious to take that extra step toward better service. Amtrak seems to be there not only to stay—but to grow.

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052105
NEIGHBORHOOD OBJECTIVES AS GENERATORS OF REGIONAL TRANSPORTATION NETWORKS

Passonneau, JR

ASCE Journal of the Urban Plan and Develop Div (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. UP2, #10032, Paper, Sept. 1973, pp 217-233

Transportation network design can start from: (1) Existing and projected traffic generation with the objective of improved network performance, or (2) individual neighborhood objectives among which are environmental quality and connections to other neighborhoods. Either is reasonable technically; the second more reasonable politically.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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052106
MINIMUM COST LOCATIONS FOR PARALLEL PUBLIC TRANSIT LINES

Hurdle, VF, California University, Berkeley

Transportation Science (General Motors Research Laboratories, 12 Mile and Mound Roads, Warren, Michigan, 48090)

Vol. 7, No. 4, Nov. 1973, pp 340-350, 1 Fig, 4 Ref

Grant NSF GP 24617

Passengers are to be carried to a rapid transit line by feeder transit lines perpendicular to the rapid transit line. How should the feeder lines be located and how should their schedules respond to a passenger arrival pattern that varies with location and time? These questions are answered for a system with a simple cost structure by using continuous functions to approximate the behavior of the system, then minimizing the cost by the methods of elementary calculus.

ACKNOWLEDGEMENT:
Transportation Science

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052110
TRAVEL PATTERNS OF SUBURBAN RAIL USERS

Rosenbluh, A

CATS Research News (Chicago Area Transportation Study, 230

North Michigan Avenue, Chicago, Illinois, 60601)

Vol. 15, No. 4, Dec. 1973, pp 8-21, 12 Fig

Information was sought as to the distance traveled by rail users both from their home to boarding station and from their debarkation station to their final destination. This kind of data would be useful not only in determining the size of the rail sheds along various commuter rail lines, but also provide useful information concerning the viability and location of individual stations.

ACKNOWLEDGEMENT:
CATS Research News

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Chicago Area Transportation Study, 230 North Michigan Avenue, Chicago, Illinois, 60601

052112
ARRIVAL OF LOCAL TRAINS AT LARGE PASSENGER STATIONS OF THE DEUTSCHE BUNDESBAHN

DIE ANKUNFT VON NAHVERKEHRSZUGEN IN GROSSEN PERSONENBAHNHOFEN DER DEUTSCHEN BUNDESBAHN
Westphal, J

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 5, 1973, pp 185-191

In connection with the investigation of the station-oriented pedestrian traffic at large junction stations of Deutsche Bundesbahn the arrival of short-distance trains was recorded in temporal and local respect by means of a time-dependent tape recording method. The empirically determined asymmetrical distribution of unpunctal arrivals of such commuter trains during the morning rush hours (6:00 to 9:00 a.m.) exhibits no significant differences between through stations and railheads. The distributions are not comparable to standard distributions. For the stopping eccentricity of short-distance trains in DB's through stations, as referred to the centrally arranged platform stairs, a symmetrical distribution was obtained, which can be considered as normal.

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052113
SURVEYS AT UNMANNED EXIT BARRIERS OF THE DEUTSCHE BUNDESBAHN

UNTERSUCHUNGEN AN UNBESETZTEN AUSGANGSSPERREN DER DEUTSCHEN BUNDESBAHN
Westphal, J

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 10, No. 10&11, 1973, 13 pp

A study dealing with pedestrian traffic in railway stations with heavy local traffic included also walking at barriers. At unattended exit barriers of large passenger stations of Deutsche Bundesbahn, through which considerable passenger flows pass in one direction on leaving the trains during the morning rush hours (6:00 to 9:00 a.m.), extensive counts were made by applying a time-dependent tape recording method under actual service conditions. The data material was evaluated by electronic data processing, applying the methods of statistics and in particular of correlations calculus. The results have been compiled in tables and diagrams as far as practicable.

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052114
MOVEMENT FLOWS ON DENSELY USED PLATFORM STAIRWAYS IN SUBURBAN STATIONS

BEWEGUNGSABLAUFE AN STARKBELASTETEN BAHNSTEIGTREPPEN VON NAHVERKEHRSBAHNHOFEN
Westphal, J

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 96, No. 10, 1972, pp 301-309

As a result of the growing importance of modern rapid-transit systems (city S-Bahn and underground railway) for public local traffic in conurbations both operational and traffic problems have to be solved, such as, for instance, pedestrian traffic on railway station premises. The article reports on movement studies relating to heavy passenger flows on platforms as well as in front of and on platform stairs. The interrelations between traffic density and walking speed on stationary stairs and in groups of passengers massing in front of stairs are discussed and details are given about walking speed on platforms, length of build-up of pedestrians in front of stairs and maximum densities on and in front of stairs. The results of extensive practical tests are represented graphically by means of correlations and partly combined in the form of assessment diagrams.

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052124
PASSENGER COMFORT LIMITATIONS ON THE DESIGN OF HIGH SPEED TRANSPORTATION SYSTEMS

Hawkins, NM

Loughborough University of Technology, Department of Transport Technology, Loughborough, Leicestershire, England

pp 47-54, 57 Ref

The report discusses the problems involved in evaluating a passenger's tolerance of discomfort and defining design criteria for comfort. The discussion involves a review of some of the available information on comfort for a wide variety of physical parameters of the vehicle environment, for example, noise, vibration and thermal comfort, as well as a more theoretical consideration of the nature of subjective comfort.

ACKNOWLEDGEMENT:
Engineering Index, EIX731203056

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052268
PROJECT HISTEP

Lindgren, PW, Melpar, Incorporated

AREA Bulletin (American Railway Engineering Association, 59 East Van Buren Street, Chicago, Illinois, 60605)

Vol. 69 N, 608, Proceeding, Oct. 1967, pp 102-107, 4 Tab

This research was undertaken to provide support services for a high-speed train evaluation program with particular emphasis placed on its effect on passenger comfort, development of data reduction computer programs, and the formulation of a general simulation program to be used in the analysis of proposed design changes. Three of four research cars were instrumented to measure pantograph motions, operating temperatures, track geometry, ride quality and performance, vibrations and noise levels, and air pressure effects when other trains are passed. Data was recorded on magnetic tape, digitized and reduced to useful engineering form. It was concluded that many problems associated with railroad operation and analysis lend themselves to solution by digital computation.

ACKNOWLEDGEMENT:
Association of American Railroads

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053725
IMPLICATIONS OF FUTURE CHOICES FOR CORRIDOR TRANSPORTATION

Graham, HR, TRW Transportation and Environmental Operations
Dietrich, WH, De Leuw, Cather and Company

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

#73-ICT-53, Paper, May 1973, 11 pp, 22 Fig, 2 Ref

Presented at the Intersociety Conference on Transportation, Denver Colo., Sept. 23-27, 1973.

Several ground and airborne options are compared over a wide range of corridor alternatives. Regions of applicability are defined for the air and ground modes. Demand is treated parametrically to evaluate the relationships of cost and competitive fares. Basic performance characteristics and desired station distance are evaluated for high speed corridor applications. A number of financing alternatives are identified which can provide sources of funds for the development of a corridor transportation system.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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053732
POWER SUPPLY FOR RAILWAYS IN CITY REGIONS. II. PRACTICAL APPLICATIONS

Bauermeister, K, German Federal Railway

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 1, Jan. 1973, 13 pp, 16 FIG

It is a common observation throughout the world that motor traffic in large cities has grown to such an extent that it can no longer be tackled even with a road construction programme which destroys the traditional urban structures. There is a lack of proportion between the space available in large cities and the space requirements of private motor traffic. Most of the existing means of local public transport such as buses and trams share the use of the roads and get stuck in traffic jams during rush hours so that their attractiveness is impaired. In some cases, remedies are sought by according privileges to public transport, but these reduce the road space available for private motor traffic. It is therefore not surprising that there is an increasingly urgent clamour for high-capacity modes of public transport, independent of the streets. The aim is to restore the attractiveness of local public transport and thereby to attract a great number of commuters who have hitherto regarded the use of their own car for the journey to work as indispensable. In future, local public transport will not succeed without acquiring a certain "rider appeal".

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053760
S-BAHN IN HAMBURG

Hellewell, DS

Modern Railways (Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England)

Vol. 31, No. 304, Jan. 1974, 5 pp, Figs, Tabs, Phots

Renowned for its integrated transport system, Hamburg is now concentrating on developing its S-Bahn system. The responsibility for the provision of public transport in the Hamburg conurbation is vested in the Hamburger Verkehrsverbund (HVV). This body was established in 1965 and is responsible for planning, marketing, and publicity, together with the organization and financing of public transport. There are eight partners in the HVV and it is they who operate the bus, express bus, tram, U-Bahn, S-Bahn and ferry services. The Hamburg conurbation covers approximately 50 km by 60 km (30 miles by 40 miles) and has a population of 2.4 million.

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053761
SUPER-TRAMWAYS FOR EDINBURGH?

Klapper, CF

Modern Railways (Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England)

Vol. 31, No. 304, Jan. 1974, 2 pp, 2 Fig

Growth in the swing of informed public opinion towards improved public transport rather than the disamenity and pollution implied by unrestricted growth of individual or private car transport is indicated by a report produced by the Scottish Association for Public Transport, which has evolved from the former Scottish Railway Development Association. This Study Paper No. 4 concerns Edinburgh and the options for transport in the Scottish capital and sharply disagrees with the views expressed by consultants. The consultants evaluated alternative strategies for Edinburgh in 1971; a conventional rail service was outlined and a more detailed but incomplete study of a limited light rail system, but both were rejected in favour of an 'enhanced bus system'. Following the keen interest shown in light rapid transit (LRT) or a super-tramway system in the Tyneside PTE, it is of interest that Option B in these plans is for higher capital investment in a service designed to serve a greater portion of the population.

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053826
PASSENGER TRANSPORT AUTHORITIES IN THE UNITED KINGDOM. THE RAIL CONTRIBUTION

Beagley, TL, Transport Industries Dept of the Environment, Eng

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 11, Nov. 1973, 7 pp

This editorial provides a review of planning and operations of passenger services on the various levels in the United Kingdom. Both Urban and Intercity passenger transportation are covered, but the emphasis is on local transportation.

ACKNOWLEDGEMENT:
Rail International

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053830
NEW STATIONS BUILT DURING ELECTRIFICATION OF THE NOISY-TOURNAN LINE

DES GARES NOUVELLES SUR LA LIGNE NOISY-TOURNAN
Kleitz, H, French National Railways

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Oct. 1973, 10 pp, 12 Fig

The author, Ingenieur Principal Hors Classe, Head of the Equipment Division, Paris-East Region, refers in this article to the alterations made to station buildings and the new stations constructed on this section of the Paris-Mulhouse line, running through the Paris suburbs, while it was being electrified; all the work carried out had become indispensable because of the increased population and property development in this area which has seen a growth rate these past few years that will probably be exceeded in the future. The author then explains the general ideas that governed the studies of all types, as well as the motivation, nature and characteristics of the work, by considering in turn the four new halts and then the alterations made to the old passenger buildings in two stations. He concludes by underlining the efforts made by the SNCF to adapt facilities to requirements which, in this instance, have reduced the distance between stops by a half.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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053833
RAILWAY SERVICES AT VAL D'ARGENTEUIL STATION

LE VAL D'ARGENTEUIL ET SA DESSERTE FERROVIAIRE
Robertin, J, French National Railways

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Dec. 1973, 8 pp, 16 Fig

In this article, the author, Ingenieur Principal Hors classe, SNCF Western Region, gives brief historical details of the construction of the lines concerned in the western suburbs of Paris; he explains how the population growth and property development after the war resulted in the decision to build a new station near the town of Argenteuil (Paris-Mantes line) which is itself in full expansion. He then refers to the town-planning and railway requirements that had to be met, and the methods adopted in connection with site, technology, civil engineering and architecture. He describes the various installations provided, the progress of the work, and gives figures which illustrate the steep rise of passenger traffic at Val d'Argenteuil station since it was opened at the end of 1970.

ACKNOWLEDGEMENT:
Revue Generale des Chemins de Fer

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053835
ALTERNATIVE MULTIMODAL PASSENGER TRANSPORTATION SYSTEMS

Frye, FF, Creighton, Hamburg, Incorporated

Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

146, Prog Rpt, 1973, 68 pp, 27 Fig, 37 Tab, 96 Ref, Apps

The objectives of this project were to review currently used methods of evaluating the economics of alternative transportation systems, develop a framework within which to evaluate the economics of alternative multimodal metropolitan transportation systems, and develop quantification methods for such factors as accessibility and capacity that relate them to all modes. The research was to include sensitivity analysis to identify those aspects of a modal investment policy that have major impacts on the output variables and therefore should be included in the results presented to transportation decision makers.

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Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418; Repr PC: $4.00

053871
REPORT ON A STUDY OF A HIGH-CAPACITY AND HIGH-SPEED TRANSPORT SYSTEM IN THE GERMAN FEDERAL REPUBLIC

BERICHT UBER DIE STUDIE FUR EIN HOCHLEISTUNGSSCHNELLVERKEHRSSYSTEM IN DER BUNDESREPUBLIK DEUTSCHLAND
Hoch, J

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

No. 2-3, 1973, 6 pp

A report submitted at the 14th Meeting dealing with "Modern railway rolling stock", held in Graz. It consists of a precise account of the very important study of a system of high-speed and high-capacity guided transport (Hochleistungsschnellbahn) carried out by the Company of the same name on behalf of the German government.

ACKNOWLEDGEMENT:
International Union of Railways, 1120

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053974
TRANSPORTATION TO FULFILL HUMAN NEEDS IN THE RURAL/URBAN ENVIRONMENT

Hudson, WR, Texas University, Austin
Walton, MC, Texas University, Austin

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

SP-389, Prog Rpt, Feb. 1973, 10 pp, 1 Fig, 2 Tab, 5 Ref

The Office of University Research of the Department of Transportation, compiled this information under report No. DOT-TST-74-15.

This paper presents background and initial funding on a multidisciplinary program sponsored by the U.S. Department of Transportation, University Research Program. This program considers transportation problems involving urban and rural travelers and relates to all modes of travel. In several parts of the program, particular emphasis is involved with the Dallas-Fort Worth Regional Airport, one of the largest in the world. Work reported in this paper include: 1. Evaluation transportation problems related to providing essential services to rural and urban dwellers. 2. Study of the effect of interurban transportation systems on the rural environment and the development or demise of the small rural communities. 3. Study of the movement of goods and freight in the Southwest including the impact of the new Dallas-Fort Worth Regional Airport. 4. Development of methodologies for considering human response to the quality of ride and service in developing criteria for the various transportation modes in both urban and rural areas. 5. Study of human response in developing methods of evaluating possible modal choice decisions in both urban and rural areas. While these are broad program areas which will require two to three years for fruition, preliminary results are reported herein which indicate the potential of multidisciplinary university research.

ACKNOWLEDGEMENT:
Society of Automotive Engineers

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053975
A COMPREHENSIVE TRANSPORTATION RESEARCH PROGRAM FOR THE COMMONWEALTH OF VIRGINIA

Dickey, JW, Virginia Polytechnic Institute & State University
Kuhlthau, AR, Virginia University

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

SP-389, Prog Rpt, Feb. 1974, 6 pp, 1 Fig

The Office of University Research of the Department of Transportation, compiled this information under report No. DOT-TST-74-15.

The program described in this paper has been initiated through support provided partially by the U.S. Department of Transportation under its Program of University Research in response to a proposal submitted jointly by Virginia Polytechnic Institute and State University and the University of Virginia with the endorsement of various state agencies and of the Secretary for Transportation and Public Safety. The objective of the program is to bring together the talents and interests widely scattered throughout the academic institutions of the state and provide a mechanism for interaction with state officials and agencies directly concerned with transportation and with other problems related to transportation. A Steering Committee has been formed to serve as a focal point for this activity. Membership includes representatives from the state government, including the Secretary for Transportation and Public Safety, from local and regional groups within the state, and from the academic institutions. The ultimate goal for this Committee is to develop a well-coordinated program of research, study, and demonstrations utilizing the talents and facilities in the state to assure that the state's problems are being explored from the broadest possible viewpoint and that Virginia is keeping abreast of the rapidly changing picture in all fields of transportation.

ACKNOWLEDGEMENT:
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053977
AN INTEGRATED ENGINEERING-PLANNING APPROACH TO THE PRESERVATION, IMPROVEMENT, AND REPLACEMENT OF ELEVATED TRANSPORTATION STRUCTURES

Silver, ML, Illinois University, Chicago Circle
Belytschko, TB, Illinois University, Chicago Circle
Gelick, M, Illinois University, Chicago Circle

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

SP-389, Prog Rpt, Feb. 1974, 8 pp, 7 Fig, 2 Tab, 11 Ref

The Office of University Research of the Department of Transportation, compiled this information under report No. DOT-TST-74-15.

This paper outlines the considerations surrounding the community acceptance of elevated railroad and rapid transit structures, both old and planned for future construction. Covered are such factors as type of neighborhood affected, land use, traffic surveys, urban renewal plans, and environmental considerations. Particular emphasis is placed upon methods of improving existing elevated structures: evaluation of the physical condition and load-carrying ability of the structure, need for structural repairs, and improved analysis techniques. Computer modeling techniques have been applied to these studies. It is shown that through use of these techniques, the transit operator can more accurately plan renewal programs to reflect the community's needs.

ACKNOWLEDGEMENT:
Society of Automotive Engineers

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053983
MOVING PEOPLE IN BIG CITIES

Way, R

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

Vol. 2, No. 2, Mar. 1973, 9 pp, 6 Fig

This article discusses urban transportation of people. The difficulties of using buses on crowded streets are reviewed and the case is stated for rapid transit systems. Alternative transit systems are reviewed, including monorails.

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054002
THE RAILROAD'S POSITION IN VERY HIGH SPEED GROUND TRANSPORTATION DEVELOPMENTS

Tessier, M, French National Railways

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Dec. 1973, 16 pp, 15 Fig

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Applications Society for presentation at the 1974 Joint ASME/IEEE Railroad Conference, Pittsburgh, Pa., April 2-4, 1974.

High speed attracts customers. From the standpoint of a railroad enterprise, this trend is interesting, because high speed trains constitute one of the most profitable services. Although the fares charged for using high speed trains are often higher than normal fares, their seat occupancy rate is always high. Therefore, SNCF, like most railroad companies has been continuously increasing the running speed of its trains, chiefly for the last 20 years, thus obtaining a double success: enlarging its clientele and developing its most profitable service.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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054003
POSSIBLE SPEED INCREASE ON EXISTING RAILROAD SYSTEMS: THE S.N.C.F. CASE

Autruffe, H, French National Railways

Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017

Dec. 1973, 5 pp, 13 Fig

A paper recommended by the IEEE Land Transportation Committee of the IEEE Industry Applications Society for presentation at the 1974 Joint ASME/IEEE Railroad Conference, Pittsburgh, Pa., April 2-4, 1974.

The purpose of this paper is to analyse problems to be solved in order to increase speed over a system which was not initially designed for high performances, and to bring out the solutions adopted by the S.N.C.F. It will be seen that possible speed increases remain limited. If there is very good reason for much higher speeds, then new lines must be built. The limitations in speed increases which result from the track itself and from its layout are imposed either by safety reasons or by passenger's comfort conditions.

ACKNOWLEDGEMENT:
Institute of Electrical and Electronics Engineers

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054113
THE PHILADELPHIA–LINDENWOLD TRANSIT LINE

Harlow, EH

Traffic Engineering (Institute of Traffic Engineers, 2029 K Street, SW, Washington, D.C., 20006)

Jan. 1974, 5 pp, 9 Fig, 1 Tab, 9 Ref

This paper describes the successful PATCO Lindenwold Rail Transit Line. It covers the planning, economics, and operation of the line. Rider statistics are given.

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054118
BEHAVIORAL PERSPECTIVE FOR TRANSPORTATION PLANNING

Hayward, DG, New York City University

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 10 pp, 2 Fig

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

At some levels of analysis, transportation planning does not need to consider people as parameters of its process. However, at most levels of analysis, planning transportation must include planning for people. Such a fairly simple observation provides an introduction to this paper; the premise is that transportation planning has the opportunity to provide qualitative and quantitative improvements in its planning for people.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054120
ARCHITECTURAL BARRIERS AND THE PROBLEMS OF THE HANDICAPPED

Noakes, EH

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 15 pp

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

To the "average" American, architectural barriers are invisible. Those who enjoy full physical powers seldom realize the difficulties experienced by the physically handicapped when confronted with such simple facts of everyday life as stairs, curbs, or escalators. To an individual on crutches, or in a wheelchair, these structural details become barriers to a normal existence. When built into a transportation complex, such structural details will render the entire system either difficult or impossible to use for the estimated 10 million citizens who suffer temporary of permanent physical handicaps.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054121
ENERGY COST AND STAIR DESIGN: A PRELIMINARY REPORT

Templer, JA Corcoran, PJ

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 20 pp, 15 Ref

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

Staircases are ancient devices, yet the contemporary design handbook recommendations and building code specifications, lacking factual information on human responses to them, are based on rules of thumb dated from Roman times. The paper describes a series of tests on normal healthy subjects using the treadmill, oxygen consumption metering equipment, and an electrocardiograph. Preliminary results indicate that rate of climb is an important factor, and that for each stair there is an optimum speed.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054122
TRAFFIC AND SERVICE CHARACTERISTICS OF PEDESTRIANS IN TERMINALS

Fruin, J, Port Authority of New York and New Jersey

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 7 pp, 2 Fig, 6 Ref

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

A passenger terminal is a functional space that is designed to accomodate the physical requirements of the transport modes it serves, as well as the human requirements of its passengers. Although the physical requirements of the transportation modes serving a terminal interface are usually well defined, surprisingly little is understood about the requirements of passenger-pedestrians. Pedestrians require adequate spaces for locomotion and waiting, and enough escalators, doors, turnstiles and other such devices to minimize delay. While there have been numerous studies of the capacity of these types of facilities, there have been few evaluations of the related levels of human comfort and convenience.

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054123
INFORMATION SYSTEMS IN TRANSPORTATION FACILITIES

Arthur, P, Arthur (Paul) and Associates

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 13 pp, Phots

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

It is a well established fact among people who make studies of these things that language determines action to an enormous degree. Similarly on the subject of communications–and specifically that aspect of it that is concerned with giving us information and guidance in finding our way around the built environment, the conventional way of communicating such information is, of course, by signs. Somewhere along the line in the development of any large project someone says, "What the hell we gonna do about the signs?" And this question right then and there determines that there will be signs–whether or not, and this is my point, signs are the best solution. Thus the opportunity to at least consider alternative solutions is forever lost. This is all the more regrettable because signs represent only a small percentage of the total means by which we can now relay essential information to people who need it in this increasingly menacing and confusing world we are building around ourselves. It is attempted in this brief presentation, to show that alternatives do exist–and what some of them are.

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054124
SIZING PEDESTRIAN QUEUEING AREAS

Fausch, PA

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 26 pp, 12 Figs, Refs

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

As the emphasis in planning new transportation facilities shifts from machine to man, there is a resulting need for tools to describe and treat the characteristics of the pedestrian. One of the more powerful tools for this planning is the recently completed work of Dr. John Fruin in "Pedestrian Planning and Design" in which the characteristics and needs of the pedestrian are discussed in detail. This work parallels the Highway Capacity Manual in the impact that it will have in improving the design capabilities of transportation planners and engineers. In his book, Dr. Fruin points out the increasing importance of computer simulation techniques to determine pedestrian area requirements in large pedestrian oriented systems. The passenger elevator systems in New York's World Trade Center is one example. Unfortunately many other new facilities have not benefited from these simulation techniques largely because of the lack of a tool for this purpose. The purpose of this paper is to describe a general purpose computer program which can be used to simulate the flow of pedestrians in typical man/transportation interface situations. The paper describes the background and development of the program and examples of its use.

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054125
HUMAN/MACHINE INTERFACE IN MOVING WALK DESIGN

Kuner, R, Barton-Aschman Associates, Incorporated

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 17 pp, Figs, 14 Ref

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

It ought to be obvious that machines are here to stay. Therefore, it is fitting and proper to devote a conference to discuss how to better live with the machines that make up our transportation systems. This paper is an outgrowth of work conducted at the Boston Redevelopment Authority by staff and four consultants on the feasibility of a system of moving walks in the South Station-Summer Street area of downtown Boston. The work was partially funded by a technical study grant from the federal Urban Mass Transportation Administration, however, the author bears full responsibility for the material and conclusions that follow. The paper starts with a definition of human engineering and then includes a discussion of the problems of integrating humans into moving walk systems. Several approaches and design features are suggested to solve or ameliorate the human engineering problems related to moving walk systems.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054126
DESIGN OF PEDESTRIAN FACILITIES FOR THE WASHINGTON METRO

Roohr, AJ, Washington Metropolitan Area Transit Authority

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 38 pp, Figs, 14 Ref

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

In case anyone is unfamiliar with the term "Metro" here it means the regional rapid transit system for the Metropolitan Area of Washington, D.C., which is now under construction by the Washington Metropolitan Area Transit Authority. The system is 98 miles long, about half subway and half surface. It has 81 stations, 44 in the District, 20 in Virginia and 22 in Maryland, and will use 556 cars. It was scheduled to start initial operations in 1974 and scheduled for completion in 1979. It will cost just short of 3 billion dollars. The total system will have 109 access points. Each station including its access facilities goes through a Planning process which culminates with a Board of Directors resolution defining the station and its facilities.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054127
PASSENGER DESIGN STANDARDS FOR BAY AREA RAPID TRANSIT STATIONS

McCutchen, WR, Bay Area Rapid Transit District

American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017

1972, 25 pp

Presented at the ASCE Specialty Conference May 31- June 2, 1972 in Washington, D.C. and compiled in the book entitled "Man/Transportation Interface".

The San Francisco Bay Area Rapid Transit (BART) stations have been designed and constructed for the basic purpose common to all rapid transit systems: to serve as points where large numbers of people can enter of leave the system expeditiously and conveniently. As the first such system ever constructed in the Far West, and the first completely new system constructed in the United States in a half century, BART stations were the result of many years of intensive planning as to suitable locations and facilities to be provided. An even greater effort was devoted during the design stage to ensure that each of the thirty-eight stations of the system would perform its intended function as well as integrate harmoniously with its environment.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054128
NEW CONCEPTS IN RAIL-BUS INTERCHANGE

Leisch, JP

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE1, #10328, Proc Paper, Feb. 1974, 17 pp

To plan and design a bus-rail mode-transfer facility within a freeway interchange of a transit-freeway transportation corridor, planners and engineers must consider the integration of all transportation facilities. In particular attention should be paid to: (1) The relationship of traffic access location and the freeway interchange; (2) interchange-intersection traffic operational efficiency; and (3) mode-transfer facility access concepts and internal circulation concepts. Major cities in North America have constructed multimode transportation corridors and with them has come the need to provide good access and efficient bus-rail intermodal transfer developed on sound planning, design and operational concepts. To establish these concepts, "Planning Considerations" are presented, including: (1) Interchange configuration influencing mode-transfer facility location and access; (2) multimode transportation corridor system design; (3) integration with arterial street systems; and (4) bus, auto, and passenger traffic generation.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054129
ESCALATORS IN RAPID TRANSIT STATIONS

O'Neill, RS

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE1, #10333, Proc Paper, Feb. 1974, 12 pp

As it becomes more apparent that comfort and convenience must be offered to the potential passenger to encourage him to change his travel mode, newer systems intend to install many more escalators per station. Several publications present escalator capacity recommendations ranging from 9,6000/hr to 10,7000/hr for 48-in. escalators operating at a speed of 120 fpm. While observed values were extrapolated to hourly volumes to permit comparison with existing capacity recommendations, it should be noted that peaking generally occurs within 1-min periods and a capacity value expressed in passengers per minute is more realistic. With this in mind, the recommended practical capacity would become 103 passengers per minute and the design value 90 passengers per minute, for 48-in. escalators operating at 120 fpm.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054130
ANALYTICAL APPROACH TO RAILWAY SIGNAL BLOCK DESIGN

Weiss, DM Fialkoff, DR

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE1, #10369, Proc Paper, Feb. 1974, 13 pp

Originally intended for rapid transit systems, it is also applicable to any rail system where high-speed, short-headway characteristics are required to maintain a smooth and efficient flow of passengers of goods. Analytical techniques are used to select system speed commands using a cost-benefit analysis; to determine the speed-location operating profile; to locate signal block boundaries; and to determine signal logic. Four computer programs are used to calculate station dwell times, to simulate train performance, to calculate safe braking distance, and to determine headway. These programs determine the highest feasible speeds, consistent with civil design restrictions, at which trains can travel while at design headways. The algorithm for block layout then ensures that the minimum number of blocks will be used to provide the design headway subject to all system limitations. Program inputs include car characteristics and track profile, user demand statistics, and the design headway.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054302
THE TRAMCAR–AN ELEGANT SOLUTION TO URBAN TRANSPORT

Klapper, CF

Engineering (Engineering, Chemical and Marine Press Limited, 33-39 Bowling Green Lane, London EC1P 1AH, England)

Vol. 213, No. 11, Nov. 1973, 3 pp

A short review of the 140-year history of tramcars (or street railways) and speculations on possible future applications.

ACKNOWLEDGEMENT:
British Railways

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054304
HIGH SPEED GROUND TRANSPORTATION BETWEEN LOS ANGELES INTERNATIONAL AIRPORT AND THE SAN FERNANDO VALLEY

Kaiser Engineers, Los Angeles, California UMTA-CA-09-0010-72-2

72-1-RE, Engr Doc, Apr. 1972, 145 pp, 10 Fig, 24 Tab, 3 App

This document was prepared for the City of Los Angeles, Department of Airports and financed in part through a grant from the U.S. Department of Transportation, Urban Mass Transportation Administration

The initial work on developing a high speed access facility to serve Los Angeles International Airport, designated Phase I, was a feasibility study which included developing a route between Los Angeles International Airport and the San Fernando Valley following the San Diego Freeway. The objective of the Phase I work was to develop the alignment, profile and structures that would permit vehicles to operate over as much of the route as reasonably possible at speeds of 150 miles per hour. The second phase carried out by others projected the patronage that a high speed transit facility would carry operating in the San Diego Freeway corridor. The Phase III work, documented herein, is the preliminary engineering phase and continues the development of the route and structures in more detail. The effort is not completed. Considerable additional engineering and vehicle-guideway development work will be necessary before a "line and grade" and a vehicle system can be considered ready for final design and construction.

ACKNOWLEDGEMENT:
Kaiser Engineers

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054309
AMTRAK PREPARES FOR THE BIG SWITCH TO RAIL

Lewis, R, National Railroad Passenger Corporation

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 4 pp, Phots

America's energy crisis has provided the final push needed to transform inter-city rail travel from a holding operation into a growth industry. During its first two years Amtrak consolidated what remained of this market and arrested the decline; now the time has come to invest in new trains, stations and other facilities so that enforced cutbacks in air and car travel can be offset by rapid expansion of rail capacity, especially in the principal urban corridors.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

054311
K74: DANISH RAILWAYS' INTER-CITY PLAN

Hjelt, P, Danish State Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 3 pp, Phots

Provision of two modern train ferries on the Great Belt crossing is the key to Danish State Railways' inter-city plan which comes into operation on May 26. These make it possible for DSB to provide an interval service of a uniformly high standard.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

054319
WASHINGTON-BALTIMORE AIRPORT ACCESS SURVEY. VOLUME I.

ABT Associates, Incorporated, 55 Wheeler Street, Cambridge, Massachusetts, 02138

Vol. 1, Sum Rpt, May 1968, 159 pp

Contract DT-735133

See also Volume 2, PB-179574, RRIS #054320

This section presents a summary of the findings of the study utilizing a visual presentation of the data. Graphs are presented that summarize the information given in greater detail in Chapters 2 through 7. A commentary is provided to highlight the most important information. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-179573

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
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PB-179573

054320
WASHINGTON-BALTIMORE AIRPORT ACCESS SURVEY. VOLUME II. BASIC TABULATION

ABT Associates, Incorporated, 55 Wheeler Street, Cambridge, Massachusetts, 02138

Vol. 2, Final Rpt, May 1968, 210 pp

Contract DT-735133

See Also Volume 3, PB-179575, RRIS #054321.

The Washington-Baltimore airport access survey has been documented in four volumes. This volume, which provides the reader with the basic data tabulations, is the second of the series. To aid in correlating the data provided in the volume to that provided in the others, particularly volume one, an introductory section is provided which contains maps of the Washington-Baltimore region showing the general geographic boundaries of the study districts, a table of selected areas which provides the numbers of the study districts used, a table of specified times which shows the numbers of the study districts that can be reached by certain specified driving times from the airports, and a dictionary of study district boundaries providing detailed geographic descriptions of the study district boundaries. (Author)

ACKNOWLEDGEMENT:

National Technical Information Service, PB-179574

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PV-179574

054321
WASHINGTON-BALTIMORE AIRPORT ACCESS SURVEY. VOLUME III. A CASE STUDY.

ABT Associates, Incorporated, 55 Wheeler Street, Cambridge, Massachusetts, 02138

Vol. 3, May 1968, 85 pp

Contract DT-735133

See Also Volume 4, PB-179576, RRIS #054322.

This volume discusses the Washington-Baltimore airport access survey as a special illustrative case including the important events and problems that arose from survey conception, to execution, to results. Alternatives considered at critical points in the development of the survey are given in some detail along with the reasons for the choices made. This volume will hopefully provide information and background to those who are considering planning other airport access studies. (Author)

ACKNOWLEDGEMENT:

National Technical Information Service, PB-179575

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PB-179575

054322
WASHINGTON-BALTIMORE AIRPORT ACCESS SURVEY. VOLUME IV. DATA PROCESSING USERS MANUAL

ABT Associates, Incorporated, 55 Wheeler Street, Cambridge, Masachusetts, 02138

Vol. 4, May 1968, 247 pp

Contract DT-735133

See Also Volume 1, PB 170573, RRIS #054319.

This document describes the data processing system developed to process the questionnaire data collected in the survey phase of the airport access study. As originally conceived, this was to have been a general purpose system, directly applicable to the processing of survey data for any airport. In the course of its development, however, it evolved into a system directly applicable to the processing of the data for the Washington-Baltimore airport access survey. (Author)

ACKNOWLEDGEMENT:

National Technical Information Service

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PB-179576

054337
BALTIMORE: RAIL RAPID TO MEET TODAY'S PROBLEMS–AND TOMORROW'S

Kizzia, T

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 7, Apr. 1974, pp 32-34, 1 Fig

This article describes the rail rapid transit system planned for Baltimore and the surrounding area. It also indicates the reasons for selecting a conventional rail transit system in preference to bus systems or new concept systems.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054344
COMMUTING PATTERNS OF INNER-CITY RESIDENTS

McKay, RV

Monthly Labor Review (Government Printing Office, North Capitol Street between G and H, NW, Washington, D.C., 20401)

Vol. 96, No. 11, Nov. 1973, pp 43-48

This article reports on the extent of suburban jobholding by inner-city residents in six major U.S. cities and the mode of transportation they use to get to those jobs. The proportion of inner-city workers who commuted to suburban jobs ranged from about one-tenth in Houston and New York to more than one-third in Los Angeles. In each of the areas, inner-city men were more likely to travel to suburban jobs than women. In every area except Los Angeles, a larger portion of blacks traveled to the suburbs than whites. The role of transportation in determining where inner-city residents usually work is difficult to isolate, since other influences were clearly present.

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Government Printing Office, Superintendent of Documents, Washington, D.C., 20402, Repr PC: Req Price

054355
LONDON UNDERGROUND

Manser, AW, London Transport Board

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 25 pp, 2 Fig, 4 Tab, 7 Ref

For an underground system, the choice of traction method does not really exist since whatever experience may have been gained in the past with steam traction, modern standards of amenity require that railways operated wholly or largely in tunnel should be free from the fumes inevitably produced by steam or diesel operation. There is not, therefore, the same opportunity for economic studies of electrification compared with diesel operation to be made. For other compelling reasons, for example absolute limits on space and practical ones of cost, the necessity of using some form of rail pick-up system rather than overhead wire electrification is needed on underground lines. It must not be overlooked that tunnelling costs of main running tunnel vary very broadly with the square of the diameter of the tunnel, and unless any increase is used to improve the carrying capacity of the stock, provision of additional tunnel space just for overhead supply is generally uneconomical in short distance dense service operation, unless through running with other existing transport systems is to be envisaged. London Transport uses a 600 volt d.c. (nominal) 4th rail system. The reason for using four rather than three rails are somewhat complex and are adequately reviewed elsewhere.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054356
VENTILATION OF OSAKA SUBWAY

Akamatsu, Y, Osaka Municipal Transportation Bureau
Maruo, M, Osaka Municipal Transportation Bureau

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 18 pp, 13 Fig

Osaka Subway had kept cool air when it was newly built 35 years ago. But as years have gone by, the air in the old section of the subway has become warmer and sultry. Some 10 years ago engineers of the Osaka Subway began to take care of this problem, and have investigated many things about that. This report is a synopsis of the ventilation of this subway system.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054357
THE REBIRTH OF A RAPID TRANSIT SYSTEM: THE REHABILITATION AND MODERNIZATION OF THE PORT AUTHORITY TRANS-HUDSON (PATH) SYSTEM

Spencer, GL, Jr, Port Authority of New York and New Jersey

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 9 pp

On September 1, 1962, following authorization by the New York and New Jersey Legislatures, the Port Authority acquired the old Hudson and Manhattan Railroad and renamed it PATH. PATH is a 14.2 mile rapid transit line with seven stations in New Jersey and six in New York. The two north tunnels form the midtown line, handling service between Hoboken, New Jersey and 33rd Street in New York and Jersey City, New Jersey and midtown Manhattan. The two south tunnels form the downtown line, connecting Hoboken, Jersey City and Newark, New Jersey, with Hudson Terminal near the financial district in lower Manhattan. Two stations in New Jersey serve as transfer points, tying all services together.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054358
POWER, SIGNAL, AND ROLLING STOCK RAPID TRANSIT CAR EQUIPMENT

O'Neil, JA, Massachusetts Bay Transportation Authority
Smith, EH, Massachusetts Bay Transportation Authority
Walsh, RF, Massachusetts Bay Transportation Authority

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 17 pp

This paper provides maps showing the areas and routes presently served and those to be extended in the future by the Massachusetts Bay Transportation Authority; historical background of the Authority, the present and proposed traction power facilities; the present and proposed signal facilities; and the present and proposed electrical equipment on rapid transit cars. The MBTA presently operates 102 route miles of Tunnel, Subway, Elevated, and Surface Grade Rapid Transit Train (R.T.L.) Service, and has under construction and scheduled plans for an additional 82 route miles of Modern Type R.T.L. Train Service, mostly at Surface Grade and in existing railroad rights-of-way.

ACKNOWLEDGEMENT:
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054359
AUTOMATING THE HAMBURG UNDERGROUND. THEORETICAL ASPECTS AND THE STATE OF THE PRACTICAL WORK BEING CARRIED OUT BY THE HAMBURGER HOCHBAHN

Tappert, H, Hamburger Hochbahn Aktiengesellschaft
Mies, A, Hamburger Hochbahn Aktiengesellschaft
Lindner, J, Hamburger Hochbahn Aktiengesellschaft

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 17 pp, 12 Fig

This paper deals with the efforts of the Hamburger Hochbahn to automate the operation of their underground railway system, the reasons for these efforts are a number of structural changes which have taken place in the areas served by the company. In order to understand them fully it is necessary to appreciate the influence of these changes.

ACKNOWLEDGEMENT:
Institution of Electrical Engineers

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054372
APPLICATIONS OF ELECTRONIC TECHNIQUES TO THE PARIS METRO

Weil, P, Regie Autonome des Transports Parisiens

Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England

#50, Conf Pub, 1968, 9 pp

This paper covers the use of advanced electronic techniques on the Paris Metro, including: control of train operation, automatic train operation, interlockings at stations, and automatic ticketing.

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Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, England, Repr PC: Req Price

054375
NEW TECHNIQUES INTRODUCED TO UNDERGROUND RAILWAYS IN TOKYO

Ishihara, Y, Teito Rapid Transit Authority
Shirai, Y, Teito Rapid Transit Authority

Institution of Electrical Engineers, Savoy Place, London WC2R

OBL, England

#50, Conf Pub, 1968, 20 pp, 14 Fig

This article covers recent developments on the Tokyo rapid transit systems, including: new line extensions, line renovations, new rolling stock, and new electrical equipment. A map and several diagrams are included.

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054411
A PARAMETRIC MODEL OF INTER-CITY PASSENGER TRANSPORT: AN INTERIM REPORT

Balcombe, RJ Rutherford, DJ Walmsley, DA

Transport and Road Research Laboratory, Crowthorne, England

TRRL-LR-607, 1973, 31 pp

A model is being developed for the assessment of inter-city transport systems. All the relevant characteristics of new or existing systems, the routes over which they might operate and the travellers who might use them are represented by parameters. These parameters are used as inputs to a computer programme which calculates the numbers of passengers likely to use each system, corresponding system costs and revenues and other qualities required for economic assessment. The model will facilitate rapid assessment of a transport system over a range of possible routes, varying in length and overall traffic levels, and also assessment of possible changes in the transport systems serving an existing route or network of routes. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227450/4

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054452
AN ANALYSIS OF SYSTEM TRADEOFFS TO IMPROVE ACCESS TO SPECIAL GENERATORS

Wegmann, FJ Ojo, J Kennedy, M

Wisconsin University, Milwaukee, Department of Systems-Design, Milwaukee, Wisconsin, 53201

Final Rpt, Aug. 1973, 158 pp

The objective of the study is to identify the role of alternative transportation systems in providing access to special areas, such as airports, universities, shopping centers, hospitals, etc. A computerized model was developed and applied to an urban university, located in a hypothetical city. Results indicate that efficient, frequent, low cost service will encourage increased patronage by the model university community. To alleviate the expense of providing costly service additions to the entire regional transit system, specialized transit services such as express shuttle bus service might be instituted.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-228349/7

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054514
THE STATE OF URBAN MASS TRANSPORTATION RESEARCH, DEVELOPMENT, AND DEMONSTRATION. VOLUME I: SUMMARY

Buck, PB Kamrass, M Margolis, H

Institute for Defense Analyses, Systems Evaluation Division, Arlington, Virginia UMTA-VA-06-0007
Systems Evaluation Div.

Mar. 1972, 49 pp

Paper copy also available from NTIS $20.00/set of 6 reports as PB-229 438-SET.

The study is intended to: (1) Summarize, aggregate, and extract the essense of results of research, development, and demonstration (RD and D) projects, transit innovations and recent urban experiences; (2) develop categorization of subject matter in the field of Urban Mass Transportation RD and D; (3) identify and discuss major areas of insufficient knowledge in each category; (4) access the relative importance of overcoming the identified deficiencies; and, (5) develop recommendations for the continuation of or enlarged emphasis on previous or ongoing UMTA RD and D program areas. The six volumes are: Summary, UMTA RD and D Findings and Projects, Bus Transit, Rail Transit, New Systems, and Systems Analysis.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229439/5

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054515
THE STATE OF URBAN MASS TRANSPORTATION RESEARCH, DEVELOPMENT, AND DEMONSTRATION. VOLUME II: UMTA R AND D FINDINGS AND PROJECTS

Buck, PB

Institute for Defense Analyses, Systems Evaluation Division, Arlington, Virginia UMTA-VA-06-0007
Systems Evaluation Div.

Final Rpt, Mar. 1972, 117 pp

Paper copy also available from NTIS $20.00/set of 6 reports as PB-229 438-SET.

The basis for the structure of the report, is the UMTA categorization system. The five primary categories are Bus Transit, Rail Transit, New Systems, Systems Analysis, and Planning and Service Development. Review of UMTA RD and D program is covered in detail, involving review of approximately 90 available reports initiated since January 1, 1969. After review of project, findings were extracted and categorized according to impact area; then aggregated and summarized. A bibliography is furnished.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229440/3

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054516
THE STATE OF URBAN MASS TRANSPORTATION RESEARCH, DEVELOPMENT, AND DEMONSTRATION. VOLUME IV: RAIL TRANSIT

Kamrass, M Stabler, E Klauder, LT Ugel, SF

Institute for Defense Analyses, Systems Evaluation Division, Arlington, Virginia UMTA-VA-06-0007
Systems Evaluation Div.

Final Rpt, Mar. 1972, 164 pp

Paper copy also available from NTIS $20.00/set of 6 reports as PB-229 438-SET.

The report, contains an overview of rail systems: state-of-the-art in rapid transit and research requirements are discussed. Appendices are 'Evaluation of the Rapid Transit Extention to Cleveland's Airport' and 'Impact of the Proposed Allegany County Transit Expressway.' Survey of recent trends and UMTA RD and D projects in commuter rail transit follows, with a discussion of impact and potential. Appendix entitled, 'GO Transit: A New Approach to Urban Technology.' Rail systems and technology topics include vehicles and equipment, electrification, train protection and system control, communications, fare collection, shop facilities, track, and personal security. Discussion of foreign rail developments includes numerous cities throughout world. References are furnished.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229442/9

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PB-229442/9

054517
THE STATE OF URBAN MASS TRANSPORTATION RESEARCH, DEVELOPMENT, AND DEMONSTRATION. VOLUME VI: SYSTEMS ANALYSIS

Kamrass, M

Institute for Defense Analyses, Systems Evaluation Division, Arlington, Virginia UMTA-VA-06-0007

Final Rpt, Mar. 1972, 102 pp

Paper copy also available from NTIS $20.00/set of 6 reports as PB-229 438-SET.

A description of intermodal integration is offered, and general forms of transport-integration discussed. Administrative integration, mergers, formation of a consortium, association or operating company, route section association, work sharing, limited agreements and special purpose cooperation are presented. Scope of service integration is put forth and combined fares, community fares and schedule and route coordination discussed. Terminals, equipment, standardization of fare collection equipment, passenger information and integration through dual mode technology are included. Examples of transport integration in major U.S. cities and foreign activities are discussed.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229444/5

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054550
DULLES AIRPORT RAPID TRANSIT SERVICE. A FEASIBILITY STUDY

Washington Metropolitan Area Transit Authority, 950 l'Enfant Plaza, Washington, D.C., 20006

July 1971, 169 pp

Prepared in cooperation with Day and Zimmermann Consulting Services, Philadelphia, Pa.

The study investigates the feasibility of extending a rapid transit line, in the median of the Dulles access highway from its projected junction with Interstate 66 to the Dulles International Airport, to be operated in conjunction with the Washington Metro System. The report encompasses requirements for right-of-way, fixed facilities and vehicles, and alternative methods and schedules of operation. Estimated capital and operating costs related to these factors have also been developed. Forecasts have been made for various time frames to estimate the numbers of travellers who would make use of this service, and revenues generated by this traffic have been projected. (DOT abstract)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-201619

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054603
TRAINS OF THE FUTURE

Staeheli, GA, Burlington Northern

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 10 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

Considering Trains of the Future, it is evident the conventional passenger train will be replaced by the High Speed Train (HST) in logical development and to speeds of 125 mph. Within a decade the next generation development of Advanced Passenger Trains (APT), whether British APT, French Turbo, Canadian LRS, or American turbotrain, will handle the majority of high density inter-city runs in America and Europe at maximum speeds of 155 mph. Beyond that point the exotic systems will certainly become a part of the surface transportation picture, whether Mag-Lev, tube train, LIM or TACV. America has lagged behind in the mass movement of people by rail transportation. This will be reversed by the aggression indicated by certain American Industries and the Pueblo High Speed Test Center. A major breakthrough is: (1) A collection system for pick up of electricity at 300 mph; (2) The 50 KVAC-60 catenary system–(a) The locomotives designed for 50 KVAC-60; (3) The superconductive metal alloys.

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Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054612
QUICK-PICK TEST CAR

QUICK-PICK-PROBEWAGEN
Brink, H Klesper, O

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 2, Feb. 1974, p 33

A dining car of new concept has been developed to permit a more economical dining car utilization. This fully electrified dining car with extensive self-service facilities is mainly intended for regional express train and fast train service. Three, Quick Pick Cars' of Type WRbuumz have been under trial in actual service since the start of the 1973 summer time-table.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

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054618
URBAN TRANSPORTATION RESEARCH AND DEVELOPMENT

National Academy of Engineering, Committee on Transportation, Washington, D.C., 20418

Report, 1972, 68 pp, Figs, Tabs, 33 Ref, 3 App

Contract DOT-OS-00035/5

A report prepared by the Committee on Transportation, of the National Academy of Engineering for the Department of Transportation.

The problems of urban transportation deserve high priority. The systems in most metropolitan areas are inadequate to provide the people with all the mobility they require. Moreover, these systems consume an increasingly large share of the nation's resources and contribute significantly to the pollution problem. The Committee recognizes that a number of its observations have been previously identified in reports, studies, and papers published over a number of years and that the Department of Transportation has taken action in many areas. However, it is the members' belief that the programs instituted to date have not had the desired impact. The committee believes that the research and development programs of the Department of Transportation need to be strengthened further, and that new efforts on certain critical problems should be initiated at once. The Committee's suggestions for action are presented.

ACKNOWLEDGEMENT:
National Academy of Engineering

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054661
MONTREAL METRO, A DOWNTOWN SUCCESS, IS NOW SPREADING OUT

Kizzia, T

Railway Age (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 5, Mar. 1974, 2 pp

Montreal is undertaking an expansion programme, costing $630 million, that will increase the subway system by 32.5 miles. To date the whole system has been paid for by the city and surrounding communities but Quebec may start to contribute to the operating deficit. A major advantage of rubber tired trains is that they can climb a steep grade (part of the new extension will be 6.5%) and hence construction costs are reduced. On the other hand, the track has to be completely enclosed which limites the system's expansion into the suburbs. Some outlying communities are reluctant to have the subway serve their area. They fear that shoppers will be attracted to Montreal.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054676
MBTA MAPS 10 YEAR, 1.5 BILLION RAIL TRANSIT EXPANSION PROGRAM

Kizzia, T

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 3, Feb. 1974, pp 20-21

In 1964 the Massachusetts Bay Transportation Authority (MBTA) was created to control Boston's mass transit system. Recently MBTA announced a 10 year, $1.5 billion plan to extend, relocate and modernize existing rapid transit lines. MBTA operates four rapid transit lines and the commuter trains over Boston & Maine tracks.

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054682
URBAN TRANSPORTATION IMPROVEMENTS THROUGH LOW-COST TRAFFIC ENGINEERING MEASURES

Vuchic, VR, Pennsylvania University, Philadelphia
Weston, MJ, Pennsylvania University, Philadelphia

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 461, 1973, pp 30-34, 1 Fig

The area in West Philadelphia selected for this project represents a typical old-fashioned set of streets designed before motorized traffic. Almost no adjustment to accommodate motorized traffic had been made to these streets. Most streets are two-way without signal coordination. Complicated intersections are not channelized. Streetcar lines, representing the optimal mode because of heavy passenger volumes and tunnel operation from the area to City Hall, and automobile flows both are traffic problems. The plan adopted on the basis of analysis of all important traffic aspects foresees a number of innovations such as improvement of network flow through one-way street operation, consolidation of streetcar lines to fewer but higher-type sections, separation of their stops to locations not conflicting with traffic, channelization of several intersections, and introduction of modern coordinated signals with transit priority feature. In summary, the proposed plan would virtually eliminate streetcar-automobile conflict, increasing reliability and safety of both; substantially reduce uncontrolled conflicts of automobile flows; result in an estimated speed increase of 50 percent for streetcars and 100 percent for automobiles; increase considerably network capacity in the area; provide for safe and convenient pedestrian movements; reduce the number of parking spaces by 14 percent; and be conducive to extension into adjacent westward areas. The plan involves a relatively low investment, is conducive to immediate implementation, and would be, according to rough estimates, highly cost-effective. Thus, this project clearly shows in general how badly under-utilized urban streets can be improved to increase capacity, speed, and safety at a fraction of the cost that new facilities would require.

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054720
THE AIR RESISTANCE OF TRAINS IN TUNNELS

DER LUFTWIDERSTAND DER ZUGE IM TUNNEL
Gackenholz, L

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 3, Mar. 1974, p 79

At first, it is pointed out that the problem of air resistance in a tunnel, which was already investigated in the past, is gaining new importance due to the construction of high-speed lines. The air resistance in a tunnel can be directly derived from the condition of flow obtained when the train passes through the tunnel. It is shown how this condition of flow can be calculated from formulae, and an example is given to demonstrate that the calculated values are in agreement with the actual test results. Moreover, the formulae for calculating the frictional forces at the tunnel wall and the compressive and frictional forces at the train are given. The dependence of the air resistance in the tunnel on the tunnel and train parameters is explained with reference to various figures. In conclusion, mention is made of the consequences to be observed in the construction and operation of high-speed lines as a result of the high air resistance in the tunnel.

ACKNOWLEDGEMENT:
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054723
ENERGY, COST, AND DESIGN CRITERIA FOR AMTRAK AND HIGH-SPEED PASSENGER TRAINS

Rice, RA, Carnegie-Mellon University

ASME/IEEE Joint Railroad Conference, 1974, 245 East 47th Street, New York, New York, 10017

Apr. 1974, 88 pp, Figs, Tabs, Refs, 3 App

Proceedings of the 1974 Joint Railroad Conference, sponsored by the American Society of Mechanical Engineers and Institute of Electrical and Electronic Engineers, Pittsburgh. Pennsylvania, 3-4 April 1974.

In appraising possible energy, cost and design criteria for successful passenger service planning, a comprehensive review was undertaken of the literature and reports covering the 1920—1960 history and results of U. S. passenger-train operations. Some of the service showed a profit for many of these years, and the pertinent factors relating to operations, fares, design and costs are summarized. A list of apparent requisites for future service is set forth, and the technically-related concepts to accomplish this are detailed at the end. Many actual designs in the 1930—1970 evolution of modern lightweight passenger trains are analyzed on a comparative basis. Using the relationships and parameters evolved from this approach, some present and future designs are evaluated against these criteria.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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054725
CN TURBO STAGES A COMEBACK—AGAIN

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 3, Feb. 1974, p 16

On January 10, 1974 the Canadian National Railways' Turbo replaced one Rapido on the Montreal-Toronto run. So far it has run without problems. The article gives a brief description of the history of the CN's problems with the Turbo.

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Canadian National Railways, Headquarters Library

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054750
BART IN OPERATION—INNOVATIONS IN RAPID TRANSIT

Bugge, WA

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE2, #10522, Proc Paper, May 1974, 18 pp

The San Francisco Bay Area Rapid Transit System (BART) is the first completely new full-scale urban mass transportation system to be completed in the United States in approx. 70 yr. As such, it offered engineers an unusual opportunity to develop new technology in vehicle performance use of electronics for automatic train controls and fare collection, esthetics, multiple use of transportation corridors, passengers station design, subway construction, and other aspects of rapid transit planning and construction. These features are described in this article, along with "start-up" problems encountered, early patronage, and the significance of the System to the economic well-being of the Bay Area.

ACKNOWLEDGEMENT:
ASCE Journal of Transportation Engineering

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054755
ISSUES IN PUBLIC TRANSPORTATION

Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

#144, Spec Rpt, 1974, 130 pp, Figs, Refs

Proceedings of a conference held by the Highway Research Board at Henniker, New Hampshire, July 9-14, 1972.

This is the report on a conference held in July 1972. At the first general session, discussion focused on problems in the entire field of public transportation. The second session, on the financing of public transportation, covered collective bargaining, subsidies, fare-box revenues, and the interrelation of service costs, quality, and quantity. The third session covered operations, the fourth session covered marketing, and the fifth covered the role of the professional in developing strategies and his relation to the administrator.

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054760
THE DEMAND FOR COMMUTER RAIL TRANSPORT

McDonough, C

Journal of Transport Economics and Policy (London School of Economics and Political Science, Houghton Street, Aldwych, London WC2A 2AE, England)

Vol. 7, No. 2, May 1973, pp 134-143, 2 Tab, 11 Ref

The study focuses on the short-run market demand for commuter rail service. In the short run, the total market demand for transport can be assumed constant, because there is insufficient time to adjust locational factors such as employment and residence that determine one's transport needs. Empirical evidence was obtained from the Boston area. Methodologically: (1) a theory of consumer demand for commuter rail transport is developed; (2) a model of market demand is developed; and (3) the results of least squares regression estimation of the parameters of the demand equation are presented and evaluated. The strong significance of the income and relative travel time variables suggests that rail demand is most sensitive to

changes in time cost, whether these changes result from changes in travel time or in the opportunity cost of this time. Moreover, commuters tend to place greater emphasis on time-minimization for peak-hour trips, which are generally work trips, than on the more occasional, leisure-oriented, off-peak trip. Evidences of this are the signs on the income coefficients, which suggest a higher opportunity cost for peak time, and the comparatively greater magnitudes of the peak relative travel time coefficients. Thus attempts to divert auto commuters to rail transport by decreasing rail travel time should have a higher probability of success during the peak period, when in fact there is greater traffic congestion. Within the higher income range, where presumably private transport is used for the home-station trip, higher income levels are associated with increased rail demand. The middle-income commuter may opt for auto commutation, not because he judges rail transport to be unsatisfactory, but because, given his valuation of time, auto transport has a comparatively low total cost. If this interpretation is correct, the reduction of home-station travel time through the provision of efficient public transit to and from suburban rail stations should tend to increase rail demand.

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054761
PASSENGER TRANSPORT INTERCHANGES ON MERSEYSIDE–A DEMONSTRATION PROGRAMME

Peat, Marwick, Kates and Company, James Street, Scottish Life House, Liverpool 2, England

R&D Rpt, Oct. 1971, 75 pp, Figs, Tabs, Phots

The monograph describes a series of demonstration projects at 13 stations including the integration of bus and rail services and the provision of improved car parking facilities for rail commuters. The studies concentrate on three aspects of interchange-based services: the introduction of direct bus feeder services providing good connections with trains; the integration of stage carriage bus and rail services through minor re-scheduling of arrival and departure times; the provision of attractive and convenient facilities at stations and an exploration of optimum parking charge levels aimed at encouraging more people to transfer from car to rail.

ACKNOWLEDGEMENT:
Transport and Road Research Laboratory

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Peat, Marwick, Kates and Company, James Street, Scottish Life House, Liverpool 2, England, Repr PC: Req Price

054762
PROSPECTUS FOR A PRELIMINARY STUDY OF LIGHT RAIL TRANSIT APPLICATIONS FOR SELECTED TEXAS CITIES

Henry, L

Texas Association for Public Transportation, 2408 Ware Road, Austin, Texas, 78741

Nov. 1973, 6 pp, 1 App

This paper outlines some of the advantages of the Light Rail Transit concept. These are lower initial cost than full rail rapid transit, lower operating costs and better service than buses, and an ability to influence urban development toward linear rather than sprawl. Fort Worth, El Paso, and San Antonio are suggested as potential cities for LRT.

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054763
REAPPRAISING METROPOLITAN TRANSPORTATION NEEDS

Humphrey, TF

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 100, No. TE2, #10532, Proc Paper, May 1974, pp 353-362

The purpose of this paper is to describe: (1) The process used to reappraise the transportation needs in Boston, Mass., and the results of that endeavor; (2) the new and revitalized comprehensive, cooperative, and continuing transportation planning process that has been established throughout Massachusetts as a means of bringing the transportation decision-making process closer to the citizens of the Commonwealth; and (3) the relationship of the new transportation planning process to the development of the Action Plan, a recent requirement of the Federal Highway Administration. The experience of the BTPR was utilized in establishing similar open and participatory planning processes throughout the state. This has resulted in a shift in emphasis, from a centralized planning effort in Boston, to a locally based planning effort focusing on the 12 regional planning agencies that encompass nearly all the 351 communities in Massachusetts.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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054800
EFFECTS OF COSTS, QUALITY, AND ORGANISATION OF TERMINAL TRANSPORT, AND OF VEHICLE TRANSFER ON THE USER'S CHOICE OF TRANSPORT MODE

INFLUENCE DU COUT DE LA QUALITE ET DE L'ORGANISATION DES TRANSPORTS TERMINAUX ET DES CHANGEMENTS DE VEHICULE SUR LE CHOIX DU MOYEN DE TRANSPORT DU VOYAGEUR
Wagon, DJ Collins, PH

European Conference of Ministers of Transport, 2 rue Andre Pascal, 75775 Paris, France

Oct. 1972, 97 pp, 14 Fig, Tabs

Memorandum prepared at ECMT request for its 19th Round Table (16/17 November 1972). It deals with : 1) the design of a rail network reducing travel time and passenger strain to a minimum; 2) the design of interchange installations and their siting; 3) the effect of breaks of journey; 4) assessment of projects for interconnection of transport networks; 5) research trends in this field.

ACKNOWLEDGEMENT:
International Union of Railways, 125

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
125

054802
THE DEVELOPMENT OF QUESTIONNAIRE SURVEYS FOR THE INVESTIGATION OF PASSENGER COMFORT

Oborne, DJ Clarke, MJ

Ergonomics (Taylor and Francis Limited, Red Lion Court, Fleet Street, London EC4, England)

Vol. 16, No. 6, Nov. 1973, 15 pp, 7 Fig

In the course of this paper the authors seek to establish the usefulness of the questionnaire as a tool for obtaining information concerning passenger comfort from the passengers themselves. An appropriate questionnaire developed at University College of Swansea is used as an illustration.

ACKNOWLEDGEMENT:
International Union of Railways, 92

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054803
FIFTEEN YEARS' OPERATION OF THE TRANS-EUROP-EXPRESS SERVICES

QUINZE ANNEES D'EXPLOITATION DES TRANS-EUROP-EXPRESS
Mertens, M

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Appears in Numbers 297 (7206) and 300 (7303) and contains a total of 56 pages and 118 figures

Following an introduction on the creation of the TEE Organisation, the author gives a detailed description, in form of monographs, of the rolling stock utilised on the various TEE routes operated since 1957 by the European railways (CFF, SNCF, SNCB, DB, FS and RENFE): railcar sets, hauled sets, motor-coach trains. The conclusion of the study will be published subsequently in the same magazine.

ACKNOWLEDGEMENT:
International Union of Railways, 120

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120

054804
STRATEGIC STUDIES ON INTER-CITY PASSENGER TRANSPORT: T.R.I.P. AND ACTION 33

ETUDES STRATEGIQUES DE TRANSPORTS INTERRURBAINS DE PERSONNES: T.R.I.P. ET ACTION 33
Recherche - Transports (Institute of Transport Research, Avenue du General Malleret-Joinville Arcueil, Val de Marne, 94)

No. 4, Oct. 1973, 7 pp

In Western Europe, two studies of different kinds are contributing to the assessment of intercity passenger transport strategies; the T.R.I.P. study on inter-regional passenger transport, and the planning survey on passenger transport requirements between the large European conurbations, called "Action 33". The former study is being carried out at national level, and discussions are planned at ECMT level. The second, created in 1973 and entrusted to the OECD, has been alloted the task of examining the methods of analysing transport demand, the transport systems to be included, or likely to appear by 1980, and the strategic relationship between the offer and the demand.

ACKNOWLEDGEMENT:
International Union of Railways, 10

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10

054805
TRAFFIC DIVERSION PROBLEMS DURING THE BUILDING OF THE URBAN AND UNDERGROUND RAIL NETWORKS AROUND THE CENTRAL STATION IN FRANKFURT/MAIN

PROBLEME DER VERKEHRSLENKUNG BEIM BAU VON S-UND U-BAHN IM BEREICH DES HAUPTBAHNHOFS IN FRANKFURT/MAIN
Schild, H Zabel, J

Eisenbahningenieur (Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany)

Vol. 24, No. 11, 1973, 5 pp, 3 Fig

Modernisation of suburban rail transport systems in built-up areas calls for extensive planning of transport in town centres. By taking as an example the station forecourt at Frankfurt/Main, an explication is given of how cars, trams, buses, taxis and pedestrians have had to be diverted along constantly changing routes according to the progress of work in the current phase of building.

ACKNOWLEDGEMENT:
International Union of Railways, 80

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80

054918
WHICH U.S. CITIES NEED RAIL TRANSIT? BRINEGAR HEDGES

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 7, Apr. 1974, pp 34-35

Two opposing programs on the future of urban transportation are being debated in Washington. On one side is the Nixon Administration represented by DOT's Secretary Brinegar that is arguing for the Unified Transportation Assistance Program (UTAP) that will promote buses and discourage rail systems and offer transit subsidies on a population basis. On the other hand are the transit planners and operators that argue that UTAP will provide less money for major projects than is currently available, that population formula subsidies would help the cities that least need it and that other systems than buses must be considered in some cases.

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054925
LOOK WHAT'S HAPPENING TO AMTRAK

Kizzia, T

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 9, May 1974, 6 pp

Since the beginning of the energy crisis in the fall of 1973 there has been a dramatic increase in Amtrak patronage. As a result, there is new pressure on the Federal Government to create new routes and finance new equipment. Although the present fuel shortage may be a temporary situation, there is a general consensus by government and the public that passenger trains will remain a viable means of transportation in the future. The article describes the developments of Amtrak since its inception and mentions the special problems of the "Northeast Corridor" and the relationship of Amtrak with the railroads.

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056762
SYSTEMS APPROACH TO MASS TRANSPORTATION

Harrison, RH

Society of Automotive Engineers, 2 Pennsylvania Plaza, New York, New York, 10001

N740224, Preprint, Feb. 1974

Construction of a mass transit system is usually among the largest of civil projects, running into billions of dollars. The disruptive act of building exclusive mass transit rights-of-way through densely populated areas will further aggravate existing modes of transportation. The general case of a metropolitan area whose population is in excess of a million people is examined with regard to selection and design of a mass transportation system. Systems that can handle 100,000-200,000 passengers during morning and evening rush hours are discussed.

ACKNOWLEDGEMENT:
Engineering Index, EIX740504620

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056784
ANALYSIS OF SATELLITE AIR TERMINAL SYSTEM

Sud, IK, International Bank for Reconstruction and Develop
Gray, P

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. TE4, Paper, Nov. 1973, pp 935-953, 22 Ref

A systems approach is used to analyze the concept for large metropolitan areas. A mathematical model formulates the problem as a fixed charge selection-allocation problem, and computes optimum locations for the satellites in the megalopolis. The analysis enables comparison among the transportation modes used to transfer passengers between the satellite collection ports and the main airport. A heuristic algorithm is used in conjunction with the model to compute locations for collection ports when a rapid transit network is used.

ACKNOWLEDGEMENT:
Engineering Index, EIX740203441

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056792
HIGH-SPEED TRANSPORT–ARE WE ON THE RIGHT LINES?

Hollingbery, PL

Electronics and Power (Box 8, Southgate House, Stevenage, Hertshire, England)

Vol. 19, No. 17

A controversial plan for making better use of the railways in the United Kingdom is outlined. It is claimed that only by making use of completely new operating philosophies can the optimum use be made of new technical developments in high-speed guided transport systems. By judicious choice of routes and modes of operation, a 400 km/hr railway network is a feasible proposition.

ACKNOWLEDGEMENT:
Engineering Index, EIX740103481

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056820
VEHICLE MAINTENANCE AT BAY AREA RAPID TRANSIT

Van Overveen, JP, San Francisco Bay Area

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/RT-8, Paper, Nov. 1973

Discusses the design of the maintenance facilities, and the actual use and application of the facilities, with emphasis on some unique pieces of equipment.

ACKNOWLEDGEMENT:
Engineering Index, EIX740104846

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056826
STRESS MODEL FOR MASS TRANSIT SYSTEMS

Hannon, B, Illinois University, Urbana
Puleo, F

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

N73-WA/Ener-5, Paper, Nov. 1973, 10 Ref

The variables which describe a mass transit system are combined in a statistical model to produce a new set of mutually independent variables called principal components which also describe the system. The principal components are combined in a generalized n-dimensional model which in three dimensions is identical to the shear and normal stress on the octahedral plane, a well-known concept from engineering mechanics. The normal stress is a measure of the system's tendency to grow without structural change; the shear stress is a measure of the tendency to change structurally without growth. These stresses are compared with the energy and employment requirements and dollar of various bus systems.

ACKNOWLEDGEMENT:
Engineering Index, EIX740303056

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056835
SOME EVIDENCE OF TRANSIT DEMAND ELASTICITIES

Kemp, MA, Urban Institute

Transportation (Elsevier Scientific Publishing Company, P.O. Box 211, Amsterdam, Netherlands)

Vol. 2, No. 1, Apr. 1973, Refs

In general, all of the limited evidence available suggests that transit demand is inelastic with respect to money price. Typically, ridership is significantly more sensitive to changes in the level of service (particularly door-to-door journey time) than to changes in fare, although service elasticities also are usually numerically less than unity. In broad terms, short-run direct fare elasticities are characteristically observed to lie within the range of 0.1 to 0.7. A more precise value in a particular instance will depend on a variety of factors in ways which largely support a priori notions. Thus in very large cities, central city areas, at peak hours, and in other circumstances where the prices of alternative modes are high, transit fare elasticities are usually numerically at the lower end of the range.

ACKNOWLEDGEMENT:
Engineering Index, EIX740102483

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056874
LONDON TO GLASGOW IN FIVE HOURS

Griffiths, AET, British Railways Board

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 172-174, 3 Fig, 2 Tab, 1 Phot

When electrification of the southern half of British Rail's West Coast main line was completed in 1966-67, linking London with Birmingham, Manchester and Liverpool, the nation was told that a new era of commercial success was beginning for inter-city passenger travel by rail. Neither the public nor, it may be admitted, those responsible for the original decision to electrify this route expected the phenomenal growth of business that was to follow as a result.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

056877
PRAGUE METRO OPENS THIS MONTH

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 183-184, 5 Phot

Faced with the problem of weight restrictions imposed by a major bridge designed to carry tramcars, Czech industry developed ultra-lightweight rolling stock for the Prague metro, but strengthening the bridge ultimately made it possible to use conventional stock.

ACKNOWLEDGEMENT:
Railway Gazette International

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056878
PERSPECTIVES FOR LIGHT RAPID TRANSIT IN BRITAIN

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 185-188, 2 Fig, 1 Phot

Because more than 20 years has elapsed since tramway development in Britain ceased, industry has had to draw on experience from abroad to meet the newly-expanding demand for light rail technology. Two prototype cars now taking shape for Tyneside provide a testbed not only for that network but also for other light railway and tramway schemes now being studied.

ACKNOWLEDGEMENT:
Railway Gazette International

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056879
WARWICK SYMPOSIUM MOVES AWAY FROM PRT

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, p 188

Two significant changes in outlook were evident at this year's symposium on Advanced Transport Systems in British Cities, held at the University of Warwick from March 27 to 29. Most marked was the shift of emphasis away from the schemes for small four to six passenger cars on fine mesh networks which dominated previous gatherings of this kind to systems having much larger vehicles on coarse-mesh networks approximating more closely to those of conventional rapid transit. Compared with earlier conferences on advanced systems, there was a greatly increased readiness at Warwick this year to discuss steel wheel technology, particularly that of street tramways.

ACKNOWLEDGEMENT:
Railway Gazette International

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056898
HBS: STUDY OF A HIGH SPEED INTERCITY SURFACE TRANSPORTATION SYSTEM FOR GERMANY. VOLUME I. SYSTEM ANALYSIS AND RESULTS

Neuber, HD Pennekamp, A Rothermel, VH

Federal Railroad Administration, Office of Research, Development and Demonstrations, Washington, D.C., 20590

FRA-ORD/D-74-26A, Rpt, 6908-7112, 1972, 140p

Technical trans. of Hochleistungs-Schnellbahn Studiengesellschaft mbH, Ottobrunn. Report (West Germany). Paper copy also available from NTIS $37.00/set of 6 reports as PB-230 457-T-SET.

Volume one of a six volume study of rapid intercity ground transportation planning in West Germany presents a general systems analysis survey involving transit models, operations management, structural designs, tariffs, and cost engineering.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230458-T

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $4.75, Microfiche: $1.45
PB-230458-T

056899
HSB: STUDY OF A HIGH SPEED INTERCITY SURFACE TRANSPORTATION SYSTEM FOR GERMANY. VOLUME II. ATTACHMENTS 1-6

Neuber, HD Pennekamp, A Rothermel, VH

Federal Railroad Administration, Office of Research, Development and Demonstrations, Washington, D.C., 20590

FRA-ORD/D-74-26B, Rpt, 6908-7112, 1972, 194p

Technical trans. of Hochleistungs-Schnellbahn Studiengesellschaft mbH, Ottobrunn. Report (West Germany). Paper copy also available from NTIS $37.00/set of 6 reports as PB-230 457-T-SET.

Volume two of a six volume study of high speed interurban rail transportation in West Germany discusses operational modes, traveling behavior of trains, line capacities, schedule modeling, mathematical analysis of transport assignment problems, and computer aided management.

ACKNOWLEDGEMENT:

National Technical Information Service, PB-230459-T

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056900
HSB: STUDY OF HIGH SPEED INTERCITY SURFACE TRANSPORTATION SYSTEM FOR GERMANY. VOLUME III. ATTACHMENT 7

Neuber, HD Pennekamp, A Rothermel, VH

Federal Railroad Administration, Office of Research, Development and Demonstrations, Washington, D.C., 20590

FRA-ORD/D-74-26C, Rpt, 6708-7112, 1972, 436p

Technical trans. of Hochleistungs-Schnellbahn Studiengesellschaft mbH, Ottobrunn. Report (West Germany). Paper copy also available from NTIS $37.00/set of 6 reports as PB-230 457-T-SET.

Volume three of a six volume study of rapid transit planning for West German intercity rail systems deals with wheel rail interactions, passenger comfort, magnetic carrying and guidance or suspension systems, pneumatic supporting and guidance systems, dynamics of air cushion suspensions, gas turbines, diesel motors, power transmission, electrical energy supply and transmission, rotating electrical drives, brakes, and aerodynamic propulsion.

ACKNOWLEDGEMENT:

National Technical Information Service, PB-230460-T

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056901
HSB: STUDY OF A HIGH SPEED INTERCITY SURFACE TRANSPORTATION SYSTEM FOR GERMANY. VOLUME IV. ATTACHMENTS 8-13

Neuber, HD Pennekamp, A Rothermel, VH

Federal Railroad Administration, Office of Research, Development and Demonstrations, Washington, D.C., 20590

FRA-ORD/D-74-26D, Rpt, 6908-7112, 1972, 170p

Technical trans. of Hochleistungs-Schnellbahn Studiengesellschaft mbH, Ottobrunn. Report (West Germany). Paper copy also available from NTIS $37.00/set of 6 reports as PB-230 457-T-SET.

The fourth volume in a six volume series on West German high speed ground transportation planning for intercity service contains materials on station design, both motor vehicle and rail, track elements, structures such as bridges and tunnels, information systems, and maintenance methods and concepts.

ACKNOWLEDGEMENT:

National Technical Information Service, PB-230461-T

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056902
HSB: STUDY OF A HIGH SPEED INTERCITY SURFACE TRANSPORTATION SYSTEM FOR GERMANY. VOLUME V. ATTACHMENT 14

Neuber, HD Pennekamp, A Rothermel, VH

Transportation Development Agency of Canada, Montreal, Quebec, Canada

Rpt, 6908-7112, 1972, 336p

Technical trans. of Hochleistungs-Schnellbahn Studiengesellschaft abH, Ottobrunn. Report (West Germany). Paper copy also available from NTIS $37.00/set of 6 reports as PB-230 457-T-SET.

Volume five of a six volume series on high speed rail transportation between cities in West Germany covers an algorithm for routing networks, automobile, truck, and passenger carriers, forecasting for 1985, transportation of containers and swap bodies, long haul freight, train frequency and capacity and waiting times, and optimum scheduling.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230462-T

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056903
HSB: STUDY OF A HIGH SPEED INTERCITY SURFACE TRANSPORTATION SYSTEM FOR GERMANY. VOLUME VI. ATTACHMENTS 15-24

Neuber, HD Pennekamp, A Rothermel, VH

Transportation Development Agency of Canada, Montreal, Quebec, Canada

Rpt, 6908-7112, 1972, 652p

Technical trans. of Hochleistungs-Schnellbahn Studiengesellschaft mbH, Ottobrunn. Report (West Germany). Paper copy also available from NTIS $37.00/set of 6 reports as PB-230 457-T-SET.

The final volume of a six volume series on planning for a high speed rail transportation system in West Germany between cities develops several traffic models, discusses investments and benefit cost analysis, considers some track sharing possibilities, and makes some recommendations.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230463-T

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PB-230463-T

056908
NORTHWEST PASSAGE DEMONSTRATION PROJECT

Chicago Transit Authority, Merchandise Mart Plaza, P.O. Box 3555, Chicago, Illinois, 60654 UMTA-IL-06-0009

May 1973, 65p

Prepared in cooperation with Chicago and North Western Railroad.

The Northwest Passage was designed to provide a convenient pedestrian interchange between a commuter railroad and a rapid transit line in the Chicago area. A modern weather-protected connecting passageway between C and NW's suburban concourse in the main passenger terminal and the mezzanine level of the Clinton-Lake station on CTA's Lake-Dan Ryan rapid transit route was constructed. The Clinton-Lake transit station was rehabilitated. Objectives of study were to: (1) Determine effect of rider use of Passage on C and NW, CTA's rapid transit line and other transportation modes; (2) ascertain characteristics of riders gained or lost and reasons for use of each particular mode, etc.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230739/5

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PB-230739/5

056952
MARKETING URBAN MASS TRANSIT-1973

Mundy, RA

Pennsylvania State University, University Park, Pennsylvania Transportation and Traffic Safety Center, University Park, Pennsylvania UMTA-PA-11-0010

TTSC-7402, Jan. 1974, 27p

Forty-one transit systems are examined in this study. Eighteen of the 41 polled now have formal department of marketing and the vast majority of marketing officers are considered members of the top management team. In terms of marketing activity, the decision to create or expand the marketing role has occurred more frequently in medium and a few small transit systems rather than in large systems. Smaller systems appear to lead the shift from a product to a market-oriented transit industry. Internal problems of marketers are delineated and include line vs. staff conflicts. According to the author, development and implementation of an integrated marketing strategy designed to attract different classes of riders has not yet been accomplished although the past 10 years have been ones of marketing awareness for some.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231310/4

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NTIS, Repr PC: $3.25, Microfiche: $1.45
PB-231310/4

057032
MODES OF TRANSPORTATION. SOURCES OF INFORMATION ON URBAN TRANSPORTATION

Solomon, RJ Silien, JS

ASCE/Urban Transportation Research Council, 345 East 47th Street, New York, New York, 10017

Bibliogr, Aug. 1968, 146 pp, Refs

Contract DOT H-804

This was prepared by the American Society of Civil Engineers, Urban Transportation Research Council and Sponsored by the U.S. Department of Transportation, Urban Mass Transportation Administration.

Inventory of modes of urban transportation classified by vehicle types, with subclasses by guideway where applicable. Over 100 vehicle systems which have been demonstrated, or are currently operated, are described and referenced. In addition, 124 proposed systems are listed. A background on vehicle performance and an extensive appendix on rail transit systems is included. Bibliographic references are included.

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PB-189937

057147
CAN PRT UNPLUG THE CITIES?

Shaffer, FE

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 5, May 1974, pp 72-74

Three cities in three countries using three different systems are building personal rapid transit systems. Of the three, Morgantown, West Virginia; Toronto, Ontario; and Nancy, France, the system at Morgantown will be finished first, in 1975. The various types of personal rapid transit are discussed.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

057148
SHAPING TRANSIT'S FUTURE

Herringer, FC, Urban Mass Transportation Administration

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 5, May 1974, pp 68-70

The article discusses the Nixon Administration's urban transit proposals. The Urban Mass Transportation Administration's new organization and its technical R&D program are described.

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Canadian National Railways, Headquarters Library

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057149
AMTRAK'S FUTURE ARRIVES EARLY

Roberts, R

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 5, May 1974, pp 62-66

The future of Amtrak was guaranteed with the passing of the Amtrak Improvement Act of 1973. In addition, the energy crisis and the support of the Nixon Administration have added to the importance of Amtrak. As a result new cars have been ordered and some will become available in 1975. Two basic designs will be used; a Metroliner style for inter-city service and a bi-level design for long haul routes. The French turbo has also been accepted as part of the Amtrak plan. Considerable improvement remains to be done in train service and in improving the working relation with the railways. But given time, Amtrak will be successful.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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057150
BART BATTLES COMPLEX PROBLEMS

Myers, ET

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 4, Apr. 1974, pp 68-73

Since Bart opened, its cars and automatic train control systems have not operated properly. Until electronic problems in the Trans Bay Tube system are overcome, hopefully by September 1974, the transit system operates in two parts and ridership is not as high as it should be. Defects in the automatic, computer controlled operation have led to a series of train failures, derailments, etc. However, BART hopes to have these problems solved within eight months. The car problem is just as serious as the electronic problems. On some days over half the cars are unserviceable.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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057258
RAIL TRANSIT: THE OPERATORS VIEW

Chicago Transit Authority, Development Planning Department, Chicago, Illinois 60654

28 pp, Figs., 3 Tab., Phots.

Rail transit has contributed to the development and maintenance of the vital urban core in American cities. Those that have central business district subways have retained the strength and vitality evidenced in Chicago's Dearborn Street, Philadelphia's Market Street and Manhattan's 6th Avenue. The two distinct, but closely interrelated, aspects affected by rail transit are: its influence on the physical shape of the community, and its influence on the community's economy.

ACKNOWLEDGEMENT:
Chicago Transit Authority

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Chicago Transit Authority, P.O. Box 3555, Merchandise Mart Plaza, Chicago, Illinois, 60654, Repr. PC: Req. Price

060991
ACCESS CHARACTERISTICS ESTIMATION SYSTEM. VOLUME I: CONCEPT DEVELOPMENT

Office of High Speed Ground Transportation, Northeast Corridor Transportation Project, Washington, D.C.

Phase 4, Final Rpt, Dec. 1969, 316p

Contract DOT-FR-8-35049

See also Volume 2, PB-190 445. Prepared in cooperation with Peat, Marwick, Livingston, and Co.

In the simulation model of the Northeast Corridor transportation project (NECTP), access links are connectors between districts and the coded transportation network. Access link characteristics are the travel impedances, such as time, cost, and distance, associated with a given link. The research documented in the report has resulted in the development and implementation of a framework for describing the access phenomenon and for estimating access characteristics for intercity person movements involving common carrier terminals. The ACcess Characteristics EStimation System (ACCESS), provides a computer-based, analytical methodology that can be used to estimate point-to-point travel impedances or weighted site accessibilities. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-190444

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PB-190444

060992
ACCESS CHARACTERISTICS ESTIMATION SYSTEM. VOLUME II: PROGRAM MANUAL

Office of High Speed Ground Transportation, Northeast Corridor Transportation Project, Washington, D.C.

Phase 4, Dec. 1969, 46p

Contract DOT-FR-8-35049

See also Volume 1, PB-190 444. Prepared in cooperation with Peat, Marwick, Livingston, and Co.

The research effort, documented in Volume 1, developed and implemented a framework, entitled ACcess Characteristics EStimation System (ACCESS), for estimating point-to-point travel impedances and/or site accessibilities to intercity common carrier terminals. The purpose of Volume 2 is to provide a program manual. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-190445

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PB-190445

061108
NORTHEAST CORRIDOR AIR TRAFFIC AND HIGH SPEED GROUND TRANSPORTATION

Federal Aviation Administration, Office of Aviation Economics, Washington, D.C.

Mar. 1970, 38p

The report reviews the high-speed ground transportation program of the Department of Transportation and studies the impact high-speed rail passenger service may have on air traffic in this critical, congested area of the United States known as the Northeast Corridor. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-705088

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AD-705088

061148
ACCESS AND DEMAND DATA USED IN THE DEVELOPMENT AND CALIBRATION OF THE NORTHEAST CORRIDOR TRANSPORTATION MODELS

Rothenberg, MJ Prokopy, J

Peat, Marwick, Livingston and Company, Washington, D.C.

Jan. 1970, 74p

Contract DOT-8-35049

The report concerns the review and development of data that served as inputs to the transportation modeling efforts of the Northeast Corridor Transportation Project. The data include times and costs associated with the access, terminal and line haul segments of intercity travel as well as the frequency of scheduled trips. In addition estimates were prepared of the magnitude of travel by mode between areal units identified as metrodistricts. (Author)

ACKNOWLEDGEMENT:

National Technical Information Service, PB-190937

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PB-190937

061157
PASSENGER DEMAND AND MODAL SPLIT MODELS: CALIBRATION AND PRELIMINARY ANALYSIS

McLynn, JM Woronka, T

Young (Arthur) and Company, Bethesda, Maryland

Dec. 1969, 172p

Contract NBS-OST-468

The report develops demand and modal split models for passenger transportation in the Northeast Corridor of the United States. These models are to be used for estimating the patronage on intercity transportation systems in the time period up to 20 years in the future. The uniqueness of these models is that they can be used to estimate patronage on many existing and new modes simultaneously and consistently, ensuring the compatibility of the several estimates. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-190946

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PB-190946

061326
ANALYSIS OF THE LOCATIONS AND FUNCTIONS OF THE TERMINAL INTERFACE SYSTEM

Worrall, RD Bruggeman, JM

Peat, Marwick, Livingston and Company, Boston, Massachusetts

Final Rpt, Dec. 1969, 463p

Contract DOT-FR-9-0030

Supersedes Volume 1, PB-188 209, Volume 2, PB-188 210, and Volume 3, PB-188 385.

The report summarizes the findings of the first phase of a projected two-phase study of transportation terminal site-selection and design. The study was conducted for the Office of High Speed Ground Transportation, Federal Railroad Administration, U.S. Department of Transportation. The research described in this report focuses on the 'interface' between intra-city and inter-city passenger transportation modes; freight and goods transportation are considered only in so far as they influence the movement of passenger traffic. Similarly, the Phase I research program emphasized development of a methodological framework rather than empirical or theoretical analysis. The tone of the findings discussed here, therefore, tends to be methodological rather than substantive. They focus heavily on questions of problem definition and analytical format, rather than on the generation of immediate, substantive results. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-191393

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PB-191393

046116
LABOR IN THE TRANSPORTATION INDUSTRIES

Lieb, RC

Office of Systems Analysis and Information, /Department of Transportation, Washington, D.C.

Feb. 1973, 144 pp

The transportation sector consumes about 20 percent of total annual expenditures for goods and services, and employs about 13 percent of the total U.S. labor force. Any interferences to production and consumption of transportation in the form of work stoppages and strikes pose serious threats to national well being. In recognition of this fact, the study examines a number of aspects of transportation labor.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-217121/3

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PB-217121/3

046406
THE SANTA FE RAILWAY LOCOMOTIVE SIMULATOR AND CO-ORDINATED ENGINEER'S TRAINING PROGRAMME

Ambrose, WG

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

71-RR-3, Paper, Apr. 1971, 9 pp

The majority of American railroads today are facing a critical shortage in the supply of locomotive engineers. The elimination of the fireman's station from the cab of modern locomotives has deeply eroded the source from which railway companies drew potential engineers. A variety of on-the-job training programmes has been initiated among several railways in an effort to accelerate training processes and to reduce the period of indenture which for so many years represented a costly and time-consuming prerequisite to this vocation; but none have been so revolutionary as the training technique introduced with the advent of locomotive and train simulators. The Santa Fe Railway recently placed in service its first complete simulator, a mobile unit which, in support of an extensive training programme has produced exceptionally well-qualified engineers. The essential details of design and construction of the simulator and the more complex functions of the visual, motion and sound systems are presented in this paper. The effectiveness of the related simulator training exercises, and the classroom instructions are reviewed. Significant applications of train dynamics analyses revealed through computer interpolation of environmental conditions are discussed.

ACKNOWLEDGEMENT:
British Railways, 29020

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American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017, Repr PC: Req Price

046723
'WINNING' AND 'LOSING' AT WORK

Maccoby, M, Harvard University

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, No. 7, July 1973, 10 pp

This article asks 'What do you want from your work?' It then identifies four types of professional employees: the craftsman, the company man, the gamesman, and the jungle fighter, for each of whom goals differ. The healthiest company cultures can be described in terms of four principles: (1) Security, (2) Equity, (3) Individuation, and (4) Democracy.

ACKNOWLEDGEMENT:
IEEE Spectrum

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046725
SCIENCE AND TECHNOLOGY IN THE RAILROAD INDUSTRY

National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, D.C., 20418

Aug. 1963

A report to the Secretary of Commerce by The Committee on Science and Technology in the Railroad Industry of NAS-NRC.

The committee's mission was to study the present use of science and technology in the railroad industry and to assess the possibilities for their further use in improving the position and productivity of the industry. A survey developed that in 1962 the railroad industry spent on research about 0.06 percent of gross railway operating revenues, and that the supply industry spent on research about 1.7 percent of net sales. Science and technology are not exploited to full advantage by the railroads, but, even if they were, they are not a panacea for all their present woes. The railroads have failed to understand their role in meeting the requirements of shippers. For an industry in which operational problems are more serious than technological problems, too little effort is devoted to systems analysis. The report recommends the establishment of a Railway Research Institute in the United States. The customers' needs include reliability of service, safety for cargo, rational pricing, and suitable equipment. The long wait in yards to assemble an 'economic' train, and the frequent delays in intermediate yards, constitute built-in delays. The carriers equipment purchases emphasize the car body and do not require better running gear. The 'service environment' is not specified. The railroad industry has failed to develop an understanding and sense of its place in the economy. The industry has shown a devotion to preservation of operating methods that could survive only in an era of rail monopoly. The industry has not combatted successfully its own inertia. The apparent complete absence of any effort to visualize what kind of railroad system would best serve the nation 20 or 40 years hence is very disturbing. The report reviews technological innovations since 1945, and the nature of current research and development. It also reviews the work of the AAR Research and Test Center, and compares it with work done in Europe by ORE and in Japan.

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PB-166882

046773
A CONSULTING ENGINEER LOOKS AT THE CHANGING SCENE OVERSEAS

Henderson, AB

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 1, Jan. 1973, 2 pp

The newly-elected Chairman of the Railway Division of the Institution of Mechanical Engineers in his address given in London on September 18, sees a continued need for the services of the Consulting Engineer worldwide to enable railways to take advantage of modern technology.

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046777
INTERNATIONALISATION OF RAILWAY KNOWLEDGE

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 1, Jan. 1973, 2 pp, 2 Phot

Generalists may participate in international gatherings designed to share knowledge but the optimisation of railways calls for more than technology. It must be backed by many years of railway experience. The exchange of thoughts by technologists who lack such a background cannot serve the cause of international co-operation.

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046827
STUDY GUIDE FOR EXAMINATION NUMBER 2: TRAFFIC, TRANSPORTATION AND PHYSICAL DISTRIBUTION MANAGEMENT

Pashek, RD, Pennsylvania State University, University Park

American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

1970

The material in this Guide will lead to a thorough understanding of the economic, social and political importance of transportation together with the economic characteristics of the various modes of transportation, a general understanding of the current concepts and practices found in the fields of transportation, traffic and physical distribution management, a general understanding of carrier pricing systems and the economic importance and effects of these systems is expected.

ACKNOWLEDGEMENT:
American Society of Traffic and Transportation

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: $5.00

046828
STUDY GUIDE FOR EXAMINATION NUMBER 3: MANAGEMENT TOOLS AND CONCEPTS

Rose, W, Houston University

American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

1970

This particular Guide emphasizes management tools and concepts. Macro and micro environmental factors are identified as they affect decisions. External forces such as the legal and political frameworks are examined in terms of their operations, applicability, and limitations to the business structure. Internally, discussion relates to the functional contributions of accounting, finance, and marketing, as well as the decision tools obtained from quantitative, behavioral, and management analysis. Of greatest significance, though, is the emphasis on incorporating all of these elements in the decision process, a systems approach, with inherent trade-offs and constraints.

ACKNOWLEDGEMENT:
American Society of Traffic and Transportation

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American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: $5.00

046860
ENGINEERING AND SCIENTIFIC MANPOWER

National Academy of Engineering, 2101 Constitution Avenue, NW, Washington, D.C., 20418

1973, 44 pp

The report addresses what the committee considers to be three areas of primary concern in establishing a long-range policy for the effective utilization of technical manpower in the national interest. These are: Dependable and timely information: Valid comprehensive data on current manpower trends, valid translations of policies and programs into their manpower implications, and valid models for forecasting manpower demand and supply. An effective procedure for planning and decision making: Consideration by the executive branch of the government on a deliberate methodical basis of the manpower consequences of its current actions as well as of proposed changes in policies and programs at both the executive and legislative levels. Educational programs and economic benefits: To ensure the continuous availability of an effective technical manpower resource for the nation and to improve manpower mobility during periods of transition of national priorities affecting technical employment.

ACKNOWLEDGEMENT:
National Academy of Engineering

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PB-222472

046890
RAILROAD MERGERS AND ABANDONMENTS

Conant, M

California University Press, Berkeley, California

Book, 1964, 212 pp

This study was conceived as an example of economic criticism of the administrative regulation of resource allocation. Railroad mergers, abandonments, and service discontinuances were chosen as the specific topics because they are interrelated aspects of business policy toward remedying the excess capacity and overinvestment in railroad lines and terminals. It is therefore appropriate to begin this work with a detailed estimate of route capacity, excess capacity, and overinvestment. A major impediment to railroad mergers has been the alleged competition between railroads. Chapters II and III examine this allegation in detail and render a judgment on the effectiveness of interrailroad competition as an impetus to adjustment of investment to changes in technology and shifts in demand. Chapter IV follows logically as an evaluation of the economic impact of recent railroad mergers. In reporting annual net savings of more than $7,000 per mile of line abandoned when traffic is transferred to a parallel line with excess capacity, these mergers demonstrate a clear relationship between traffic density and cost. Chapters V, VI, and VII are concerned with the problems of reallocation of resources through disinvestment in fixed plant. The emphasis is on the regulatory aspects of joint use and abandonment of facilities. The plan of this study was to deal only with those regulatory problems of combination and disinvestment that were peculiar to the railroad industry.

ACKNOWLEDGEMENT:
California University Press

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California University Press, Berkeley, California, Repr HC: $7.50

046891
PENSIONS: THE BIG LOTTERY

Backe, RJ Cummings, F

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, No. 6, June 1973, p 59

Private pension plans are an important source of retirement income for engineers in the U.S. Although resources such as Government-sponsored Social Security, personal savings, and investments are widely available, the income they provide is often inadequate unless supplemented by a private pension plan. Such private plans are motivated by the individual's need for personal security as well as competitive and social pressures on companies and other groups. However, the operational driving force behind most of them lies in tax advantages offered by the U.S. Internal Revenue Service (IRS). In fact, such plans usually offer little of special value to employers or employees unless they have been qualified by the IRS, for such qualification brings highly significant tax advantages.

ACKNOWLEDGEMENT:
IEEE Spectrum

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Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017, Repr PC: Reg Price

046893
THE CORPORATION: JUST A GRANFALLOON?

West, JS

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, N6, June 1973, p 46

The Corporation often seems invested with an omnipotence it shouldn't, or perhaps doesn't have. Provision for feedback is rare, and even then passes through a filter that voids the negative variety. Within a corporation, communication is a one-way street, from the top down. The unfortunate aspect of the family illusion is that even though you may have displayed the appropriate loyalty and performed your job well, you are still at the mercy of forces totally beyond your control or influence.

ACKNOWLEDGEMENT:
IEEE Spectrum

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046894
A NEW FOCUS FOR IEEE'S PROFESSIONAL GOALS

Goldberg, HS

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, N6, June 1973, p 62

Since early in 1972, when IEEE's Board of Directors confirmed through a member survey the pressing member need for increased professional activities to supplement the the Institute's formidable array of technical activities, IEEE has been vigorously pursuing programs designed to provide its members with the professional benefits engineers have for too long lacked. IEEE's U.S. activities encompass Government relations, pensions, employment practices, member employment services, and manpower planning. In addition, USAC is monitoring IEEE efforts in the areas of technology forecasting, career development and continuing education, international standards, and ecology.

ACKNOWLEDGEMENT:
IEEE Spectrum

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Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017, Repr PC: Reg Price

046919
TRANSPORTATION R&D BY PRIVATE ENTERPRISE

Emling, RV, General Electric Company

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 96, TE4, 7668, Paper, Nov. 1970, pp 591-601

Rail automation is used as an example of a complete, industry sponsored developmental cycle, starting from basic research on electronic computers and automation concepts, progressing to operational rail automation hardware installed in new transit systems and remotely controlled locomotives. A summary of current ground transportation research and development opportunities is also presented.

ACKNOWLEDGEMENT:
Engineering Index, EI73 15007

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046971
INTERNATIONAL COLLOQUIUM ON THE SHARING OF RAILWAY KNOWLEDGE. THEME NO 2: THE MEANS OF SHARING KNOWLEDGE. THE SET-UP OF POSSIBLE STRUCTURES

Squilbin, IR

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

Nov. 1972, 45 pp

Appeared as #397 in International Railway Documentation, No. 4, 1973.

The above report shows the method which it is proposed to adopt in order to find a solution to the multiple aspects and inherent difficulties resulting from the very different levels of railway knowledge throughout the world. When dealing with international organisations, the disparity between their potential, and their activities, in the field of documentation, is shown. In present circumstances, and basing on an enquiry carried out by the OECD, it would appear to be utopian to attempt to concentrate all documentation at one point. Before considering automation, the most rational solution would be to elaborate a flexible structure, on several levels, with a certain amount of re-grouping in accordance with affinities, and to make full use of the existing organisations. After interventions by the delegates, and with the object of formulating concrete proposals, it was suggested that the solutions to be considered should be examined by a Working Party, whose remit would later be defined. The appendices show the UNISIST recommendations, information concerning existing organisations, a proposed method of classifying documents, and the theses presented by the SZD in regard to the sharing of knowledge.

ACKNOWLEDGEMENT:
International Railway Congress Association

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046997
THE RAILROAD RETIREMENT SYSTEM: REPORTS TO THE PRESIDENT AND THE CONGRESS

Commission on Railroad Retirement, 1111 20th Street, NW, Washington, D.C.

1972, 896 pp

This volume embodies the several reports of the Commission on Railroad Retirement. Together they represent the product of a comprehensive systematic study which cost, in all, some $1 million. Rather sophisticated sensitivity testing by means of a computerized, dynamic actuarial model as well as more conventional, descriptive analysis were used in the study. The results are presented in the Commission's report and are documented in the three staff reports, all of which are included in this volume.

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Executive Office of the President, Office of Management and Budget, Washington, D.C., Repr PC: Req Price

047537
BENTLEY CHARGES ARCHAIC LAWS SHORTCHANGING U.S. VAN CONCEPT

Wood, V

Container News (Communication Channels, Incorporated, 461 8th Avenue, New York, New York, 10001)

Aug. 1973, 1 pp

This country is not realizing the true benefits from the container concept it invented because of regulatory red tape and laws designed for transportation of the past, Federal Maritime Commission Chairman Helen Delich Bentley has claimed. The drastic change in ocean transport from the age-old system of handling freight piece by piece to the use of truck-size containers is having impact far beyond anything dreamed of by those who were directly involved with its introduction. It would be difficult to find any element of the transportation industry that is not now party to one conflict or another in relation to legal issues arising from intermodalism. The industry's legal conflicts included the problems of ocean conferences over container revenue pools or intermodal rules; labor contract assessments relative to port trade; the equity or possible lack of it in dock labor agreements; the impact of new mini-land-bridge rates on port competition; and the legality of substitute services by containership operators.

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047729
OPERATING SIMULATION OF RAILWAY INSTALLATIONS

Meier-Solfrian, W Probst, R

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

N6, 1971, pp 549-557, 5 Fig, 3 Tab, 17 Ref

A simulation model was used in order to decide whether the prescribed operating programme was rational, and, possibly, to detect any bottlenecks. The project examined concerns the Berne-Wylerfeld marshalling and transhipment yard, to be for express goods traffic. One of the principal objects of simulation was to examine whether, having regard to all the restrictions in time and space, it would be possible to maintain a service, in spite of traffic fluctuations. The method of simultaneous programmed formation involved is derived from the french method (known as the Hirson method). The model consists of a number of elements which correspond, in consecutive order, to the different succeeding stages. For example, a part of the programme produced by the computer shows the progress of the operations to be carried times, on condition that all the operations involved in the formation of trains are systemised.

ACKNOWLEDGEMENT:
Association of American Railroads

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047752
ECONOMICS OF GREAT LAKES SHIPPING IN AN EXTENDED SEASON

Nowacki, H Benford, H Atkins, A

Michigan University, Ann Arbor, Department of Naval Architecture and Marine Engineering, Ann Arbor, Michigan, 48104

139, Intrm Rpt, Jan. 1973, 93 pp

Contract MA-1-35487

Presented to Great Lakes and Great Rivers Section Society of Naval Architects and Marine Engineers, Cleveland, Ohio.

The object of the study is to establish a widely applicable procedure for estimating the economic benefits to ship owners by extending the Great Lakes operating season in the movement, essentially, of pelletized iron ore. Each ship on the Great Lakes must be studied for an appropriate extension of service, and an analytical procedure was developed to determine the best length of yearly operation for specific ships. Certain ship characteristics are reviewed for possible means of extending the shipping season.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-73-10930

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NTIS, Repr PC: $3.99, Microfiche: $1.45
COM-73-10930

047753
ECONOMICS OF GREAT LAKES BULK CARRIERS IN WINTER OPERATIONS

Nowacki, H Benford, H Kaldjian, M Martin, DJ

Michigan University, Ann Arbor, Department of Naval Architecture and Marine Engineering, Ann Arbor, Michigan, 48104

135, Final Rpt, Nov. 1972, 160 pp

Contract MA-1-35487

The object of the study is to establish a widely applicable procedure for estimating the economic benefits to ship owners by extending the Great Lakes operating season in the movement, essentially, of pelletized iron ore. The intent is to provide a method for predicting costs and benefits accruing to any Great Lakes shipowner who might engage in extended season operations, presented in the form of a computerized model of general applicability. The model must be constructed in a manner that allows easy modification as new facts are gathered from continuing research and development.

ACKNOWLEDGEMENT:
National Technical Information Service, COM-73-10931

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COM-73-10931

047799
FRENCH RAILWAY REPRESENTATION ABROAD

PRESENCE DU RAIL FRANCAIS A L'ETRANGER
Descadeillas, A Botier, J

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

July 1972, p 517

The Authors, who are respectively Ingenieur en Chef and Ingenieur Principal in the SNCF Commercial Department, explain why, because of the type of traffic they convey, the railway companies very quickly appointed representatives abroad for canvassing and sales after they were created. They explain how the agencies developed in importance for passenger and freight traffic, as well as in the new areas of liaison and general information of example: their commercial and publicity work and their internal organisation are described. The SNCF has several agencies abroad at present.

ACKNOWLEDGEMENT:
International Union of Railways

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047809
COLLABORATION BETWEEN UIC AND IRCA IN THE SHARING OF RAILWAY KNOWLEDGE

LA COLLABORATION ENTRE L'UIC ET L'AICCF DANS LE PARTAGE DES CONNAISSANCES FERROVIAIRES
Lataire, L

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

May 1972, p 331

The author, General Manager of the SNCB, Chairman of the IRCA, outlines the leading part played by the IRCA since the end of the last century in the liberal flow of railway information of all types originating in the countries where railways were first built towards those recently created. He explains the contribution made by the UIC and how collaboration and unification have led to better integration in Europe. Both organizations are therefore complementary in certain respects and this has enabled events to be organized and held jointly so as to have maximum impact. The Colloquium next June on the "Sharing of Knowledge", which will enable views to be exchanged and practical solutions sought, is a brilliant example of this method of cooperation.

ACKNOWLEDGEMENT:
International Union of Railways

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047810
THE UIC'S ROLE IN INTERNATIONAL RAILWAY COOPERATION

LE ROLE DE L'UIC DANS LA COOPERATION INTERNATIONALE DES CHEMINS DE FER
Rodonyi, K

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

May 1972, p 327

The author, Senior Vice Minister of Communications and Posts of Hungary, Chairman of the UIC Board of Management, explains the need felt, right from the advent of the railway because of its very nature, for the introduction of international technical methods and procedures. This want was supplied in 1922 at the world level with the establishment of UIC which has become increasingly important in the most varied fields throughout the years and is now a strong organization, actively furthering a very wide range of studies, and around which function numerous international bodies (ORE, Eurofima, Interfrigo, Intercontainer, etc...); it has also actively participated in a number of spectacular achievements such as the introduction of the TEE and TEEM networks, to be followed by automatic coupling.

ACKNOWLEDGEMENT:
International Union of Railways

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047824
FUNCTIONAL RAILWAY COST ACCOUNTING AND STATISTICAL SYSTEM FOR TRAFFIC AND MANAGERIAL CONTROL
Whitten, HO

Whitten (Herbert O) and Associates, 7022 Marguerite Court, Annandale, Virginia, 22003

Feb. 1972, 272 pp, Tabs, Refs

This book presents the basic concepts of a new Functional Railway Cost Accounting and Statistical System for Traffic and Managerial Control, which incorporates the principles of marginal costing and capacity utilization into a managerial accounting and cost control system. The system discussed includes preliminary suggestions for a new railroad system of accounts and an account structure for major operating and maintenance expenses arranged according to functions performed. The new system was carried to its present stage of development during a one year period of research into the existing accounting and costing methods of many of the railroads throughout the world, as well as the United States and Canada. The new system of railroad cost accounting recommended embodies many of the ideas which have been developed during thirty years of experience and contact with individuals in the public utility and railroad fields. The major portion of the material in the book is new and not previously published. It has been under review by a number of experts during the past year and one half, which has resulted in a number of changes and improvements.

ACKNOWLEDGEMENT:
National Oceanic and Atmospheric Administration

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Whitten (Herbert O) and Associates, 7022 Marguerite Court, Annandale, Virginia, 22003, Repr PC: $25.00

047825
EDUCATION VS. EXPERIENCE--HOW DO WE DEVELOP TOMORROW'S OPERATING MANAGERS?

American Association of Railroad Superintendents, 18154 Harwood Avenue, Homewood, Illinois, 60403

1973, 246 pp

Proceedings of the Seventy-Sixth Annual Meeting, American Association of Railroad Superintendents, Chicago, Illinois, 13-15 June 1972.

The development of operating managers may well be one of the railroad industry's most critical problems in the years to come. The objective of training and management development should be to produce officers who understand the railroad business and can adjust to changing situations. Although college graduates may have more formal training in analyzing situations and asking why things are done, men from the ranks tend to have more first-hand feeling for operations. With proper training tailored to their individual needs either group can produce outstanding managers and it makes little sense to arbitrarily restrict opportunities to people with any specific background. To attract and retain men who can think, the railroads must continue to improve the working conditions of railroad managers.

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American Association of Railroad Superintendents, 18154 Harwood Avenue, Homewood, Illinois, 60403, Repr PC: Req Price

047828
KATY NORTHWEST: A CASE STUDY OF BRANCH LINE RAILROADING

Hofsommer, DL, Wayland College

Oklahoma State University, Stillwater, Oklahoma

PhD Thesis, July 1973

Dissertation Available from Dr. Donovan L. Hofsommer, Associate Professor of History, Wayland College, Plainview, Texas 79072.

Study delineates the history of several hundred miles of branch line railroad operated by the Missouri-Kansas-Texas in northern Texas and in western Oklahoma. It deals with the conception, operation, and eventual abandonment of most of this mileage. It also is an investigation into the reasons for abandonment; the reasons why certain parcels of abandoned track were purchased and turned into independent short line railroads; and why the State of Oklahoma wished to secure most of it for continued rail operation. In sum, it is a case study of branch line railroading on the Great Plains.

ACKNOWLEDGEMENT:
Wayland College

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047833
ORGANIZING FOR INNOVATION

Morton, JA

McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York, 10020

192 pp

Calling on his experience at Bell Laboratories, the author gives expert advice on setting goals, posing problems, and structuring "people systems" so that the specialized functions and integration of creative people in a technological organization will work naturally. He shows how to apply the system method to a wide variety of technical and "people" problems to improve employee motivation and performance.

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McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York, 10020, Orig PC: $11.50

047949
MERGES, TECHNICAL CHANGE, AND RETURNS TO SCALE IN THE RAILROAD INDUSTRY

Kneafsey, JT, Massachusetts Institute of Technology

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

This paper assesses the desirability of mergers in the railroad industry. This objective is accomplished by testing several hypotheses which relate mergers to technical change and which test for the existence of increasing returns to scale in the industry. A deterministic model is used for the railroad industry to estimate the degree of technical change, defined as a shift in the aggregate production function of all major railroads over a specified time period (in this case, 1954-1969, the period of the current merger cycle).

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047950
MERGERS AND THE TRANSPORT SYSTEM

Roberts, MJ, Pittsburgh University, Pittsburgh

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

This paper offers a setting for the session's discussions by placing mergers in the broader context of transport system organization and operation. The framework used to view "merger criteria and plant rationalization" may, however, turn these terms around because of greater concern for rationalization concepts than for merger criteria. While some propositions explored are applicable generally, the focus is on railroads. Mergers are examined as an organizing device, with special attention to the Penn Central as a source of object lessons.

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047957
TRANSPORTATION INDUSTRY PROBLEM AREAS AND POWER RELATIONSHIPS

Drake, JW, Purdue University

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

The American transportation picture is so diverse, so complex, so all pervasive in the economy, and so seemingly riddled with unsolvable problems that one often despairs of thinking of it as a whole and lapses into more detailed consideration of narrower aspects and individual problem areas. And problem areas it always seems to be. How long has it been since our transportation industry could have been spoken of in a largely favorable light? When was it last that, like electronics, computers, chemicals, oil or many other industries since World Wars I or II, transportation could have been spoken of as a burgeoning, profitable, innovative, industry making rapid strides in better serving society and improving the quality of life? On an overall basis including, private auto, perhaps as recently as the late 1940's. Looking at common carrier alone, from the standpoint of all modes, it is unlikely to have been true since the 1920's. Certainly some modes such as truck, pipeline and air have made rapid strides since then, but others such as rail were stagnant. Then other modes developed problems of other kinds; labor, management, ecological, technical, etc., until now, though a large and critical segment of our economy, often estimated at 20% of the GNP (including all the round-by-round multiplier effects in an input/output sense), transportation seems to account for more than 20% of our chronic problems.

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047974
A PLAN FOR TOMORROW

Ford, N

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 28, No. 9, Sept. 1973, pp 71-76

Nationalization of the railroads is of concern to everyone. There are only two alternatives to nationalization: retain the status quo or massively re-structure the industry. Eight railroads in the Northeast are bankrupt, four railroads in the Midwest are marginal earners, the industry needs huge infusions of new capital, and must somehow refinance nearly a billion in longterm debt before the end of 1980. Return on equity for 1972 was only 3 percent, and net working capital was down. Railroads are no longer a growth industry. Maintaining the status quo won't be good enough, and some kind of re-structuring is clearly indicated. This article believes the industry should restructure itself into a small number of nationwide systems. The root cause of the problem is the corporate structure. The railroad network must go everywhere. The article advocates four competitive, privately owned systems, reaching all major centers. It would begin with four large systems in the West, and permit them to operate over the tracks of the two or three systems in the South. Eventually, as the Eastern situation is relieved, the four Western systems would be permitted to operate into the East.

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047975
A CONTEST FOR LEADERSHIP

Roberts, R

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 28, No. 9, Sept. 1973, pp 90-94

This article views the present railroad problems and the Northeastern Railroad Crisis and asks the question: "Are FRA, ICC, and AAR up to the job?" It is suggested by some that the ICC be done away with. FRA has a "reregulation" concept. Railroads have viewed FRA's passenger research as no help and its new standards for safety as costly incursion into their private affairs. ICC criticizes the railroads for being unable to agree on issues vital to their future. Some see the FRA as the best hope for the industry. A question for FRA is whether to add to its missions. Some FRA research is viewed as counterproductive from a freight viewpoint. FRA points out that the economy of the steel wheel on the steel rail can be wiped out in terminal costs. Polls reveal that people do not respect railroad management, and some think the government could do a better job. AAR, although on a lower budget, now commands greater respect, and is preparing for TRAIN II. The article concludes with recommendations for FRA, ICC, and AAR action.

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047984
IS IT ENDSVILLE FOR THE RAILROADS?

Forbes (Forbes Incorporated, 60 Fifth Avenue, New York, New York, 10011)

Oct. 1969, pp 30-40

This article, written prior to the Penn Central bankruptcy, states that during most of the Sixties, things seemed to be improving for the railroads. Mergers, a new rate making strategy, and piggyback seemed to be the prescription. But, by the end of the decade hope had given way to pessimism. Nationalization is being talked about. The railroads position has deteriorated alarmingly in the last three years. A serious problem is the labor intensiveness of the industry, and the unions stubborn refusal to let management benefit from new technology. The passenger deficit has soared (prior to Amtrak). The merger movement was in trouble, piggyback had gone slack, and the investment credit had been ended. The fate of the railroads lies in the hands of government, labor, and the courts. Abandoments are likely to be more difficult in the future, and the railroads have started losing market share. Rail service has been bad, and the service problem is very serious. Many industry executives are pinning their hopes on the new automatic car identification. A railroad's fortunes are basically determined by the territory it serves.

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Forbes Incorporated, 60 Fifth Avenue, New York, New York, 10011, Repr PC: Req Price

048015
HOW MUCH MOVES WHERE ON PENN CENTRAL

Trains (Kalmbach Publishing Company, 1027 North 7th Street, Milwaukee, Wisconsin, 53233)

Vol. 33, No. 12, Oct. 1973, pp 16-17

This is a reproduction of a Penn Central Traffic Density Map that was a part of the exhibits involved in current Congressional deliberations. The editor has added comments on the high density and low-density lines.

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048017
TRAINING THE RAILWAY ENGINEER

Andrews, HI

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 6, July 1973, pp 243-246

The basic course of studies will be of one years specialised training in railway mechanical or railway electrical engineering to supplement the normal undergraduate studies of students having an honours engineering degree, and for this it will now be possible for the degree of M.Sc. to be awarded in appropriate circumstances. This would appear to meet the needs of most railway organizations in Great Britain and is in line with the views of the British Council for students from overseas.

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048204
CIVIL ENGINEERING FOR THE PLANT ENGINEER

Schwartz, M

McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York, 10020

Book, 1972, 290 pp

The Announcement for this book appears in Civil Engineering--ASCE, December 1972.

"Civil Engineering for the Plant Engineer" is intended for the plant engineer whose background is not in civil engineering. The book discusses those aspects of civil engineering that are likely to become part of his responsibility, including property acquisition, industrial surveying, soils and foundations, and others.

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McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York, 10020, Repr PC: $14.50

048206
SUPERIOR PENSION PLAN HELPS ATTRACT EMPLOYEES

Schoustra, JL Summerhays, RS

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Jan. 1973, pp 58-59

The Announcement for this book appears in Civil Engineering--ASCE, October 1972.

In anticipation of the trend toward portable pensions, a newly formed consulting firm searched for and found a plan which met these basic requirements: portability, equal treatment of personnel of all ages and salary levels, and substantial life benefits from the first day of participation.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017, Repr PC: Req Price

048246
THE FUTURE OF RAILWAY RESEARCH

Spring, KH

Railway Engineering Journal (Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1, England)

July 1972, 7 pp, 6 Fig

In the first place, the author reviews the research now being carried out, and provides brief information concerning each branch. He then examines the perspectives opened up by this work for the future—exploration of the range of speeds of around 400 km/h as well as of the limits made possible by adhesion, having regard to the improvements made to rolling stock and the track, progress in the case of motor systems by improving the turbine, sulphur-sodium batteries, selective two-way telecommunication between trains occupying a given section, and more extensive automation of their control, by means of computers carried on board, and automated management of traffic, orientated, ultimately, towards a system of wagons with autonomous, tele-controlled, motor equipment.

ACKNOWLEDGEMENT:
International Union of Railways, 1294

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, Paris 15, France, Repr PC: Req Price

048305
THE NORTHEAST: IT MUST COME FIRST

Shaffer, FE

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Sept. 1973

The Penn Central is not the only problem. Not one of the six bankrupt lines stands alone. Most proposed solutions include Federal aid, tax abatement, and modernization of strictures on abandonment. Some plans provide for continuation of local service by payment of 30% of operating losses by the community or concern involved. The Boston-Washington Corridor must be preserved and upgraded. One third of the traffic on the corridor is freight trains, and much of the track must be retained for freight. The Nineteen Seventies may prove to be a decade of radical change in the nation's basic transportation system. The Northeast railroad problem is a result of half a century of tipping the economic scales in favor of newer modes of transportation. Eastern Railroads failed to receive $167 million in coal revenues due to clean air requirements.

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050066
PRICE AND THE STRUCTURE OF FREIGHT CAR OWNERSHIP

Boles, PP, Department of Agriculture
Gerald, JO, Department of Agriculture

Southern Journal of Agricultural Economics (Southern Agricultural Economics Association, P.O. Box 1071, Knoxville, Tennessee, 37901)

Dec. 1970, 7 pp, 5 Fig, 5 Tab, 6 Ref

The recurring shortage of railcars to haul agricultural and forest products continues to be of utmost interest to farmers and agriculturally related enterprises. Pricing systems internal to the railroad industry prior to 1964 may have discouraged railroads from purchasing an adequate supply of railcars to meet the needs of shippers (2 and 3). These same pricing systems also may have discouraged railroads from purchasing high cost market-oriented equipment. An endeavor has been made to examine the performance of railroads in upgrading the quality of their fleets in response to a significant change in the pricing system in 1964.

ACKNOWLEDGEMENT:
Department of Agriculture

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Department of Agriculture, Economic Research Service, Washington, D.C., 20250, Repr PC: No Charge

050105
D&H BATTLES TO KEEP GATEWAYS OPEN

Shaffer, FE

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 28, No. 4, Apr. 1973, pp 66-69

The Delaware & Hudson plans for one major rail system in the East "the little D&H is not going to stand idly by and let this happen without a long, hard fight to the finish." While the D&H is geared up to celebrate its 150th anniversary as a transportation company this month, the hoopla should not hide the line's determination to provide a gateway to New England independent of the PC.

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050299
A MULTI-MODAL GOODS DISTRIBUTION MODEL WITH EMPHASIS ON AIR CARGO

Wallace, RS, Lea (ND) and Associates Limited

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-37, 1973, 19 pp, 4 Fig, 9 Tab, 21 Ref

An examination is made of the role in Canada's economic development of its domestic air cargo transport industry in conjunction with its two major competitors, road and rail, over a time frame of 1967 to 1987. A macro model, forecasting the ton-mile freight demand for road, rail and air services is developed. It relates ton-miles to the growth in gross national product. A brief study is made of expected technological developments in each mode, with particular emphasis on the air cargo mode, as they affect future transportation costs. Cost data are collected for each mode for the base year 1967. Based on this information, component cost data are developed for later use in the distribution model. A model employing linear graph analysis techniques is developed to simulate the three-mode transport industry. It is demonstrated on a three-mode two-mode hypothetical system. A 30-city, three-mode model of the nation's goods distribution system is then calibrated on destination distribution. In its present state it is a pilot model.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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050331
PUBLIC DISSENT AND PROFESSIONAL RESPONSIBILITY

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Sept. 1973, pp 98-99

An engineer disagrees on a major issue with his employer. He explains why he disagrees, but is unsuccessful in getting the decision changed. Question: Are there any situations in which he should publicly "Blow the Whistle" or expose his employer? (For example, in the case of what he considers to be an ill-advised freeway or canal project or airport or dam.) He can always quit, of course, but seldom will his quitting lead to a changed decision on a disputed engineering matter. If he does blow the whistle, he could be fired—will his profession support him, or at least investigate whether he should be supported and not fired." Indeed, Ralph Nader says a man is truly a professional only if he is in a field where his fellow specialists do support their whistle blowers. In this article four civil engineers discuss the issue.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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050332
PROPER GRIEVANCE HANDLING MAKES UNIONS NECESSARY

Chipman, LD

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Sept. 1973, pp 95-97

The "classical workshop" and the "non-union contract" can facilitate the effective communication engineers need concerning salary, advancement, benefits, performance evaluation, and other personnel policies and practices. Conventional procedures for communicating and handling grievances are frequently ineffective and can result in unionization attempts. The "classical workshop," which assures the individual anonymity and protection missing in conventional procedures, can clear communication blockages, quickly identify problem areas, and develop trust in upper management. The "non-union contract" is a publication that clearly describes local personnel policies and practices. The "classical workshop" and the "non-union contract" incorporate the most attractive features of union grievance procedures and union contracts into a format compatible with professional needs.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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050333
ASCE'S INVOLVEMENT IN PENSION CONCEPTS

Ward, J

ASCE Civil Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Sept. 1973, pp 93-94

Eligibility, vesting, and portability of pension plans are under study by ASCE. The Society is also considering involvement in Pensions for Professionals, a general pension plan geared to professionals. ASCE is also a participant in the Joint Committee on Pensions, in association with other engineering, scientific and architectural societies to promote legislation beneficial to all in technical fields. Features of PFP plan adapted and adopted by the American Society for Microbiology are described. These include: eligibility vesting; contributions; funding; pre-retirement survivor's benefit; early retirement; disability retirement; optional forms of retirement benefits; equity investments; and terminated employees.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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050362
THE ROLE OF THE AREA MANAGER

Taylor, RK

Permanent Way Institution, Journ & Rpt of Proceed (Derry and Sons, Limited, Canal Street, Nottingham, England)

Vol. 91, Pt1, Proceeding, 1973, pp 39-44

The organization structure of the Tyne Area is given. The organization is built up by function within the area and the Area Manager Tyne has four assistants. These are: 1) Operating Assistant (who is also Deputy Manager); 2) Commercial/Terminals; 3) Technical Electrical Engineering); and 4) Staff and Administration.

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050364
1973 GOLDEN FREIGHT CAR AWARD

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 28, No. 6, June 1973, 12 pp, Phots

This issue contained several marketing related articles, principally the announcement that Penn Central had won the Golden Freight Car Award for 1973 for their efforts in container and piggyback traffic.

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050365
BURLINGTON NORTHERN 1973: SPOTLIGHT ON THE SHOWCASE MERGER

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 28, No. 10, Oct. 1973, 15 pp

This issue gave extensive coverage to the Burlington Northern. Areas covered include the successful merger that formed BN, resource development of mineral rights, marketing services, the information system 'Compass', unit train operations, yard operations, and capital improvements, as well as public relations.

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050393
THE "MYTHS" OF THE OPEN DOOR, THE WHITE KNIGHT, THE WRONG PREPOSITION

Wood, AD, New York Telephone Company

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 1, 1973, pp 16-23

To get a grasp on a workable employee communications program, these three "myths" which block effective communications, must be disposed of. The first one is crucial, it centers around the self-delusion that we are all "good guys" and "my door is always open". Actually there is an inherent, deep seated "fear of the boss" and a sweetening of bad news as they ascend the hierarchy of command. The second myth is one that says "when you are in trouble send in a white knight". He will raise results, reduce costs, turn employees' attitudes, solve all problems and be on his way, all in 12 to 18 months. It does not work that way. The battle ground of the white knight is only 2 levels up and down and he has to stay around for a while to be effective in the two-level zone. The final myth, the wrong preposition, should be obvious: Employee Information should not be only "to" but also "from". A communications model for a District Superintendent is proposed.

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050410
TRAINING LETTERS FOR M/W EMPLOYEES

Railway Track and Structures (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

pp 26-27

About two years ago it became evident that the number of young men in the supervisory force of the Rock Island was growing. Some had five years or less of track experience. It was realized that a training program was needed not only to educate the trackmen and supervisors lacking experience but also to serve as a refresher course for the more experienced personnel. To assure having the type of training that was felt to be necessary, it was decided that the railroad would have to conduct this instruction itself. Another decision was that the training could best be handled by issuing a series of "track maintenance letters" in which the various maintenance matters that were considered basic and important would be discussed one at a time.

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050424
CLOSED FIST OR OPEN MIND

Hoppe, CW

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 28, No. 11, Nov. 1973

There are two basic managerial philosophies of motivation—force and attraction. The "force" philosophy, sometimes referred to as Theory X by behavioral scientists, is based on the assumption that by and large people are lazy and must be driven to produce. The "attraction" philosophy, Theory Y, assumes that most people desire to fulfill their role and need only encouragement to produce. Theory X, a carry-over of the Master/Serf relationship of the Middle Ages, is the traditional philosophy of management, not only in the railroad industry but in nearly all mature industries and government.

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050556
NEW COURSES OF ACTION IN "PURCHASING"

Hower, GM, Union Pacific Railroad

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 3, May 1973, pp 41-44, 1 Fig, 5 Phot

With the introduction of computers having more advanced capabilities, Union Pacific has been able to develop a completely mechanized system for all storehouse stock. This system consists of a complete purchasing description, vendor index, vendor's and average price, terms, average tracers, surplus reports, automatic transfers, exception reports and, of course, the mathematical formulae necessary to accomplish it. This improved system gives the purchasing and materials management people more time and motivation to better carry out their responsibilities.

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

050559
CYCLICAL INVENTORY SYSTEM

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 3, May 1973, 2 pp, 2 Fig, 4 Phot

A unique, computer-based, cylical inventory system has been in the process of development at the Great Lakes Region of the Canadian National at Toronto, Ontario. Paramount in CN's objectives has been to eliminate peak work periods in inventory taking, to minimize excessive inventory stocks, and—from a practical standpoint—to count as many items as possible when stock on hand is at its lowest point.

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050572
YOU AND YOUR PENSION

Backe, RJ Cummings, F

IEEE Spectrum (Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 10, No. 5, May 1973, pp 55-58, 1 Tab

Pension reform is a major issue among electrical engineers. Most of them have pension plans, but many forfeit them.

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050605
RENFE'S STRATEGIC PLANNING FOR 1972-85

Vincente, FL, Spanish National Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 7, July 1973, pp 741-753, 3 Ref.

A most useful instrument in achieving these objectives is the formulation of a "strategy" and its concretisation in the form of an explicit planning programme. In the field of strategic planning, the railway administrations are no exception.

ACKNOWLEDGEMENT:
International Railway Congress Association

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050611
IMPLEMENTATION OF THE SNCB 1970-1979 TEN-YEAR PLAN

Lataire, L, International Railway Congress Association

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 5, May 1973, pp 605-608

Since 1970, the SNCB has been pursuing the ten-year investment plan extending up to 1979. This plan is based on uniform principles which govern the administration of the National Company, and it is worthwhile to recall them here.

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050613
RESEARCH AND DEVELOPMENT ON RAILWAYS

Srinivasan, M, Ministry of Railways, India

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 5, May 1973, pp 625-631

Competition from road and air compelled railways to set up elaborate research and development facilities to modernize rail transport. For long years, governments did not consider it a responsibility of the State to fund and encourage R & D in railways. In the recent past, governments in several countries have funded R & D in railways for specific purposes. Universities and national laboratories have, of late, been taking interest in R & D in railways. There is a case for government and industry in all countries to interest themselves in R & D in railways. In most countries the railway is the largest industrial undertaking and renders national service. Competition from road and air has put railway finances to severe strain. Railway assets have a very long life and, therefore, it is not easy to introduce innovations as in the case of road and air transport. The steel wheel over the steel rail is still the most efficient mode of transport in terms of tractive effort and will enable the railway to remain highly competitive in handling bulk transport over long distances provided the operation is updated. The railway can benefit considerably by economies of scale. Dieselization and electrification of traction, automation, data processing, operations research, and so on, are some of the recent innovations. Introduction of containers presages a profitable era for railways. The railway should specialize in offering the type of service which other systems of transport cannot offer at the price. R & D in railways is a captive organization. The user of the railway is identified and his needs can be foreseen. Innovations in railway can be monitored through all the stages because there is a complete cycle of feedback of performance and information from the conception stage through the design, production and testing stages, and use, repair and overhaul. The several systems of R & D in railways are described along with their features and advantages and disadvantages. The author gives glimpses of the vista of the future.

ACKNOWLEDGEMENT:
International Railway Congress Association

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050614
ANALYSIS OF EFFECTS IN TRANSPORT BUSINESSES

Fulling, F, German Federal Railway

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 5, May 1973, pp 609-614, 11 Ref

Analysis of effects in transport businesses is certainly not a new concept but only a new term. A comprehensive definition has so far been lacking. For this reason the article first defines the concept and, in the process, discusses productivity, value analysis, innovation, economics and profitability calculations. Also mentioned are critical reviews as well as cost-benefit and benefit-effectiveness studies as they are now defined. Later, the article deals with the analysis of effects, especially as applied to the fields, where its use is intended, and discusses the question who is to be responsible for making the analysis and how it is to be conducted. Several examples are given in illustration and, the author points out that analysis of effects is an essential management tool.

ACKNOWLEDGEMENT:
International Railway Congress Association

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050648
THE UIC OFFICE FOR RESEARCH AND EXPERIMENTS (ORE)–ORGANISATION AND ACTIVITIES

L'O.R.E.–OFFICE DE RECHERCHES ET D'ESSAIS DE L'UIC
Pettelat, A
Duchemin, J
Tripier, A
Dogneton, P, UIC Office for Research and Experiments

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

July 1973, pp 458-463, 1 Fig, 9 Phot

In this article, the authors first explain the historical background of a body which was needed because of the essentially international character of the railway and how it materialized in its most recent form when ORE was created by the UIC at Utrecht in 1949. They then give details of the tasks entrusted to ORE, its organization and working methods, how the work is financed and classified in five groups, and the means and facilities it has available (railway research centres, Vienna Arsenal Testing Station). In conclusion, they review the main problems studied (automatic coupling, high-speed running, standardization, fundamental research,...) and refer to the documents and reports ORE has published.

ACKNOWLEDGEMENT:
French National Railways

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050651
THE MINERAL POSITION OF THE UNITED STATES

Cameron, EN

Wisconsin University Press, P.O. Box 1379, Madison, Wisconsin, 53701

1973, 159 pp, Tabs

Papers present review of the national mineral position for the geological profession, and provide capsule summary projecting America's position for the remaining years of this century.

ACKNOWLEDGEMENT:
Science News

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Wisconsin University Press, P.O. Box 1379, Madison, Wisconsin, 53701, Repr PC: $10.00

050662
MASTER PLAN FOR THE EUROPEAN RAILWAY OF THE FUTURE

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

1973, 29 pp, 2 Tab, 11 App

The Planning Committee has developed, in a first stage, the Master Plan for the European Railway of the Future based upon a homogenous network of main lines which meet the quantitative and qualitative requirements of traffic forecasts for 1985 and which offer the same high capacity. The scope of the study is limited to the networks of the European UIC Member Railways. Working from the principle that the Master Plan to be developed should consist of connections between the zones which generate a large amount of traffic, the Committee began by determining the zones which have a high traffic potential and which make up the nodes of the Master Plan. Starting from these nodes, a geographical plan of the network of traffic connections was established. It served as the theoretical basis of the Master Plan.

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International Union of Railways, Utrecht, Netherlands, Repr PC: Req Price

050663
MASTER PLAN FOR THE EUROPEAN RAILWAY OF THE FUTURE. ANNEXES

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

1973, Tabs, 11 App

The appendices to the Master Plan for the European Railway for the Future present several maps illustrating areas with traffic potential, a geographic network model, journey times, traffic density and proposed routes.

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050664
RAILWAY ROUTE STUDIES

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

1973, Apps

The International Union of Railways has prepared five route studies: Munchen—Verona; Basel—Milano; Torino—Chambery; Barcelona—Narbonne; and Great Britain—Continent.

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International Union of Railways, Utrecht, Netherlands, Repr PC: Req Price

050674
THE PART PLAYED BY THE HUGARIAN STATE RAILWAYS IN CENTRAL EUROPEAN TRAFFIC

Meszaros, K, Hungarian State Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 6, June 1973, 10 pp, 3 Fig

In many European countries, the railways represent a considerable part of the national assets. That is why not only the railway administrations but also the responsible governments of these countries show a great interest in the near and more distant future of the railways, mainly in the context of national economy but also from a closely related viewpoint of technical progress and long-term policy. For this purpose, many forecasts and surveys in depth have been prepared concerning the transport demands to be expected in the different European countries, and these surveys have been accompanied by estimates of the share of the railways in the transport market and of the qualitative and quantitative parameters of the rail transport capacity required for this purpose.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050677
THE PRACTICAL APPLICATIONS OF SIMULATION AND OTHER AIDS IN IMPROVING TRAIN OPERATIONS

Alward, SA, Seaboard Coast Line Railroad

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973, 5 pp, 2 Fig

This paper presents the practical use made by a major U.S. railroad of a large scale network simulation model. This model of the traffic flow over the entire railroad network of major yards and connecting trackage has been designed and developed in close coordination with the Operating Department of the railroad. Examples of its use in forecasting the feasibility and impact of changing train schedules, pre-blocking and new run-through train operations will be described. Other computer aids including on-line monitoring of car movements to automatically divert and re-route cars according to customer instruction, along with on-line techniques to assist in the control of empty equipment by automatic re-routing to distribution points will be described.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050680
INTERFRIGO IN THE EUROPEAN RAILWAY CONTEXT

Carlier, R, Interfrigo

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973, 4 pp

INTERFRIGO is a cooperative company, the members of which are all Railway Administrators. Its purpose is to cover all operations for obtaining and maintaining the optimum temperature for foodstuffs during conveyance. It operates through specialized rolling stock belonging to its members and through its own rolling stock. The data processing function is based on messages emanating from the Railways, which are often transmitted on magnetic tapes. The two main objects of the Information Processing function within INTERFRIGO are: (1) the continual improvement of the input of the information received from the Railways, in relation to the development of the latters' methods and equipment, and the gradual introduction of Centralized Administration of Freight Traffic, of which it must become an integral part; and (2) the rational operation of the data bank which it has established.

ACKNOWLEDGEMENT:
Rail International

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050851
THE NEGRO IN THE RAILROAD INDUSTRY

Risker, HW, Jr Denison, MC

Pennsylvania University, Philadelphia, Wharton School of Finance and Commerce, Philadelphia, Pennsylvania, 19104

16, Book, 1971, 202 pp

In September 1966, the Ford Foundation announced a major grant to the Industrial Research Unit of the Wharton School to fund studies of the Racial Policies of American Industry. The purpose of the research effort, now in its fourth year, is to determine why some industries are more hospitable to the employment of Negroes than are others and why some companies within the same industry have vastly different racial employment policies, and to propose appropriate policy. The studies have proceeded on an industry by industry basis. This study of the railroad industry is No. 16 in a series of reports dealing with specific industries.

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050908
COLLECTIVE BARGAINING IN THE RAILROAD INDUSTRY

Kaufman, JJ

Russell and Russell Publishers, 122 East 42nd Street, New York, New York, 10017

Book, 1952, 229 pp, 3 Tab, Refs

The writer has participated in hearings before emergency and arbitration boards established in accordance with the provisions of the Railway Labor Act, as amended. Out of this experience have come three observations with respect to labor relations in the railroad industry: first, the collective bargaining relationships are unusually complex; second, the popular belief that collective bargaining relationships have been mature and responsible is erroneous; third, in the past decade a number of serious strikes or threatened strikes have occurred. The last two observations naturally called for an explanation. The first observation made the answer only more difficult.

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050981
WHATS YOUR SALARY PROGRESS?

ASME Journal of Mechanical Engineering (American Society of Mechanical Engineers, 345 East 47th STreet, New York, New York, 10017)

Dec. 1973, p 79

The publication is available at $3.00 per copy (orders for less than $10.00 must be prepaid) from the Engineer's Joint Council, Dept. PK, 345 East 47th Street, New York, N.Y. 10017.

A new 24-page booklet, called The Engineer's Salary Evaluation Kit, will help any engineer assess his salary progress. Compiled by the Engineering Manpower Commission of Engineers Joint Council, the kit includes charts, worksheets, data, and comparative graphs to help the engineer judge his relative standing.

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Engineers Joint Council, Dept PK, 345 East 47th Street, New York, New York, 10017, Repr PC: $3.00

051298
THE RAILWAY LABOR ACT: A CASE FOR COMPULSORY ARBITRATION

Davis, GM, Arkansas University
Holley, WH, Jr, Auburn University

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-38, 1973, 12 pp, 6 Tab, 39 Ref

In this paper the existing federal legislation dealing with railroad labor-management relations are examined in order to provide perception into the magnitude and complexity of labor disputes. Furthermore, industrial production and wage rates for a twenty-year interval are contrasted with comparable rail data. Next, railroad labor force trends are analyzed and multivariate regressions are calculated for labor force size, miles of road, ton-miles, industry rate of return, and the aggregrate number of railroad companies. Specific categories of railroad employment are investigated relative to growth and contraction. The supply of railroad labor, moreover, is projected under dichotomous conditions, i.e., with and without compulsory arbitration. Lastly, several legislative amendments to the Railway Labor Act and the Interstate Commerce Act involving compulsory arbitration are advocated.

ACKNOWLEDGEMENT:
American Society of Mechanical Engineers

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051330
UIC DRAFTS ITS MASTER PLAN FOR EUROPE

Hope, R

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 11, Nov. 1973, pp 429-431

For the first time, the UIC has brought together separate national plans for new and improved lines to carry passengers at 200 to 300 km/h, and a coherent 20,000 km network which could be completed by 1985 has been defined. The author outlines the technical standards which have been put forward for discussion, and explains that the next task will be to examine in detail five key axes along which major improvements in speed and capacity are required.

ACKNOWLEDGEMENT:
Railway Gazette International

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051358
JOB ENRICHMENT IN INDUSTRY

Treadway, HH, Du Pont de Nemours (EI) and Company, Incorporated

ASME Journal of Mechanical Engineering (American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017)

Dec. 1973, p 10

It is called job enrichment–the field that seeks to improve both task efficiency and human satisfaction by means of building into people's jobs greater scope for personal achievement and its recognition, more challenging and responsible work, and greater opportunity for individual advancement and growth. Here's an assessment of job enrichment as a technique for management to improve effectiveness and to fulfill individual needs, while at the same time improving corporate profits.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051390
EUROTRIB 1973–TRIBOLOGY AND RELIABILITY

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 9, Nov. 1973, p 397

Tribology is the science and engineering of the interaction of surfaces upon each other, in relative motion to each other. Tribology deals with lubrication, friction, and wear. It also deals with adhesion. This paper is a short commentary on the First European Tribology Conference in London in September 1973.

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051419
"MAN ON THE MOVE"...WITH TOMORROW'S RAILROAD

Fisher, FG, Rail Transportation and Mass Transit, STV, Inc

American Society of Mechanical Engineers, 345 East 47th Street, New York, New York, 10017

73-ICT-95, Paper, Sept. 1973, 11 pp, 9 Fig

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

America's railroads today serve 45,000 communities on approximately 200,000 miles of rail line; have a national freight car fleet of 1.75 million cars; move the freight car fleet with 30,000 locomotive units with a total generating power of 50 million horsepower; employ approximately 600,000 persons that results in an annual payroll and fringes approaching $7 billion; make annual purchases of approximately $5 billion; in addition to payroll and fringes, pay annual taxes of $500 million; maintain a plant with a replacement cost new less depreciation of over $30 billion, but if rebuilt from scratch would cost over $100 billion. With all of this the American railroads handle approximately 3750 ton-miles for every person. Tomorrow's railroad will be required to haul an estimated 5000 ton-miles per person. The railroads are accepting tomorrow's challenge and are totally committed to accommodate its burgeoning population with all its social problems and needs.

ACKNOWLEDGEMENT:
ASME Journal of Mechanical Engineering

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051429
SALARY GUIDELINES: ENLIGHTENED IMPLEMENTATION OR UNIONIZATION?

McMinn, JH

ASCE Engineering Issues-J of Prof Activities (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. PP4, Paper #10090, Proceeding, Oct. 1973, pp 429-432

Engineers have failed to convince others, and themselves, of the importance and value of the service they perform. This must be the first step in justifying an improved economic status for civil engineers. Salary guidelines implementation will also require that engineers, particularly young engineers, refuse to accept permanent employment with organizations that have not adopted the salary guidelines for all job classifications. A long-range goal should be to bring about broader ownership of private engineering firms through employee stock ownership plans.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051430
SALARY EVALUATION FOR YOUNG PROFESSIONALS

Dobbs, ED

ASCE Engineering Issues-J of Prof Activities (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. PP4, Paper #10083, Proceeding, Oct. 1973, pp 421-428

The young engineer (and old-timer, too) expects to be compensated commensurate with his or her ability to produce. The company, through the supervisor, should be willing to provide the engineer with an adequate measurement of job performance. Along with general guidelines to assure that this is being accomplished, this article provides specific recommendations on defining the job and executing the performance appraisal.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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051440
RAILWAY SYSTEM OF THE FRIULI-VENEZIA GIULIA REGION

IL SISTEMA FERROVIARIO DELLA REGIONE FRUILI-VENEZIA GIULIA
Pellis, P

Ingegneria Ferroviaria (Collegio Ingegneri Ferroviari Italiani, Piazza Croce Rossa, Rome, Italy)

No. 2, Feb. 1973, pp 121-136

The geographical position of the Friuli-Venezia Giulia Region gives it the function of a "bridge" region between Western and Eastern Europe, as well as between the Mediterranean and Eastern sea routes and the center of the Continent. From this there arises the necessity for a sufficient strengthening of the overland transport infrastructures, both to guarantee the passage of intense movements of persons and to encourage the high flows of freight which in the present decade, might probably double. In this memorandum, consideration is given to the railway network of the Friuli-Venezia Giulia Region in its essential structure, enframing it within the complex of the great European axes. The examination is necessarily extended to the contiguous areas and especially to the Alpine areas facing the northeastern frontier. Thus, presentation is made of a possible proposal of interventions to increase the capacity of the three basic routes on the northern, northeastern and eastern axes, with changes of a planimetric and altimetric nature of varying grade and level, in order to shorten routes and increase speeds.

ACKNOWLEDGEMENT:
Engineering Index, EI 74 055460

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051567
RAILROADS OF THE U.S.S.R.

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

Report, June 1960, 342 pp, Figs, Tabs, Phots, Apps

Report by US Railroad Exchange Delegation to the Soviet Union, June 1960.

This book is a report on the tour of the railways of the U.S.S.R. by a group of U.S. railroad officers. Subjects covered include management, transportation, locomotives, cars, track, roadway, structures, signaling, communications, electrification and research and training.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
AAR, Repr PC: Req Price

051569
BRITISH AND EUROPEAN RAILROADS

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

Report, July 1960, 157 pp, Figs, Tabs, Phots, Apps

Report on inspection by the AAR delegation to British and European Railroads, July 1960.

This is a report on a visit to European Railways by a delegation of U.S. railroad officers. Subjects covered include management, operations, locomotives, cars, roadway, track, structures, signals, communications, electrification, and research and education.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
AAR, Repr PC: Req Price

051971
TECHNOLOGICAL RAILWAY RESEARCH AND THE PLANNING AND GUIDANCE OF DEVELOPMENT PROJECTS

BAHNTECHNOLOGISCHE FORSCHUNG UND ENTWICKLUNG-PROJEKTPLANUNG UND–LENKUNG
Lehmann, H

Eisenbahntechnische Rundschau (Hestra-Verlag, Hernichel und Dr. Strasse, Darmstadt, West Germany)

No. 1/2, Jan. 1973, 6 pp, 3 Fig, 1 Ref

The author, who is a member of the German Federal Railway's Board, describes the planning of the main general projects at top management level. The drawings provided show the principal methods used in order to define objectives, means, and the time necessary to carry out the plans.

ACKNOWLEDGEMENT:
International Union of Railways, 953

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price
953

052074
MARKETING TECHNIQUES AND THE MASS TRANSIT SYSTEM

National Urban League, Incorporated, 52 East 52nd Street, New York, New York, 10022 UMTA-DC06-0020-731,2

July 1973

Also prepared by Mark Battle Associates. Pricing at NTIS is Repr PC $4.25, Microfiche, $1.45 each for Vol. PB 223735 and Suppl Vol. PB 223736.

Market research, product planning, pricing, promotion, and information techniques are discussed in the transit context. Results of personal interviews with transit system officials in five cities are presented to examine alternative approaches to marketing. System-wide product planning is essential to any carefully planned promotion. At a minimum this should cover safety, convenience, maintenance, and special schedules. Newspaper advertising for transit is one of the most widespread techniques. The supplementary handbook volume contains a selection of materials that have been used by transit systems to promote their service or to provide the public with information about using their service. The samples represent some of the more creative pieces that were provided by the 58 transit systems covered in the research.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS

052077
DISAPPEARING STAFF FORCE THE PACE OF AUTOMATION

Maxwell, WW, London Transport Executive

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 4 pp, Phots

Much has already been done by London Transport to automate the signalling, driving and fare collection functions, but staff shortages disrupted scheduled services in 1973 as never before. The use of one-man crews is being extended, but the need to find acceptable and safe ways of operating trains with no crew on board is now pressing; further automation is essential if urban transport is not to come to a halt for lack of staff.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

052084
MARKETING ENTERPRISE BOOSTS NS REVENUES

Hellinga, GS, Netherlands Railways

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 1, Jan. 1974, 2 pp, 1 Phot

The "Spoornaar '75" plan and "Spoorslag '70" campaign enabled Netherlands Railways to reverse its decline in passenger traffic, but subsequent fare increases overtook inflation and caused growth to stagnate. G. S. Hellinga describes recent stategies aimed at expanding rail's share of the passenger market, and so creating a favourable climate for investment in the national network.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

052096
UIC MASTER PLAN FOR EUROPEAN RAILWAYS OF THE FUTURE

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 1, Jan. 1974, 8 pp, 7 Fig, 3 Phot

The Master Plan embraces a network of uniform-capacity main lines of 40,000 km comprising new and remodelled lines devised from a geographical model embracing many existing routes and technically studied to provide speeds up to 250 km/h or more, into which is incorporated the Channel Tunnel.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

052107
A NOTE ON COMPUTATIONAL SIMPLIFICATIONS IN SOLVING GENERALIZED TRANSPORTATION PROBLEMS

Glover, F, Colorado University, Boulder
Klingman, D, Texas University, Austin

Transportation Science (General Motors Research Laboratories, 12 Mile and Mound Roads, Warren, Michigan, 48090)

Vol. 7, No. 4, Nov. 1973, pp 351-361, 2 Fig, 13 Ref

Efficient techniques are given for implementing the pricing-out and change-of-basis procedures for generalized transportation problems. Our approach avoids the necessity to 'parameterize' the calculations, which is the more standard procedure. In addition, we show that the pricing-out and change-of-basis procedures can be organized in a manner that permits the calculations for one to be utilized in the other, further reducing total computational effort.

ACKNOWLEDGEMENT:
Transportation Science

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052140
PROJECT FARE TASK IV REPORT. URBAN MASS TRANSPORTATION INDUSTRY FINANCIAL AND OPERATING DATA REPORTING SYSTEM. VOLUME I. TASK AND PROJECT SUMMARY

Harvey, DL Nagel, JW Van Lieshout, WT Malachuk, DJ

Andersen (Arthur) and Company, 815 Connecticut Avenue, NW, Washington, D.C., 20006

7203-7311, Nov. 1973, 80 pp

Contract DOT-UT-20008

Paper copy also available from NTIS $20.00/set of 5 reports as PB-226 353/SET.

The report contains a description of the uniform reporting system for the urban mass transit industry designed and tested in Project FARE. It is presented in five volumes. Volume I contains a description of how Task IV was accomplished and the conclusions and recommendations reached at the end of the task. It also contains a summary of the conduct of the entire project.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226354/9

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $3.75, Microfiche: $1.45
PB-226354/9

052541
UIC ACTION PROGRAMME 1974

International Union of Railways, Office for Research and Experiments, Utrecht, Netherlands

1974

The Action Programme features questions affecting the largest number of Railways in Europe, the Middle East and the Maghreb. It is presented under nine chapters, subdivided into problems: (1) Economics of Rail Transport; (2) Market Information; (3) Definition of the Offer; (4) Marketing; (5) Technical Equipment; (6) Operating; (7) General Administration; (8) Public Relations; and (9) Planning. Numerous maps and diagrams are included.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

052542
AXIS "GREAT BRITAIN–TUNNEL-CONTINENT"

International Union of Railways, Planning Committee, Utrecht, Netherlands

Intrm Rpt., Apr. 1973, 25 pp, Figs.

The services between Great Britain and the Continent via the Channel Tunnel and the suitability of the existing railway installations for conveying both the new traffic and the old traffic in developed form were studied. This interim report covers the initial findings, work in hand, and sets out the difficulties encountered, which are mainly due to the extension of the zone of and the network in question and the gaps in the statistical and forecasting information.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr. PC: Req. Price

053839
"DISCIPLINED" OPERATION

Gastler, HL, Chicago & North Western Transportation Company

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 16, No. 4, July 1973, 4 pp, Phots

The Chicago and North Western wants the decisions to be made at the executive level. That has been the motivation for such organizational changes as the division manager concept, the "disciplined transportation" concept and the "disciplined car movement" concept, which are presented in this article.

ACKNOWLEDGEMENT:
Progressive Railroading

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

054267
RAILROADS' NEED FOR NEW MARKETS

Wallace, GR, Penn Central Transportation Company

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp A1-A10

The railroads of the past supplied conventional car load and less car load freight service. They knew well how to exploit the potential of their property. Today they have: LCL service, now mostly left to the trucks; piggyback, which in its simplest form is perhaps half a car load; conventional carload service; incentive carload rates; jumbo car rates; multiple car rates; special movement rates; trainload rates; unit train rates and integral train rates. But there is a need to find and exploit new markets and remain a part of the American business scene.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054268
THE INDIVIDUAL MARKET–PETROLEUM INDUSTRY

Dowling, FM, Missouri Pacific Railroad

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp A11-A19

The rail share of the U.S. refined petroleum products transportation market has declined from 30.41 percent in 1938 to 2.55 percent in 1968 while the tons transported by pipeline have increased about thirty times, by truck twenty times and by water three times. The issue of short haul rail petroleum traffic (bulk liquid refined petroleum products) is discussed and some recommendations are made with a view to improve the situation.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054269
THE INDIVIDUAL MARKET–INDUSTRIAL CHEMICAL

Stender, RL, Chessie System
Norton, JH, Du Pont de Nemours (EI) and Company, Incorporated

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp A20-A32, 2 Fig

The railroad's share of the total available market is declining, indicating little or no growth in the intermediate or short-haul categories. A discussion of short haul traffic, a case history example, and some recommendations are given.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054270
THE INDUSTRIAL MARKET–STEEL INDUSTRY

Vignovic, R, Elgin, Joliet and Eastern Railway
Jerndt, WA, Inland Steel Company

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp A33-A49, 2 Fig

Steel is important to the railroads because of the tonnage and revenue on traffic they currently handle, and because of the opportunity it presents for increasing rail tonnages and revenues. Statistics, which show where steel is produced and where it is consumed, along with some comments on steel industry pricing are given to develop the case that steel is a short haul market.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054271
CEMENT INDUSTRY MARKET

Munro, JM, Penn Central Transportation Company
Hutter, CJ, Canada Cement Lafarge, Limited

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp A50-A66, 8 Fig

Currently, cement shipments amount to 75 millions short tons with the U.S. which represents an 85% increase since 1950. In contrast to this growth performance, U.S. railraods, as a whole, in 1972, delivered some 12 million tons as compared to 32 million tons in 1952, which is a reduction of some 62%. An attempt to answer the question that should be asked by the railroads "What must we do to

respond to our customers' specific transportation requirements in order to recapture the cement business" is made.

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054272
THE INDIVIDUAL MARKET–GRAIN INDUSTRY

Snook, RJ, Atchison, Topeka and Santa Fe Railway
Ratledge, JT, Continental Grain Company

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp A67-A80, 1 Fig, 3 Tab

There is a short haul market for the railroads in the handling of grain, but the competition in the grain sector is particularly fierce and the railroads must be particularly selective in going after it.

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054273
PENETRATING THE SHORT HAUL MARKET

Cooke, ST, Canadian National Railways
Jacobs, SL, Canadian Pacific Railways
Grocki, JJ, Central Railroad Company of New Jersey

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 23 pp

Mr. Cooke, Canadian National Railways, Mr. Jacobs, CP Rail, and Mr. Grocki, Central Railroad Company of New Jersey discuss how their companies meet the challenge of the short haul market.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO: Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054274
LABOR VIEWS INNOVATIVE RAILROAD OPERATIONS

Gabriel, QC, United Transportation Union

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 6 pp

The project of the United Transportation Union is to get railroad presidents to tell their management how they want the employees to be treated–with respect and dignity–and correct a lot of problems that in the long run, are hurting the American railroads.

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054275
CRITIQUE OF THE SHORT HAUL RAILROAD MARKET

Banks, RL, Banks (RL) and Associates, Incorporated

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 15 pp

The author discusses at length the papers given on short haul traffic at this RSMA session. His own thought is that the railroads need more than decentralization, they need to have their marketing people given more authority.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO: Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054276
THE TRUCK DELIVERY CONCEPT

Macomber, FS, Kearney (AT) and Company Incorporated

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, 6 pp, 8 Fig

To implement the truck delivery concept, two steps appear to be necessary. 1. There is a need to keep the engine attached and avoid the costly business of setting off cars–this entails a dedicated dump train crew based at the quarry that cuts across seniority district, bypasses yards, occasionally runs on the other railroad's track, and is trained to actuate the dump cars (Union cooperation essential); 2. An expanded storage and retrieval facility capable of accepting dumped aggregate several cars at a time must be developed: (a) through a trestle, and (b) by side dumping.

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054289
COLLECTIVE BARGAINING AND MANPOWER IN URBAN MASS TRANSIT SYSTEMS

Barnum, DT

Pennsylvania University, Philadelphia, Transportation Studies Center, Philadelphia, Pennsylvania, 19104

UMTA-PA-11-001-72-3, Final Rpt, 1972, 438 pp, Figs, Tabs, Refs, Apps

Contract PA-11-0011

This study contains an overall analysis of collective bargaining and manpower problems in the urban transit industry since the late 1930's. The effects of transfer from private to public ownership have been discussed in the collective bargaining structure and productivity of the system. Also the effects and prospects of increased governmental support for the transit industry have been analyzed. A subject index is included, as well as an extensive bibliography.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO: NTIS, Repr PC: $24.00, Microfiche: $1.45
PB-221886

054303
STALLED PROFESSIONALISM: THE RECRUITMENT OF RAILWAY OFFICIALS IN THE UNITED STATES, 1885-1940

Morris, S, Manchester University

Business History Review (Harvard Graduate School of Business Administration, 214-16 Baker Library, Soldiers Field, Boston, Massachusetts, 02163)

Vol. 47, No. 3, Sept. 1973, 18 pp

The author investigation of American railway management indicates that the railroads, which had been such innovative institutions in the nineteenth century, clung to ossified and outmoded managerial practices after the industry reached maturity. Inbred and inflexible systems of recruitment and promotion, he argues, were a noteworthy aspect of the economic decline of American railroads in the twentieth century.

ACKNOWLEDGEMENT:
Business History Review

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Harvard Graduate School of Business Administration, 214-16 Baker Library, Soldiers Field, Boston, Massachusetts, 02163, Repr PC: Req Price

054317
GUIDELINES FOR WRITING RAILROAD OPERATING RULES

Devoe, DB Story, AW

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142 FRA-RT-74-1

DOT-TSC-FRA-73-7, Tech Rpt, July 1973, 27 pp

The report constitutes an aid to persons or groups who must create or revise railroad operation rules. It provides guidance for avoiding confusion, ambiguity and misconceptions in the wording of rules. Content, style and organization are discussed, with illustrations of both desirable and undersirable practices taken from current codes of operating rules.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-223733

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: Req Price
PB-223733

054596
TRAINING LOCOMOTIVE ENGINEERS

Cocquyt, MA, Canadian National Railways

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 9 pp, Phots

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

Canadian National opened in June 1972 its Engine Service Training Centre. The course at the training center covers eight weeks with a mid-term break of four days for the students. Students are selected from the ranks of conductors and yard foremen. The classroom training program covers four main areas: Rules and regulations, equipment function, both motive power and rolling stock, air and dynamic brakes, and train handling and track-train dynamics. Following graduation, the students with the assistance of master mechanics and regular locomotive engineers undertake the road part of the training program. While the staff at the Training Centre decides whether or not a student graduates from the Centre, it is a master mechanic who makes the final decision when he is qualified as an engineer. The training aides, such as a locomotive simulator are described in this paper.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054602
LABOR RELATIONS

Dempsey, WH

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 6 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

In labor relations, one has to deal with change in human relations, change in productivity, and, at a different level, changes in social attitudes toward the appropriate distribution of the income of a particular industry. Then, in a very important way, labor relations has to deal with technological changes. One example of this is the crew consist question, the question as to how many brakemen should be employed on our trains. This question is developed in this paper, and the settlement of the Firemen's dispute and the railroad retirement question are mentioned briefly.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054604
RAILROADING IN EUROPE

Staeheli, GA, Burlington Northern

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 17 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

Because of the magnitude of the subject this report is presented as a narrative created through observation. It covers: Brakes in European practice; Finance; Freight traffic; Passenger service; Speed, Labor; Tracks; Tunnels and bridges; Research; Railroad investments; Signaling; Flagging; Couplers; Engines; New passenger cars; Deadman control; Museums; Uniforms; Railroad industries and shops; Communication; and Road crossings.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054605
DEFECT REPORTING

Beig, EC, Union Pacific Railroad

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643

Proceeding, 1973, 3 pp

Thirty-Seventh Annual Proceedings of the Railway Fuel and Operating Officers Association, 1973.

The problem of engineers' defect work reports, relating from trouble in having crews furnish them, maintenance people using them properly and correcting items reported on them, and other related problems associated with work reports, has been one of controversy for many years. Engineers do not always seem to appreciate the task of furnishing work or defect reports and yet an intelligent work report has no limit as to the valuable information it can furnish the maintenance man and the railroad.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:

Railway Fuel and Operating Officers Association, 10414 South Wood Street, Chicago, Illinois, 60643, Repr PC: Req Price

054607
A BRIEF SURVEY OF THE RAILROADS OF PRINCIPAL INDUSTRIAL COUNTRIES

Union Pacific Railroad, 345 Park Avenue, New York, New York

Feb. 1971, 70 pp, Tabs, Refs

This study was undertaken to determine the current position of rail systems in principal industrial countries, most of which have been nationalized for many years. The survey includes the railroads of seven nations other than the United States, and concentrates primarily on the period between 1964 and 1968. The latter year is the latest period for which detailed financial results are generally available. Comparative data is included on the Union Pacific Railroad Company. This is essentially a statistical survey.

ACKNOWLEDGEMENT:
Union Pacific Railroad

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Union Pacific Railroad, 345 Park Avenue, New York, New York, Repr PC: Req Price

054619
RAILWAY TRAFFIC ORGANIZATION REPORT

Office of Federal Coordinator of Transportation, 400 7th Street, SW, Washington, D.C., 20590

July 1935, 151 pp, Figs, Tabs

This book is no longer in print but can be consulted at the Department of Transportation Library.

This report on railroad freight service was something of a classic for its time. It was based on material collected from the Class I railroads. The report covers such areas as organization, pricing, selling, and personnel.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Department of Transportation Library, 400 7th Street, SW, Washington, D.C., 20590

054620
THE EXTENT OF LOW WAGES AND LONG HOURS IN THE RAILROAD INDUSTRY

Office of Federal Coordinator of Transportation, 400 7th Street, SW, Washington, D.C., 20590

Aug. 1935, 78 pp, Figs, Tabs

This book is no longer in print but can be consulted at the Department of Transportation Library.

A study of the extent to which long hours and low wages prevailed in the railroad industry was undertaken. This report presents the findings of that study. The report may be of value as background information on railroad labor relations.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Department of Transportation Library, 400 7th Street, SW, Washington, D.C., 20590

054647
SHOULD NORTH AMERICA ABANDON THE INDIVIDUAL ROUTING OF WAGONLOADS

Macomber, FS Marino, JH

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 127, No. 5, May 1971, 4 pp, 5 Fig, 1 Phot

A.T. Kearney & Co. Inc. have examined the implications of a drastic reduction in route-mileage combined with a network of intermodal unit trains.

ACKNOWLEDGEMENT:
British Railways, 71/218

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

054667
TIME TO MAKE OUR CASE

Ingram, JW, Federal Railroad Administration

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 1, Jan. 1974, 2 pp

It isn't our basic technology that is outdated, rather it is the application of that technology to modern needs. The railroad industry must join forces with the various levels of government in forging change for the good of the nation. After outlining demands made on the railroad industry and the urgent need of working together, a call is made to work to rationalize demands on our resources.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

054670
RAIL RESEARCH NOW SOLUTIONS ORIENTED

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 1, Jan. 1974, 2 pp

During the last few years there has been a major increase in basic railway research sponsored by the AAR. The money is spent primarily on practical projects and very little is available for developing new technology. The article lists the major fields in which AAR sponsored research is being carried out.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

054673
EMPLOYEE TRAINING

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 4, Feb. 1974, pp 16-24

In a series of three articles the problems and goals of employee training are outlined. As a result of the major technological changes in railways it is much more important that employees receive training that will qualify them for the job. The articles outline some of the new approaches to training.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054677
RAILROADS AND THE PRESS: A VIEW FROM THE NEWSROOM

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 3, Feb. 1974, 4 pp

One of the most effective methods to spread a good image of a railway company, and of railways in general, is through the news media. This requires that the newsmen have a satisfactory relationship with railway Public Relation Officers. In a series of seven interviews with prominent newsmen, the attitude of the news media to railways is discussed.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054717
THE ROLLING STOCK WITHIN THE MODERNIZATION PROGRAM OF THE PORTUGUESE RAILWAYS

DER FAHRZEUGPARK IM RAHMEN DES MODERNISIERUNGSPLANES DER PORTUGIESISCHEN STAATSBAHNEN
Almeida e Castro, F

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung, Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 98, No. 3, Mar. 1974, p 67

Within a six years' modernisation project for the CP which aims at the improvement of the railways, it is also planned to renew the rolling stock amounting to a total of approx. 460 millions of DM. With regard to the special structure of transport in Portugal, the main point will be the supply of electrical or Diesel multiple unit trains. As, on the other hand, there is no intention, for economical reasons, to straighten the railway line which involves many curves, there is interest for a control system depending on the radius of the curves. The increasing of speed puts also much strain on the brakes; thus, it is planned to replace the vacuum brake by the air brake. 5000 antiquated freight wagons shall be scrapped and replaced by 2000 bogie cars having a greater loading capacity. The locomotives shall be used mainly for the freight trains.

ACKNOWLEDGEMENT:
Glasers Annalen ZEV

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
ESL, Repr PC: 3DOL+25¢/p, Microfilm: 3DOL+5¢/fr

054724
TRANSPORTATION IN KENTUCKY

Kentucky Department of Commerce, Division of Research and Planning, Frankfurt, Kentucky

1973, 38 pp, Figs, 21 Tabs

This document catalogs transportation facilities in the state of Kentucky. Descriptions and maps are presented for railroads, inland waterways, highways, and air transportation facilities.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Kentucky Department of Commerce, Division of Research and Planning, Frankfurt, Kentucky, Repr PC: Req Price

054727
EMPLOYEE OWNERSHIP: A NEW WAY TO RUN A RAILROAD

McClaughry, J

Business and Society Review/Innovation (Warren, Gorham and Lamont, Incorporated, 89 Beach Street, Boston, Massachusetts, 02111)

1974, pp 34-37

This article reviews the transition of the Chicago and Northwestern from an unwanted part of a conglomerate to a profitable, employee owned corporation.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Warren, Gorham and Lamont, Incorporated, 89 Beach Street, Boston, Massachusetts, 02111, Repr PC: Req Price

054735
MANAGEMENT BY CREATIVITY OR CONTROL?

Holder, JJ, Jr, Yellow Freight Systems, Incorporated

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 3, 1973, pp 16-23, Tabs

In our ever-changing economic environment many firms fail because they are too control oriented and cannot creatively apply innovations and new techniques. On the other hand, many firms have too many managers thinking and functioning in the "ideal environment" who lose sight of their original purpose for being in business; making a profit and rewarding shareholders. Most successful firms are able to gain a precise balance between creativity and control in their management philosophies. The ability to make sound decisions based on historical experience and data, while at the same time protecting one's corporate future is a rare feat indeed. If a firm is to be continually successful and effective, a synthesis between the theoretical approaches to profitable growth and development, and the hard practical aspects of doing business in a competitive environment must be achieved.

ACKNOWLEDGEMENT:
Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

054757
ANNUAL IMPROVEMENTS SURVEY; LOOKING AHEAD, A LOOK BEHIND

Shaffer, FE

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 2, Feb. 1974, pp 59-75

The article lists the major improvements in the engineering and mechanical areas for 1973 of 49 railways in North America. Plans for 1974 are also outlined. A similar survey is conducted for sixteen urban rail transit systems in Canada and the United States.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

054924
HOW THE INDUSTRY IS PUSHING FOR GRASS ROOTS SUPPORT

Welty, A

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 9, May 1974, 5 pp

With the present energy crisis and the large media coverage on Amtrak, the railway industry has never had a better chance to improve the public's image of railroads. Railways have made attempts recently to improve their image; the most notable example being ASTRO/STA, but individual companies have not been aggressive in promoting themselves to the public. This is due in part to lack of funds. Generally, the future for public relations looks promising and necessary.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054938
GETTING RESEARCH FINDINGS INTO PRACTICE

Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

No. 23, 20-5 FY '71, Proj Rpt, 1974, 24 pp, 6 Fig, 1 Tab, 10 Ref, 2 App

Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration.

This report will be of special interest to highway administrators, researchers, and others in highway management whose responsibilities include the implementation of research findings. A wide variety of organizational processes that have been applied successfully by individual highway agencies in transferring research findings to practical application, and that might be adaptable to use in other agencies, are described.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: $3.20

056956
MANAGERIAL RESOURCES AND PERSONNEL PRACTICES IN URBAN MASS TRANSPORTATION

Mundy, RA Spychalski, JC

Pennsylvania State University, University Park, Pennsylvania Transportation and Traffic Safety Center, University Park, Pennsylvania UMTA-PA-11-0010

TTSC-7317, Nov. 1973, 321p

The primary purpose of this project was to identify and evaluate policies, practices and other conditions relating to the supply of managerial personnel in the urban mass transit industry. The study, conducted during 1972-1973, sought to provide information concerning the following: An inventory of management, technical, and supervisory personnel in the industry; a current profile of management and technical personnel; a summary of personnel practices and training methods now being used in the industry; an assessment of manpower demand and supply in the industry by administrative levels; and a review of the roles of UMTA, universities and the industry in improving the training of personnel in the transit industry with respect to training methods, course contents, level of support for trainees and related matters.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231433/4

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $7.25, Microfiche: $1.45
PB-231433/4

057146
TRANSIT DIRECTORY OF PRODUCTS AND SUPPLIERS

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 5, May 1974, pp 99-162

The 1974 Transit Directory supplies an alphabetical list of products and suppliers of most railway related requirements.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

044823
MICHIGAN TRANSPORTATION IN THE SEVENTIES

Taylor, WC, Michigan Interagency Transportation Council

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 98, No. TE4, Proc Paper 9350, Nov. 1972, pp 847-853

The State of Michigan and the U.S. Department of Transportation have both introduced programs that alter transportation policy. In Michigan, the Governor has proposed a program to divert a portion of the motor fuel tax to a discretionary account. These funds would then be used to meet urban transportation problems without restriction to modes. His proposal also includes a $1.7 billion highway program, and a move toward a system of regional airports. President Nixon's transportation revenue sharing proposal is analyzed as it might affect these Michigan programs. Multimodal state planning efforts are questioned, based on the measurable impacts found in Michigan. The ability of the civil engineer to maintain a prominent role in establishing transportation policy is questioned. Revised thinking and training are recommended to prepare the profession for the new challenges.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017, Repr PC: Req Price

046076
PUBLIC ENTERPRISE IN PRACTICE

Pryke, R

St Martin's Press, Incorporated, 175 Fifth Avenue, New York, New York, 10010

Book, 1972, 473 pp

This book began as a study of the nationalized industries' investment criteria for the Department of Applied Economics at Cambridge University under the general supervision of Mr. Michael Posner. However as the project got under way it became evident that it was unrealistic to consider investment policy in isolation, and that most of the fundamental questions about the economics of the nationalized industries had never been answered. As a result the purpose of the study gradually changed and it was ultimately decided to make a general survey of the economic performance of the public enterprise sector. Nevertheless the original object has constantly been kept in mind and the whole of the third part of the book has been devoted to the way in which the nationalized industries have framed and evaluated their investment programmes. This section of the book also contains a case study of the West Midlands Gas Board which was undertaken before the purpose of the inquiry was redefined.

ACKNOWLEDGEMENT:
St. Martin's Press, Incorporated

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
St Martin's Press, Incorporated, 175 Fifth Avenue, New York, New York, 10010, Orig PC: Req Price

046269
REPORT ON NATIONAL TRANSPORTATION POLICIES

Barber, RJ

Systems Analysis and Research Corporation, 1801 K Street, NW, Washington, D.C.

Sept. 1971, 180p

See also PB-219 224 and PB-219 226.

Part 1 of the report provides transportation policy highlights, and analysis of the principal characteristics of the existing transportation policies and programs, and a description of future trends. Part 2 describes in some detail the federal financial participation programs of the various modes of transportation, and the type of economic regulation applicable to each. It includes a supporting appendix on key statutory and executive agency pronouncements on transportation policy. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-219225/0

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PB-219225/0

046274
AN ANALYSIS OF URBAN MASS TRANSIT SUBSIDIES

Peskin, HM

Institute for Defense Analyses, 400 Army-Navy Drive, Arlington, Virginia, 22202

IDA/HQ-71-12831, Jan. 1973, 60 pp

IA DOT-OS-10017

The paper analyzes possible rationales for public subsidies to transit firms and discusses the validity of each argument. An abstract model relating subsidy formulas to social goals is developed and used to analyze cost subsidies such as capital grants. Estimates of the cost of several subsidy formulas are also presented. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-219077/5

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NTIS, Repr PC: $4.50, Microfiche: $1.45
PB-219077/5

046305
TRANSPORTATION ECONOMICS AND PUBLIC POLICY

Pegrum, DF, California University, Los Angeles

Irwin (Richard D), Incorporated, 1818 Ridge Road, Homewood, Illinois, 60430

Book, 1968, 632 pp, 2 App

In all countries transportation is a matter of prime concern to the governments. In countries where private enterprise renders transportation services for others, specialized forms of public control have grown up, and a large body of transport law has emerged. Transportation, with its huge demands on economic resources has been of special interest to the economist because of the unique place it occupies in the economic activity of society, and because of the unique institutional setting in which it discharges its functions. The book is divided into five main parts, each of which is designed to be more or less self-contained. Each part, however, is built upon the preceding one with the endeavor to avoid as much repetition as possible. Part I deals with transportation as an economic activity and its place in the economy. Part II sets forth the basic economic principles that bear upon transportation and its problems. Part III deals with the regulation of transportation in the United States. Part IV on national transportation policy discusses what are the key issues of the present time as they affect the conduct of private enterprise in transport, and as they affect public policy which is presumed to be directed to achieve an efficient allocation and utilization of economic resources. Part V on urban transportation endeavors to set forth the basic problems of transportation that face the large metropolitan areas today. This book is a deliberate attempt to develop the economic principles of transportation.

ACKNOWLEDGEMENT:

Irwin (Richard D), Incorporated

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Irwin (Richard D), Incorporated, 1818 Ridge Road, Homewood, Illinois, 60430, Orig PC: Req Price

046368
LATIN AMERICAN RAILWAYS PRESS HOME THEIR SOCIAL ADVANTAGES

Flouret, EAS, Latin American Railway Association

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 6, June 1973, pp 209-211, 5 Phot

Governments in Latin America have invested heavily in roads to the detriment of their rail networks, but despite this imbalance it is the railways which now offer the greatest opportunities for technological development, particularly for heavy freight flows and the movement of people in cities.

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046369
TORONTO PUTS PUBLIC TRANSPORT FIRST

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 6, June 1973, pp 212-215, 2 Fig, 3 Phot

Transport policy in Metropolitan Toronto has swung from highway to public transport orientation in recent years. Cancellation of the half-completed Spadina expressway in 1971 has been followed by increased support for public transport operators, and more controversially by a search for new intermediate rapid transit technology. Tom Parkinson, who represents the Toronto Transit Commission on the Metropolitan Toronto Transportation Plan Review, discusses these changes and their effect on existing and planned commuter rail, rapid transit and tramway services.

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IPC TRANSPORT PRESS, Repr PC: Req Price

046370
TIME FOR A SQUARE DEAL ON INFRASTRUCTURE COSTS

Leach, R, McKinsey and Company, Incorporated
McIsaac, GS, McKinsey and Company, Incorporated

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 6, June 1973, pp 216-219, 1 Phot

In 'Blueprint for a European Railway' (RG April 1972) was made the case for establishing a unified European railway system. As was recognized then, this is a long-term objective that for political, social and emotional reasons will not easily or quickly be achieved. Imaginative new policies are now an urgent necessity, and put forward are some immediate steps that can be taken by each country to relieve current financial problems while preparing for further amalgamation of activities later on.

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046372
UITP MEETS AT THE HAGUE

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 6, June 1973, pp 229-230

Rail transport was to the fore at the International Union of Public Transport's 40th Congress, but there is still scope for closer links between national railway systems and local public transport operators.

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IPC TRANSPORT PRESS, Repr PC: Req Price

046574
THE BARGE MIXING RULE PROGRAM

Department of Transportation, Office of Policy and Plans Development, Washington, D.C., 20590

Vol. 1&2, Mar. 1973, 803 pp

Two volumes available separately. Vol. 1 (AD-762349) 204 pp; Repr PC; $6.75; Microfiche; $1.45. Vol. 2 (AD-762350), 599 pp; Repr PC; $12.50; Microfiche; $1.45.

This is a study of the economic regulation of the domestic dry bulk commodity transportation system on the inland rivers and lakes of the United States. Vol. 1 traces the development of the inland river system from colonial times explaining the action and inter-action of laws, engineering developments in tow-boats and barges, waterway development by various government agencies, and the commodities carried in trade. Vol. 2 documents the legal and regulatory aspects of barge shipments on the inland waterways and the economic impact of this trade.

ACKNOWLEDGEMENT:
Department of Transportation

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046711
A METHODOLOGICAL APPROACH FOR EVALUATING TRANSPORTATION RATE INCREASES

Davis, GM, Arkansas University
Swimmer, A, Arizona State University

ICC Practitioners' Journal (Interstate Commerce Commission, Editorial Office, 1112 ICC Building, Washington, D.C., 20423)

Vol. 40, No. 3, Mar. 1973, pp 308-325, 3 Fig

American's domestic transportation industry is massive and its physical output constitutes approximately ten percent of gross national product annually. Substantial segments of the interstate-intercity transportation industry, moreover, are regulated by independent, modally aligned commissions; boards, and bureaus inasmuch as interstate commerce resides within jurisdictional purview of the Congress. On a micro-basis, transportation outlays represent a substantial cost factor to the individual entrepreneur. This particular cost factor is increasing each year, and is pedagogically classifiable as a variable expense to the purchaser. As with any alternation in cost structures, a legitimate theoretical hypothesis can be proffered: will the individual firm voluntarily absorb an augmentation in transportation cost factor, or will the increase be shifted to the ultimate consumer in the form of higher product prices? The answer to this poignant inquiry harbors prodigious Federal policy implications.

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Interstate Commerce Commission, Editorial Office, 1112 ICC Building, Washington, D.C., 20423, Repr PC: $4.50

046724
NON-TRANSPORT CRISES, AS WELL AS RAILROAD PROBLEMS WILL BRING TRANSPORTATION POLICY CHANGES

Boyd, AS

Illinois Central Gulf Railroad, 135 East Eleventh Place, Chicago, Illinois, 60605

Memo, Apr. 1973, 16 pp

Change is coming in U.S. transportation policy, and it may be forced by non-transport problems as much as by current transport crises such as railroad bankruptcy in the Northeast. That is the prediction of Alan S. Boyd, Illinois Central Gulf Railroad president. "Consider the implications of other policy-in-the-making: land-use, environmental pollution, and resource conservation. All of such policy changes as are being forced upon us as we retreat from our former beliefs in infinite growth, infinite resources, infinite energy and infinite land, are bound to have enormous effects upon our public and private transportation systems," Boyd says. "The new public sensitivity to energy, pollution, resource, land-use and consumerism matters offer some interesting and hopeful elements to the current railroad crisis."

ACKNOWLEDGEMENT:
Illinois Central Gulf Railroad

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Illinois Central Gulf Railroad, Press Relations, 135 East Eleventh Place, Chicago, Illinois, 60605, Repr PC: No Charge

046829
STUDY GUIDE FOR EXAMINATION NUMBER 4: TRANSPORTATION LAW AND REGULATION

Broz, JJ

American Society of Traffic and Transportation, 345 West Jackson Boulevard, Chicago, Illinois, 60606

1970

Guide No. 4 seeks to develop a respect for the law of transportation, and a management attitude toward its evolutionary development in the hands of Congress and our regulatory body, the Interstate Commerce Commission. In addition to regulation by the I.C.C. transportation is regulated by the Federal Maritime Commission and by the Civil Aeronautics Board, for the modes of transport under their respective jurisdictions.

ACKNOWLEDGEMENT:
American Society of Traffic and Transportation

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: $5.00

046858
HIGH SPEED RAILWAY NETWORKS WITHIN THE UIC FRAMEWORK

Bordoni, IF

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, N5, June 1973, 3 pp

UIC member administrations, embracing some 400,000 km of railway, point to the possibility of a common European railway management headquarters organisation as has already been brought about by the Union in much of the technical and operating spheres. FS plans for a radically-revised system gives railwaymen no satisfaction in a universal movement to improve environments nationally.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: $5.40

046859
CONTRIBUTION OF THE INTERNATIONAL RAILWAY CONGRESS ASSOCIATION TO THE INTERNATIONAL RAILWAY CO-OPERATION AND DEVELOPMENT

Squilbin, IR

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 5, June 1973, 2 pp

Created on the initiative of the Belgium Government in 1885, IRCA has promoted co-operation between railways internationally and since 1968 one main theme has been deliberated at its Congresses and Enlarged Meetings. RAIL INTERNATIONAL published jointly by IRCA and UIC reports results of matters raised by Governments and railways as well as published authoritative articles on management.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: $5.40

046888
TECHNIQUES OF TRANSPORT PLANNING, VOLUME I: PRICING AND PROJECT EVALUATION

Meyer, JR Straszheim, MR

Brookings Institution, 1775 Massachusetts Avenue, NW, Washington, D.C., 20036

Vol. 1, Book, June 1970, 341 pp

The publication of Techniques of Transport Planning in two volumes completes the Harvard research and concludes the Brookings Transport Research Program. In this first volume, Pricing and Project Evaluation, the authors survey the principles of engineering design, price theory and welfare economics, capital budgeting, and decision theory as a basis for public policy decisions regarding transport investments. Using a single project as a frame of reference, they synthesize and extend the literature of conventional project evaluation, or cost-benefit analysis, as a tool for making those decisions. They thus lay the foundation for Volume 2, Systems Analysis and Simulation Models, which extends the analysis of transport planning to the transport system as a whole. Many transport projects affect the performance of entire transport systems and have a pervasive influence throughout the economy, as the authors illustrate by applying their model to the Colombian economy and transport system.

ACKNOWLEDGEMENT:
Brookings Institution

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Brookings Institution, 1775 Massachusetts Avenue, NW, Washington, D.C., 20036, Repr PC: Reg Price

046889
TECHNIQUES OF TRANSPORT PLANNING; VOLUME 2 SYSTEMS ANALYSIS AND SIMULATION MODELS

Kresge, DT Roberts, PO

Brookings Institution, 1775 Massachusetts Avenue, NW, Washington, D.C., 20036

Vol. 2, Book, Nov. 1970, 228 pp

Rational transport planning seeks the optimum quantity timing, and allocation of transport investments in support of specific economic development goals. Volume 1 of Techniques of Transport

Planning surveyed the underlying principles and synthesized the literature of conventional project evaluation, or cost-benefit analysis, as a tool for making transport investment decisions. In this second volume, the authors apply systems analysis to the transport network of a developing country, Colombia, using a series of interacting models to simulate the network and the economy of Colombia as a whole. Their aim is to demonstrate the applicability of the models to actual planning decisions made under realistic constraints. Systems Analysis and Simulation Models is the final study produced by the Brookings Transport Research Program, which was supported by a grant from the U.S. Agency for International Development.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Brookings Institution, 1775 Massachusetts Avenue, Washington, D.C., 20036, Repr PC: Req Price

047010
USSR: MOVING FORWARD WITH A SINGLE TRANSPORT SYSTEM

Taradonkin, A

Defense Transportation Journal (National Defense Transportation Association, 1612 K Street, NW, Washington, D.C., 20006)

May 1973, pp 40-43

There is a single transport system operating in the Soviet Union: an interconnected complex of railroads and highways, riverways and sea routes, air routes and pipeline mains. All these transport facilities are the state property of the entire people, and they function and develop under a single economic plan. All these types of transport work on the principles of cooperation and collaboration, without competition, rather supplementing one another and doing one and the same job of meeting the requirements of the national economy and the population, in transportation. When one considers the functional importance of each type of transport, the prevalence of railroads in domestic transportation (especially in long-range deliveries) is seen even more tangibly.

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National Defense Transportation Association, 1612 K Street, NW, Washington, D.C., 20006, Repr PC: Reg Price

047266
THE BARGE MIXING RULE PROBLEM: A STUDY OF THE ECONOMIC REGULATION OF DOMESTIC DRY BULK COMMODITY TRANSPORTATION. VOLUME I. REPORT OF THE STUDY

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

Mar. 1973, 204 pp

See also report dated Mar 73, AD-762 350.

The Mixing Rule Study was initiated by Public Law 91-590 directing the Department of Transportation to investigate the economic regulation of dry bulk commodity transportation. Specifically, the Congress felt a need to learn more about the so-called Barge Mixing Rule Problem concerning the economic regulation of domestic barge transportation of dry bulk commodities. The report contains the results of the study and attempts to describe, clarify and analyze all of the significant public policy issues relevant to the problem. The study draws on published sources and on a specially conducted survey of all known dry bulk operators on the Mississippi River, its tributaries, and the Gulf Intracoastal Waterway. The interpretation of these data was validated through staff interviews with shipper and carrier industry associations, government agencies, and academic authorities. The conclusions and recommendations of the study are those of the Secretary of Transportation. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, AD-762349

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AD-762349

047267
THE BARGE MIXING RULE PROBLEM: A STUDY OF THE ECONOMIC REGULATION OF DOMESTIC DRY BULK COMMODITY TRANSPORTATION. VOLUME II. APPENDICES

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

Mar. 1973, 599 pp

See also report dated Mar 73, AD-762 349.

Contents: Requirement for the study; Economic regulation of water carriers; The administrative and legal interpretations of Section 303(b) of the Interstate Commerce Act; Water carrier questionnaire; 1970 movements of commodities.

ACKNOWLEDGEMENT:
National Technical Information Service, AD-762350

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $12.50, Microfiche: $1.45
AD-762350

047473
EFFICIENCY CRITERIA FOR NATIONALISED INDUSTRIES

Nove, A

Allen (George) and Unwin Limited, England

150 pp

Let it be admitted right away that this is a book which will appeal to the few whose interest in the purpose and performance of the nationalised industries extends some way further than firmly-held beliefs (never mind the evidence) on opposite sides of the political divide; for those readers unversed in economic theory, some of the author's references will be obscure. Nevertheless, with the subject of public ownership again promising to become a live political issue, Professor Nove's study has been published at a peculiarly apposite moment. Although it covers the whole spectrum of state enterprise in Great Britain, and not merely a single industry, it provides an interesting counter-weight to the arguments put forward by Dr. Joy in his recent book about British Railways. Indeed, Professor Nove starts with much more basic questions and criticises in particular previous Labour administrations' unclear perception of the 'public interest' when laying down practical ground rules for the nationalised industries. As the author remarks, unless the 'public interest' does have some real meaning relating to possible conflict between private profitability and some apparently desirable act or omission there is little point in nationalising anything. In practice, even where provision has been made for special grants to cover loss-making social services, legislation has tended to stress the 'commercial objectives' of the industries concerned. Within each organisation this has encouraged a fragmented approach to the accounting of its various activities, and internal cross-subsidisation has come to be regarded as unhealthy, even though it is a perfectly normal commercial practice in many other fields. Professor Nove illustrates his arguments with numerous examples of policy decisions in which it is very difficult to see the 'public interest' at work (and, as an authority on Eastern European economic affairs, he devotes a chapter to a study of industries operating within a Communist system). If the book's most pointed criticisms are directed at the party that has traditionally supported the principle of public ownership, that is not an attack on the principle itself. On the other side of the fence, fortunately for the nationalised industries, whatever sort of hostile noises the Conservatives have made in opposition (or at past elections), in Government their approach has been less doctrinaire.

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047830
TRANSPORT DISINTEGRATED

Calvert, R, National Council on Inland Transport

Calvert (Roger), 396 City Road, London ECIV 2QA, England

Book reviewed in Railway Gazette International, August 1973.

Mr. Calvert, who is Secretary of the National Council on Inland Transport, records the contraction of Britain's transport network, particularly the railways, during the 1960s. He shows how the country is still as far away as ever from an integrated transport system, and puts forward his case for railways and waterways as the most economic modes and those which achieve reasonable environmental standards.

ACKNOWLEDGEMENT:
Railway Gazette International

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Calvert (Roger), 396 City Road, London ECIV 2QA, England, Repr PC: Req Price

047842
NORTHEASTERN RAILROAD PROBLEM. A REPORT TO CONGRESS

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

Mar. 1973, 59 pp, Figs

Submitted to Congress by the Secretary of Transportation in response to S. J. Res. 59-2.

On February 9, 1972, Congress directed the Secretary of Transportation to provide, within 45 days, a plan to deal with the Northeast area rail problem. This report is submitted in response to that request.

ACKNOWLEDGEMENT:
Department of Transportation

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Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590, Repr PC: Req Price

047940
DEVELOPING STATE DOT ORGANIZATIONS

Brune, BA, Kearney (AT) and Company Incorporated

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

The question of whether any given state should create a DOT involves numerous considerations and profound ramifications. However, an equally important question concerns the organization and activities of that department, once created. This paper is based on the premise that a state has arrived at a decision to form a DOT. In 1971 the Illinois Legislature addressed a number of major problems with regard to transportation. Much of the material presented in this paper is drawn from the report submitted by the Commission to the Governor in January 1972. In this paper, which includes descriptions of the Illinois experience for illustration, emphasis is placed on the development and benefits of an analytical approach to organizing a state DOT. An effort has also been made to identify factors that should be recognized by the private sector with regard to its dealings with state DOTs.

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047941
TOWARDS A MORE EFFECTIVE STATE ROLE IN TRANSPORTATION

Larson, TD, Pennsylvania State University, University Park

Transportation Research Forum, Brown Palace Hotel, Denver, Colorado

Vol. 13, No. 1, Proceeding, 1972

Proceedings of the Thirteenth Annual Meeting, Transportation Research Forum, Brown Palace Hotel, Denver, Colorado, 8-10 November 1972.

The premises for this paper are that the U.S. is experiencing rapid urbanization, that this urban-suburban society is defining a new service role for transportation, and that for state DOT's to be effective in this context they must adopt different policies than those embraced by traditional state highway administration—new policies consistent with new demographic localities. Organizational forms should tend toward the hierarchical, executive type, thus providing for effective management with reliance on the ballot box for control. Where there is a clear organizational imbalance caused by state operations of a too-extensive highway system as is true in Pennsylvania, this should be corrected by returning roads of other than statewide significance to local control, along with proper funding. The state transportation organization must employ and provide equal opportunity for advancement for all relevant disciplines. In the new departments of transportation, planning is the one area where full cooperation among modes and between urban and rural concerns is mandated. State involvement in the urban mass transit area, generally outside its purview in the past, can be premised on the critical need for additional funds in such areas and the desirability of state coordination for comprehensive planning. The policy-shaping aspect of planning offers long-term encouragement for eventual rationality in state transportation involvement.

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047961
CONNECTICUT MASTER TRANSPORTATION PLAN-1973

Connecticut Department of Transportation, P.O. Drawer A-24 Wolcott Hill Road, Wethersfield, Connecticut, 06109

Dec. 1972, 154 pp

This plan is a continuation of the 1971 and 1972 plans in that the transportation planning effort of the Connecticut Department of Transportation, in conjunction with other State agencies and regional planning agencies, is an on-going continuous process. Transportation needs through 1990, discussed and displayed in the report, amount to approximately $6 billion. The report details the immediate and short range needs for all modes which, in the next three fiscal years, will require approximately $1.5 billion. The program shows, in the following seven years, needs requiring $1 billion. In the development of this plan, alternate forms of transportation were considered to fill the demands and needs for both people and goods throughout Connecticut. There is a need for further analysis and planning in the future, which will be conducted by this Department in cooperation with other agencies. In Chapter V the report discusses the deletion of three sections of expressway from the 1972 Master Transportation Plan, the need to purchase approximately 1900 new buses over the next seventeen years for local bus service, the proposed construction of exclusive busways, improved commuter rail service, the development of a State Airport System, plus a variety of other proposals.

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048162
STRAIGHTENING OUT THE DB'S FINANCES

Vaerst, W, German Federal Railway

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 7, July 1973, pp 265-267, 2 Tab

On May 24 the German Federal Railway published the results of policy studies carried out by the new Board appointed last year. These show that greater investment in rail will prove the cheapest solution economically in the long run, while increasing the DB's traffic would yield substantial social advantages.

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048213
ILLINOIS CREATES A DEPARTMENT OF TRANSPORTATION

Shipley, RR, Illinois State Department of Transportation
Mathews, WE, Illinois State Department of Transportation
McKeever, JL, Colorado State University, Fort Collins

Highway Research Circular (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 145, Aug. 1973, 43 pp

The paper follows the development of the Illinois Department of Transportation from development through initial implementation. It describes the Implementation Group, which was created to coordinate and direct the implementation of the Department, the objectives which guided the Group and the activities which were pursued in the implementation process. Policies and procedures were formulated by the Group which covered the transfer of external responsibilities to the new Department; an initial organization review; the process used in structuring the organizational units; a job evaluation project; the personnel selection process; the importance of communications in the implementation process; and the manpower, budget and logistical problems considered in implementing the new Department without disrupting ongoing activities. The last section of the paper describes the functional organization which was developed based on the mission and objectives of the new Department. An organization chart is shown and the functional responsibilities of each organizational unit are described.

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048270
INVENTORY, APPRAISAL, AND PERSPECTIVES CONCERNING RESEARCH AND DEVELOPMENT IN THE CASE OF LAND AND SEA TRANSPORT

INVENTAIRE, BILAN ET PERSPECTIVES DE RECHERCHE ET DE DEVELOPPEMENT EN MATIERE DE TRANSPORTS TERRESTRES ET MARITIMES
Setec-Economie, 92 Courbevoie, France

1971, 553 pp

Published for the European Communities' Commission 'General Management of General Research and Technology', 1971. In 3 Volumes.

The results of a study requested, in December 1969, by the European Communities' Commission. The geographical area covered by the study includes the 6 countries in the European Community, as well as Great Britain, Switzerland, the United States and Canada. The study was divided into 3 parts: 1) the role of the State in regard to research in the different countries within the geographical area covered by the study, which terminates with a chapter dealing with international co-operation on questions of research and development in the field of land and sea transport; 2) the inventory itself of the activities concerning research and development, which is divided into 3 sections; i.e. the elementary techniques intended for land or sea applications (the linear motor, motors causing less pollution, or no pollution, air-cushion suspension, the system of magnetic suspension, accumulators, fuel cells, the control and regulation of road traffic), systems of land transport (systems of inter-urban transport, and systems of transport in conurbations), and systems of sea transport; and 3) general observations designed to provide information enabling restricted areas to be defined, concerning which the European Communities' Commission should undertake considerably more detailed work.

ACKNOWLEDGEMENT:
International Railway Documentation, 274

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

048273
TRANSPORT SYSTEMS

LES TRANSPORTS
Editions Armand Colin, Paris, France.

Vol. 1, 1972, 352 pp, Figs, Tabs

The above work, in the "Plan and Planning" collection of the General Planning Commissariat, has been published as a result of the planning studies submitted by the Transport Committee, which are intended to propose, on the basis of a global estimate of the volume of passenger and goods traffic to be expected by 1985, an allocation of these traffics to the different forms of transport, by examining, through the medium of contrasted situations, the possible alternatives and the strategies to which they give rise. After setting out general details of the position concerning transport by 1985, an examination is carried out of regional, inter-regional, "intra-continental," and inter-continental, passenger traffic. The third part, in which a study is made of goods traffic, deals successively with specific studies relating to the internal transport of roughly manufactured goods, as well with those concerning the internal transport of semi-manufactured, and fully manufactured, goods, the allocation of traffic to the different forms of transport, and traffic linked to distribution. The final chapters contain an overall view of the results of these studies, together with details of the inter-continental transport of goods traffic. The general conclusions are followed by voluminous appendices and bibliographical details concerning planning in the transport industry.

ACKNOWLEDGEMENT:
International Railway Documentation, 283

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International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

048301
STATE GOVERNMENT PERSPECTIVES ON LIGHT DENSITY RAIL OPERATIONS

Clapp, NM, Wisconsin Department of Transportation

American Highways (American Association of State Highway Officials, 341 National Press Building, Washington, D.C., 20004)

Vol. 52, No. 2, Apr. 1973, 4 pp

Presented before the Symposium on Economic and Public Policy Factors Influencing Light Density Rail Line Operations, Boulder, Colorado, January 10-11, 1973.

With the growth of our economy, service by complementary and sometimes competing modes of transport—highway and air—has also come about. However, recent applications filed with the Interstate Commerce Commission leave no doubt that the desire exists to reduce substantially the mileage of rail track and thin that network of service in Wisconsin. A look at the statistics shows that momentum is just gathering on track abandoment proceedings in Wisconsin. Not only will the abandonment process accelerate, but the facilities and areas impacted will be of greater import than ever before in the state's transportation history. What approach can a state such as Wisconsin take to the threat of large-scale abandonments? What actions are possible; what tools are at hand: In recognition of the variety of interests and conflicts in the entire situation, three basic factors stand out—the present carriers; the current shippers; and the rather formless shape bearing the mask of future generations.

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050075
THE LEGISLATION OF BALANCE

Pikarsky, M

ASCE Journal of Transportation Engineering (American Society of Civil Engineers, 345 East 47th Street, New York, New York, 10017)

Vol. 99, No. TE3, Paper 9938, Proceeding, Aug. 1973, pp 483-488

This paper explores various avenues of legislation that can be effective in rebalancing the nation's transportation modes, especially between Mass Transit and highway construction. The federal government is in a position to rebalance these modes by agreeing to pay the same 90% of mass transit projects as is paid for interstate highway construction, by exempting mass transit projects from elaborate comprehensive planning requirements, particularly with regard to replacement of capital equipment, when such extensive processes are not required for highway construction and to release mass transit funds which the Congress has appropriated but which are now held by executive impoundment. Local governing bodies should be given the right to decide which local transportation projects should be given priority with regard to allocation of the Highway Trust Fund. Historical background information and current transportation policy information are included.

ACKNOWLEDGEMENT:
American Society of Civil Engineers

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050087
THE CAMBRIAN COAST LINE: A COST/BENEFIT ANALYSIS OF THE RETENTION OF RAILWAY SERVICES ON THE CAMBRIAN LINE

Ministry of Transport, England, Saint Christopher House, Southwark Street, London SE1, England

1969, 45 pp, Figs, 16 Tab, 4 App

In the spring of 1967 the then Minister of Transport announced that a special Economic Unit was being established in the Ministry to study unremunerative railway passenger services. One of the Unit's duties was to develop the use of cost/benefit analysis as an aide to the examination of railways passenger closure proposals, and the service chosen for pilot study was that between Machynlleth and Pwllheli along the north eastern shore of Cardigan Bay in Wales. This Report is the result of the study, and it is issued by the Directorate of Economics and the Directorate of Statistics in the Ministry in association with the Government Social Survey. As announced in January 1969, the Government has undertaken to pay a grant for 1969 under the provisions of Section 39 of the Transport Act 1968 for the continuance of services on this line.

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050133
SINGLE STATE OPERATION

Hart, G, Reaugh, Hart, Allison, Prescott and Davis

ICC Practitioners' Journal (Assn of Interstate Commerce Comm Practitioners, 1112 ICC Building, Washington, D.C., 20423)

Vol. 40, No. 6, Sept. 1973, pp 726-744

Any person desiring to institute operations as a common carrier by motor vehicle in interstate or foreign commerce within the confines of a single-state theoretically, at least, has a choice of three procedural alternatives which are provided for under Part II of the Interstate Commerce Act.

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050140
HIGH SPEED GROUND TRANSPORTATION ACT OF 1965

Federal Railroad Administration, Office of Research, Development and Demonstrations, Washington, D.C., 20590

No. 6, FRA-ORD/D-74-8, Ann Rpt, Sept. 1972, 145 pp

See also Annual rept. no. 5, PB-212 694.

The report accounts for High Speed Ground Transportation activities and covers the period ending 30 September 1972. Previous reports of the former Office of High Speed Ground Transportation have served as a source book on the HSGT Program for Congressional Committees, other DOT organizations, prospective contractors, academicians, and others wanting to know about HSGT program content, accomplishments, or future direction. HSGT activities are now a portion of the work of the Office of Research, Development, and Demonstrations in the reorganized Federal Railroad Administration. This Sixth Report will serve the same purpose as previous reports and reflect the more recent emphasis of the activities at the High Speed Ground Test Center in Colorado, expanding hardware development programs, and maturing demonstration programs.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-222261/0

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NTIS, Repr PC: $4.50, Microfiche: $1.45
PB-222261/0

050339
RAILROAD CONSOLIDATION AND RELOCATION

Chamberlain, EA, Sverdrup and Parcel and Associates, Incorporated

Planners Notebook (American Institute of Planners, 1776 Massachusetts Avenue, NW, Washington, D.C., 20036)

Vol. 3, No. 3, June 1973, 6 pp

This case study points out the complexity of the railroad "problem" in a medium-sized city, and it shows how one solution is being achieved through public sector and railroad cooperation. This situation posed by rail operations is common in most cities where downtown and urban area railroad crossings create traffic problems and safety hazards. The solution in Lincoln, Nebraska offers one type of legal and financial arrangement possible. Of most importance in this case study is the basic recognition that the city and the railroads shared a problem which is being solved by joint efforts. Lincoln was one of the first cities to come to grips with the "railroad problem" and its relationship to highways and community redevelopment. It offers an example to others across the nation. A recent Federal Railway Administration (FRA), Department of Transportation, study proposal listed the Lincoln program as a primary reference for analysis of railroad and urban area coordination.

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American Institute of Planners, 917 15th Street, NW, Washington, D.C., 20005, Repr PC: $2.00

050394
AN ANALYSIS OF THE COST TO THE UNITED STATES OF A ONE YEAR DELAY IN THE DELIVERY OF ALASKAN NORTH SLOPE OIL

O'Leary, BG, Canadian Institute of Guided Ground Transport
Lake, RW, Canadian Institute of Guided Ground Transport
Law, CE, Canadian Institute of Guided Ground Transport

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 1, 1973, pp 24-50, 2 Tab, 8 Ref, 4 App

The major purpose of this study was to examine the validity of the claim that delay in the exploitation of Prudhoe Bay oil reserves would be very costly to the United States. The analysis upon which this claim was based was examined in depth. Since the assumptions underlying the model proved unrealistic, a model allowing for escalating costs and prices and the risk implicit in continuing dependence on Middle-East oil supplies was developed. The results obtained were carefully analyzed for a wide range of possibilities. A one year's delay in the exploitation of Prudhoe Bay oil will result in a net benefit to the United States in the order of one-half billion dollars. This figure is in sharp contrast to the suggestion that a one year's delay will cost the nation one billion dollars. Although the methodology used by the Department of the Interior is sound, the unrealistic "simplifying" assumptions that costs and prices will remain constant and the magnitude of the discount rate selected render it useless. The combined effect of these oversimplifications is the inference that oil conserved until 1989 is worthless to the nation. The $500 million net benefit figure is derived from the same methodology, without the simplifying assumptions. It is also concluded that, in view of the ever increasing dependence of the United States on offshore supplies of crude oil and the present shortage of continental crude reserves (including Canada and Alaska), the Alaskan reserves should not be exploited until the United States has carefully examined its policy concerning the level of strategic petroleum reserves that should be conserved for future contingencies.

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050462
CHANNEL TUNNEL WINS GOVERNMENT APPROVAL

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 129, No. 10, Oct. 1973, 387 pp

In a white paper published on Sept. 12, 1972, the terms under which private capital raised on the international markets can be used to finance the Channel Tunnel have been set out. At the same time, the British Government has declared itself in favour of building the tunnel, subject only to Parliamentary approval and the favourable results of further technical and revenue studies to be carried out next year which form Phase II of the whole project. The French Government has for many years favoured construction of the tunnel, and approval of the project by the British Parliameter will remove the last real barrier.

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050480
TRAINS INTO FLOWERS

Commoner, B

Harper's Magazine (Harpers Magazine, Incorporated, 2 Park Avenue, New York, New York, 10016)

Vol. 247, No. 1483, Dec. 1973, pp 78-86

This article is critical of the proposed 'rationalization' of trackage and routes as part of the re-organization of Penn Central. The author points out that railroad routes are practically 'irreplaceable' if abandoned, that railroads are much less damaging to the environment than truck transport, and that railroads conserve energy. He is critical of the American railroads which operate at a profit motive, and calls for railroads to be operated as a public service, that is, as a nationalized industry.

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Harper's Magazine, Incorporated, 2 Park Avenue, New York, New York, 10016, Repr PC: Req Price

050659
TRANSPORTATION PLANNING IMPROVEMENT PRIORITIES: DEVELOPMENT OF A METHODOLOGY

Melinyshyn, W, Ontario Ministry of Transportation & Communication
Crowther, R, Ontario Ministry of Transportation & Communication
O'Doherty, JD, Voorhees (Alan M) and Associates, Incorporated

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 458, 1973, pp 1-12, 7 Ref

The selection and timing of large-scale transportation investments should be undertaken by using a cost-effective technique within a framework of clearly stated objectives and assumptions. Such a technique bridges current long-range planning and project implementation and ensures that implementation of transportation improvements optimizes overall benefits to the public and simultaneously achieves horizon-year plans. The priority planning methodology discussed in this paper identifies and assesses transportation improvement impacts on both transportation users and the community at large. Impacts, beneficial or unbeneficial, are evaluated and used to develop time streams of present worth of benefits as functions of the year of implementation. The functional benefit and cost time streams are combined with future budget estimates and subjected to linear programming analysis. The linear program selects and stages a mix of transportation improvements that maximizes the total present worth of benefits capable of being realized, given the assumed budgets. The methodology has important potential uses as both a management decision-making tool and a readily accessible transportation planning data source.

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050660
MULTIMODAL NATIONAL URBAN TRANSPORTATION POLICY PLANNING MODEL

Weiner, E, Office of the Secretary of Transportation
Kassoff, E, Maryland Department of Transportation
Gendell, DS, Federal Highway Administration

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

N, 458, 1973, pp 31-41, 13 Fig, 9 Ref

This multimodal version of the model system of the Transportation Resource Allocation Study employs aggregate modeling techniques that treat each urban area as a single analysis unit. A level of investment is specified, and within that level are mixes of 4 types of transportation facilities: freeways, arterials, conventional bus, and rapid transit. For each alternative, travel projections are made on the basis of both socioeconomic variables and the nature and extent of the transportation system. Travel is split between automobile and transit modes. System performance measures are estimated on the basis of the interaction of system supply and travel demand. Travel times and costs are calculated for each mode. In addition, the model calculates external effects such as land consumed, air pollution, and fatalities. The model tested the effects of 12 alternatives consisting of 4 mixes of transportation facilities for the 63 urbanized areas that will have populations of more than 500,000 in 1990.

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050661
PROCEDURES USED IN DEVELOPMENT OF UNIFIED TRANSPORTATION WORK PROGRAMS FOR THE MASSACHUSETTS PLANNING PROCESS

Campbell, B, Massachusetts Department of Public Works
Humphrey, TF, Massachusetts Department of Public Works

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 458, 1973, pp 42-48

The Massachusetts Department of Public Works has undertaken an ambitious program to revitalize its transportation planning process. The major focus has been on the 12 regional planning agencies that incorporate every community in the commonwealth. For each of the regions, unified transportation work programs have been developed that describe the comprehensive transportation planning work to be undertaken for a 5-year period. The work programs will be implemented under the direction of policy groups established in each region. Each policy group is composed of representatives from state, regional, and local agencies and from citizen groups and the general public. A major objective of the revitalized planning process is to develop projects for implementation that are mutually agreeable. Therefore, the success of the program will be measured by its ability to produce agreed-upon projects for implementation. A key mechanism for accomplishing this objective is the development and subsequent implementation of the unified transportation work programs. This paper describes the major features of the revitalized planning process, the procedures used to develop the unified transportation work programs, and the manner in which the planning specified in the work programs is being implemented.

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050667
EVALUATION OF ROAD-RAIL INTERACTION IN THAILAND

Jones, JH, Asian Institute of Technology

Transportation (Elsevier Scientific Publishing Company, Box 211, Amsterdam, Netherlands)

Vol. 2, No. 3, Oct. 1973, pp 281-298

The main line of the State Railway of Thailand to serve the Northeastern region of the kingdom was built in 1900 to the town of Korat and subsequently extended to its northern extremity at the Laos border. The Friendship Highway, a modern highway parallel to the railway and serving the same transportation corridor, was completed in 1958 as far as Korat. In 1965 the northern extension of the Friendship Highway was opened to Nong Khai, the northern terminous of the railway. The effect of the nearby and parallel highway on freight traffic—for upland crops, vegetables, rice, kenaf, and forest products—is shown in terms of tonnages dispatched by the railway and in relation to the production of those commodities. Passenger traffic originating on the Northeastern railway line is analysed. Statistics indicating the shift in modal split between road and rail, for both freight and passengers in the Kingdom, are presented for a six-year period. An estimate of the loss in revenue for the Korat-Nong Khai segment of the railway has been made for both originating passengers and certain classes of freight traffic. Clearly demonstrated is the unceasing trend toward road haulage of freight and the use of highway buses by intercity passengers. This paper is intended to draw attention to the magnitude of the problem rather than to suggest definitive solutions.

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050676
THE RAILWAY AND SOCIETY

Hjelt, P, Danish State Railways

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 9, Sept. 1973

More than other modes of transport, the railways have contributed towards establishing the basic conditions for industrial and urban development—features characteristic for countries which have been in the vanguard of progress during the last 100 to 150 years. Owing to the railway, it has been possible to achieve rapid transport, over great distances, of large quantities of goods and passengers. Meanwhile, the motor car and the aeroplane have appeared—modes of transport with whom the railway could not compete in terms of mobility and speed. Motorways and airports were given priority to the detriment of the railways, thus accelerating a process which tended to relegate the railway to an inferior status. Moreover, although the railways clearly had to withdraw from the monopoly position which they had occupied in the sphere of land transport and which they had well maintained in their time, the liabilities incurred at that time, derived from the monopoly status, were still in existence.

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050694
RAILWAY TRANSPORT OF THE USSR IN THE YEAR 2000

Karetinikov, AD, Railway Research Institute, USSR

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 8, Aug. 1973, 10 pp

In recent years much attention has been directed in the USSR to forecasting the development of the national economy for a long period of time. Most of the Research Institutes, Ministries and Planning organizations take an active part in solving this important problem. This can be accounted for first of all by the fact that it is difficult to solve important national economic problems in terms of conventional five-year plans. Planning for a longer period of time would have been complicated without projections. In making projections the USSR was able to choose the most advanced trends in technological progress, to outline effective ways of developing the national economy and its individual branches, to determine the course of development of science and technology. Long-term forecasting is of a special significance to the multi-branch and extensive economy of railway transport since, with the rapid increase in the volume of freight and passenger traffic, account should be taken of the fact that the technical means of railway transport cannot very often be renewed, for they are intended for a life of 30-40 years and in certain cases up to 100 years (for example, the track formation).

ACKNOWLEDGEMENT:
Rail International

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International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium, Repr PC: Req Price

050853
AGRICULTURAL COOPERATIVES AND EXEMPT AGRICULTURAL COMMODITIES

Carver, CW

ICC Practitioners' Journal (Assn of Interstate Commerce Comm Practitioners, 1112 ICC Building, Washington, D.C., 20423)

Vol. 40, No. 6, Sept. 1973, pp 711-725

The Interstate Commerce Commission was established in 1887 to regulate the several railroads. The advent of efficient and economical motor vehicles gave rise to the trucking industry which began to capture more and more of the inter-city transportation of freight. With the growth of trucking business there came also many disadvantages to members of the trucking industry and the shipping public, not to mention the railroads. In 1935 the Motor Carrier Act was passed which regulated market entry and rate levels. In September of 1940 Congress passed the Transportation Act of 1940 which incorporated the Motor Carrier Act of 1935 as Part 2 of the Interstate Commerce Act. For numerous reasons, including depressions and the fact that a number of the members of Congress were representatives from farming areas, there had been in effect, well prior to the passage of the Motor Carrier Act, a public policy favoring the interest of farmers.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, NEW York, 14209, Repr PC: Req Price

050854
IS IT PRIVATE CARRIAGE OR IS IT FOR-HIRE TRANSPORTATION

Keller, JE, Keller and Heckman

ICC Practitioners' Journal (Assn of Interstate Commerce Comm Practitioners, 1112 ICC Building, Washington, D.C., 20423)

Vol. 40, No. 6, Sept. 1973, pp 749-756

Private carriers are the subject of above-average attention these days in the transportation field. They are the object of much discussion by the rail and water carriers as well as the highway for-hire carriers. Why is there such a cacophony of voices decrying private carriage today. Of course, some of it springs from competitive forces, from pocketbook philosophy. Most of it comes from a misunderstanding of what constitutes private carriage and also from a basic appreciation of the contributions which private carriers make to the whole transportation system. We must try to explain the background for these misconceptions.

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050855
COMMERCIAL ZONES; MUNICIPALITIES, CONTIGUOUS; "INCIDENTAL TO OTHER CARRIER SERVICE"

Baker, DW, Handler, Baker and Greene

ICC Practitioners' Journal (Assn of Interstate Commerce Comm Practitioners, 1112 ICC Building, Washington, D.C., 20423)

Vol. 40, No. 6, Sept. 1973, pp 749-756

The commercial zone exemption is something with which everyone involved in interstate transportation is familiar. This knowledge is gained from a person's day-to-day experiences in carrying out the duties of his employment and the particular problems he will experience will depend upon by whom and where he is employed. The involved statutory provision creating commercial zomes, Section 203(b)(8) of the Interstate Commerce Act, has had a remarkable durability and has survived the test of time, for it has not been changed since it was enacted as part of the Motor Carrier Act of 1935.

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050884
REALITY TAKING OVER

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 3, No. 8, Oct. 1973, pp 348-349, Phots

The rejuvenation of railways demanded for so long by users, operators and by sheer historical necessity is at least on the way and the nineteenth century methods, equipment and organization are to be transformed into ones fit to stand up to the needs and expectations of the twenty first. The signs are emerging not only by the way of new up to date stations, extended city and suburban lines, new rolling stock and faster and much improved services but, above all, by the way of extensive and ever growing momentum of railway electrification which in the end is the only effective, civilized and environmentally justifiable method of moving large numbers of people and large quantities of goods in what is likely to become a rather densely populated world.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr PC: Req Price

051336
SUMMARY OF AWARDS/FISCAL YEAR 1973. PROGRAM OF UNIVERSITY RESEARCH

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590 TST-60

DOT-TST-74-9, Sept. 1973, 30 pp, 1 App

For additional copies write in care of the Office of University Research, Department of Transportation.

Abstracts of contracts awarded in Fy 1973 for research under a program exclusively with universities. Substantive and programmatic summaries indicate contributions to urban mobility, raising transportation productivity, energy, environment, safety and community decision making process; to prescribed program elements and research objectives; and to type of research (basic, applied, etc.) and mode of transport.

ACKNOWLEDGEMENT:
Department of Transportation

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590, Repr PC: Req Price

051348
PRIVATE CARRIAGE TRENDS: ARE THEY REVERSIBLE?

Reistrup, PH

Illinois Central Gulf Railroad, 135 East Eleventh Place, Chicago, Illinois, 60605

Oct. 1973, 8 pp

Presented at the National Freight Traffic Association, Boca Raton, Florida, Oct. 29, 1973.

This paper considers the growth of private carriage and its impact on common carriers.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Illinois Central Gulf Railroad, Press Relations, 135 East Eleventh Place, Chicago, Illinois, 60605, Repr PC: Req Price

051378
ORGANIZATION AND COMPETITION IN TRANSPORTATION: THE AGRICULTURAL EXEMPT SECTOR

Lamkin, J, Texas Transportation Institute

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 13, No. 1, Sept. 1973, 8 pp, 3 Tab

The transportaion of agricultural commodities by truck is not subject to economic regulation when moved in interstate commerce. Agricultural commodities are specifically exempt from Interstate Commerce Commission regulation in section 203(b)(6) of the Interstate Commerce Act. Exempt truck transportation presents a unique contrast in regulatory policy and affords an opportunity to observe the results existing in the seeming paradox of both regulated and nonregulated for hire transportation operating within the same economy.

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American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

051572
ALTERNATE FORMULAS FOR A FEDERAL OPERATING SUBSIDY PROGRAM FOR TRANSIT

Oi, WY

Institute for Defense Analyses, Program Analysis Division, Arlington, Virginia

P-943, Final Rpt, Nov. 1973, 140 pp

See also report dated Jan 73, PB-219 077.

The paper discusses the rationale for transit subsidies, and explores the implications of four simple transit-subsidy formulas. It reviews the several arguments that have been advanced to justify the subsidization of mass transit services; describes some of the many possible subsidy formulas for allocating funds under an operating subsidy program; and directs attention to four criteria that should be used in selecting a particular subsidy formula; efficacy, incentives for economic efficiency, distribution costs, and equity. Four simple transit-subsidy formulas are analyzed: subsidies proportional to urban populations, to transit revenue-passengers, to vehicle-miles of service, or to potential transit-riders.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225718/6

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PB-225718/6

051906
TRANSPORTATION POLICY: AN EXAMINATION OF CONSTITUTIONAL AND INTERGOVERNMENTAL ASPECTS OF A COORDINATED TRANSPORTATION POLICY IN CANADA

Burns, RM

Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada

#73-3, Mar. 1973

This report represents a preliminary study into the various factors and influences involved in the development of a coordinated transportation policy within the Canadian federal system. The study is of a general nature, and is the result of a survey of secondary sources only. This particular problem has been approached through an analysis of the background of transportation development in Canada from several aspects: historical, political, economic, and legal, including some concept of how transportation policy has developed under these various influences. A detailed examination of the historical development of transportation has been undertaken as a further step in establishing the status of transportation in Canadian policy formulation. This is followed by a study of political and economic influences. The research has clearly indicated that the lines of demarcation of responsibility are often confusing and intersecting, which in itself has been instrumental in the development of policies by central and provincial governments which in many cases have been contradictory rather than complementary. An examination of legal and constitutional aspects delineates the problems which are involved in the development of a coordinated transportation policy within the federal framework, and aids in a clearer understanding of why a coherent and consistent policy has not emerged despite a long history of public involvement in transportation. Transportation policy has continued to be developed from separate modes rather than in the total sense. These preliminary insights reinforce the prime purpose of the study: an attempt to establish an understanding of the intricacies of the problem from all points of view, and to underline the necessity of developing some more effective ways of relating the often diverse interests of the various jurisdictions in Canada through the development of a national transportation policy.

ACKNOWLEDGEMENT:
Canadian Institute of Guided Ground Transport

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Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6, Canada, Repr PC: Req Price

051934
RAIL SERVICE IN THE MIDWEST AND NORTHEAST REGION

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

Vol. 1, Report, Feb. 1974, 86 pp, Figs, Tabs

A Report by the Secretary of Transportation. Submitted in Accordance with Section 204 of the Regional Rail Reorganization Act of 1973, (P.L. 93-236). A two volume appendix is also available.

The Regional Rail Reorganization Act of 1973 (P.L. 93-236), enacted January 2, 1974, directed the Secretary of Transportation to submit a comprehensive report containing his conclusions and recommendations with respect to the geographic zones in the midwest and northeast region within and between which rail service should be provided. This report is submitted in accordance with that provision.

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Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590, Repr PC: Req Price

051935
PENN CENTRAL: WHAT PRICE GOVERNMENT AID?

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 174, No. 3, Feb. 1973, 1 p

Penn Central's trustees have recommended three alternative forms of government assistance: a) Subsidies until the railroad becomes viable; b) Joint venture involving conveyance of rail plant to public authority, government commitment to maintain and to improve plant, and proportionate sharing of user charges paid by private operating company; c) Government purchase or lease of right of way at fair market value with subsequent government operation by private company paying user charges.

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

052067
AMERICAN GROUND TRANSPORT. A PROPOSAL FOR RECONSTRUCTING THE AUTOMOBILE, TRUCK, BUS, AND RAIL INDUSTRIES

Snell, BC

Government Printing Office, Superintendent of Documents, Washington, D.C., 20402

27-540 0, Feb. 1974, 103 pp, Tabs, Phots, Refs

Presented to the Subcommittee on Antitrust and Monopoly, Committee of Justice, U.S. Senate, Feb. 26, 1974.

This report, which was presented to a Senate Subcommittee, is primarily concerned with competition in the transportation industry. It contains sections on the demise of street railway and interurban electric railway systems, of the political opposition to rapid transit, and on the replacement of New Haven electric locomotives by diesels. The report blames the economic power of certain auto makers for many of the present day transportation problems in the U.S.

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053724
WE MUST SUBSIDIZE MASS TRANSIT

Ronan, WJ, Institute for Rapid Transit

Reader's Digest Association, Incorporated, Pleasantville, New York, 10570

Apr. 1974, 3 pp

This article states the case for subsidizing mass transit. It points out the financial problems of mass transit, the need for transit in urban areas; and the energy and environmental benefits to be realized from improved mass transit.

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Reader's Digest Association, Incorporated, Pleasantville, New York, 10570, Repr PC: Req Price

053730
ANY POLICY AIMING TO PROMOTE PUBLIC TRANSPORT, TO BE EFFICIENT HAS TO BE BASED ON IMPORTANT IMPROVEMENTS OF THE QUALITY OF SERVICE.

Frybourg, M, Institute of Transport Research

Rail International (International Railway Congress Association, 17-21 rue de Louvain, 1000 Brussels, Belgium)

No. 1, Jan. 1973, 11 pp, Figs, Tabs

The economic planning has placed the accent on the importance of the macro-economy in order to deal with the vast counter balance between the aggregates of the national finance.

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ESL, Repr PC: 3DOL+25¢/p, Microfilm: 3DOL+5¢/fr

053733
CO-OPERATION OF PUBLIC TRANSPORT UNDERTAKINGS IN CITY REGIONS: PROBLEMS OF COST ACCOUNTS, TARIFFS AND REVENUE SHARING, FROM THE GERMAN FEDERAL RAILWAY'S POINT OF VIEW

Boecker, KH, German Federal Railway
Pertzsch, HJ, German Federal Railway

Rail International (International Railway Congress Association, 17-21 rue de Louvrain, 1000 Brussels, Belgium)

No. 1, Jan. 1973, 15 pp

It has taken a long time—a far too long time—before it has come to be generally recognised that the enormous efforts made by our generation in order to cope with the traffic problems in large conurbations can by no means be confined to measures for private transport but that, at present and in future, it is public transport which must form the backbone of the transport systems. In the course of the long process which our society has undergone in appreciating the value of well-organised local public transport systems, there is today again some reason to hope that it may, after all, still be possible to master the traffic problem in the large city regions.

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053868
POLITICALLY EXPEDIENT LEGISLATION—TRANSPORTATION'S WATERLOO

Neuschell, RP, McKinsey and Company, Incorporated

Progressive Railroading (Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606)

Vol. 17, No. 3, Mar. 1974, 3 pp

This article maintains the the Rail Reorganization Act is getting us no closer to the problems of our transportation system as a whole. It further maintains the act does nothing to restructure and permanently improve the cash flow of the new NE railroad, nor does act necessarily open the door for solutions to the fundamental problems of economics, marketing, and operations. The fault lies with the crisis approach we take in coping with the fundamental problem of transportation in this country: How should we divide up the national transportation dollar between modes of transportation?

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Murphy-Richter Publishing Company, 9 South Clinton Street, Chicago, Illinois, 60606, Repr PC: Req Price

053879
REGULATORY POLICY AND DECISIONS RELATING TO RAIL CONTRACT RATES

De Jarnette, KR, Banks (RL) and Associates, Incorporated

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 13, No. 2, Dec. 1973, 22 pp, Refs

In this paper, an attempt will be made to explore one possible way that the railroads might be able to improve their ability to capture and hold additional business; namely contract rates and contractual agreements with their customers. While permitting railroads such contracting powers may seem a relatively small gesture, it has the very large advantage of not adding to the burden of the citizen as consumer and taxpayer.

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American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

053880
FREIGHT TRANSPORTATION: A STUDY OF FEDERAL INTERMODAL OWNERSHIP POLICY

Lieb, RC

Praeger Publishers, Incorporated, 111 Fourth Avenue, New York, New York, 10003

Vol. 13, No. 2, Dec. 1972, 225 pp

The railroad industry has not been allowed by the ICC to expand freely into other modes of transportation. In other words, no matter how willing the railroads were to become intermodal transportation companies, they were basically stymied by the ICC's interpretation of the existing transport legislation. Professor Lieb has carefully prepared an outstanding analysis of the federal government's policy toward intermodal ownership. The study is very adequately footnoted, so that it becomes a goldmine for researchers who wish to examine any aspect of intermodal ownership in more detail.

ACKNOWLEDGEMENT:
Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Praeger Publishers, Incorporated, 111 Fourth Avenue, New York, New York, 10003, Orig PC: $15.00

053881
RAILROADS AND THE TRANSPORTATION PROBLEM: SOME THOUGHTS ON STRATEGY AND POLITICAL ROLES

Nupp, BL, Department of Transportation

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 13, No. 2, Dec. 1973, 4 pp

The railroad problem has been for long a symbol of failure—failure in public policy, in private industrial policy, in management, in technological application. The ICC comes in for a share of blame. It has not allowed the railroads to raise rates fast enough to match inflation; it has not allowed the railroads to lower their rates fast enough to meet competiton; it has allowed rail merger cases to get bogged down in extensive procedural activities; even while it was failing to take a comprehensive view of rail industry's regional and national structure. But many critics maintain that a principal problem with transport regulation is that it has been captured by the railroads and merely registers their wishes. Why, then, have they not wished for better things? History shows conclusively that the rail industry has not been rich in strategic thought.

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American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

053985
A CRITIQUE OF THE STUDY "EVALUATION OF RAIL RAPID TRANSIT AND EXPRESS BUS SERVICE IN THE URBAN COMMUTER MARKET"

Vuchic, VR, Pennsylvania University, Philadelphia

Institute of Public Administration, 1619 Massachusetts Avenue, NW, Washington, D.C., 20036

Feb. 1974, 25 pp, 5 Fig, 17 Ref

The original study was done by the Institute for Defense Analysis the critique was sponsored by the Office of Transportation Planning Analysis U.S. Department of Transportation.

The recently released IDA Study discusses some important issues in urban transportation and its contents have already caused considerable controversy. The purpose of this Critique is to analyze the Study—its objectives, methods and findings—evaluate its implications, and suggest what stand UMTA should take toward it. The Critique is based on a thorough review of the Study Report and related literature, as well as on a discussion with Mr. Weiner, the technical monitor of the Study. The Critique analyzes all main aspects of the Study to a depth which is considered necessary to evaluate its approach and findings.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Vuchic (Vukan R), Towne Building, 220 South 33rd Street D3, Philadelphia, Pennsylvania, 19174, Repr PC: Req Price

053986
COMMENTS ON THE STATEMENT BEFORE THE HOUSE APPROPRIATIONS SUBCOMMITTEE ON TRANSPORTATION, 5 MARCH 1974 BY CLAUDE S. BRINEGAR, SECRETARY

Vuchic, VR, Pennsylvania University, Philadelphia

Vuchic (Vukan R), Towne Building, 220 South 33rd Street D3, Philadelphia, Pennsylvania, 19174

Mar. 1974, 6 pp

These brief comments are written on the request of the Subcommittee Chairman, Representative John McFall; and in response to Secretary Brinegar's invitation for comments on his Statement.

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Vuchic (Vukan R), Towne Building, 220 South 33rd Street D3, Philadelphia, Pennsylvania, 19174, Repr PC: Req Price

053987
NATIONAL TRANSPORTATION POLICY–THE BASIC PREREQUISITE FOR PROGRESS

Vuchic, VR, Pennsylvania University, Philadelphia

Vuchic (Vukan R), Towne Building, 220 South 33rd Street D3, Philadelphia, Pennsylvania, 19174

Mar. 1974, 11 pp

The fact is that large segments of our transportation systems are unreliable, inefficient and wasteful; their environmental impact is often harmful; but above all, one of the basic findings of the Doyle Report from 1961, that our national transportation does not represent a system, is probably as correct today as it was at that time.

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Vuchic (Vukan R), Towne Building, 220 South 33rd Street D3, Philadelphia, Pennsylvania, 19174, Repr PC: Req Price

054131
1973 RAILROAD LEGISLATION IN HISTORICAL PERSPECTIVE

Stern, GL, Illinois Central Gulf Railroad

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 3, 1973, 12 pp

This paper reviews the history of legislation affecting the railroads and then comments on some of the bills pending in 1973.

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Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054266
ABANDONMENT IS NOT THE ANSWER

Meislahan, HS, Illinois Central Gulf Railroad

Railway Management Review (Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611)

Vol. 73, No. 2, 1973, pp 1-8, 4 Fig

The pros and cons of abandonment policy are discussed. It is concluded that massive abandonment will not produce healthier railroads nor would this program necessarily be in the public interest. Case-by-case analysis on almost any major railroad will reveal some lines that are a financial liability, but weighing both the pluses and the minuses of large-scale retrenchment leads to the fundamental conclusion that abandonment is counterproductive and will fail to arrest the railroad's decline.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Railway Systems and Management Association, 181 East Lake Shore Drive, Chicago, Illinois, 60611, Repr PC: Req Price

054297
EVALUATION OF THE SECRETARY OF TRANSPORTATION'S RAIL SERVICES REPORT

Interstate Commerce Commission, 1112 ICC Building, Washington, D.C., 20423

May 1974, 36 pp, 3 Fig

Report of the Rail Services Planning Office to the United States Railway Association.

This is an evaluation by the Rail Service Planning Office (ICC) of the DOT Report 'Rail Service in the Midwest and Northeast Region'. The evaluation reflects a fundamental dissatisfaction with the DOT report, and also concludes the public must participate in the planning process.

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2600-00959

054315
PLANNING VIABLE NETWORK IN THE MIDWEST AND NORTHEAST

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 3, Mar. 1974, 4 pp, 2 Fig, 1 Tab

The Regional Rail Reorganisation Act which became law on January 2 required the Department of Transportation to submit recommendations for future levels of freight service over a large area of the United States in which eight railways were bankrupt. On February 1 Claude S. Brinegar, Secretary of Transportation, presented his report setting out DOT's recommendations for putting new life into bankrupt and ailing railways in the Northwest and Midwest. This represents the first serious attempt to rationalise the most complex and underutilised part of the US rail network.

ACKNOWLEDGEMENT:
Railway Gazette International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
IPC TRANSPORT PRESS, Repr PC: Req Price

054336
THE GERMAN FEDERAL LOOKS TO THE FUTURE

Hughes, M

Modern Railways (Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England)

Vol. 31, No. 307, Apr. 1974, pp 140-143, 3 Fig, 6 Phot

This article covers the plans of the German Federal Railway in such areas as motive power, the Intercity passenger network, and related areas.

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Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England, Repr PC: Req Price

054352
CURRENT PROBLEMS OF THE GERMAN FEDERAL RAILWAY

AKTUELLE PROBLEME DER DEUTSCHEN BUNDESBAHN

Lehmann, H

Glasers Annalen ZEV (Siemens (Georg) Verlagsbuchhandlung,

Luetzowstrasse 6, 1 Berlin 30, West Germany)

Vol. 97, No. 7, 1973, 3 pp, 7 Fig, 1 Tab

The report on the stabilization of the German Federal Railway's financial situation which was recently presented to the German Minister of Transport explains the course to be followed by the DB in the future. In the first phase—that of investment and expansion—where the aim is to obtain a fundamental improvement of the situation in the undertaking, plans are to increase transport services considerably without a basic change in staff size. The second phase—that of automation and concentration—which is expected to result in a considerable saving of manpower, requires the modification of the network structure. The construction of new sections of line, which is to begin shortly, will provide the conditions required for this objective. The sections are part of the Master Plan for the European Railway of the Future. According to studies on the trial installations planned for the Danube basin, the maximum capacity high-speed line will complete the conventional railway network.

ACKNOWLEDGEMENT:
International Union of Railways, 1228

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ESL, Repr PC: 3DOL+25¢/p, Microfilm: 3DOL+5¢/fr

054513
SUBSIDIZATION OF TRANSIT OPERATING COSTS: A CASE STUDY OF METRO

Sherman, MM

Consortium of Universities, 1717 Massachusetts Avenue, NW, Washington, D.C., 20036

UTC-03-73, Final Rpt, 7209-7305, May 1973, 45 pp

The report discusses the reasons why public assistance to urban transit properties is often very necessary. A financial analysis is made of the Washington Metropolitan Area Transit Authority's (WMATA or METRO) rail system presently under construction. Ways to relieve deficits are identified. A formula is devised to see how the financing of such deficits might be allocated among the 3 major political jurisdictions in the area: the District of Columbia, Virginia and Maryland. The proposed formula is based on service, ridership and population characteristics of each of these areas. The analysis is theoretical and designed to offer local transportation planners thought and tools in case operating deficits arise. Political problems and jurisdictional conflicts are alluded to but not discussed in detail.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-229086/4

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PB-229086/4

054616
EDUCATION IN TRANSPORTATION SYSTEMS PLANNING

Highway Research Record (Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

No. 462, 40 pp

The past few years witnessed profound changes in the basic manner in which transportation services are viewed, developed and operated. The passage of the Federal-Aid Highway Act of 1968, the National Environmental Policy Act of 1969, and the Federal-Aid Highway Act of 1970, the expansion of programs in urban mass transit, and a rising level of concern on the part of the public have all led to a new set of rules and directions for those actively engaged in the provision of transportation services. These changes have led to protection of parklands, TOPICS studies, environmental impact statements, noise and air pollution studies, relocation assistance programs, capital grants for mass transit, citizen participation panels, joint use projects, demonstration projects for innovative transportation systems, and so on. These changes are having substantial impacts on transportation education programs at many universities, and have already created a need to incorporate a broader array of subjects into the curriculum.

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Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418, Repr PC: $1.80

054634
RESTRUCTURING THE NORTHEAST: THE NEXT 600 DAYS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 1, Jan. 1974, 3 pp

The article describes the timetable for the implication of the Regional Rail Reorganization Act of 1973. The United States Railway Association (USRA), a non-profit association will draw up the final system plan and create the for-profit Consolidated Rail Conrporation to operate the new system. The article also mentions the conditions under which the new company will be financed and how the present railways will be included in the system.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, Repr PC: $3.00

054635
AN ALTERNATIVE TO THE OCTOPUS CONCEPT OF NORTHEAST RAIL REORGANIZATION

Sterzing, CG, Delaware and Hudson Railroad

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 3, Feb. 1974, 3 pp

In this essay, Sterzing suggests a constructive alternative to the present concept of the Northeast rail reorganization. He outlines the problems that could occur under the present plans to restructure the railways.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054651
TESTIMONY CONCERNING THE U.S. DEPARTMENT OF TRANSPORTATION REPORT ON RAIL SERVICES IN THE MIDWEST AND NORTHEAST REGION

Northwestern Indiana Regional Planning Commission, 8149 Kennedy Avenue, Highland, Indiana, 46322

Tech Memo, Mar. 1974, 10 pp

This Narrative Statement of Testimony is part of a document submitted for the record to the Rail Services Planning Office of the Interstate Commerce Commission. The Statement was presented on March 11, 1974 at Indianapolis, Indiana with respect to hearings concerning the U.S. Department of Transportation Report on Rail

Service in the Midwest and Northeast Region.

ACKNOWLEDGEMENT:
Northwestern Indiana Regional Planning Commission

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Northwestern Indiana Regional Planning Commission, 8149 Kennedy Avenue, Highland, Indiana, 46322, Repr PC: Req Price

054652
SEVENTH REPORT ON THE HIGH SPEED GROUND TRANSPORTATION ACT OF 1965 AND THE RAILROAD TECHNOLOGY PROGRAM

Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590

1973, 82 pp, 69 Fig, 4 Tab, Apps

This Seventh Report covers research, development and demonstration activities of the Federal Railroad Administration to carry out the Congressional mandate during the year ending September 30, 1973. In order that all such efforts of FRA be reported in one document, this report also covers, in addition to the work under the High Speed Ground Transportation Act, related work performed by the FRA Office of Research, Development and Demonstrations under the appropriation for Railroad Research. The annual reports are written to serve as an information source for all parties who have a technological interest in FRA activities, including Committees of Congress, other DOT organizations, academicians, prospective contractors and others who want or need to know about results obtained. This and future annual reports are intended to describe progress for the complete Research, Development and Demonstrations Program of the Federal Railroad Administration. A full bibliography of RD&D research reports appears as Appendix B.

ACKNOWLEDGEMENT:
Federal Railroad Administration

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Department of Transportation, 400 7th Street, SW, Washington, D.C., 20590, Repr PC: Req Price

054654
DOT SECRETARY BRINEGAR: "I CAN SEE A HARDER THRUST TOWARD RAIL"

Lewis, RG   Miller, LS

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 2, Jan. 1974, 4 pp

In an interview, DOT Secretary Claude S. Brinegar discussed the energy crisis and its impact on railways. He predicts a continued growth in rail freight and a strong revival of inter-city and urban rail passenger traffic. The fuel shortage is creating problems in obtaining diesel fuel but it is not yet critical. Brinegar is strongly opposed to nationalizing the railways and believes that the problems can be solved by private ownership. He is also very critical of the present government attitude to urban rail transit. He believes that cities should be required to finance a larger proportion of the cost of urban transit and there should be an incentive program attached to federal funds that would encourage the cities to operate efficient transit systems.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054657
DOT'S NORTHEAST PROPOSALS RIDE INTO A STORM

Railway Age (Simmons-Boardman Publishing Corporation, P.O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 6, Mar. 1974, 3 pp

The railways that are affected by the Regional Rail Reorganization Act of 1973 have reacted strongly against the proposed abandonment of 15,575 miles of track and the rationalization of yards and facilities. The solvent railways are afraid that they will join the bankrupt lines if the proposed Consolidated Rail Corp. (Conrail) is allowed to, in effect, nationalize the major railways in the Northeast and Midwest. The article describes the reaction of seven railways that will be affected.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054659
THE FEDERAL CLIMATE GETS WARMER

Railway Age (Simmons-Boardman Publishing Corporation, P. O. Box 350, Bristol, Connecticut, 06010)

Vol. 175, No. 6, Mar. 1974, 2 pp

In recent months and especially since the energy crisis, Washington has become much more willing to listen to railway problems and solutions. Railways are also making more efforts to be heard. In 1970 the ASTRO program was begun to advertise the condition of railways to the government and public. As well, railway companies are beginning to maintain their own Washington offices to lobby for them. However, the most important reason for Washington's interest is due to the political climate that reflects from the public opinion. This attitude will last probably through 1974 but no one can say what will happen after that.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054668
FRA: REALITY THROUGH RESEARCH

Roberts, R

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 1, Jan. 1974

FRA begins to live down its "exotic passenger systems" image with projects aimed at improving railroad freight service. This article includes tables which list all current railroad research projects sponsored by the FRA. The projects are listed under the following headings: 1) Construction and operation of High Speed Ground Transportation Center, Pueblo, Colorado; 2) Advanced and exotic technologies (LIM, TACRV, etc....; 3) Conventional rail research–freight and general; 4) Conventional rail research–passenger; and 5) Miscellaneous. The contract numbers and contractors, cost, date approved and estimated, completion with summaries are provided for each project.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603, Repr PC: Req Price

054671
DYNAMICS IN THE DESERT

Shedd, T

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 3, Mar. 1974, 3 pp

Full operation of the DOT "High Speed Ground Test Center" at Pueblo, Colorado is expected to begin in 1975. The Center will test and develop both conventional rail technology such as linear induction vehicles and tracked air cushion vehicles. There are extensive facilities to study urban rail transit, and track and train dynamics. The Pueblo Test Center will provide the opportunity for railroads and suppliers to benefit from government sponsored R&D.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054678
THE KEY WORD: COMPETITION

Modern Railroads (Cahners Publishing Company, Incorporated, 5 South Wabash Avenue, Chicago, Illinois, 60603)

Vol. 29, No. 3, Mar. 1974, p 13

A series of three short articles describes the suggested route abandonments in the DOT study released in February. If carried out, 15,575 miles of track would be removed including much duplicate main lines of competing companies major cities in the Northeast.

ACKNOWLEDGEMENT:
Canadian National Railways, Headquarters Library

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054726
IMPROVING RAILROAD PRODUCTIVITY

National Commission on Productivity, 200 M Street, NW, Washington, D.C., 20508

Nov. 1973, 329 pp, Figs, Tabs

Final Report of the Task Force on Railroad Productivity to The National Commission on Productivity and the Council of Economic Advisers.

The final report is concerned with the railroads primarily as transporters of freight rather than passengers. Its scope is further narrowed to a consideration of actions that might be taken by the Federal government to improve railroad productivity and performance. It does not, therefore, consider other government actions, such as swifter approval of applications for general rate increases, which might be desirable but would not directly affect productivity. Nor does the report systematically explore reforms which private management might implement themselves but in which the participation of the government is not essential. The report does not address the railroad crisis in the Northeast expressly, but rather only as the problems in the Northeast significantly intertwine with the problems facing the entire industry.

ACKNOWLEDGEMENT:
National Commission on Productivity

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National Commission on Productivity, 2000 M Street, NW, Washington, D.C., 20508, Repr PC: Req Price

054729
AMTRAK IN PERSPECTIVE: WHERE GOEST THE POINTLESS ARROW?

Patton, EP, Tennessee University, Knoxville

American Economic Review (American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212)

Vol. 64, No. 2, May 1974, pp 372-377, 19 Ref

Presented at the 86th Annual Meeting of the American Economic Association, New York, N.Y., December 28-30, 1973.

This paper considers Amtrak from an economic viewpoint. It analyzes Amtrak's markets and determines that there are two: corridors and long distance routes. It suggests criteria for evaluating Amtrak performance. It finds no case for subsidizing the long distance trains, but does cite circumstances under which corridor operations would be deserving of subsidies.

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American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212, Repr PC: Req Price

054730
THE WHEEL: SHOULD WE REINVENT IT?

Norton, HS, South Carolina University, Columbia

American Economic Review (American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212)

Vol. 64, No. 2, Feb. 1974, pp 378-383, 5 Ref

Presented at the 86th Annual Meeting of the American Economic Association, New York, N.Y., December 28-30, 1973.

This paper begins with the premise that our intercity passenger transport system is less effective than we would like, and it asks if there is a place for revitalized railroad passenger service. The railroad passenger efforts of the thirties and of the early fifties were doomed at the outset by public policy favoring airport and highway development. Energy and environment may be factors, but service must be made attractive. The paper concludes that the railroad role is in the 500 to 1000 mile range between heavily populated areas where congestion is severe. It concludes that such service can be made equal to airline and bus service.

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American Economic Association, 1313 21st Avenue South, Nashville, Tennessee, 37212, Repr PC: Req Price

054738
SYSTEMS APPROACH TO COST-BENEFIT ANALYSIS OF URBAN TRANSPORTATION

Sastry, MVR, Chico State College

Transportation Journal (American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606)

Vol. 12, No. 3, 1973, pp 39-45, 2 Fig, 3 Tab, 5 Ref

The government and public are currently considering how increases in traffic congestion, land committed to freeways, and air pollution might be simultaneously ameliorated by suitable new rapid transit systems. What is not clear is the extent to which people would actually use new rapid transit systems, and what some of the indirect socioeconomic effects might be if they did. The overall objective of urban transportation analysis is to study the effects of a new transportation system such as the rapid transit, on the environment and on the socioeconomic conditions of a city.

ACKNOWLEDGEMENT:
Transportation Journal

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606, Repr PC: Req Price

054740
THE ROLE AND ACCOUNTABILITY OF NATIONALISED INDUSTRIES

Marsh, R, British Railways Board

Foundation for Business Responsibilities, Room 11-18 Portland House, Stag Place, London SW1, England

Paper, 1972, 7 pp

This paper presents some of the problems and responsibilities that British Railways have faced as a nationalized industry, including common carrier obligations, modernization plans, government control, passenger service problems, and subsidies.

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Foundation for Business Responsibilities, Room 11-18 Portland House, Stag Place, London SW1, England, Repr PC: Req Price

054753
HOW TO REACH THAT NORTH SLOPE OIL: SOME ALTERNATIVES AND THEIR ECONOMICS

Rice, RA, Carnegie-Mellon University

Technology Review (Massachusetts Institute of Technology, Cambridge, Massachusetts, 02139)

Vol. 75, No. 7, June 1973, 10 pp

This article suggests that a high capacity continental railroad may be far better than the proposed Alaska pipeline. The two major proposals to move the oil were for the pipeline and for ocean tankers via the Northwest Passage. Proposals for railroads have not received much attention. This proposal presents two alternate routes for heavy duty double track railroads from Alaska to Montana. The paper considers relative costs. Unit trains of tank cars are proposed. Added benefits would be the ability of the railroad to carry other Alaskan products and Alaskan needs, and also tourists.

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054806
CITIZEN GROUPS, PUBLIC POLICY AND URBAN TRANSPORTATION

Taebel, DA

Traffic Quarterly (Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880)

Oct. 1973, 13 pp

The article deals with the reactions of the population to projects for the creation of means of transport, the methods which the citizens may employ to make their views known, the disadvantages in allowing transporters' pressure groups to draw up the transport policy, the futility of the arguments often brought forward to justify expensive investments in transport, particularly in roads.

ACKNOWLEDGEMENT:
International Union of Railways, 7

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Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880, Repr PC: Req Price

054807
BRITAIN–BR URGES GOVERNMENT TO BOOST INVESTMENTS

International Railway Journal (Simmons-Boardman Publishing Corporation, P.O Box 350, Bristol, Connecticut, 06010)

Nov. 1973, 25 pp, Figs

This is a series of articles about the present situation and future projects at British Railways. It seems impossible for the existing 18,500 km network to be operated without a 200 million Pound Sterling per annum subsidy. Improved intercity services may make a major profitable contribution. As far as freight is concerned, wagon load traffic will probably fall from 60 million tons in 1971 to 24 million in 1981 but block-train and freight-liner traffic could well go up from 126 to 167 million tons. To obtain such results, BR is asking the Government to invest 1800 million Pound Sterling between 1972 and 1981.

ACKNOWLEDGEMENT:
International Union of Railways, 8

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054808
PROBLEM SOLVING IN URBAN TRANSPORTATION

Barkley, BT

Traffic Quarterly (Eno Foundation for Transportation, Incorporated, Westport, Connecticut, 06880)

Oct. 1973, 12 pp

After recalling the various theories on the subject, this article suggests in particular that transport policy-making must begin at the level of a district in the town, and be aimed first of all at creating satisfactory local living conditions for the inhabitants, taking into account their specific needs, which may differ widely from one town area to another (well-off districts, pensioners, ghettos, etc.).

ACKNOWLEDGEMENT:
International Union of Railways, 7

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054809
CHANNEL TUNNEL. VEHICULAR MOVEMENTS IN PROPOSED FERRY TRAINS

Ellson, PB Layfield, RC

Department of Commerce, Springfield, Virginia, 22151

1972, 82 pp, 28 Fig, 7 Tab

Report of the Transport and Road Research Laboratory at Crowthorne (England) on its studies in connection with Channel Tunnel ferry train services. These studies were to finalise proposals for terminal arrangements, optimum vehicle design and dimensions, loading and unloading times for road vehicles, tunnel throughput. The report gives a detailed description of plans and of tests carried out. These have resulted in operating time formulae involving very high numbers of parameters and in recommendations concerning the equipment to be used.

ACKNOWLEDGEMENT:

International Union of Railways, #127

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PB-214191

056875
POLITICS OF EXPANSION

Marsh, R, British Railways Board
Mulley, F, Department of the Environment, England

Railway Gazette International (IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England)

Vol. 130, No. 5, May 1974, pp 169-171, 1 Tab

Fred Mulley, Britain's new Minister for Transport Industries, faces conflicting pressures to expand rail investment and cut public spending on transport. With BR's credibility as an alternative to greater use of roads severely damaged by industrial action during the energy crisis, completion of London-Glasgow electrification on May 6 provides Richard Marsh, BRB Chairman, with a fresh opportunity to press home the case for switching investment from road to rail. Richard Hope examines Mr. Mulley's options, and concludes that pressures to solve environmental and social problems through greatly expanded use of rail are now almost irresistable--so long as unproductive use of manpower doesn't push the price too high.

ACKNOWLEDGEMENT:
Railway Gazette International

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IPC TRANSPORT PRESS, Repr PC: Req Price

056889
RELATIONSHIPS BETWEEN THE TRANSIT OPERATOR AND THE REGIONAL PLANNING AGENCY IN A LARGE METROPOLITAN AREA

Watt, P, Metropolitan Transportation Commission
Dahms, LD, Bay Area Rapid Transit District

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#475, 1973, pp 14-17

This article is one of seven reports prepared for the 52nd Annual Meeting of the Highway Research Board and is contained in the Highway Research Record entitled "Federal, State, and Local Roles in Transit Planning" which sells for $1.80.

Previous arrangements have resulted in a mismatch between the kinds of transportation facilities that are locally desired and the kind that can be delivered by existing federal and state transportation agencies. If this is to be overcome, such relationships will have to change. Many of the freeways in the area have been mandated by state and federal plans. The newly created nine county Metropolitan Transportation Commission will fail in its charge without fundamental changes in existing financing and institutional arrangements in the San Francisco region.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

056890
THE STATE'S ROLE IN THE TRANSIT ASPECTS OF LONG-RANGE TRANSPORTATION PLANNING

Kinstlinger, J, Pennsylvania Department of Transportation

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#475, 1973, pp 26-29, 1 Ref

This article is one of seven reports prepared for the 52nd Annual Meeting of the Highway Research Record entitled "Federal, State, and Local Roles in Transit Planning" which sells for $1.80.

This paper describes the role of Penn DOT in transportation. It states the goals and discusses the steps taken to realize the goals. It concludes with some recommendations to the federal government to facilitate urban mass transit programs and transportation system planning.

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Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

056891
THE STATE'S ROLE IN TRANSIT IMPLEMENTATION

Pyers, CE, Maryland Department of Transportation

Highway Research Record (Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418)

#475, 1973, pp 30-33

This article is one of seven reports prepared for the 52nd Annual Meeting of the Highway Research Board and is contained in the Highway Research Record entitled "Federal, State, and Local Roles in Transit Planning" which sells for $1.80.

This paper describes the Maryland DOT, which combines the former highway, motor vehicle, transit, port, and aviation functions, and has a single Transportation Trust Fund. The department operates the Baltimore bus system, and is building the Baltimore rail rapid system. The department is in negotiations with railroads for commuter services in the Washington region.

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Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

041683
CONTRIBUTING INFORMATION TO RRIS

Seamon, JH

Transportation Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

73R01, May 1973, 3 pp

The Railroad Research Information Service (RRIS) is a computer-based information service under development within the National Research Council with financial support from the Federal Railroad Administration. This service will give transportation administrators, engineers, and researchers rapid access to information about ongoing and completed railroad-related research. This paper identifies the type of material that is suitable for entry to RRIS Files and describes the mechanism of entry.

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044571
RRIS BULLETIN AUTUMN 1973

Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

1973

Contract DOT-OS-00035

This publication contains 1,297 abstracts of journal articles and research reports selected by RRIS from current railroad literature and 150 summaries of ongoing research activities in the railroad field. The material covers the entire range of railroading from technology to management, economics, government regulation, and operations. The material is arranged according to the RRIS classification scheme in two separate sections, one for the abstracts and one for the summaries. The book also contains subject term, author, and source indexes.

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PB-226784/AS

046710
METRO 1970-1971

Union Internationale des Transports Publics, Avenue de l'Uruguay 19, B-1050 Brussels, Belguim

1971, 223 pp

Available in French, German and English.

This bibliography gives information on metropolitan railways being planned, under construction and in operation throughout the world. It also deals with material related to underground tramways, rail communication with airports, automatic fare collection, train washing installations, park-and-ride, escalators and automatic turnstiles. There are four bibliographies covering from 1960 to the present.

ACKNOWLEDGEMENT:
Union Internationale des Transports Publics

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Union Internationale de Transports Publics, Avenue de l'Uruguay 19, B-1050 Brussels, Belguim, Repr PC: $35.00

046884
OUR RAILROADS IN PRINT—A BIBLIOGRAPHY

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

Feb. 1973, 76 pp

This bibliography—for school use and for the general public—is compiled and distributed by the Association of American Railroads solely as an accommodation to persons who are interested in railroad transportation literature. Those who wish to increase their knowledge of railroads will find listed herein many of the best books and stories that have been written on this fascinating subject. A list of periodicals relating to railroads is also included for the convenience of those who are interested in current progress and developments. Teachers and students may find the list useful in connection with transportation study in the classroom. The items have been grouped to assist in selecting works appropriate to special interests. Titles of works about individual railroad companies, too numerous to include here, may be obtained from local libraries, historical societies, or by writing to this Association. Only titles which are now believed to be in print or which are likely to be found in libraries are included in the list. Out-of-print publications of continuing reference value are indicated by an asterisk (*).

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Association of American Railroads

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046985
TRANSPORTATION SECURITY: LITERATURE SURVEY

Hill, YJ

Deutsche Forschungs-u Versuchsanst f Luft-u Raumft (Aachen, West Germany)

June 1972

Results of a literature search covering crime and transportation are presented as a preliminary bibliography. Modal aspects within transportation are accommodated by classifying data within the following sections: (1) Crime and Security; (2) Transportation; (3) Air Transport (Freight); (4) Air Piracy; (5) Motor Transport; (6) Rail Transport; (7) Urban Transport; (8) Water Transport; (9) Appendices. The specially designed classification scheme permits intermodal approaches to specialized problems.

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047474
RAILWAY DIRECTORY & YEAR BOOK 1973

IPC Transport Press Limited, Dorset House, Stamford Street, London SE1 9LU, England

Book, 1973

A comprehensive guide to the rail transport systems of the world, the 1973 edition contains over 700 pages of statistical and general data, together with fold-out maps of railway systems across whole continents—plus over 100 exclusive route maps featuring the major railways of every country. Completely updated, it gives detailed information on railways and allied subjects.

ACKNOWLEDGEMENT:
IPC Transport Press Limited

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047986
ALABAMA TRANSPORTATION BIBLIOGRAPHY

Alabama Development Office, State Office Building, Montgomery, Alabama, 36104

ALA-ADO-X996-73-01

The purpose of the Alabama Transportation Bibliography is to provide the professional planner and developer with a reference to transportation literature concerning the State of Alabama which can be utilized for research in the field of planning and economic development. This Bibliography has been made possible by the assistance and cooperation of a number of persons and institutions active in the field of data collection for the transportation literature of Alabama. Those persons and institutions assisting have been cited in the Acknowledgment pages of this document. This Bibliography is not intended to promote the viewpoints contained in the literature but only to establish a means for making the information contained in the literature but only to established a means for making the information contained in them easily accessible to users. This Bibliography is not inclusive. It was necessary to close the Bibliography at the end of March even though additional studies and references have already been identified. We solicit all concerned with the vital problem of transportation in Alabama to apprise the Alabama Development Office of any oversights and we request continued support in providing this Office with forthcoming documents or the correct bibliographical data that relate to the objective of this Bibliography. We also solicit your support in providing the Alabama Department of Archives and History with retrospective, current, and forthcoming documents that relate to the objectives of establishing bibliographical control for the transportation literature of Alabama.

ACKNOWLEDGEMENT:
Alabama Development Office

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048300
GENERAL DICTIONARY OF RAILWAY TERMS

LEXIQUE GENERAL DES TERMES FERROVIARES
International Union of Railways, 14 rue Jean Rey, 75015 Paris, France

This dictionary, which is intended for the use of all those who are required by their occupations—or out of personal curiosity—to read or write anything concerning railways, in a language with which they are not completely familiar, has met with a considerable degree of well-merited success, because of the care devoted to its preparation. The progress made today by railway science, in the same way as all other sciences, is, however, rapid, and the necessity had, therefore, arisen of bringing the dictionary up to date. As a result, some 3,000 terms were added, and, as those already contained in the first edition were, at the same time, completely revised, a work of considerable technical value has been produced. The addition of the Dutch language to the five original languages contained in the first edition (French, German, English, Italian and Spanish) will enable its value to be still further increased.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

050549
CONTAINERIZATION-A BIBLIOGRAPHY-JANUARY-DECEMBER 1971

Ramm, DV

Northwestern University, Evanston, Transportation Center Library, Evanston, Illinois

May 1972, 28 pp

This bibliography supplements and updates the earlier bibliographies on containerization prepared by the Transportation Center Library. It includes approximately 800 references covering the calendar year 1971, together with some references received too late for inclusion in the last edition, and a few listings from early 1972.

ACKNOWLEDGEMENT:
Northwestern University, Evanston

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Northwestern University, Evanston, Transportation Center Library, Evanston, Illinois, Repr PC: Req Price

051581
URBAN MASS TRANSPORTATION ABSTRACTS. VOLUME II

Urban Mass Transportation Administration, 400 7th Street, SW, Washington, D.C., 20590

UMTA-TRIC-73-1, Sept. 1973, 244 pp

See also report dated Oct 72, PB-213 212.

The volume contains 194 abstracts of reports in the field of urban mass transportation which are available from the National Technical Information Service. The reports were generated by research, development and demonstration; technical studies; and university research and training projects sponsored under the UMTA Act of 1964 (amended). Each abstract contains complete bibliographic data, from two to twelve keyword identifiers, up to 400 words of text capsulizing major topics covered in the report, and the NTIS accession number and price. In addition, all abstracts are indexed by title, geographic area, performing organization, project number and keyword. Abstract of reports from the first book of abstracts (PB-213-212) are also cross-referenced. These abstracts cover a broad spectrum of urban mass transportation research of interest to engineers, planners, students, transit managers and operators, public administrators, students, and persons in related fields. Further books of abstracts will be published on a regular basis.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-225368/0

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NTIS, Repr PC: $5.75, Microfiche: $1.45
PB-225368/0

051923
METRIC SYSTEM GUIDE—VOLUME 1

Keller (JJ) and Associates, Incorporated, 145 West Wisconsin Avenue, Neenah, Wisconsin, 54956

This Guide provides the basic background information necessary for understanding and evaluating the problems involved in "metrication" for America. The "Metric System Guide—Volume 1" parallels the announcement by major industries to go metric. Its planning, research and development have been several years in the making. From introduction to glossary, the first volume contains 15 comprehensive parts designed for specific background in Metrology. It is first in a series of volumes on the Metric system—to be used individually or collectively.

ACKNOWLEDGEMENT:
Keller (JJ) and Associates, Incorporated

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053759
PRINCIPLES OF TRANSPORT

Faulks, RW

Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

Jan. 1974

The fundamental principles and practice of movement by land, sea and air are amply covered, and make Principles of Transport not only of interest to the general reader but essential for students preparing for examinations of the Institute of Transport and Institute of Traffic Administration. Principles of Transport is the successor book to Elements of Transport which was first published in 1964. Although Elements of Transport ran successfully through two editions, not only much of the detail but also the academic approach to the subject has now changed and the original work is no longer entirely suited to present day concepts. It is partly for this reason that the Chartered Institute of Transport has seen fit to revise its syllabus and one of the new papers, which is designated 'Transport', identifies its subject as a separate discipline with unique principles and characteristics. In preparing this work, the needs of students studying for this new subject have been kept very much in mind and in so doing only a little more than fifty percent of the original Elements of Transport text has been retained. Even this is presented in an updated and modified form. The remainder of the work is completely new.

ACKNOWLEDGEMENT:
Modern Railways

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Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England, Repr PC: Req Price

054414
SUMMARY OF NATIONAL TRANSPORTATION STATISTICS

Hicks, GV Sheppard, SY

Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts, 02142

DOT-TSC-OST-73-36, Final Rpt, Nov. 1973, 111 pp

The report is a compendium of selected national-level transportation statistics. Included are cost inventory, and performance data describing the passenger and cargo operations of the following modes: air carrier, general aviation, automobile, bus, truck, local transit, rail, water, and oil pipeline. Published annually in November, the report includes basic descriptors of U.S. transportation, such as operating revenues and expenses, number of vehicles and employees, vehicle-miles and passenger miles, etc. As its name implies, the report is a summary of a larger data base, consisting of time-series collected from a variety of government and private statistical handbooks. In this edition, the selected data cover the period 1961 through 1971.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-226747/4

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PB-226747/4

054478
ACTION PLAN FOR A NATIONAL NETWORK OF TRANSPORTATION RESEARCH INFORMATION SERVICES (TRISNET)

Highway Research Board, 2101 Constitution Avenue, NW, Washington, D.C., 20418

Final Rpt, 7301-7306, Dec. 1973, 48 pp

Contract DOT-OS-00035

See also report dated Nov 72, PB-214 004.

This report of the TRIS Committee contains thirty-eight recommendations and seven implementation tasks for the development of a national network of transportation research information services. The recommendations cover user requirements, a subsystem for project resumes and document abstracts, a subsystem for document access, network coordination, and financial support for the network. Implementation tasks include a coordinating unit for the network, user conferences, market research and publicity, on-line access, a document access subsystem, development of new services, and service directories.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-227468/6

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $3.25, Microfiche: $1.45
PB-227468/6

054767
RUSSIA'S HIGHWAYS–EXPANSION OF THE HIGHWAY SYSTEM FOR NEW FIVE YEAR PROJECTS

Erb, H

Army Foreign Science and Technology Center, Charlottesville, Virginia

FSTC-HT-23-2406-72, Jan. 1974, 9 pp

Distribution Limited to U.S. Government Agencies only, Proprietary Information, 1 October 1972. Other requests for this document must be referred to Commander, Army Foreign Science and Technology Center, Charlottesville, Virginia 22901. This document is a translation of Soldat und Technik (West Germany), Issue 2, pp 72-74, February 1972.

This article is a report on the Russian Highway and Railroad System. It describes its history and especially the last twenty-five years, as can be learned from publications and lectures. (Author)

ACKNOWLEDGEMENT:
Defense Documentation Center, AD-917878L

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Army Foreign Science and Technology Center, Charlottesville, Virginia, Repr PC: Req Price

054769
ATLAS OF TEXAS

Arbingast, SA
Kennamer, LG Ryan, RH Lo, A Karney, DL Zlatkovich, CP Bonine, ME Steele, RG
Texas University, Austin, Bureau of Business Research, Austin, Texas, 78712

Atlas, 1973, 132 pp, Figs, 3 App

This book presents information on the resources of the state of Texas. Numerous maps illustrate the distribution of resources throughout the state.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Texas University, Austin, Bureau of Business Research, Austin, Texas, 78712, Repr PC: #5.00

056883
PROGRESS IN RAILROAD RESEARCH

Harris, WJ, Jr, Association of American Railroads

Association of American Railroads, 1920 L Street, NW, Washington, D.C., 20036

1972-1973, 1973, 241 pp, Figs, Refs

This report describes the AAR research work now underway or planned for the near future. It also describes the facilities available at the Chicago Railroad Technical Center. It describes the AAR programs involving university research. The research projects described deal with train track dynamics, track stresses, track structure, computer models, freight car information systems, and with safety and hazardous materials.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
AAR, Repr PC: Req Price

056893
RAIL TECHNOLOGY PRESENT AND FUTURE–THE BRITISH CONTRIBUTION

Strategy Limited, Grosvenor Gardens House, Grosvenor Gardens, Victoria, London SW1W 0BS, England

1974, 230 pp, Figs, Phots

This basically promotional document contains a fair amount of information of a technical nature, as well as numerous photographs and diagrams of British developments.

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
British Trade Development Office, 150 East 58th Street, New York, New York, 10022, Repr PC: Req Price

056897
PUBLISHED RESEARCH REPORTS–FEDERAL RAILROAD ADMINISTRATION

Federal Railroad Administration, Office of Research Development and Demonstrations, Washington, D.C., 20590

FRA-ORD/D-74-23, Bibliog, 66-7310, Oct. 1973, 103 pp

Prepared by National Technical Information Service, Springfield, Va. Supersedes PB-213047.

The bibliography presents and abstracts major research reports published by the Office of Research, Development and Demonstrations (ORD and D) in the Federal Railroad Administration, U.S. Department of Transportation. Also included are selected reports of other Department of Transportation agencies that relate to ORD and D activities. These reports represent results of contracted research, development, demonstrations, systems engineering, technology assessment, transportation surveys, and mathematical model developments, along with intramural research reports and program and project summaries. The abstracts are arranged according to technical categories under Rail Technology and Advanced Systems. (Author)

ACKNOWLEDGEMENT:
National Technical Information Service, PB-230007/7

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr. PC: $4.50, Microfiche: $1.45
PB-230007/7

056995
UMTA TRANSPORTATION PLANNING SYSTEM REFERENCE MANUAL

Urban Mass Transportation Administration, Office of Research, Development and Demonstration, Washington, D.C.

UMTA-RDD-8-74-1, Tech Rpt, Apr. 1974, 526 pp

Supersedes report no. PB-212 473.

The UMTA Transportation Planning System (UTPS) is a collection of IBM System/360 computer programs for use in planning multi-modal transportation systems. The objective of UTPS is to provide a readily available, easy-to-use, and fully tested program package for transportation planners attempting to solve a wide variety of problems. UTPS presently consists of 13 separate but interrelated computer programs designed for use in the IBM 360 operating system. This document, the reference manual, summarizes relevant information for operators of the UTPS system, and it is intended to be used as a concise reference for persons already familiar with the usage of the programs. Specific sections include statements of system controls, subject program controls, program writeup organization, software system description, catalogued procedures, and actual program writeups.

ACKNOWLEDGEMENT:
National Technical Information Service, PB-231865/7

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
NTIS, Repr PC: $10.25, Microfiche: $1.45
PB-231865/7

057156
UNITY IS KNOWLEDGE–INTERNATIONAL COOPERATION IN THE RAILWAY DOCUMENTATION SPHERE

S'UNIR POUR SE DOCUMENTER–LA COOPERATION INTERNATIONALE EN MATIERE DE DOCUMENTATION FERROVIAIRE
Canyn, V, International Union of Railways, BD

Revue Generale des Chemins de Fer (Societe Nationale des Chemins de Fer Francais, 92 rue Bonaparte, 75 Paris 6e, France)

Mar. 1974, 14 pp, 5 Fig

This article is also available in English and German.

The purpose of this article is to explain how railway documentation is organized internationally. After giving an idea of the importance of documentary information in the modern world, the author explains the development of international cooperation in this sphere and then describes the structure and operation of the UIC railway documentation network. In conclusion, he outlines prospects in the more or less distant future.

ACKNOWLEDGEMENT:
International Union of Railways

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
International Union of Railways, BD, 14 rue Jean Rey, 75015 Paris, France, Repr PC: Req Price

057183
THE USES AND MIS-USES OF REFERENCES

Rail Engineering International (Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England)

Vol. 4, No. 4, May 1974, pp 157-158

A technical paper on whatever subject usually cites a number of references by the way of providing additional information. The comments were prompted by at least one paper on railway topics recently presented before one of the Engineering Institutions.

ACKNOWLEDGEMENT:
Rail Engineering International

TO PURCHASE COPIES OF THIS DOCUMENT WRITE TO:
Broadfields (Technical Publishers) Limited, Little Leighs, Chelmsford, Essex CM3 1PF, England, Repr. PC: Req. Price

025221
LASER CUTTING CONCEPT FOR MECHANICAL TUNNELERS

PERFORMING AGENCY:
United Aircraft Research Laboratories, East Hartford, Connecticut

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lucke, W.N., Tel. 202-4260808

STATUS: Active TOTAL FUNDS: $99931 FUND TYPE: Contract CONTR. NO. : DOT-FR-20021

Using the contractor's 12-tub continuous-wave electric-discharge laser facility, a series of rock-melting tests will be performed to assess the importance to the rock kerfing process of laser power, power density, traverse speed, and optical system number. Laser hole drilling tests will be performed. The effect of a blowing jet to remove molten rock will be evaluated for both forms of laser drilling. These tests will be performed on rock cubes approximately 6 inches on a slide, including a hard granite, a hard tap rock, and a third rock-type specified by the contractor and of particular interest for the Northeast Corridor region.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-54

036999
PRESERVATION IMPROVEMENT AND REPLACEMENT OF ELEVATED TRANSPORTATION STRUCTURE BY ENGINEERING-PLANNING

INVESTIGATORS:
Silver, M.L.

PERFORMING AGENCY:
Illinois University, Chicago, P.O. Box 4348, Chicago, Illinois 60680

SPONSORING AGENCY:
Office of Systems Development and Technology, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
McFarland, R.K., Tel. 202-4269639

STATUS: Active START DATE: June 1973 COMPL. DATE: Aug. 1974 TOTAL FUNDS: $98920 FUND TYPE: Contract- CONTR. NO. : DOT-OS-30092

The contractor shall carry out initial studies to determine the behavior of elevated structures from two standpoints: Existing structures, which do not possess acceptable dynamic characteristics based on present day criteria, and new structures, which can be designed to ensure that the required dynamic characteristics are within acceptable limits. This research program shall analytically model structural systems consisting of the elevated structure itself, the foundation, and the surrounding soil. The analysis shall be sufficiently general so that the behavior of a wide variety of structural systems can be investigated. As an analytic program requires field measurements to ensure that the numberical results truly represent field conditions, a small field measurement program shall be included in this research program.

ACKNOWLEDGEMENT:
Office of Systems Development and Technology, PR# PUR-1-30224

038648
DEVELOPMENT AND TESTING OF NEW TUNNEL SUPPORTS

INVESTIGATORS:
Peck, R.B.

PERFORMING AGENCY:
Illinois University, Urbana, Board of Trustees, Urbana, Illinois 61801

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lucke, W.N., Tel. 202-4260808

STATUS: Active START DATE: Jan. 1973 COMPL. DATE: Aug. 1973 TOTAL FUNDS: $499950 FUND TYPE: Contract- CONTR. NO. : DOT-FR-30022

The University will investigate and test new concepts in rational tunnel design, new materials and techniques for shotcrete support of tunnels and new materials and improved structural design for segmented tunnel linings.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-65

045172
STUDY AND DEVELOPMENT OF PLANS AND RECOMMENDATIONS FOR THE CONSOLIDATION AND RELOCATION OF THE RAILROAD FACILITIES

INVESTIGATORS:
Pendergrass, B.P., Tel. 402-3462112

PERFORMING AGENCY:
Omaha-Council Bluffs, 1620 Farnam Street, Suite 1137, Omaha, Nebraska 68102
Metropolitan Area Planning Agency

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Crisafulli, R.J., Tel. 202-4261677

STATUS: Active START DATE: June 1973 COMPL. DATE: Feb. 1974 TOTAL FUNDS: $70000 FUND TYPE: Contract- CONTR. NO. : DOT-FR-30076 CONTR. TYPE: FFP

The Contractor shall furnish all necessary qualified personnel, facilities, materials and such other services necessary to perform a "Rail Transportation Study". It shall provide for the study and development of plans and recommendations for the consolidation and relocation of railroad facilities associated with the Missouri Riverfront Developemnt Program.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 3061

046488
NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING

INVESTIGATORS:
Hudson, D.E.

PERFORMING AGENCY:
California Institute of Technology, Division of Engineering and Applied Science, 1201 East California Boulevard, Pasadena, California 91109

SPONSORING AGENCY:
National Science Foundation, Division of Advanced Technological Applications

STATUS: Active START DATE: Apr. 1973 COMPL. DATE: Mar. 1974 FUND TYPE: Grant CONTR. NO. : GI-28098X

This grant is the third year support for GI-28098X. It is a companion to Grant GK-28349X to University of California at Berkeley.

It is the purpose of this center to collect and organize all the research information currently available on earthquake engineering and related areas. This will provide the first opportunity to collect, and assess information from many different sources and at the same time be a single source for researchers in the field to obtain information from a comprehensive collection. This will be geared to meet the needs of both academic researchers and design engineers. The library will consist of reports (both published and unpublished), site visit records, data collected from various seismic regions, an abstracting service and potentially as a basis for a technical journal directed to the needs of earthquake engineers.

ACKNOWLEDGEMENT:
Science Information Exchange, GSE 3202 2

047346
A MODEL FOR SYSTEMS ANALYSIS OF TUNNELING AND EXCAVATION

INVESTIGATORS:
Mcgarry, F.J. Moavenzadeh, F.

PERFORMING AGENCY:
Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts 02139

SPONSORING AGENCY:
National Science Foundation, Division of Advanced Technological Applications, 1800 G Street, NW, Washington, D.C. 20550 PROJ. NO. GI-34029A1

STATUS: Active START DATE: May 1973 COMPL. DATE: Apr. 1974 TOTAL FUNDS: $137500

The purpose of this research is to develop a computer model of the tunneling-excavation process, using techniques of systems analysis. The model is intended to be as comprehensive and as realistic as is possible; toward this end, close liaison will be maintained with appropriate contractors, government agencies, equipment manufacturers and engineering organizations. The model will be used for the following purposes: 1) To conduct sensitivity analyses to identify needed improvements in the current state of the art and to assess the impact of such improvements, if they could be realized by research and development investment; 2) to evaluate specific current or proposed innovations in tunneling technology on a cost-benefit basis; 3) to provide a means for rational cost estimation of tunnel construction, including the use of probabilistic methods when advisable because of geologic, hydrologic, and other uncertain factors; and 5) to permit optimization of the total tunneling system according to selected criteria such as construction time, construction cost, total cost including the service provided by the facility, safety, minimum disruption of contiguous activities, etc. A comprehensive analysis considering social as well as technical and economic factors is sought.

ACKNOWLEDGEMENT:
Science Information Exchange, GSQ 219 1

050712
TUNNEL AND TUNNEL LINING BEHAVIOR

INVESTIGATORS:
Hendron, A.J.

PERFORMING AGENCY:
Illinois University, Urbana, Department of Civil Engineering, Urbana, Illinois 61801
Washington University, Seattle

SPONSORING AGENCY:
National Science Foundation, Division of Advanced Technological Applications, 1800 G Street, NW, Washington, D.C. PROJ. NO. GI-33644X1

STATUS: Active START DATE: June 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $46300

The program will utilize field measurements from actual construction projects. One phase of the study will result in an Instrumentation Guide which will provide in detail the types of observations that should be made in soft-ground and hard-rock tunnels; the most appropriate instruments under various conditions, how they should be installed, maintained, calibrated, and read; and the intensity of the observational program as related to potential benefits and instrumentation costs. The other phase will be centered on the interpretation of field measurements 1) for rock tunnels: initial and ultimate load-displacement relations, heading support requirements, improvement of support techniques, progress of machine tunneling, controlled blasting, geologic factors affecting support requirements; 2) for soft-ground tunnels: loss of ground as related to tunneling conditions, soil structure interaction, linings in shield tunnels, progress of machine tunneling, de-watering. The program will assist agencies that are planning and executing tunnel observations, collect data, advance the art of tunnel instrumentation, interpret and disseminate the results of tunnel instrumentation.

ACKNOWLEDGEMENT:
Science Information Exchange, GSQ 201 1

050718
SHOTCRETE FOR TUNNEL SUPPORT

INVESTIGATORS:
Rutenbeck, T.

PERFORMING AGENCY:
Department of the Interior, Bureau of Reclamation, Concrete and Structural Branch, Denver Federal Center, Building 67, Denver, Colorado 80225

SPONSORING AGENCY:
Department of the Interior, National Bureau of Standards

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $50000

The use of shotcrete for tunnel support is becoming more widespread because of its great potential benefit from an economic and application standpoint. However, because of this relatively new use for shotcrete, many factors about its use are still in a development stage or even unknown, and problems occur in the field that require solutions. Research is planned to investigate methods of assuring quality control including in-place testing, methods of set acceleration, and cement-accelerator compatability. Application procedures and environmental factors will be studied to find ways of improving working conditions while maintaining quality control.

ACKNOWLEDGEMENT:
Science Information Exchange, ZUF 522 3

050719
RAPID TUNNEL EXCAVATION–SOILS AND SOFT ROCK

INVESTIGATORS:
Ellis, W.

PERFORMING AGENCY:
Department of the Interior, Bureau of Reclamation, Earth Sciences Branch, Denver Federal Center, Building 67, Denver, Colorado 80225

SPONSORING AGENCY:
Department of the Interior, Bureau of Reclamation

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

Although no funds are programed for the period July 1973 to June 1974, during the following year some research is expected to be resumed. An initial part of this project will be to consolidate and summarize previous information on sampling techniques, classification of materials, test procedures, test results, conclusions, recommendations, etc. in easy reference form. This will be of value in planning and conducting future testing of soils and soft rock in tunnels.

ACKNOWLEDGEMENT:
Science Information Exchange, ZUF 514 3

051264
POLYMER IMPREGNATED CONCRETE TUNNEL SUPPORT AND LINING TEST PROGRAM

INVESTIGATORS:
Spencer, R.W. Carpenter, L.

PERFORMING AGENCY:
Bureau of Reclamation, Department of the Interior, Concrete & Structural Branch, Denver Federal Center, Bldg 67, Denver, Colorado 80225

SPONSORING AGENCY:
Bureau of Reclamation, Department of the Interior

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $15000

To fully obtain the advantage that may be presented by rapid underground tunnel excavation methods, a tunnel support and lining system must be developed to enable a contractor to support and line a tunnel as rapidly as the heading is advanced and closely behind the excavating operation. Description of project: Investigate, develop and test precast polymer-impregnate concrete tunnel support-lining systems. The goals are to: 1. Develop techniques for fabrication and test single segments. 2. Assemble the segments into a full scale system, load and test, evaluate application and develop design criteria and construction procedures. 3. Perform single segment tests with other joint configurations and segment thicknesses and full scale tests on polymer–impregnated segments with back packing of frangible materials. 4. Develop high strength polymer shotcrete system. 5. Perform full scale tests on shotcrete systems. 6. Make analytical studies of various joint and segment configurations including larger diameters then the full scale test and shapes other than circular. 7. Make performance comparisons and economic studies of the systems investigated.

ACKNOWLEDGEMENT:
Science Information Exchange, ZUF 602 2

013867
CONSTRUCT TEST TRACK

PERFORMING AGENCY:
Atchison, Topeka and Santa Fe Railway, 80 East Jackson Boulevard, Chicago, Illinois 60604

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
O'Sullivan, WB, Tel. 202-4262860

STATUS: Active START DATE: Apr. 1969 COMPL. DATE: Dec. 1973 TOTAL FUNDS: $847200 FUND TYPE: Contract- CONTR. NO.: DOT-FR-00043 CONTR. TYPE: BOA

Basic Agreement for design, construction, instrumentation, data collection & analysis, and maintenance of a test track. The purpose of the test track is to investigate methods of providing more stable railroad track for the higher train speeds and heavier car loadings.

ACKNOWLEDGEMENT:
Federal Railroad Administration

018953
TRACK GEOMETRY SURVEY DEVICE

INVESTIGATORS:
Derr, A.J., Manager, Transportation Programs, Tel. 516-3336960

PERFORMING AGENCY:
General Applied Science Laboratories, Incorporated, Merrick and Stewart Avenues, Westbury, New York 11590

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Woll, T.P., Tel. 202-4260855

STATUS: Obligated START DATE: June 1971 COMPL. DATE: June 1972 TOTAL FUNDS: $172313

Development, fabrication and demonstration of a special Track Geometry Survey Device which will measure the track geometry of a high precision railroad test track at the Pueblo Test Center.

APPROACH AND METHODS:
The Device shall be developed in accordance with technical specifications of the contract and contractor's proposal.

ACKNOWLEDGEMENT:
Federal Railroad Administration

019580
FIELD STUDIES OF TRACK SUPPORTED ON PRESTRESSED CONCRETE TIES: TESTS TO EVALUATE STRUCTURAL CAPACITY OF SLAB AND BEAM RAIL SUPPORT STRUCTURES

PPS#4.C.2..2.

PERFORMING AGENCY:
Atchison, Topeka and Santa Fe Railway, 80 East Jackson Boulevard, Chicago, Illinois 60604

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
O'Sullivan, WB, Tel. 202-4260855

STATUS: Active COMPL. DATE: Dec. 1978 TOTAL FUNDS: $199900 FUND TYPE: Contract CONTR. NO. : DOT-FR-9-0043 CONTR. TYPE: BOA

No Abstract.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-135

036282
RESPONSE OF CONTINUOUSLY SUPPORTED RAIL WHEN SUBJECTED TO STATIC AND DYNAMIC LOADS

INVESTIGATORS:
Kerr, A.D., Professor

PERFORMING AGENCY:
New York University, Bronx, School of Engineering and Sciences, University HN, Bronx, New York 10453

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: May 1972 COMPL. DATE: Aug. 1973 TOTAL FUNDS: $57444 FUND TYPE: Contract- CONTR. NO.: DOT-FR-20064

To conduct analysis of certain specific track and vehicle related problems. These studies will be directed to consideration of such topics as the damped response of railroad track systems to rolling loads traveling at varying speeds.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-201

036357
GASL TRACK SURVEY DEVICE

PERFORMING AGENCY:
Porter (Norman) Associates, 2488 Grand Concourse, New York, New York 10458

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Obligated START DATE: Apr. 1972 COMPL. DATE: July 1972 TOTAL FUNDS: $20770

The contractor shall provide all necessary qualified personnel materials and services to perform a survey at the Reading Facility to validate the GASL Track Survey Device.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-164

036737
TRACK COMPONENT AND TRACK RESPONSE INVESTIGATIONS

PERFORMING AGENCY:
Chessie System, 2 North Charles Street, Baltimore, Maryland 21201

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: Aug. 1971 COMPL. DATE: Aug. 1972 TOTAL FUNDS: $37668 FUND TYPE: Contract- CONTR. NO.: DOT-FR-20015 CONTR. TYPE: CS

C&O Railway Company and the B&O Railroad Company will conduct a series of track component and track response investigations.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 71-176

038054
ANALYZE DATA FOR SOIL PRESSURE CELLS

PERFORMING AGENCY:
Atchison, Topeka and Santa Fe Railway, 80 East Jackson Boulevard, Chicago, Illinois 60606

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Kakaley, E., Tel. 202-4260855

STATUS: *Active* START DATE: June 1972 TOTAL FUNDS: $362886 FUND TYPE: Contract CONTR. NO. : DOT-FR-90043/7 CONTR. TYPE: CPFF

The contractor shall, through a contract with the Portland Cement Association, procure, install, monitor, and analyze data from Soil Pressure Cells *in the cross tie portions of* the Kansas Test Track on the Santa Fe Main Line. These additional cells will supplement and add to already existing load cells and measuring devices provided under the Basic Task Order No. 7. This supplemental program will yield additional data concerning the track characteristics and will reduce future overall monitoring costs for the Government by reducing the amount of labor involved in moving the lesser number sensors to new station locations and will allow more data to be collected over a greater distance of the test section without moving instrumentation devices.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-192

038056
REVIEW OF PRICING OF RAILROAD ROADWAY

PERFORMING AGENCY:
Morrison-Knudsen Company, Incorporated, 400 Broadway, Boise, Idaho 83707

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Active START DATE: Oct. 1972 COMPL. DATE: Nov. 1972 TOTAL FUNDS: $8800 FUND TYPE: Contract CONTR. NO. : DOT-FR-30016

Pricing of railroad roadway and electrification improvements planned for the Northeast Corridor, Boston to Washington, D.C., referring to documentation from the Northeast Corridor Report, furnished to the Contractor by the Federal Railroad Administration. A brief letter report shall be furnished immediately upon completion of the work summarizing the general confidence level of the Northeast Corridor route improvement pricing.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-72

038729
BALLAST CRIB AND SHOULDER COMPACTOR

PERFORMING AGENCY:
Plasser-American Corporation, 2001 Myers Road, Chesapeake, Virginia 23324

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: Oct. 1972 COMPL. DATE: Feb. 1973 TOTAL FUNDS: $74070 FUND TYPE: Contract CONTR. NO. : DOT-FR-30001

In conjuction with studies planned at the High Speed Ground Test Center at Pueblo, Colorado, as well as peripheral studies, it is desired to test and quantitatively evaluate the results of crib and shoulder compaction with respect to track support and stability. To accomplish testing over an anticipated range of track structures and compaction requirements, the machine desired will be capable of a degree of adjustability as defined in the requirements.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-113

038782
DATA ACQUISTION SYSTEMS FOR THE URBAN RAIL SUPPORTING TECHNOLOGY PROGRAM

PERFORMING AGENCY:
Sperry Rand Corporation, Univac Division, P.O.Box 3525, St. Paul, Minnesota 55101

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Poirier, Tel. 617-4942484

STATUS: Active START DATE: Mar. 1973 COMPL. DATE: Dec. 1973 TOTAL FUNDS: $356627 FUND TYPE: Contract-CONTR. NO. : DOT-TSC-561 CONTR. TYPE: FFP

This contract is for the development and fabrication of data acquisition systems for acquisition and storage of test data on-board a rapid rail vehicle and also at wayside, monitoring and collecting data as vehicles move over the rails. The acquisition of all systems is expected to provide a good test capability, needed in the UMTA Rail Technology Program. The delivery of all units will be completed within ten months from the commencement data of the proposed contract.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# PE-0071

038969
DESIGN, ASSEMBLE, INSTALL AND TEST TWO (2) TRACK GEOMETRY SYSTEMS

PERFORMING AGENCY:
MB Associates, Bollinger Canyon Road, San Ramon, California 94583

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Rutyna, F.J., Tel. 617-4942792

STATUS: Active START DATE: June 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $134592 FUND TYPE: Contract-CONTR. NO. : DOT-TSC-616 CONTR. TYPE: FFP

The contract is for the design, assembly, installation and test of two (2) track geometry systems for measuring track gage, alignment, profile and cross level of rapid transit track from a moving rapid transit train at the High Speed Ground Test Center, Pueblo, Colorado. The proposed system can be mounted onto a regular revenue vehicle which normally operates on the track being inspected. This system would allow for track inspection on short notice at revenue speeds and supplement visual inspections conducted by track walkers. This system would provide urban rail transit systems an inexpensive and reliable method to measure track geometry.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# PE-0081

038973
RAILROAD TRACK STRUCTURES RESEARCH

PERFORMING AGENCY:
Association of American Railroads, 1920 L Street, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
O'Sullivan, W, Tel. 202-4260855

STATUS: Active START DATE: May 1973 COMPL. DATE: May 1975 TOTAL FUNDS: $447218 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30038

The Federal Railroad Administration (FRA) and the Association of American Railroads (AAR), the contractor, enter into a program to perform Railroad Track Structures Research. The program is expected to encompass a number of Tasks for research into a variety of technical factors affecting railroad track and related systems and subsystems. The initial portion of the Railroad Track Structures Research program shall consist of the four Tasks: Mathematical Modelling, Ballast and Subgrade Material Performance Tests, testing Phase, and Track Research Laboratory Facility. Other Tasks may be added from time to time depending upon availability of funds and contractual authorization.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-106,73-106-1

038974
CONTINUOUS MEASUREMENT OF DYNAMIC COMPLIANCE CHARACTERISTICS OF RAILROAD TRACK

INVESTIGATORS:
Prause, R.H., Tel. 614-2993151

PERFORMING AGENCY:
Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Woll, T.P., Tel. 202-4264377

STATUS: Active START DATE: May 1973 COMPL. DATE: June 1973 TOTAL FUNDS: $299920 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30051 CONTR. TYPE: CPFF

The contract is for the design, fabrication, demonstration and furnishing of equipment for the continuous measurement of dynamic compliance characteristics of railroad track.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-39

045168
DEVELOP AND JUSTIFY METHODOLGIES AND PROCEDURES FOR ANALYZING THE ECONOMIC COST OF RAILROAD ROADWAY

INVESTIGATORS:
Williams, J.H., Tel. 415-9892670

PERFORMING AGENCY:
Tops On-Line Services Incorporated, 111 Pine Street, Suite 911, San Francisco, California 94111

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Davies, G.K., Tel. 202-4269682

STATUS: Active START DATE: June 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $188127 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30028 CONTR. TYPE: CPFF

To develop and justify a set of methodologies and procedures for analyzing the economic costs of providing, maintaining and operating the railroad roadway and attendant structures under various geographic, physical, climatic, operating and traffic condititions for the purpose of developing a portion of the relevant economic costs for pricing purposes.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 3026

045824
BALLAST CONSOLIDATOR

PERFORMING AGENCY:
Missouri Pacific Railroad, Missouri Pacific Building, 210 North 13th Street, St. Louis, Missouri 63103

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Crawford, T.S., Tel. 202-4260872

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: Sept. 1974 TOTAL FUNDS: $245000 FUND TYPE: Contract- CONTR. NO.: CN-DOT-FR-40002

The Federal Railroad Administration (FRA) has within it's Government property control jurisdiction, a unit of railroad track maintenance equipment designated as a Ballast Consolidator. The design function of this machine is, in part, to complement the commonly conducted tamping of track smoothing activities. The object of the machine application is to re-consolidate, in the regions adjacent to cross ties, track ballast previously disturbed during the tamping process.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-231

045825
BALLAST CONSOLIDATOR

PERFORMING AGENCY:
Penn Central Transportation Company, Six Penn Center Plaza, Philadelphia, Pennsylvania 19104

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Crawford, T.S., Tel. 202-4260872

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: Sept. 1974 TOTAL FUNDS: $54000 FUND TYPE: Contract- CONTR. NO.: DOT-FR-40004

The Federal Railroad Administration (FRA) has within it's Government property control jurisdiction, a unit of railroad track maintenance equipment designated as a Ballast Consolidator. The design function of this machine is, in part, to complement the commonly conducted tamping of track smoothing activities. The object of the machine application is to re-consolidate, in the regions adjacent to cross ties, track ballast previously disturbed during the tamping process. It is believed that this re-consolidation action confers a desired level of stability to track more quickly than procedures relies upon, heretofore.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-231

045827
BALLAST CONSOLIDATION

PERFORMING AGENCY:
St Louis Southwestern Railway, Cotton Belt Building, P.O. Box 959, Tyler, Texas 75701

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Crawford, T.S., Tel. 202-4260872

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: Sept. 1974 FUND TYPE: Contract CONTR. NO. : DOT-FR-40007

The Federal Railroad Administration (FRA) has within it's Government property control jurisdiction, a unit of railroad track maintenance equipment designated as a Ballast Consolidator. The design function of this machine is, in part, to complement the commonly conducted tamping of track smoothing activities. The object of the machine application is to re-consolidate, in the regions adjacent to cross ties, track ballast previously disturbed during the tamping process. It is believed that this re-consolidation action confers a desird level of stability to track more quickly than procedures relies upon, heretofore.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-231

054695
DEFORMATIONS UNDER RAIL TRACK STRUCTURE AND SUPPORT

INVESTIGATORS:
Raymond, G.P. Batchelor, B.D. Gaskin, P.N. Davies, J.R.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada PROJ. NO. 2.22

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

The original full application for research aid covered five years and involved a study of the stresses and deformations under dynamic and static load systems in railway tract structure and support. That portion which was approved for study in this financial year consists mainly of a study of the geotechnical properties of different ballast materials. Vibration characteristics, strength, stress strain characteristics, density and disintegration of the ballast are the main soil properties being studied. Expansion of the project to involve a more complete study of soil layer interaction when placed in the form of a tract support was approved and commenced. This will involve the planning of large scale testing. The equipment for this testing has been assembled and the first tests will commence shortly.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

013865
RESPONSE OF THE CONTINUOUSLY SUPPORTED RAIL WHEN SUBJECTED TO STATIC AND DYNAMIC LOADS

PPS# 4.B.2.

INVESTIGATORS:
Kerr

PERFORMING AGENCY:
New York University, New York, New York, New York

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
O'Sullivan, WB, Tel. 202-4262860

STATUS: Obligated START DATE: June 1970 COMPL. DATE: Mar. 1972 TOTAL FUNDS: $36141 FUND TYPE: Contract- CONTR. NO. : DOT-FR-10019 CONTR. TYPE: CR

A systematic study of the response of a railroad track when subject to various loads, such as constrained thermal expansions, the moving train, etc.

ACKNOWLEDGEMENT:
Federal Railroad Administration, 72-161

019710
A STUDY OF STRESSES AND DEFORMATIONS UNDER DYNAMIC AND STATIC LOAD SYSTEMS IN TRACK STRUCTURES AND SUPPORT

PERFORMING AGENCY:
Queen's University, Department of Civil Engineering, Kingston, Ontario Canada

SPONSORING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario Canada

STATUS: Active COMPL. DATE: Jan. 1971

OBJECTIVES AND SCOPE:
The original full application for research aid covered five years and involved a study of the stresses and deformations under dynamic and static load systems in railway tract structure and support. The primary financing was awarded in 1971 for a study of the geotechnical properties of different ballast materials. Vibration characteristics, strength, stress strain characteristics, density and disintegration of the ballast are the main soil properties being studied. Expansion of the project to involve a more complete study of soil layer interaction when placed in the form of a tract support was later approved and commenced. This involves large scale testing. The equipment for this testing has been assembled and the first tests commenced.

ACKNOWLEDGEMENT:
Roads and Transportation Association of Canada

025369
MONITORING OF WHEEL/RAIL SIMULATOR PROTOTYPE CONTROL SYSTEM EFFORT

INVESTIGATORS:
Lavery, A.L., Tel. 617-4942040

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Active TOTAL FUNDS: $70000 FUND TYPE: PPA CONTR. NO. : PPA-RR-210 CONTR. TYPE: CR

The FRA, as manager of the joint FRA/UMTA wheel/rail dynamics research facility, has retained Wyle Laboratories to act as system manager for the effort. The Wyle effort includes the construction and testing of a prototype control system which consists of a single simulator module and its associated digital, analog, instrumentation and mechanical subsystems. This PPA designates TSC as technical monitor for FRA of the prototype control system implementation and test for the remainder of FY 72. This effort will represent additional scope to the work on the wheel-rail simulator presently being performed by TSC for UMTA.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036280
COMPARATIVE ANALYSIS OF DYNAMICS OF FREIGHT AND PASSENGER RAIL VEHICLES

PERFORMING AGENCY:
Battelle Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262695

STATUS: Active START DATE: May 1972 COMPL. DATE: Oct. 1972 TOTAL FUNDS: $48012 FUND TYPE: Contract CONTR. NO. : DOT-FR-20077 CONTR. TYPE: CPFF

A comparative Analysis of Dynamics of Freight and Passenger Rail Vehicles will be undertaken to determine the effects of track on the vehicles and vice versa. This study is part of an overall study to perform a comprehensive analysis of the economic, technical and institutional factors involved in implementing and operating improved Passenger Train service in the United States as opposed to tracked Air Cushion Vehicle or Magnetically Levitated Vehicle Systems.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036618
PREDICT HIGH SPEED PERFORMANCE OF THE FOUR-WHEEL BOGIES OF THE LINEAR INDUCTION MOTOR RESEARCH VEHICLE

PERFORMING AGENCY:
British Railways Board, London England

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active COMPL. DATE: June 1973 TOTAL FUNDS: $35450 FUND TYPE: Contract CONTR. NO. : DOT-FR-30261

Predict analytically the high speed performance of the four-wheel bogies of the Linear Induction Motor Research Vehicle, guiding selection of design parameters and later supporting test data interpretation.

ACKNOWLEDGEMENT:
Federal Railroad Administration

038647
FOUR (4) WHEEL/RAIL DYNAMICS SIMULATOR TRACK MODULE

PERFORMING AGENCY:
Gulf and Western Industrial Products Company, Research and Development Center, 101 Chester Road, Swarthmore, Pennsylvania 19081

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Spencer, P., Tel. 202-4269644

STATUS: Active START DATE: Jan. 1973 COMPL. DATE: Jan. 1976 TOTAL FUNDS: $730710

The proposed contract will include the following effort to provide four wheel/Rail Dynamics simular Track Module Systems: a) Program management and administrative services: b) Preliminary and final detail designs: c) Engineering analyses: d) Documentation: e) Materials, procurement and manufacturing: f) Assembly services, in-plant subsystem and systems performance tests: and g) Shipping, on-site installation and checkout services. Track Module Systems will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions at the High Speed Ground Test Center, Pueblo, Colorado.

ACKNOWLEDGEMENT:
Federal Railroad Administration

038727
EXPERIMENTAL AND THEORETICAL STUDY OF THE MECHANICS OF ROLLING CONTACT

INVESTIGATORS:
Nayak, P.R.

PERFORMING AGENCY:
Bolt, Beranek and Newman, Incorporated, 50 Moulton Street, Cambridge, Massachusetts 02138

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Active START DATE: Apr. 1971 COMPL. DATE: Dec. 1972 TOTAL FUNDS: $63730 FUND TYPE: Contract-CONTR. NO.: DOT-FR-10031 CONTR. TYPE: CPFF

There are two tasks to this contract. In task 1–Junction Deformation Studies–the contractor will design and build an apparatus for the study of the behavior of large-scale model junctions at high sliding speeds and in the presence of high vibration levels. The junctions will be modeled by steel spheres of approximately 1/8 inch radius. In task 2– Rolling Friction Studies–the contractor will build a simple rolling contact/apparatus on which the effects of slip velocity, surface vibration, surface roughness, and surface temperature on the rolling friction coefficient will be conducted.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 71-90

045823
TRACK TRAIN DYNAMICS RESEARCH PROGRAM

PERFORMING AGENCY:
Association of American Railroads, 1020 L Street, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Ullman, K.B., Tel. 202-4260855

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: Nov. 1974 TOTAL FUNDS: $247618 FUND TYPE: Contract-CONTR. NO.: DOT-FR-40011 CONTR. TYPE: CR

The objective of this contract as part of the Track Train Dynamics Research Program is to develop a better understanding of the dynamic interrelationships between the moving train and the fixed guideway structure on which it operates. This understanding will result in the development of techniques for improved train handling and train make-up. Authoritative guidelines for train handling and train make-up will be established, providing better performance and thus increasing time reliability of rail freight transportation. A train handling plan or matrix, incorporating combinations of key parameters, will be prepared, and it then will be available for use by each railroad to suit its operations.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-210-2

045826
PROGRAM TO STUDY TRACK-TRAIN DYNAMICS

PERFORMING AGENCY:
General Electric Company, 2901 East Lake Road, Erie, Pennsylvania 16501

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Crawford, T.S., Tel. 202-4260872

STATUS: Active START DATE: Aug. 1973 COMPL. DATE: Nov. 1973 FUND TYPE: Contract CONTR. NO. : DOT-FR-40013

The Association of American Railroads (AAR) has initiated a program to study track-train dynamics. FRA is supporting this program as are many railroad equipment suppliers, including GE. In furtherance of the track-train dynamics study, GE has proposed a high speed locomotive test program. FRA is willing to participate in and support this program.

ACKNOWLEDGEMENT:
Federal Railroad Administration

054696
DYNAMICS OF FREIGHT TRAINS

INVESTIGATORS:
Kurtz, E.F.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada PROJ. NO. 2.8

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

A mathematical model has been developed for investigating the dynamic stability of cars in long freight trains and appears able to predict accurately the stability characteristics of a specific container car employed by Canadian National Railways for which dynamic stability data are available. Groups of up to sixteen cars were investigated, and the results indicate that the range of train velocities for which a long freight train will exhibit stable behaviour can apparently be determined with satisfactory accuracy by consideration of individual cars free of coupling forces. The model includes the effects of creep and spin forces at the rail-wheel interface, and a consideration of spin forces was found to be important. It is possible to define an optimum value of lozenge stiffness for which the freight-car trucks would be stable as regards hunting for all speed of interest for freight trains.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

014827
METROLINER ELECTRICAL SYSTEMS RELIABILITY

INVESTIGATORS:
Watt, C.W., Task Manager, Tel. 617-4942054
Ebacher, R., Project Contact, Tel. 617-4942257

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142 PROJ. NO. PPA RR06-0

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590 PROJ. NO. 71-RR-0

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4260855

STATUS: Active START DATE: Jan. 1971 COMPL. DATE: June 1972 TOTAL FUNDS: $160000 FUND TYPE: PPA CONTR. NO.: PPA-RR-06/0 CONTR. TYPE: CR

OBJECTIVES AND SCOPE:
This work will be done in close cooperation with staff of the Office of High Speed Ground Transportation, the Penn Central Railroad, and their contractor. Working closely with personnel from the Office of High Speed Ground Transportation, the responsible staff from TSC will familiarize itself thoroughly with the electrical systems of the Metroliners, the problems that have been evident in their operation to date, and with the analyses already done as to the causes and possible cures for these problems. Utilizing the expertise and equipment available at the Transportation Systems Center, analysis to determine the cause of failure of parts and equipment will be made as needed. Based on the information derived from the above tasks, maintenance practices will be reviewed.

ACKNOWLEDGEMENT:
Transportation Systems Center

016867
DEMONSTRATE TWO TRAIN SETS OF DUAL-POWER GAS TURBINE ELECTRIC POWERED COMMUTER RAILROAD CARS

PERFORMING AGENCY:
Washington Metropolitan Area Transit Authority, 950 L'Enfant Plaza, SW, Washington, D.C.

SPONSORING AGENCY:
Urban Mass Transportation Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Silien, J.S., Tel. 202-4260090

STATUS: Active START DATE: Dec. 1971 COMPL. DATE: Dec. 1974 TOTAL FUNDS: $7400000 FUND TYPE: Grant- CONTR. NO.: DOT-UT-613

No Abstract.

ACKNOWLEDGEMENT:
Urban Mass Transportation Administration, NY-06-0005

025403
URBAN RAPID RAIL VEHICLE PROGRAM

PPS# 2.1.

INVESTIGATORS:
Cord, J., Tel. 215-5223200

PERFORMING AGENCY:
Boeing Company, Vertol Division, Philadelphia, Pennsylvania

SPONSORING AGENCY:
Urban Mass Transportation Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Silien, J.S., Tel. 202-4260090

STATUS: Active START DATE: June 1971 TOTAL FUNDS: $12322624 FUND TYPE: Contract CONTR. NO. : DOT-UT-10007

No Abstract.

ACKNOWLEDGEMENT:
Urban Mass Transportation Administration, IT-06-0026

036354
RESEARCH STUDY TO PERFORM ANALYSIS OF RAILROAD CAR TRUCK AND WHEEL FATIGUE

PERFORMING AGENCY:
IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bray, D.E., Tel. 202-4261227

STATUS: Active START DATE: June 1972 TOTAL FUNDS: $243023 FUND TYPE: Contract CONTR. NO.: DOT-FR-20070

Identify and investigate the load and environmental factors which influence performance efficiency of freight car trucks and wheels, devise and conduct an experimental program to determine the effect of the frequency and magnitude of the dynamic loads which are imposed upon trucks and wheels in a range of freight operations, define engineering design and service life criteria for freight car trucks and wheels, investigate the interrelation between existing designs and manufacture and the degree of structural adequacy which each offers, evaluate alternative conceptual approaches to freight car truck design on the basis of broad application of costs and benefits.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-19

036771
METRO IMPROVEMENT

PERFORMING AGENCY:
General Electric Company, Pennsylvania

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Gannett, M.C., Tel. 202-4260772

STATUS: Obligated START DATE: June 1971 TOTAL FUNDS: $3297392 FUND TYPE: Contract CONTR. NO. : DOT-FR-10037

In order to determine why the Metroliner has not performed as originally planned and to assume a role of leadership in the future development of this type equipment, work is to be performed to correct the Metroliner reliability problems and to make necessary modifications and improvements based upon operating experience. Investigation and train modifications based upon will be conducted. It is anticipated that the engineering effort and the modification work will require two years to complete.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036986
ADVANCED DESIGN TECHNIQUES FOR RAIL TRANSPORTATION VEHICLES

INVESTIGATORS:
Wilson, L.S.

PERFORMING AGENCY:
Washington University, St Louis, St Louis, Missouri 63130

SPONSORING AGENCY:
Office of Systems Development and Technology, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bray, D.E., Tel. 202-4260855

STATUS: Active START DATE: Apr. 1973 COMPL. DATE: Apr. 1975 TOTAL FUNDS: $84400 FUND TYPE: Contract CONTR. NO.: DOT-OS-30108

The contractor shall develop an analytical model suitable for simulating the structural action of typical rail transportation vehicle components with sufficiently high degrees of precision to permit realistic evaluation of their expected fatigue life. Emphasis shall be on estimation of stress levels near points of singularity such as cutouts, stiffeners and support attachments. This model shall be based on the results of recent research on the part of the contractor and others which indicates that a family of finite elements, exhibiting convergence with respect to increasing orders of approximation as well as with respect to progressively reduced element sizes, can be constructed utilizing a new formulation technique known as the constraint method.

ACKNOWLEDGEMENT:
Office of Systems Development and Technology, PR# PUR-1-30035

038060
FLAW DETECTION IN RAILWAY WHEELS USING ACOUSTIC SIGNATURES

PERFORMING AGENCY:
Houston University, Department of Mechanical Engineering, Houston, Texas 77004

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bray, D.E., Tel. 202-4261227

STATUS: Active START DATE: Oct. 1972 COMPL. DATE: Oct. 1974 TOTAL FUNDS: $115573 FUND TYPE: Contract-CONTR. NO.: DOT-TSC-729

Phase I involves testing for defect identification by continuous static excitation. Methods and equipment for finding defects shall be developed. Phase II shall use the methods and facilities developed in Phase I to study the acoustic signatures of a variety of railroad wheel designs, sizes and typical flaws.

ACKNOWLEDGEMENT:
Transportation Systems Center, DOT-FR-30002

038061
RAIL HAZARDOUS MATERIAL TANK CAR DESIGN STUDY

PERFORMING AGENCY:
Calspan Corporation, 4455 Genesee, Buffalo, New York 14221

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bray, D.E., Tel. 202-4261227

STATUS: Active START DATE: Oct. 1972 COMPL. DATE: Aug. 1974 TOTAL FUNDS: $94555 FUND TYPE: Contract CONTR. NO.: DOT-FR-20069 CONTR. TYPE: CPFF

The objectives of the study are: (1) to provide the basis for defining practical and economical safety improvements which can be either retrofitted to in-service cars or incorporated into the design and manufacture of new tank cars, and (2) define the safety research gaps which must be remedied before a prototype tank car can be designed to optimal safety/economic considerations.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-64

038826
PERFORM POST ACCEPTANCE TEST ON THE STATE-OF-THE-ART CAR (SOAC)

PERFORMING AGENCY:
Boeing Company, P.O. Box 16858, Philadelphia, Pennsylvania 19142

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Neat, G., Tel. 617-4942290

STATUS: Active START DATE: Feb. 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $496001 FUND TYPE: Contract-CONTR. NO.: DOT-TSC-580 CONTR. TYPE: CPFF

The Ground Systems Division of the Transportation Systems Center, which is acting as Systems Manager for the Rail Programs Branch of UMTA in certain research, development and demonstration areas, is funding this contract for the twofold purpose: to perform post acceptance engineering test on the State-of-the-Art Car and to expand and improve the General Vehicle Test Plan. Both of these objectives are in furtherance of the Urban Rail Supporting Technology Program and more specifically will: provide engineering data for the Advanced Concepts Train Programs, provide UMTA with an engineering baseline to judge future program progress, relate HSGTC track characteristics to those of 5 model areas, and provide an instrumentation package that can be used on railcar test programs, including the AC Train.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# PE-0082

038849
IMPROVE METROLINER TRUCKS

PERFORMING AGENCY:
LTV Aerospace Corporation, Ground Transportation Division, P.O. Box 5907, Dallas, Texas 75222

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Ullman, K.B., Tel. 202-4260855

STATUS: Active START DATE: Mar. 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $3784869 FUND TYPE: Contract-CONTR. NO.: DOT-FR-20049 CONTR. TYPE: FFP

The objective of this contract is to design, fabricate, test, integrate and railcar test improved metroliner trucks.

ACKNOWLEDGEMENT:
Federal Railraod Administration

045009
STRUCTURAL STUDY OF HAZARDOUS MATERIAL TANK CARS

INVESTIGATORS:
Wilkinson, M.

PERFORMING AGENCY:
Louisiana Polytechnic Institute, Ruston, Louisiana 71270

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Levine, D., Tel. 202-4260855

STATUS: Active START DATE: May 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $49000 FUND TYPE: Contract- CONTR. NO. : DOT-FR-30056 CONTR. TYPE: CR

The ojectives of this research can be accomplished in three phases. The first phase shall be concerned with a review and evaluation of present specifications under which tank cars are currently being built. A study of the forces which tank cars are normally subjected to in service conditions will be part of this study. The next two phases are inter-related with one being an experimental study of a scale model one fourth or one fifth of a 112A 340W type tank car and the other being a theoretical analysis of a full scale tank car of the type 112A 340W using realistic thermal loads obtained from fire tests and analysis of fire accidents.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-208

045693
FRACTURE RESISTANCE CHARACTERISTICS OF RAILROAD WHEELS

PERFORMING AGENCY:
Boeing Company, P.O. Box 3707, Seattle, Washington 98124

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Valente, R.E., Tel. 617-4942146

STATUS: Active START DATE: May 1973 COMPL. DATE: Jan. 1975 TOTAL FUNDS: $61380 FUND TYPE: Contract CONTR. NO. : DOT-TSC-617 CONTR. TYPE: CPFF

Tasks include: 1—Carry out plane strain crack toughness (K1c) tests on specimens removed from the rim, plate, or hub locations of railroad wheels. 2—Evaluate fatigue crack propagation in railroad wheels and correlate fatigue crack growth rate with the range of the stress intensity factor. 3—Establish conventional tensile, hardness, and impact toughness mechanical properties of railroad wheels. 4—Present and analyze fracture toughness (K1c) & fatigue test data and attempt determination of critical crack size that will cause wheel fracture for different stress levels.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TME-0101

045708
CRASHWORTHINESS OF URBAN RAIL CARS

PERFORMING AGENCY:
Calspan Corporation, P.O. Box 235, Buffalo, New York 14221

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Weinstock, H., Tel. 617-4942038

STATUS: Active START DATE: Aug. 1973 COMPL. DATE: July 1974 TOTAL FUNDS: $151831 FUND TYPE: Contract- CONTR. NO. : DOT-TSC-681 CONTR. TYPE: CPFF

The results of the project are to include: 1. Definition of crashworthiness criteria for Urban Rail Systems. 2. Assessment of the crashworthiness of existing Urban Rail Vehicles. 3. Indentification, analysis and assessment of state-of-the-art of crash energy management devices that can be retrofitted to existing vehicle designs. 4. Design Tradeoff Studies of improved structural designs in terms of passenger safety risks, vehicle weight and cost. 5. Engineering standards for Rail Rapid Transit Vehicle Crashworthiness.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TMP-0141

045718
STUDY AND EVALUATION OF DYNAMIC CHARACTERISTICS OF RAIL VEHICLES

PERFORMING AGENCY:
General Electric Company, Transportation Systems Business Division, 2901 East Lake Road, Erie, Pennsylvania 16501

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Kelleher, D.J., Tel. 617-4942144

STATUS: Active START DATE: June 1973 COMPL. DATE: Dec. 1973 TOTAL FUNDS: $58580 FUND TYPE: Contract- CONTR. NO. : DOT-TSC-652 CONTR. TYPE: CPF

The purpose of this procurement is to obtain engineering data that will be applied to the development of a design evaluation capability in the dynamic performance of urban rail vehicles. This design evaluation capability will provide an analytical and experimental framework for design of diagnostic dynamic performance tests on urban rail vehicle design at the D.O.T. High Speed Ground Test Center and interpretation of the results of these tests. This capability will also include analytic tools which will permit recommendations of design parameter changes to improve observed dynamic performance.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TMP-0119

045752
LOCOMOTIVE CRASH ATTENUATION DEVICE

PERFORMING AGENCY:
Minicars, Incorporated, 35 La Patera Lane, Goleta, California 93017

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Koplow, M.D., Tel. 617-4942769

STATUS: Active START DATE: Feb. 1973 COMPL. DATE: Aug. 1973 TOTAL FUNDS: $70950 FUND TYPE: Contract- CONTR. NO. : DOT-TSC-573

The objective of the contract is to define and study the train-strikes-vehicle type event, to find a method to reduce the high incidence of fatal injury associated with this type of accident, and to embody this method in a preliminary design of a crash attenuation device and to accomplish a preliminary design, with cost estimate of a crash attenuation device for trains which effectively incorporate the method of fatality reduction. The contract will consist of statistical, analytical, and design tasks but will not include the fabrication of a prototype crash attenuation device. (Testing may be performed to determine or verify information required for analyses.) The output of the contract shall be a statistical and physical definition of the train-strikes-vehicle type accident, and an analytical study of the impact event.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TME-0083-GF

046502
RAILROAD WHEEL INVESTIGATION

INVESTIGATORS:
Wetenkamp, H.R., Professor

PERFORMING AGENCY:
Illinois University, Urbana, Department of Theoretical & Applied Math, Sch of Engineer, Urbana, Illinois 61801

SPONSORING AGENCY:
Griffin Wheel Company

An analytical elastic solution to determine the stresses developed in a railway car wheel when subjected to axisymmetric heating is being used to evaluate different geometric designs. Experimental determination of the temperatures developed on the tread of a car wheel are being examined to evaluate the effect of brake shoe geometry.

ACKNOWLEDGEMENT:
Science Information Exchange, JGF 2 3

050338
ARTICULATED RAIL CAR TRUCK DEVELOPMENT

PERFORMING AGENCY:
Railway Engineering Associates, Incorporated, 38 West University Avenue, Bethlehem, Pennsylvania 18015

SPONSORING AGENCY:
Railway Engineering Associates, Incorporated, 38 West University Avenue, Bethlehem, Pennsylvania 18015
Philadelphia, Bethlehem and New England Railroad

OBJECTIVES AND SCOPE:
Develop a dramatically improved freight car truck. Obtain background information for applying basic design to (a) locomotives; (b) rapid-transit cars, and (c) passenger cars.

APPROACH AND METHODS:
Design, build, and test a 100 ton capacity car set of trucks based on earlier work with 1/8 size scale models and a continuing work with mathematical models (computer simulation).

PROGRESS AND RESULTS:
Low speed testing over switching railroad trackage indicates that basic design and principles are sound. Plans being made for further testing for longer distances and at higher speeds. 800 REPORTS ISSUED:
List, H.A., AN EVALUATION OF RECENT DEVELOPMENTS IN RAIL CAR TRUCK DESIGN, ASME #71-RR-1, Apr. 1971 RRIS #050340-No 7401

ACKNOWLEDGEMENT:
Railway Engineering Associates, Incorporated

051251
RAILCAR REFRIGERATION GENERATION DEMONSTRATION

INVESTIGATORS:
Daudet, H.

PERFORMING AGENCY:
AiResearch Manufacturing Company, Garrett Corporation, 402 South 36th Street, Phoenix, Arizona 85034

SPONSORING AGENCY:
National Science Foundation, Division of National and International Programs, 1800 G Street, NW, Washington, D.C. 20550

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

Description: This program was initiated to develop a closed Brayton cycle gas turbine engine for mechanical refrigeration of railcars. A breadboard demonstrator was fabricated and operated. A set of components was delivered to Pacific Fruit Express and subjected to test on railways around the U.S. A specialized combustor and control system was also delivered to PFE.

ACKNOWLEDGEMENT:
Science Information Exchange, AQ 945

007457
HEAVY DUTY MARINE GAS TURBINE DEVELOPMENT PROJECT

INVESTIGATORS:
Kaplan, S.M., Tel. 518-3742211

PERFORMING AGENCY:
General Electric Company, Gas Turbine Department, Schenectady, New York

SPONSORING AGENCY:
Maritime Administration, Department of Commerce, Main Commerce Building, Washington, D.C. 20230 PROJ. NO. DDM-467

RESPONSIBLE INDIVIDUAL:
Critelli, F.X., Tel. 207-9675425

STATUS: Active START DATE: June 1970 COMPL. DATE: June 1975 TOTAL FUNDS: $8025000 FUND TYPE: Contract- CONTR. NO. : 0-35510 CONTR. TYPE: CS

OBJECTIVES AND SCOPE:
The project will undertake those development efforts and improvements necessary to "marinize" the industrial regenerative gas turbine to provide an economically and technically attractive propulsion machinery system for ships of the U.S. merchant marine; having lower acquisition and operating costs than existing forms of propulsion power generation.

APPROACH AND METHODS:
The marinization of the industrial regenerative gas turbine will require research and development efforts to provide: (1) a demonstrated capability to efficiently and reliably burn Bunker "C" fuel, and (2) a self-contained (internal) capability to reverse direction of rotation.

PROGRESS AND RESULTS:
As an economically competitive system all efforts will be concentrated on insuring that the developed system will offer: (1) increased ship reliability and availability (reduced maintenance), (2) improved operational manpower utilization, (3) improved energy utilization (reduced specific fuel consumption), and (4) increased shipyard productivity (reduced installation manhours). 800 REPORTS ISSUED: Critelli, F.X; Kaplan, S.M; Carvana, A., HEAVY DUTY MARING GAS TURBINE DEVELOPMENT PROJECT, General Electric Company, Feb. 1974, MRIS #053938

ACKNOWLEDGEMENT:
Maritime Administration

025220
TRAIN CONTROL AND OPERATIONS EVALUATION

INVESTIGATORS:
Hergenrother, K., Tel. 617-4942048

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Regan, L.G., Tel. 202-4261510

STATUS: Active COMPL. DATE: June 1972 TOTAL FUNDS: $135000 FUND TYPE: PPA CONTR. NO. : PPA-RR-201/2 CONTR. TYPE: CR

An important aspect of railroad safety concerns locomotive speed indicators, and the recording of speed and other safety-related locomotive functions. Present equipment for this purpose will be evaluated, and a study of the technical problems of locomotive data recording will be performed. The recent public awareness of the national ecology has made it necessary that the railroads both measure and control their noise and engine exhaust emissions. This problem has been divided into two tasks in FY72: 1. system analysis, including industry pollution survey and suggested method of analysis and standards: and 2. evaluation of measurement and control techniques.Evaluation of locomotive speed indicators and study of the technical problems of locomotive data recording. System Analysis, including industry pollution survey.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036276
TASK ANALYSIS OF RAILROAD ENGINEMAN'S FUNCTIONS

PERFORMING AGENCY:
McDonnell Douglas Corporation, 2600 North Third Street, Saint Charles, Missouri 63301

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Regan, L.G., Tel. 202-4261510

STATUS: Obligated START DATE: June 1972 COMPL. DATE: Aug. 1972 TOTAL FUNDS: $15000 FUND TYPE: Contract- CONTR. NO. : DOT-FR-20036 CONTR. TYPE: FFP

OBJECTIVES AND SCOPE:
The analysis shall include the principle tasks of the Engineman in road freight operations. For each task, the step-by-step procedures for task performance shall be listed, together with tabulations for each step of the following: a. Information received, b. Display or communications method, c. Information processing and decision making required of the Engineman, d. Response of action required, e. Controls of communications for response, f. Potential hazards associated with the step, g. Interaction of other members of the operating crew.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-38

054561
ON BOARD ENERGY STORAGE FOR TRANSIT CAR POWER CONSUMPTION REDUCTION

INVESTIGATORS:
Nickel, E.

PERFORMING AGENCY:
AiResearch Manufacturing Company, Garrett Corporation, 2525 West 190th Street, Torrance, California 90501

SPONSORING AGENCY:
Metropolitan Transportation Authority of New York

Description: The design, development and testing of an electric propulsion system with an onboard energy storage unit for use on various subway and commuter cars. The kinetic energy of the moving car during braking is directed to a motor driven flywheel resulting in storage of the energy by increasing the speed of the flywheel. During acceleration the flywheel energy is released and supplies the majority of power required for acceleration of the car. Third rail power supplies an average power flow which is low through a chopper for drag, mechanical and electrical losses. Performance by computer analysis indicates a potential energy savings of 30% and peak power reduction as high as 60% over a typical NYCTA track profile. Verification of performance compared to conventional cars will be accomplished by operation on the NYCTA subway lines.

ACKNOWLEDGEMENT:
Science Information Exchange, AR 182

054697
MONITORING AND DIAGNOSTIC EQUIPMENT FOR MAINTENANCE OF DIESEL ELECTRICAL LOCOMOTIVES

INVESTIGATORS:
Rawat, S.K.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada PROJ. NO. 3.11.72

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

This project is aimed at various aspects of preventive and predictive maintenance of diesel-electric locomotives. The main concern is the effectiveness of modern testing equipment for performance monitoring and maintenance, which include certain electronic analyzers for the testing of mechanical components, SEARCH (System Evaluation and Reliability Checker) for the testing of electrical components, and onboard data-logger systems for continuous performance evaluation of locomotives.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

019702
A COMMUNICATIONS SYSTEM FOR LONG TRAINS

INVESTIGATORS:
Aitken, G.J.M.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario Canada

SPONSORING AGENCY:
Canadian Pacific Railways, Windsor Station, Montreal 3, Quebec Canada
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario Canada

STATUS: Active COMPL. DATE: Jan. 1971

OBJECTIVES AND SCOPE:
This project aims to develop a communications system capable of communicating braking and locomotive control instructions as well as providing a voice channel on long trains. Individual car-mounted components will be used which will permit inductive, capacitive, or radiative coupling.

ACKNOWLEDGEMENT:
Roads and Transportation Association of Canada

019708
CONTROL OF MULTI-LOCOMOTIVE POWERED TRAINS

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario Canada

SPONSORING AGENCY:
Canadian Pacific Railways, Windsor Station, Montreal 3, Quebec Canada
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario Canada

RESPONSIBLE INDIVIDUAL:
McLane, P.J.

STATUS: Active START DATE: Jan. 1971 COMPL. DATE: Apr. 1974

OBJECTIVES AND SCOPE:
This project will apply linear control theory in the design of an "auto-pilot" for multi-locomotive powered trains by regulating the coupler force and velocity of vehicle members in strings of high-speed vehicles; while maintaining tractive effort for the locomotives.

ACKNOWLEDGEMENT:
Roads and Transportation Association of Canada

025196
COMMUNICATIONS FOR HIGH SPEED GROUND TRANSPORTATION

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Ward, E., Tel. 202-4260850

STATUS: Active TOTAL FUNDS: $285000

This project is a continuation of the study and evaluation of wayside communications systems for high speed trains. It is divided into three tasks which are outlined in detail below. These are to study and evaluate available systems throughout the electromagnetic spectrum: to determine the risk of EMI with the PCM telemetry system at Pueblo: and to develop a computer model of a long PCM transmission line.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-RR

054694
TRAIN CONTROL SYSTEMS FOR UNSIGNALLED RAILWAY LINES

INVESTIGATORS:
MacKay, N.A.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

This is a feasibility study to examine the requirements for the control of trains along unsignalled rail lines with a view to developing a control system that can be incorporated simply and economically into present-day railroad procedures.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

054699
SURFACE WAVEGUIDES FOR GUIDED RADAR AND OBSTACLE DETECTION

INVESTIGATORS:
Beal, J.C.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

Open-guiding electromagnetic structures, i.e. surface waveguides, are being studied, both theoretically and experimentally, with the aim of providing a means for the detection of obstacles in guided ground transportation. Initially, emphasis is being placed on the detection of landslides in mountainous areas on present railway systems. This can be called "Guided Radar", as the intention is to enable a train to be warned within the braking distance of the train. Only the electromagnetic field aspects are being studied in this project; the signal-processing is under separate and co-ordinated investigation, formerly by Dr. G.J.M. Aitken also of Queen's University, now also by Dr. J.C. Beal.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

036745
HUMAN FACTORS OF RAILROAD OPERATIONS

INVESTIGATORS:
Devoe, D.B., Tel. 617-4942368

PERFORMING AGENCY:
Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Regan, L.G., Tel. 202-4261510

STATUS: Obligated START DATE: June 1972 COMPL. DATE: June 1973 TOTAL FUNDS: $300000 FUND TYPE: PPA- CONTR. NO. : PPA-RR-309

In view of the high incidence of railroad accidents due to human factors and the lack of federal regulations regarding safe performance by railroad personnel, a human factors program has been undertaken to provide the technical services necessary in this area for support of FRA regulatory responsibilities. Support is provided in the development of physical fitness standards, and research efforts in the areas of detailed task analysis, physiological measurement, accident investigation and vandalism. Additional work will be undertaken in the areas of standards for operating rules, railroad signals, training for railroad operations, aptitudes, attitudes and type of supervision and establishing a simulation facility and its research program.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-73-RR

049659
HUMAN FACTORS IN RAILROAD OPERATIONS

INVESTIGATORS:
Devoe, D.B., TIF, Tel. 617-4942368

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Stauffer, J.B., Tel. 202-4262965

STATUS: Active START DATE: Aug. 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $416000 FUND TYPE: PPA CONTR. NO. : PPA-RR-X09

This continues a program of research and consultation on human factors in railroad safety in support of FRA regulatory responsibilities involving human performance.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-74-RR

054559
COMBINED EFFECTS OF NOISE, WORK AND HEAT ON HUMAN HEARING

INVESTIGATORS:
Heins, A.

PERFORMING AGENCY:
Department of Health, Education and Welfare, Public Health Serv Ctr for Dis Control, Physical Agents Br, 15th & Walnut Streets, Room 506, Cincinnati, Ohio 45202

SPONSORING AGENCY:
National Inst for Occupational Safety and Health, Department of Health, Education and Welfare, Public Health Service, Cincinnati, Ohio 45202 PROJ. NO. 438-210-05

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

In this project the temporary noise-induced hearing loss resulting from exposure to broad band noise while under conditions of heat stress is being examined. Under closely controlled laboratory conditons, twelve young, healthy, male subjects with normal hearing were exposed to different noise levels while under various climatic and workload conditions. Susceptibility to temporary threshold shifts is being evaluated using air conduction audiometric examinations administered before exposure and both two and thirty minutes after exposure.

ACKNOWLEDGEMENT:
Science Information Exchange, AM 473 1

054562
LABORATORY STUDIES OF NOISE–INDUCED HEARING LOSS

INVESTIGATORS:
Dunn, D.

PERFORMING AGENCY:
Department of Health, Education and Welfare, Public Health Serv Ctr for Dis Control, Physical Agents Br, 5th & Walnut Streets, Room 506, Cincinnati, Ohio 45202

SPONSORING AGENCY:
National Inst for Occupational Safety and Health, Department of Health, Education and Welfare, Public Health Service, Cincinnati, Ohio 45202 PROJ. NO. 438-210-03

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974 FUND TYPE: ID

Studies will be conducted of temporary and permanent hearing losses in animals and temporary hearing loss in human subjects, in order to determine effects of impact noise, fluctuating noise levels, "quiet" rest periods, shortened exposures at high levels, intermittent noise, lengthened exposures, and noise spectrum. Work with rats will continue, and some primate work will be done. Laboratory facilities for noise exposure, hearing testing, and anatomical work will be expanded and improved.

ACKNOWLEDGEMENT:
Science Information Exchange, AS 510

025441
LOCOMOTIVE CRASH ATTENUATION DEVICE

INVESTIGATORS:
Koplow, M.D.

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active TOTAL FUNDS: $92400 FUND TYPE: PPA CONTR. NO.: PPA-RR-211 CONTR. TYPE: CR

OBJECTIVES AND SCOPE:
The train-strikes-vehicle type accident accounts for about 75% of the 1,100 or more annual train-involved grade crossing fatalities. The chief victims of these accidents are passenger car occupants (85%), but infrequent train/bus collisions have been notable tragedies. The fatality producing mechanisms of these accidents-impact force, disintegration, penetration, and fire, can be reduced in severity by modifying the forward cushioning device, while other design features can lessen the tendency of the train to drag, penetrate, roll, or otherwise destroy the impacted vehicle. This task undertakes the analysis, development, fabrication and testing of a crash attenuation device for trains. The device must be effective for a major potential of being reasonably economical to manufacture and install. In addition, the device must be practical. Its use must be compatible with efficient railroad practice.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036727
NATIONAL PUBLIC RAILROADS-HIGHWAY GRADE CROSSING INFORMATION SYSTEM

INVESTIGATORS:
Sproles, M.R.

PERFORMING AGENCY:
Association of American Railroads, 1920 L Street, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590
Association of American Railroads, 1920 L Street, NW, Washington, D.C. 20036

STATUS: Active START DATE: June 1972 COMPL. DATE: Dec. 1973 TOTAL FUNDS: $1275000 FUND TYPE: Contract- CONTR. NO.: DOT-FR-20082 CONTR. TYPE: CS

OBJECTIVES AND SCOPE:
Develop a Centralized Comprehensive, National Public Railroad-Highway Grade Crossing Information System and number each public railroad-highway grade crossing in accordance with the Schedule and General Provisions.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-67

036744
GRADE CROSSING PROTECTION

INVESTIGATORS:
Hopkins, J.B., Tel. 617-4942048

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973 TOTAL FUNDS: $400000 FUND TYPE: PPA CONTR. NO.: PPA-RR-302

Development of improved technology for grade crossing protection, and delineation of the optimal application of both conventional and innovative systems. The FY73 effort will consist of four tasks: (1) coordination of relevant past and present activities of FRA and others, summarizing the present status and specifically recommending a future course, (2) further development and extensive field test of new means of train detection and signal activation, to provide technically and economically acceptable alternatives to and improvements on track circuits, (3) extension of past studies of desirability and means of enhancing train visibility to support a large-scale test of the concept, and (4) study of the feasibility of locomotive-mounted crash attenuation structures.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-73-RR

038053
PROGRAM DEFINITION STUDY FOR RAIL-HIGHWAY GRADE CROSSING IMPROVEMENT

PERFORMING AGENCY:
Voorhees (Alan M) and Associates, Incorporated, Westgate Research Park, McLean, Virginia 22101

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Levin, B., Tel. 202-4261567

STATUS: Inactive START DATE: Aug. 1971 TOTAL FUNDS: $30884 FUND TYPE: Contract CONTR. NO.: DOT-FR-20001 CONTR. TYPE: CPFF

This improved program definition study will include data on crossings, accidents and railroad operating costs which have become available since the original report was completed. Additional technical assistance in the preparation of reports specified in the Railroad Safety Act of 1970 is required in accordance with Attachment A, Phase I and II.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# FRA-420

045794
SPECIAL MICROWAVE ASPECTS OF ANTICAPATORY CRASH SENSORS AND GRADE CROSSING PROTECTIVE SYSTEMS

PERFORMING AGENCY:
Lowell Technology Institute, Research Foundation, 450 Aiken Street, Lowell, Massachusetts 01854

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Burke, W., Tel. 617-4942042

STATUS: Active START DATE: Mar. 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $27879 FUND TYPE: Contract- CONTR. NO.: DOT-TSC-589 CONTR. TYPE: CR

The Contractor shall furnish the necessary personnel, facililties, services and materials to accomplish the work set forth below: 1. Characterization of Radar Automobile Crash Sensor Performance as a function of Frequency. 2. Inter-Vehicle Interference Countermeasures. 3. Special Topics of Relevance to Microwave Grade Crossing Protective Systems. 4. Reports are required and shall be prepared in accordance with 'Contractor Report Exhibit' dated February 5, 1971.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TME-0104

049658
RAIL SAFETY/GRADE CROSSINGS PROTECTION

INVESTIGATORS:
Coulombre, R.E., PT, Tel. 617-4942449

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Stauffer, J.B., Tel. 202-4262965

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $812000 FUND TYPE: PPA CONTR. NO.: PPA-RR-X02

The program will consist of four major tasks: (1) Development of Application Guidelines for Train 'on board' conspicuity and impact attenuation devices. (2) Standardization of protection equipment will be emphasized including three related cost reduction objectives for production cost, maintenance cost and administrative cost. (3) Innovative System development will study new grade crossing protection concepts. (4) System Analysis will establish interadministration, state and railroad requirements for a data system to accommodate new FRA grade crossing inventory and other data.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-74-RR

054560
DEVELOPMENT OF NEW CORROSION PROTECTION DEVICES FOR SUBWAY EQUIPMENT

PERFORMING AGENCY:
Long Island Lighting Company, 175 East Old Country Road, Hicksville, New York 11801

SPONSORING AGENCY:
Long Island Lighting Company, 175 East Old Country Road, Hicksville, New York 11801

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

Description: To research & develop new or improved corrosion protection devices for subway equipment installed in severely corrosive environments. Project will result in improved reliability and safety to public and operating personnel and will reduce maintenance costs.

ACKNOWLEDGEMENT:
Science Information Exchange, AP 698

036351
RAILROAD LOCOMOTIVE EXHAUST EMISSION CONTROL

INVESTIGATORS:
Hergenrother, K., Tel. 617-4942041

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590 PROJ. NO. RP-30

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Active START DATE: July 1972 COMPL. DATE: Sept. 1973 TOTAL FUNDS: $120000 FUND TYPE: PPA CONTR. NO.: PPA-RR-301

A program started with the Environmental Protection Agency in FY72 to identify and evaluate the retrofittable engine modifications will continue. A cooperative effort will be undertaken with the American Association of Railroads to study the sensitivity of diesel engine emissions to maintenance and repair procedures.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-73-RR

045080
PROVIDE ENGINEERING DATA ON WHEEL/RAIL NOISE AND VIBRATION CONTROL TECHNOLOGY

PERFORMING AGENCY:
Bolt, Beranek and Newman, Incorporated, 50 Moulton Street, Cambridge, Massachusetts 02138

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lotz, R., Tel. 617-4942412

STATUS: Active START DATE: June 1973 COMPL. DATE: July 1974 TOTAL FUNDS: $183900 FUND TYPE: Contract- CONTR. NO.: DOT-TSC-644 CONTR. TYPE: CPFF

Study is for the development of a quantitative mechanical theory of wheel/rail noise generation and radiation, and from the theory develop a verified noise prediction method applicable to existing and potential new wheel/rail noise control devices, including the cost-effectiveness aspects. The results of the study will develop and demonstrate improved devices and design methods for reduction of acoustic noise due to metal railroad type wheels rolling on metal rails as applied to Urban Rail Transit Systems.

ACKNOWLEDGEMENT:
Transportation Systems Center

045089
PROVIDE ENGINEERING DATA ON TRACK AND ELEVATED STRUCTURE NOISE AND VIBRATION CONTROL TECHNOLOGY

PERFORMING AGENCY:
Cambridge Collaborative, Incorporated, 238 Main Street, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Kurgweil, L.G., Tel. 617-4942142

STATUS: Active START DATE: June 1973 COMPL. DATE: July 1974 TOTAL FUNDS: $146644 FUND TYPE: Contract- CONTR. NO.: DOT-TSC-643 CONTR. TYPE: CPFF

Purpose is to develop and demonstrate improved design methods for reduction of acoustic noise radiation from and vibration transmission through track and elevated guideways as applied to Urban Rail Transit Systems. The results of this study will develop new design methods for control of track and elevated structure noise and vibration.

ACKNOWLEDGEMENT:
Transportation Systems Center

045756
COMPONENT DEVELOPMENT AND ENGINEERING DATA SERVICES

PERFORMING AGENCY:
Bolt, Beranek and Newman, Incorporated, 50 Moulton Street, Cambridge, Massachusetts 02138

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Votolato, A.C., Tel. 617-4942190

STATUS: Active START DATE: Apr. 1973 COMPL. DATE: Nov. 1973 TOTAL FUNDS: $49000 FUND TYPE: Contract- CONTR. NO.: DOT-TSC-603 CONTR. TYPE: CPF

The objective of this contract is to provide component development and engineering data services aimed at reducing noise emanating from tracked air cushion vehicles (TACV) and other rapid transit systems.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TMP-0113

051252
EQUIPMENT FOR MONITORING COMBUSTION PRODUCTS

INVESTIGATORS:
Conta, L.D.

PERFORMING AGENCY:
Rhode Island University, Department of Mechanical Engineering & Applied Mechanics, Administration Building, Kingston, Rhode Island 02881

SPONSORING AGENCY:
National Science Foundation, Division of Engineering, 1800 G Street, NW, Washington, D.C. PROJ. NO. GK-38175

STATUS: Active START DATE: Apr. 1973 COMPL. DATE: Mar. 1974 TOTAL FUNDS: $9500

This grant provides support to acquire two pieces of equipment highly essential in carrying out studies which monitor combustion products from various sources including internal combustion engines. Both pieces of equipment, the chemiluminescence device for determining oxides of nitrogen and the nondispersive infrared unit to determine carbon monoxide will be used by numerous individuals active in various air pollution studies. These include investigation of a new internal combustion engine concept, removal of SO2 and NOx from flue gases, chemical and electrochemical reduction of NO2 and NO to elemental nitrogen, and wet-phase oxidation of sewage waste treatment.

ACKNOWLEDGEMENT:
Science Information Exchange, GSE 4229

013854
NON-SCANNING OBSTACLE DETECTION SYSTEM

INVESTIGATORS:
Paul, G.S., Tel. 202-4269661

PERFORMING AGENCY:
Applied Metro Technology, Incorporated, 66 East Gloucester Pike, Barrington, New Jersey 08007

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Mould, J.C., Tel. 202-4269661

STATUS: Completed START DATE: Dec. 1969 COMPL. DATE: Aug. 1973 TOTAL FUNDS: $105638 FUND TYPE: Contract- CONTR. NO.: DOT-FR-00019 CONTR. TYPE: CPFF

In high speed ground transportation, obstacles on the guideway require detection a considerable distance ahead of a vehicle in order to pass control signal to vehicle to stop allowing for deceleration distance. The obstacle detection system being designed and tested consists of non-lasing (infra red) beams optically covering the surface of the guideway and then reflected to detectors which in turn transmit any interruption to control center for signal to vehicle. System will detect obstacles one inch in diameter at distances up to 200 feet. Laboratory and field tests are now being conducted for later application of system to the TACRV guideway.

ACKNOWLEDGEMENT:
Federal Railroad Administration

013855
SIMULATION AND ANALYSIS OF PERFORMANCE OF A WAYSIDE COMMUNICATION SYSTEM EMPLOYING FDM-FM MODULATION

INVESTIGATORS:
Carbine, I.R., Project Engineer, Tel. 505-5242851

PERFORMING AGENCY:
New Mexico State University, Las Cruces, Box 3548, Las Cruces, New Mexico 88801

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Novotny, R.A., Tel. 202-4269564

STATUS: Active COMPL. DATE: June 1973 TOTAL FUNDS: $190266 FUND TYPE: Contract CONTR. NO. : DOT-FR-10027 CONTR. TYPE: CR

Communication between a high speed guided vehicle and the wayside requires the highest order of reliability as such communication also carries the command and control signals besides telephonic voice communication. Different modulation systems can be employed and analysis of AM and FM have determined that these modulation systems are subject to noise and reflections. FDM-FM another modulation system has in other communication systems superior performance, a simulation and analysis of this method will be undertaken revising the computer program previously completed by the NM State University. Upon completion of this project the revised computer program will be transferred to TSC for simulation using PCM modulation technique.

ACKNOWLEDGEMENT:
Federal Railroad Administration

013856
ADVANCED LIM WITH POWER CONDITIONING EQUIPMENT FOR USE ON TACRV

PPS# 72-1.C.1.

INVESTIGATORS:
Weinstein, C., Project Manager, Tel. 213-3239500X281

PERFORMING AGENCY:
AiResearch Manufacturing Company, Garrett Corporation, 2525 West 190th Street, Torrance, California 90509

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Guarino, M., Tel. 202-4269660

STATUS: Active START DATE: June 1970 COMPL. DATE: Jan. 1974 TOTAL FUNDS: $6058222 FUND TYPE: Contract- CONTR. NO.: DOT-FR-00029 CONTR. TYPE: CPFF

OBJECTIVES AND SCOPE:
Design and laboratory development of a self supported Linear Motor operating from power conditioned from standard wayside electric power. Linear motor being designed for operation at 300 mph providing a thrust of 15,000 lbs. for use on the TACRV. The power conditioning equipment being designed operates from wayside power of 8250 Volts and provides to the linear motor variable frequency and voltage using solid state technology. Upon completion of Task 1 the design manufacture will proceed under Task 2 with completion of ADLIM system by April 1971 for installation in TACRV and testing at the High Speed Ground Test Center. The design, manufacture has proceeded under Task 2 with completion of 1/2 ADLIM system by April 1971 for installation in TACRV and testing at the High Speed Ground Test Center.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-124

013861
STUDY OF MAGNETIC SUSPENSION FOR HIGH SPEED GROUND VEHICLES

INVESTIGATORS:
Coffey, H., Tel. 415-3266200

PERFORMING AGENCY:
Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Harding, J.T., Tel. 202-4269660

STATUS: Active START DATE: Feb. 1971 COMPL. DATE: Apr. 1974 TOTAL FUNDS: $335934 FUND TYPE: Contract- CONTR. NO.: DOT-FR-10001 CONTR. TYPE: CPFF

OHSGT wishes to determine whether magnetic levitation is a practical alternative to wheels or air cushions for suspending and guiding high speed ground vehicles. Knowledge is needed on the dynamic stability of such a suspension and also the magnitude and configuration of the magnetic field required for levitation. SRI is measuring the dynamic performance of a 14 foot sled travelling over a 500 foot guideway. The sled is supported and guided by four superconducting magnets. This program supplements DOT-FR-10026.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-181

013862
STUDY OF MAGNETIC SUSPENSIONS FOR HIGH SPEED GROUND VEHICLES

INVESTIGATORS:
Reitz, J.R., Tel. 313-3227006

PERFORMING AGENCY:
Ford Motor Company, 23400 Michigan Avenue, Dearborn, Michigan 48121

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Harding, J.T., Tel. 202-4269660

STATUS: Active START DATE: Feb. 1971 COMPL. DATE: Nov. 1973 TOTAL FUNDS: $522879 FUND TYPE: Contract- CONTR. NO. : DOT-FR-10026 CONTR. TYPE: FPF

This program complements DOT-FR-10001. The objective is the same, namely the determination of feasibility of mangetic levitation for HSG vehicles. Analytical and experimental studies of both attractive and repulsive maglev are required.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-168

013876
CONTINUATION OF HIGH SPEED GROUND TEST RESEARCH

PPS# 72-1.c.1.

INVESTIGATORS:
Wormley, D.N., Associate Professor, Tel. 617-2532246

PERFORMING AGENCY:
Massachusetts Institute of Technology, Cambridge, Massachusetts

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lampros, A.F., Tel. 202-4269564

STATUS: Active START DATE: Dec. 1970 COMPL. DATE: Sept. 1973 TOTAL FUNDS: $184800 FUND TYPE: Contract- CONTR. NO. : DOT-FR-10007 CONTR. TYPE: CR

Continuation of Research in Coupled Dynamic Interactions between High Speed Ground Transport Vehicles and Guideway Structures. Task 1 is being performed to optimize and formulate guidelines for designers of vehicles guideway systems. Continuation of Basis Research and Development in Fluid Suspension Dynamics. Task 2 concerns the development of new techniques for improving the ride quality of tracked air cushion vehicles, through active control of the air cushion system, and the development of associated guidelines for vehicle designers.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-110

014825
ELECTRIC POWER AND PROPULSION FOR HIGH SPEED TRACKED VEHICLES

INVESTIGATORS:
Raposa, F.L., Task Manager, Tel. 617-4942031

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20591 PROJ. NO. 71-RR-1

RESPONSIBLE INDIVIDUAL:
Ward, E.J., Tel. 202-4260850

STATUS: Active START DATE: Nov. 1970 COMPL. DATE: June 1972 TOTAL FUNDS: $255000 FUND TYPE: PPA CONTR. NO. : PPA-RR-05/1 CONTR. TYPE: CR

OBJECTIVES AND SCOPE:
This task is concerned with advanced concepts in electric power and propulsion for high speed tracked vehicles, which will guide the development of light weight and reliable systems. The sub-system components consist of the linear electric motor, power conditioning, collection and distribution. This task provides DOT with a technical base in electric power and propulsion from which to assess contractor effort. This task is a continuation of FY71, and combines the previous separate tasks of power conditioning and power collection.

ACKNOWLEDGEMENT:
Transportation Systems Center

036104
ELECTRIC POWER AND PROPULSION FOR HIGH SPEED TRACKED VEHICLES

INVESTIGATORS:
Raposa, F.L., Tel. 617-4942031

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Guarino, M., Tel. 202-4260808
Harding, J.T.

STATUS: Active TOTAL FUNDS: $300000 FUND TYPE: PPA CONTR. NO. : PPA-RR-205/1 CONTR. TYPE: CR

This task is concerned with advanced concepts in electric power and propulsion for high speed tracked vehicles, which will guide the development of light weight and reliable systems. The sub-system components consist of the linear electric motor, power conditioning, collection and distribution. This task provides DOT with a technical base in electric power and propulsion from which to assess contractor effort. This task is a continuation of FY71, and combines the previous separate tasks of power conditioning and power collection.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036388
ROCKET SLED TESTS

PERFORMING AGENCY:
Naval Weapons Center, China Lake, California 93555

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Novotny, R.A., Tel. 202-4269564

STATUS: Active START DATE: Dec. 1971 FUND TYPE: IA

A power collection system designed to transfer 12 megawatts of 30, 8000 volt, 60 cycle power from rails installed along a guideway to a vehicle moving 300 mph was tested for dynamic stability at the Naval Weapon Center. The tests proved that the system is stable at all speeds up to 300 mph.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036414
ECONOMICAL DEVELOPMENT OF DUAL MODE TRANSPORTATION

PERFORMING AGENCY:
Office of Systems Development and Technology, Department of Transportation, Washington, D.C. 20590

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Kamalian, N., Tel. 202-4260808

STATUS: Obligated START DATE: Nov. 1972 COMPL. DATE: June 1972 TOTAL FUNDS: $170000 FUND TYPE: ID- CONTR. NO. : DOT-AR-20010

Economic analyses shall be conducted in parallel with critical subsystem technology development work to support the program.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036742
ELECTRIC POWER AND PROPULSION FOR HIGH SPEED TRACKED VEHICLES

INVESTIGATORS:
Raposa, F.L., Tel. 617-4942031

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Guarino, M., Tel. 202-4269660

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973 TOTAL FUNDS: $385000 FUND TYPE: PPA CONTR. NO. : PPA-RR-305/2

This task is concerned with advanced concepts in electric power and propulsion for high speed tracked vehicles, which will guide the development of light weight and reliable systems. The sub-system components consist of the linear electric motor, power conditioning, collection and distribution. This task provides DOT with a technical base in electric power and propulsion from which to assess contractor effort. This task is a continuation of FY 72.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA 73-RR

036748
RAM AIR CUSHION

INVESTIGATORS:
Barrows, T.M., Tel. 617-4942451

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Koper, J., Tel. 202-4269564

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973 TOTAL FUNDS: $65000 FUND TYPE: PPA CONTR. NO. : PPA-RR-307

The ram air cushion (formerly ram wing) has been shown to be a very attractive concept for high speed ground transportation. Research will continue on experimentally validating the theoretical models for this concept using the towing tank technique developed during FY72, and parametric studies will be carried out to determine promising vehicle configurations. An additional effort will be made to determine the best method of propulsion for these vehicles. Detailed plans will be formulated for a powered model demonstration.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-73-RR

038062
HIGH SPEED SUSPENDED VEHICLE SYSTEMS

INVESTIGATORS:
Graham, H.R., Tel. 213-5363054

PERFORMING AGENCY:
TRW Systems Group, One Space Park, Redondo Beach, California 90278

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Gross, A., Tel. 202-4269660

STATUS: Active START DATE: July 1972 COMPL. DATE: Oct. 1973 TOTAL FUNDS: $378005 FUND TYPE: Contract- CONTR. NO. : DOT-FR-30004 CONTR. TYPE: CPFF

The work to be performed under the proposed contract is directed to the completion of the High Speed Suspended Vehicle Systems (SVS) Study including an economic comparison of the SVS class with alternate systems and a comprehensive investigation of cable supported guideways. The study will also investigate critical gas dynamics relationships to provide data vital to the potential employment of the Tube Vehicle Systems for high speed operations. The study will evaluate the potential of the SVS on a comparative basis with other types now being contemplated.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-01

038644
TRANSLATION OF TESTS ON TRANSRAPID 02 SYSTEM

PERFORMING AGENCY:
Krauss-Maffel AG, DGA International, Incorporated, 1225 Nineteenth Street, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Harding, J.T., Tel. 202-4269660

STATUS: Active START DATE: Dec. 1972 COMPL. DATE: Mar. 1973 TOTAL FUNDS: $19574 FUND TYPE: Contract- CONTR. NO. : DOT-FR-30017 CONTR. TYPE: FFP

The contractor shall compile, interpret, translate, from German to English, print, and deliver to the Federal Railroad Administration certain data accumulated from tests of the Transrapid 02 System, which shall include: data on accelerations of the primary suspension and motions at any speed up to 100 mph, data, for simulators only, on eddy current effects and on lift-to-drag ratios over entire speed range up to 300 mph, and data on energy consumption, relationships of tolerances and costs for guideway construction, safety aspects, and electro-magnetic interferences.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 14-66

038645
WAYSIDE POWER DISTRIBUTION & COLLECTION SYSTEM

PERFORMING AGENCY:
AiResearch Manufacturing Company, Garrett Corporation, 2525 West 190th Street, Torrance, California 90509

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Novotny, R.A., Tel. 202-4269564

STATUS: Active START DATE: Jan. 1973 COMPL. DATE: Feb. 1974 TOTAL FUNDS: $1299452 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30036 CONTR. TYPE: CPFF

The proposed contractor shall continue performance to deliver a "Wayside Power Distribution & Collection System" for the Tracked Air Cushion Research Vehicle (TACRV). This "Phase III" segment is for installation, Acceptance Testing and Development" of the system. Phase I and II currently being performed by AiResearch Mfg. Co. under Contract No. DOT-FR-10002.

ACKNOWLEDGEMENT:
Federal Railroad Administration

038646
TEST PROGRAM ON THE LINEAR INDUCTION MOTOR TEST VEHICLE

INVESTIGATORS:
D'Sena, GO, Tel. 213-3239500

PERFORMING AGENCY:
AiResearch Manufacturing Company, Garrett Corporation, 2595 West 190th Street, Torrance, California

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Grumwald, K., Tel. 303-5455660

STATUS: Active START DATE: Jan. 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $1534088 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30026 CONTR. TYPE: CPFF

Test program on the linear induction motor test vehicle at the High Speed Ground Test Center, Modifications to the vehicle. The primary objective of the test program is to obtain meaningful high-speed test data on LIM electrical performance and vehicle dynamics at speeds in excess of 200 mph, and preferably in the vicinity of 250 mph.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-18

038789
TRACKED AIR CUSHION RESEARCH VEHICLE, PHASE V, TEST OPERATIONS PROGRAM

PERFORMING AGENCY:
Grumman Aerospace Corporation, Bethpage, New York 11714

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lampros, A.F., Tel. 202-4269564

STATUS: Active START DATE: Feb. 1973 COMPL. DATE: Jan. 1976 TOTAL FUNDS: $2606823 CONTR. NO.: DOT-FR-30041 CT-41

The TACRV Phase V Test Operations Program will be implemented and conducted in conformance with Grumman Report PMT-B4-R72-6 TACRV Phase V Test Operations Plan. Effort will be required at DOT's High Speed Ground Test Center and Grumman, Bethpage to satisfy the various activities associtated with TACRV test operations. The TACRV Test Operations Program consists of the following tasks: Test Operations—HSGTC, Test Operations—Bethpage, Ingress/Egress System Design, Fabriction and Installation, Guideway Perturbations Design, Fabrication and Installation, TACRV Remote Control Design, TACRV Systems Interface Management and TACRV Arrestment System Study.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-158

038829
HIGH SPEED GROUND TRANSPORTATION RESEARCH

INVESTIGATORS:
McCabe, W., Tel. 703-8933500

PERFORMING AGENCY:
Mitre Corporation, 1820 Dolley Madison Boulevard, McLean, Virginia 22101

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bang, A.J., Tel. 202-4260808

STATUS: Active START DATE: Sept. 1972 COMPL. DATE: June 1974 TOTAL FUNDS: $1701269 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30015 CONTR. TYPE: CPFF

This contract provides for technical support for High Speed Ground Transportation for the period 1 September 1972—14 Sept. 1973 in the following areas: Tracked Air Cushion Vehicles, Magnetic Levitation, Tracked Levitated Vehicle System Interface, Single-Sided Linear Induction Motor, Linear Induction Motor Research Vehicle, High Speed Ground Test Center, Tube Vehicle Systems, Electrical Subsystems, Vehicle System Dynamics. The work Covered by proposed contract is a continuation of former contract FR-7-35248.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-43

038937
SYNCHRONOUSLY OPERATING LINEAR ELECTRIC MOTOR FOR SPEED GROUND TRANSPORTATION

INVESTIGATORS:
Levi, E.

PERFORMING AGENCY:
Polytechnic Institute of Brooklyn, 333 Jay Street, Brooklyn, New York 11201

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: Apr. 1973 COMPL. DATE: Mar. 1974 TOTAL FUNDS: $124955 FUND TYPE: Contract- CONTR. NO.: DOT-FR-30030

The linear electric motors operating at synchronous speed and energized on the vehicle with a view towards utilizing the passive reaction rail for both propulsion and magnetic suspension. This study will involve seven theoretical and two experimental tasks.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-111

045724
DESIGN STUDY OF LOW-COST GUIDEWAY FOR TACV

PERFORMING AGENCY:
TRW Systems Group, One Space Park, Redondo Beach, California 90278

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Kelleher, D.J., Tel. 617-4942144

STATUS: Active START DATE: June 1972 COMPL. DATE: June 1975 TOTAL FUNDS: $268156 FUND TYPE: Contract-
CONTR. NO. : DOT-TSC-442 CONTR. TYPE: CPF

This program consists of two parts which are to be initiated simultaneously at the time of contract award. Part A, Tracked Air Cushion Research Vehicle (TACRV) Guideway. This part is for the design of a 15-mile extension of at-grade guideway to be built at the High Speed Ground Test Center, Pueblo, Colorado, for the evaluation of a 300 mph TACRV. Part B, TACV Operation Guideway. This part to be completed nine months after program initiation, is for the preliminary engineering design of both at-grade and elevated, low cost, minimum maintenance guideways, for use with passenger carrying tracked air cushion vehicles for operation at speeds up to 300 mph. Stage lengths of 25, 50, 100, and 200 miles are to be considered.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# TMP-0080

047345
COMMUNICATION WITH HIGH SPEED TRAINS

INVESTIGATORS:
McIntosh, R.E.

PERFORMING AGENCY:
Massachusetts University, Amherst, Graduate School, Amherst, Massachusetts 01002

SPONSORING AGENCY:
National Science Foundation, Division of Engineering, 1800 G Street, NW, Washington, D.C. 20550 PROJ. NO. GK-33091

STATUS: Active START DATE: Mar. 1973 COMPL. DATE: Feb. 1974 TOTAL FUNDS: $17750

Investigation will be directed to determining how amplitude and frequency modulation errors caused by random coupling of the surface waveguides on which communication signals are tramsmitted can be minimized. An analysis is to be made of the effects that noise produced by the transmitter and the receiver have on communications with high speed trains.

ACKNOWLEDGEMENT:
Science Information Exchange, GSE 3573 1

048575
TABULATIONS OF RAILROAD DATA

PERFORMING AGENCY:
International Business Machines Corporation, 18100 Frederick Pike, Gaithersburg, Maryland 29760

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: Apr. 1973 COMPL. DATE: Apr. 1974 TOTAL FUNDS: $108000 FUND TYPE: Contract-
CONTR. NO. : DOT-FR-20024

IBM will undertake to provide programming and analysis as necessary to develop for the Federal Railroad Administration and the Office of Systems Analysis and Information, U. S. Department of Transportation (OSAI), a series of tabulations of railroad data regarding railroad shipments of the Penn Central Railroad. These tabulations will be obtained from the 1% ICC Railroad Waybill Sample data for 1964 and 1966, and estimated 1% Waybill Sample data for 1980.

ACKNOWLEDGEMENT:
Federal Railroad Administration

054565
GROUND TRANSPORTATION AT SPEEDS EXCEEDING 300 MPH

INVESTIGATORS:
Levi, E.

PERFORMING AGENCY:
Polytechnic Institute of Brooklyn, School of Science, Department of Electrophysics, 333 Jay Street, Brooklyn, New York 11201

SPONSORING AGENCY:
Polytechnic Institute of Brooklyn, 333 Jay Street, Brooklyn, New York 11201

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

Description: Electric propulsion at synchronous speed of over 300 mph. The train is airborne and the primary windings of the electric motors are embedded in evenly spaced supports above superhighway.

ACKNOWLEDGEMENT:
Science Information Exchange, NPO 34

054701
MAGNETIC LEVITATION AND LINEAR MOTOR FOR GUIDED GROUND TRANSPORTATION

INVESTIGATORS:
Atherton, D.L.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada PROJ. NO. 6.1.72

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

An investigation into the use of superconducting magnets for the levitation and synchronous propulsion of high speed vehicles. Primary consideration has been given to engineering studies of the magnet and propulsion systems, including lift and drag calculations, levitation magnet and cryogenic system design, magnetic shielding, linear synchronous motor analysis, and the design of a large scale test facility. Numerical calculations of the lift and drag characteristics of our vehicle design have been made, and the effects of rounded magnet corners and finite conductor size have been determined. Levitation magnets have been designed, and it is shown that superinsulation with intermediate heat shields can efficiently minimize the cryogenic heat losses. Fringing fields in the passenger compartment have been calculated and shielding methods are discussed. A literature survey indicates that biological effects of low magnetic fields are not likely to be significant, although insufficient information precludes definite conclusions. Analysis of various aspects of linear synchronous motor propulsion indicates that it can be economically feasible, and that high efficiencies can be obtained for suspension heights up to 30 cm with sequentially powered track sections. Finally a conceptual design for the test facility which will be constructed at Queen's next year is presented.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

018950
RAILROAD ACCIDENT INFORMATION REPORTING SYSTEM

INVESTIGATORS:
Cain, T.C.

PERFORMING AGENCY:
Cain (Tolis) Corporation, 7316 Wisconsin Avenue, NW, Washington, D.C. 20014

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Cantay, W.E., Tel. 202-4261567

STATUS: Inactive START DATE: June 1971 TOTAL FUNDS: $143790 FUND TYPE: Contract CONTR. NO. : DOT-FR-10059 CONTR. TYPE: CPFF

To develop a railroad accident information reporting system for FRA.

ACKNOWLEDGEMENT:
Federal Railroad Administration

025370
RAIL AND WHEEL FLAW DETECTION

INVESTIGATORS:
Lyons, J.W., Tel. 617-4942040

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bray, D.E., Tel. 202-4262965

STATUS: Active TOTAL FUNDS: $26000 FUND TYPE: PPA CONTR. NO. : PPA-RR-212 CONTR. TYPE: CR

Defects in and failure of equipment such as trucks, wheels and axles, couplers, brakes, etc., were responsible for 23.25% of all train accidents in 1970 and caused $38.3 million damage to equipment and track. Although extensive inspections of these items are carried out during manufacture, overhaul, and maintenance, few techniques or methods are available for in-service inspection. Defects can develop. A program to provide the necessary technology for greater reliability of suspension components and rails, and to develop in-service inspection methods and criteria for these items, has been initiated to promote greater safety in railroad freight and passenger service.

ACKNOWLEDGEMENT:
Federal Railroad Administration, 72-RR

036274
DATA COLLECTION

PERFORMING AGENCY:
Central Technology, Incorporated, 811 Fenton Street, Silver Spring, Maryland 20910

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Obligated START DATE: May 1972 COMPL. DATE: Nov. 1972 TOTAL FUNDS: $117523 FUND TYPE: Contract CONTR. NO. : DOT-FR-10052

CENTEC in its data gathering efforts to date has obtained access to the extensive derailment report files of several large railroads. These reports record track goemetry as related to the derailment. Assembly of these data into a meaningful categorization could disclose the track geometry limits that tend to induce derailments. Such findings would bear directly on the FRA efforts to set minimum safety standards for track geometry. It is proposed that these data be collected and assembled accordingly.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-44

038972
OPERATING EQUIPMENT

INVESTIGATORS:
Lavery, A.L., TME, Tel. 617-4942040

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Stauffer, J.B., Tel. 202-4260956

STATUS: Active START DATE: Mar. 1973 COMPL. DATE: Apr. 1974 TOTAL FUNDS: $540000 FUND TYPE: PPA CONTR. NO. : PPA-RR-312/1

This project seeks the improvement of railroad safety and efficiency by providing a technological basis for improvement and possible regulation in locomotive data collection and display, flaw detection train signaling and control, derailment detection, train visibility enhancement and other similar areas.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-73-RR

048571
RAIL SAFETY/EQUIPMENT

INVESTIGATORS:
Lavery, A.L., TME, Tel. 617-4942040

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Stauffer, J.B., Tel. 202-4262965

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: Feb. 1975 TOTAL FUNDS: $1093500 FUND TYPE: PPA CONTR. NO. : PPA-RR-X14/0

This project seeks the improvement of railroad safety and efficiency by providing a technological basis for improvement and possible regulation in rail vehicle crashworthiness, inspection of equipment, surveillance of equipment, and other important areas.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-74-RR

054567
RAILROAD TANK CAR SAFETY VALVE TEST PROGRAM

INVESTIGATORS:
Lantzer, E.L.

PERFORMING AGENCY:
Department of the Air Force, Rocket Propulsion Laboratory, Edwards AFB, Edwards, California 93523

SPONSORING AGENCY:
Department of the Air Force, Department of Defense

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

This program is being accomplished under the area of technology transfer in the AFRPL Rocket Propulsion Plan. This AFRPL conducted program will provide data required by the Federal Railroad Administration of the Department of Transportation in their job of seeking means to improve railroad tank car safety in accidents. The object of this program is to determine the relief and flow characteristics of class DOT-112A tank car safety relief valves. The program consists of four basis phases. The first phase of effort in this program is the analysis phase, and will define the most appropriate way to measure the performance of the relief valves. The second phase is system build-up. The third phase is valve testing and the last phase is preparation of the final report. Under the analysis phase additional ways to accomplish steady state and blowdown tests of saturated and superheated propane will be evaluated. The instrumentation needed to obtain flow data will be investigated and an instrumentation list compiled for each approach. Each test approach will be analyzed for the capability to expand to test larger valves at a future date. Specific equipment and materials needed will be determined for each test approach. The third phase of the program will be to test the relief valves in water. GN2 and propane in accordance with approved procedures resulting from phase I. The first test to be run will be a proof test of the propane tank at one and one-half times the tank maximum working pressure of 500 psi. The nitrogen and water flow tests, to be run next, will check out the flow measurement capabilities of the system and provide flow data for the test values. These tests will also calibrate the epoxy flow nozzles used for flow measurement. Data from the nitrogen and water tests will be correlated with other data generated for these types of valves and will also serve as a baseline for comparison of known fluids with propane. The cracking and reseat pressures of the test valves will also be determined. The propane flow tests will then be conducted. These tests will be conducted with saturated vapor, as well as saturated liquid which will flash through the valves. Flow rates for the valves will be determined for various pressures from cracking pressure of approximately 280 psig to 475 psig. The final item to be accomplished in the program will be to write a final report.

ACKNOWLEDGEMENT:
Science Information Exchange, ZQF342540 1

045012

STUDY OF ALTERNATIVES TO PROPOSED RE-ELECTRIFICATION OF NEW HAVEN REGION OF PENN CENTRAL RAILROAD

PERFORMING AGENCY:
Gibbs and Hill, Incorporated, 393 Seventh Avenue, New York, New York 10001

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: June 1973 COMPL. DATE: June 1974 TOTAL FUNDS: $28780 FUND TYPE: Contract-CONTR. NO.: DOT-FR-30065 CONTR. TYPE: CPFF

The Contractor shall perform engineering services and furnish recommendations and appropriate reports by studying alternatives to the proposed re-electrification of the New Haven Region of the Penn Central Railroad and by studying the feasibility of employing 25kv overhead power supply between New Haven, Conn. and New York, N.Y., including the N.Y. Connecting RR.

ACKNOWLEDGEMENT:
Federal Railroad Administration

045815
BART IMPACT PROGRAM

PERFORMING AGENCY:
Metropolitan Transportation Commission, Hotel Claremont, Berkeley, California 94705

SPONSORING AGENCY:
Office of the Secretary of Transportation, Department of Transportation, Office of Noise Abatement, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Bouchard, R.J., Tel. 202-4260163

STATUS: Active START DATE: June 1973 TOTAL FUNDS: $135419 FUND TYPE: Contract CONTR. NO. : DOT-OS-30176/1

Under this task TSC will provide staff personnel and special consultants necessary to perform required management functions for the complex and comprehensive BART Impact Program. Management of the four basic types of tasks as specified by the basic ordering agreement will be provided. A summary of these tasks is as follows: (1) overall management (task #1) and data management, (2) specific analysis efforts, (3) identifying particular impact areas, and (4) specialized efforts of the overall program objectives.

ACKNOWLEDGEMENT:
Office of the Secretary of Transportation, PR# DOT-OS-30176

054703
RAILWAY TO THE ARCTIC

INVESTIGATORS:
Law, C.E.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada

SPONSORING AGENCY:
Transportation Development Agency of Canada

A study of the technical, economic and operational feasibility of a railroad to bring arctic slope oil (and gas) to market. It was concluded that the railway was technically and operationally feasible and financially attractive. Three Routes were studied in detail. The most attractive crossed the arctic slope from Prudhoe Bay to the Mackenzie Delta and then ascended the Mackenzie to near the NWT border with Alberta. Some 360 locomotive units and 11,000 tank cars would be required to move 2,000,000 barrels of oil per day. Capital cost would be about 2.4 billion dollars, annual operating cost 193 million dollars. A tariff of about 67 cents per barrel would provide an adequate return. The railroad would employ some 4600 people. Numerous reports have been prepared. Two phases complete. Third phase is a joint CN/CP study funded by Canadian Government.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

045821
COMPUTER-BASED RAILROAD NETWORK MODEL

PERFORMING AGENCY:
International Business Machines Corporation, 18100 Frederick Pine, Gaithersburg, Maryland 20760

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Davies, G.K., Tel. 202-4269682

STATUS: Active START DATE: Oct. 1973 COMPL. DATE: Jan. 1975 TOTAL FUNDS: $90000 FUND TYPE: Contract CONTR. NO. : DOT-FR-40012

The objective of this project is the development of a computer based railroad network model which will be capable of facilitating the analyses of, and providing insights into the potential impacts of alternative public policies aimed at plant and/or corporate rationalization of the railroad industry. Outputs of primary interest will include rates of plant utilization, revenue generation, estimated costs and probable viability, all analyzed on a segment-by-segment basis.

ACKNOWLEDGEMENT:
Federal Railroad Administration

045714
ANALYSIS OF THE ECONOMICS OF RAILROAD OPERATIONS AND REORGANIZATION IN THE NORTHEASTERN UNITED STATES

PERFORMING AGENCY:
Multi-Logic Corporation, 41 B Street, Burlington, Massachusetts 01803

SPONSORING AGENCY:
Transportation Systems Center, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Valente, R.E., Tel. 617-4942146

STATUS: Active START DATE: Aug. 1973 COMPL. DATE: Aug. 1973 TOTAL FUNDS: $21638 FUND TYPE: Contract-CONTR. NO.: DOT-TSC-679

The Transportation Systems Center has undertaken to assist the Federal Railroad Administration in the analysis of the economics of railroad operations and reorgainization in the Northeastern United States. An essential first step is the mapping of the railroad structure of the region, along with alternate highway and waterway routes. This mapping is to be accomplished by digitizing map tracings of the transportation zones of the region.

ACKNOWLEDGEMENT:
Transportation Systems Center, PR# S-0054/0054A

051256
ECONOMIC EFFECT OF CHANGING RAILROAD SYSTEMS ON GRAIN HANDLING FIRMS

INVESTIGATORS:
Baumel, C.P. Thompson, W.H.

PERFORMING AGENCY:
Iowa State University, Agricultural Experiment Station, Agricultural Economics, Beardshear Hall, Ames, Iowa 50010

SPONSORING AGENCY:
Department of Agriculture, Iowa Cooperative State Research Service, Iowa PROJ. NO. 0056040

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Estimate the effect of railroad abandonment or reduced service on country elevator operations. Determine the needed adjustment in the grain industry resulting from railroad abandonment or reduced services. Evaluate alternative options open to country elevator operations in adjusting to these changes. Estimate the effect of these changes on the flow of grain shipments. APPROACH: Develop a model describing the grain transportation system in Iowa. Collect data for use in the model. Complete the analyses required to achieve the objectives. PROGRESS: The model has been completed and the basic data to run the model have been collected. The model and data were tested on a small area in North Central Iowa. The results appeared to be good. At the present time, the model is being applied to 6-1/2 county area in Northwest Iowa. The purpose of this work is to determine the optimum number size and types of elevators in the area and the optimum mode of transportation of grain out of the area.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 56040 4

025222
ALTERNATIVE RAIL BASED GRAIN DISTRIBUTION SYSTEMS

PPS# 3.A.1.

PERFORMING AGENCY:
Iowa State University, Ames, Iowa

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Boone, J., Tel. 202-4269682

STATUS: Active START DATE: Apr. 1972 COMPL. DATE: Sept. 1973 TOTAL FUNDS: $191319 FUND TYPE: Contract-CONTR. NO. : DOT-FR-20025

Fully describes the region's grain marketing system in terms of, but not limited to location, number, destination and transportation network. Develop the costs of production, storage, conditioning, and transportation of grain within the region. Forecast the production and off–farm consumption of grains produced within the region. Develop and analyze a series of rail-based transportation/storage alternatives. Select the alternative that will produce the least cost of physical distribution for the region's grains, subject, but not limited, to: magnitude of investments required, financial viability, and flexibility.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-20

032668
A LONG-RUN PREDICTION OF UNITED STATES SEA-BORNE TRADE 1970-1990

INVESTIGATORS:
Teal, R., Tel. 202-9672466

PERFORMING AGENCY:
Maritime Administration, Department of Commerce, Department of Commerce, Washington, D.C. 20230

SPONSORING AGENCY:
Maritime Administration, Department of Commerce, Washington, D.C. 20230

STATUS: Active START DATE: Mar. 1969 COMPL. DATE: May 1973

OBJECTIVES AND SCOPE:
This project has been designed to provide predictions of total U.S. waterborne trade, covering over 200 major commodity groups, the economic regions of the world, and U.S. trade routes. It will predict U.S. waterborne foreign trade by relating trade to the gross national product of a given country. The study is intended to provide the framework on which experts (on either selected regions or individual commodities) can systematically add in information that extends or improves this prediction in such a way that all other users of the prediction model can benefit from their insight. The project was designed by the Maritime Administration as input for broad planning purposes. Chief among these are: (1) The determination of the number and type of ships which should be built for the U.S. flag, and subsidized by Marad. (2) The optimization of the utilization of ships already in the U.S. fleet. (3) Prediction of the potential demand for stevedoring and sea going labor in various regions of the United States. (4) The identification of trade routes that various companies want to operate on and the commodities that they intend to carry. A potential shipowner requires a trade forecast which is quite accurate during the "half-life" of his investment, when it is most critical that he maintain an adequate cash flow. The outlines of the study therefore employ different techniques to predict trade in the periods 1970-75, 1975-1985, and 1985-1990. The ability to predict trade accurately in the earlier periods has been enhanced by a greater reliance on recent historical trade data and on intensive review of immediate economic trends. The trade forecast for later periods depends more upon an analysis of long term trends and developments. Although care has been taken to make the forecast as accurate as possible throughout the next two decades, particular attention has been given to the accuracy over the next five to ten years. This report will provide a review of the project at two distinct levels (1) it presents in the body a general statement of results and methodology (2) the appendixes provide a detailed review of the results, the data, the econometric procedures, the computer programs, and other information of interest to the technically-oriented reader.

ACKNOWLEDGEMENT:
Maritime Administration

043606
BULK TRANSPORT OF FRUITS AND VEGTABLES BY COVERED RAIL HOPPER CAR

INVESTIGATORS:
Black, W.R.

PERFORMING AGENCY:
Department of Agriculture, Transportation Research Br/Transp I Facilities Div, Federal Center Building, Hayttsville, Maryland 20782

SPONSORING AGENCY:
Department of Agriculture, Cooperative State Research Service, Washington, D.C. PROJ. NO. 27790

STATUS: Active START DATE: Jan. 1971 COMPL. DATE: Jan. 1974

This information reflects only the results obtained during the period specified and final results are subject to completion of the investigation.

The Objectives are to evaluate feasibility of transporting selected fresh fruits and vegetables in bulk in refrigerated railroad covered hopper cars.

PROGRESS AND RESULTS:
Shipments of California White Rose-type potatoes in bulk in refrigerated, covered hooper cars and shipments by conventional methods in 100-pound burlap bags in ice bunker and mechanical refrigerator cars to a Boston, Mass. prepackaging plant were studied during the year. The packout rate for saleable potatoes received in the bulk hopper cars averaged about 2 percent more than those received in bags in conventional refrigerator cars. Product temperatures in the shipments received in all types of cars were at satisfactory levels. Total potential savings in refrigeration, loading and unloading labor, and material costs in favor of the large hopper car were found to total $960.00 for a 176,000 pounds hopper carload as compared with a 48,000 pound load of bagged potatoes in a conventional refrigerator car. Further savings for the shippers ranging as high as $1,900.00 per carload are also possible through incentive freight rates for use of the large hopper cars.

ACKNOWLEDGEMENT:
Department of Agriculture, 0021708

048009
FEASIBLE AND POTENTIAL ECONOMICS OF USING BULK TRANSPORT SYSTEMS FOR HAULING FRESH FRUITS AND VEGETABLES BY RAIL TO REDUCE TRANSPORT DAMAGE AND HANDLING COSTS

INVESTIGATORS:
Black, W.R., Agricultural Marketing Res Specialist, Tel. 301-3442815

PERFORMING AGENCY:
Agricultural Research Service, Agricultural Marketing Research Institute, Building 011A, ARC-West, Beltsville, Maryland 20705

SPONSORING AGENCY:
Agricultural Research Service, Agricultural Marketing Research Institute, Building 011A, ARC-West, Beltsville, Maryland 20705

RESPONSIBLE INDIVIDUAL:
Breakiron, P.L., Chief, Tel. 301-3442815

STATUS: Active START DATE: Mar. 1970 COMPL. DATE: June 1974 TOTAL FUNDS: $75000 FUND TYPE: In-House

OBJECTIVES AND SCOPE:
To evaluate the feasibility of transporting selected fresh fruits and vegetables in bulk in mechanically refrigerated covered railroad hopper cars.

APPROACH AND METHODS:
Make experimental shipments from shipping point packinghouses to processing plants and terminal market prepackaging plants. Develop performance data, including comparative product damage, cooling rates and spoilage during transport. Obtain material, labor and equipment inputs and convert to cost data for hopper car and conventional transport and handling systems. Make cost and performance comparisons of bulk and conventional transport and handling systems. Studies have been completed on potatoes, onions and citrus fruits shipped for fresh consumption.

PROGRESS AND RESULTS:
Products shipped in bulk arrived in as good or better condition than in conventional shipments: pack-out yields were increased as much as 6 percent; potential savings per bulk car shipment were estimated to be about $480 on citrus, $600 on onions, and $900 on potatoes. Bulk rail shipments of potatoes, onions, apples, oranges and grapefruit are now being made on a regular commercial basis. Seed potatoes, carrots, and pears have been shipped successfully on an experimental basis. Also, grain, sugar beet pellets and sunflower seed have been bulk shipped successfully. There are now 160 jumbo mechanically refrigerated covered hopper rail cars service. Additional experimental shipments are planned on dry onions for processing and Valencia oranges for fresh consumption.

ACKNOWLEDGEMENT:
Department of Agriculture

051018
ACTIC OIL AND GAS BY RAIL: A STUDY OF THE TECHNICAL FEASIBILITY AND COST OF TRANSPORTATING CRUDE OIL AND LIQUEFIED NATURAL GAS FROM THE ARCTIC SOUTHWARD BY RAIL

INVESTIGATORS:
Maughan, V.R., Study Director, Tel. 8663193
Smith, S., Study Deputy Director, Tel. 8662352

PERFORMING AGENCY:
Canalog Consultants Limited, P.O. Box 8100, Montreal, Quebec Canada
Canadian Pacific Consulting Services Limited, Windsor Station, Montreal, Quebec Canada

SPONSORING AGENCY:
Ministry of Transport, Canada, Transportation Development Agency, 2085 Union, 8th Floor, Montreal, Quebec Canada

RESPONSIBLE INDIVIDUAL:
Brenckmann, M., Chief, Air Transport Projects, Tel. 283-7846

STATUS: Active START DATE: June 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $1250000 FUND TYPE: Contract

Prepared by the Joint Study Group from Canalog Consultants Limited and Canadian Pacific Consulting Services Limited

The concept of transporting oil and gas from the Arctic by rail is being re-examined using the extensive expertise of the two major railroads in Canada, supported by numerous inputs from various specialized sub-contractors. Feasibility and cost will be assessed for a number of routes and line throughputs, covering various cases of oil and gas production on the North Slope and the Mackenzie Delta. As of January 1974, most contributive sub-contract work is complete, documenting engineering feasibility. Cost analysis remains to be completed as well as report preparation.

ACKNOWLEDGEMENT:
Ministry of Transport, Canada

051254
EFFECT OF TRANSPORTATION RATES, FACILITIES, AND INSTITUTIONS UPON THE GRAIN MARKETING SYSTEM IN MONTANA

INVESTIGATORS:
McConnen, R.J. St George, G.

PERFORMING AGENCY:
Montana State University, Bozeman, Department of Agricultural Economics, Agricultural Experiment Station, Bozeman, Montana 59715

SPONSORING AGENCY:
Department of Agriculture, Montana Cooperative State Research Service, Montana PROJ. NO. 0002036

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Determine present railroad and truck rate structure for grain moving within and out of Montana; determine changes in railroad grain loadings and rates over past 40 years as compared with production; analyze movememts of grain directly from farms and elevators, both by truck and railroad. Determine handling methods, rates, pricing, origin, destination and uses for grain handled by truck from farm and elevator points in Montana; determine effects of barge services on Columbia upon truck and rail transportation in Montana. Determine effects of trends in transportation methods and rates on grain-pricing methods and institutions in Montana, with special attention to different kinds of wheat and other grains. APPROACH: Will use secondary data and information obtainable from regulatory authorities. Also obtain data from carriers and farmers through use of questionnaires. Transportation models and location theory will be applied to data in analysis. PROGRESS: George St. George's M.S. thesis "The Effect of Rail Transportation on Montana's Wheat Economy" has been completed and accepted. The two market model used to estimate country elevator price resulted in accurate estimates of the value of wheat in Montana. The thesis is being re-written as a station publication and freight rates used in calculations have been updated. A phase on transportation work has just begun. With the addition of a staff member who will have a major portion of his time allocated to research in transportation, a major problem analysis is under way.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 2036 5

051255
EFFECTS OF TRANSPORTATION RATES-SERVICES ON LOCATION, NUMBER AND SIZE OF GRAIN HANDLING FACILITIES

INVESTIGATORS:
Cramer, G.L.

PERFORMING AGENCY:
Montana State University, Bozeman, Department of Agricultural Economics, Agricultural Experiment Station, Bozeman, Montana 59715

SPONSORING AGENCY:
Department of Agriculture, Montana Cooperative State Research Service, Montana PROJ. NO. 0030815

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Determine impact of changing transportation rates on grain handling facilities in Montana as a basis for future planning. APPROACH: Determine sources of grain supply, types of transportation to farm storage and elevators and costs. Obtain similar information on the distribution of Montana grains including flow patterns for domestic and export trade. Use these factors to determine type, size and location of grain handling facilities needed for the future. PROGRESS: The basic part of this project which was to determine the optimal number, size, and location of country grain elevators has been completed and two manuscripts have been published. The results of this phase of the research conclude that the optimal number of elevators in the long run should be 27 facilities rather than the present 332. Since the number of elevators has been considerably reduced, the average size, of necessity, must increase. Also, the cost of shipping to elevators by truck will have increased, however, the lower cost of large elevators and the lower rail costs to be obtained by improved location pattern were viewed to more than offset increased costs of assembly by truck. The cost curves used are basically long run in nature and no short run adjustments in the wheat elevator industry are implied. The results of the study have been discussed with the industry and it should provide some insight into the industry's capacity, and locational problems. Individual grain elevator companies may use these results to investigate size and location of new and present elevators. The next phase of this research is to analyze the export demand for Montana winter and spring wheat in the Asian market. At present about 60 percent of Montana's wheat production moves into this growing market. To date, a review of literature has been completed and a method of estimating Montana exports of winter and spring wheat is being developed.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 30815 3

051257
TRANSPORTATION OF GRAIN AND FARM SUPPLIES WITHIN SOUTH DAKOTA

INVESTIGATORS:
Payne, W.F.

PERFORMING AGENCY:
South Dakota State University, Agricultural Experiment Station, Department of Economics, Brookings, South Dakota 57006

SPONSORING AGENCY:
Department of Agriculture, South Dakota Cooperative State Research Service, South Dakota PROJ. NO. 0058733

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Develop an historical perspective of changes in grain and farm supply transportation patterns within South Dakota. Identify forces leading to changes in the pattern and method of transportation. Identify alternative courses of adjustment for the transportation of grain and farm supplies. Evaluate the impact of the above alternatives upon various groups of marketing participants. APPROACH: A comprehensive status and trends report will be made for South Dakota grain and farm supply transportation. Primary and secondary data will be obtained from various governmental and trade publications, mail questionnaires, and personal interviews. Alternative transportation policies and developments will be analyzed for the impact on the cost of transporting grain and farm supplies. Mathematical programming and various statistical methods will be utilized in the analysis. PROGRESS: Work has concentrated upon analysis of data and dissemination of results. Two experiment station bulletins and a research article have been published to date. Two additional research articles dealing with boxcar supply and truck transportation have been accepted for publication during 1973. Adequate long distance transportation was found to be vital to the South Dakota grain industry, with out-of-state destinations accounting for the following percentages of county elevator shipments to non-farm destinations: wheat 97%, flaxseed 99%, soybeans 98%, corn 97%, oats 97%, barley 99% and grain sorghum 99%. Minneapolis, Minnesota, was found to be the primary out-of-state destination for wheat, flaxseed and barley with Sioux City, Iowa, the primary destination for corn, grain sorghum and soybeans. Oat shipments were found to be split about equally between Minneapolis and Sioux City. Data analyzed during 1972 also indicate that 71% of all South Dakota grain shipped from country elevators to non-farm destinations was moved by rail. The remaining 29% was transported by truck.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 58733 2

051258
IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS

INVESTIGATORS:
Anderson, D.G.

PERFORMING AGENCY:
Nebraska University, Lincoln, Agricultural Experiment Station, Department of Agricultural Economics, Lincoln, Nebraska 68508

SPONSORING AGENCY:
Department of Agriculture, Nebraska Cooperative State Research Service, Nebraska PROJ. NO. 0060519

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; Estimate demand for feed and fertilizer: project alternate changes in grain transportation; Determine economic feasibility of alternative systems of grain movement from producers to destinations; Determine effect of changes on number, size, type and location of country elevators and on local employment and services; Determine consequences of projected transportation changes on distribution of feed and fertilizer; and develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Research has centered primarily on measuring and projecting to 1980 grain production, surpluses and deficits for each Nebraska county. A special agreement with the State-Federal Division of Agricultural Statistics has resulted in the generation of surplus-deficit data by county for the years 1960-69. Work is continuing on the 1980 projections. Grain flow patterns and freight-car supply and demand measurements from Project No.

10-56 are being adapted for use in the present project. The immediate objective is an evaluation of the economic impact of rail branchline abandonment on farmers, country elevators and rural communities.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 60519 1

051259
IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS

INVESTIGATORS:
Baumel, C.P. Thompson, W.H. Wisner, R.N.

PERFORMING AGENCY:
Iowa State University, Agricultural Experiment Station, Beardshear Hall, Ames, Iowa 50010

SPONSORING AGENCY:
Department of Agriculture, Iowa PROJ. NO. 0060521

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; Estimate demand for feed and fertilizer. Project alternate changes in grain transportation; Determine economic feasibility of alternative systems of grain movement from producers to destinations; Determine effect of changes listed on number, size, type and location of country elevators and on local employment and services; Determine consequences of projected transportation changes on distribution of feed and fertilizer; and Develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Estimates of the quantities of grain to move out of the state have been estimated. The model has been completed and the basic data to run the model have been collected. The model and data were tested on a small area in North Central Iowa. The results appeared to be good. At the present time, the model is being applied to a 6 1/2 county area in Northwest Iowa. The purpose of this work is to determine the optimum number size and types of elevators in the area and the optimum mode of transportation of grain out of the area.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 60521 1

051260
IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAINS AND FARM SUPPLY FIRMS

INVESTIGATORS:
Sorenson, L.O. Mccoy, J.H.

PERFORMING AGENCY:
Kansas State University, Agricultural Experiment Station, Department of Agri Eco, Anderson Hall, Manhattan, Kansas 66502

SPONSORING AGENCY:
Department of Agriculture, Kansas Cooperative State Research Service, Kansas PROJ. NO. 0061435

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties. Estimate demand for feed and fertilizer. Project alternate changes in grain transportation. Determine economic feasibility of alternative systems of grain movement from producers to destinations. Determine effect of changes on number, size, type, and location of country elevators and on local employment and services. Determine consequences of projected transportation changes on distribution of feed and fertilizer, and develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Feed grain-livestock balances by counties have been completed for 1966-71 and projected for 1975 and 1980 in accordance with procedures agreed upon with other states in the regional project. Wheat production by counties has also been projected to 1975 and 1980 to determine exportable grain surpluses. (This objective paralleled an objective of Kansas project H-710 and the work supported by that project.) Market flows and transportation data for 1971 for corn, milo and soybeans produced in Kansas were collected along with flow data for wheat, in conjunction with another project. Data are being analyzed to further illustrate transport needs for movement of Kansas grains. Data on railroad abandonment in Kansas in the past two decades and information on maximum-load condition of all Kansas railroad mileage have been obtained. Data are to be used toward evaluation of potential rail abandonment.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 61435 1

054563
UTILIZATION AND IMPROVEMENT OF VEHICLES FOR TRANSPORT OF GRAIN

INVESTIGATORS:
Guilfoy, R.F.

PERFORMING AGENCY:
Department of Agriculture, Transportation and Facilities Research Division, Federal Center Building, Hyattsville, Maryland 20782

SPONSORING AGENCY:
Department of Agriculture, Agricultural Research Service, Transport & Facil Res Div

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974 FUND TYPE: ID

OBJECTIVE: Improve the utilization of present transport equipment for grain and develop new transport concepts, in order to hold down transport costs and reduce loss and damage to grain in transit. APPROACH: Study present equipment, methods, and techniques for the transport and physical distribution of grain. Evaluate each phase of distribution on the basis of cost and performance. Develop concepts for changes in equipment and methods with a view toward: better utilization of present equipment; development of improved transport equipment and techniques; faster loading and unloading of vehicles; reducing overall physical distribution time; reducing the number of times product is handled and transferred; evaluate and test new ideas; and assist industry in full adoption of improvements. PROGRESS: Some exploratory work was done in FY 73 to see if it might be feasible to load more grain in railroad boxcars, and thus increase car utilization. Data were obtained on the weight of grain in 1,500 carloads of grain handled at elevators in Chicago, Minneapolis, and Kansas City. From an analysis of that data in comparison with car capacities and load limits, it was concluded that it would not be feasible to, in general, increase the amount of grain in cars. Exploratory work will continue in FY 74 to determine other possible areas for improvement in grain transport.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 22877 1

054564
A RATE-COST ANALYSIS OF NEBRASKA LIVESTOCK AND MEAT TRANSPORTATION WITH GRAIN SHIPMENT COMPARISONS

INVESTIGATORS:
Anderson, D.G.

PERFORMING AGENCY:
Nebraska University, Lincoln, Agricultural Experiment Station, Agricultural Economics, Lincoln, Nebraska 68508

SPONSORING AGENCY:
Department of Agriculture, Nebraska Cooperative State Research Service, Nebraska PROJ. NO. 0063941

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

OBJECTIVE: Determine geographic patterns of interstate shipments of Nebraska livestock and meat. Determine extent to which hackhauls are available and economically significant to livestock and meat truckers. Measure costs of truck shipments of livestock and meat. Obtain truck and rail rates for livestock and meat shipments. Compare truck costs with truck and rail rates. Compare costs and rates for livestock and meat shipments with those for grain shipments. APPROACH: Descriptive information will be obtained from packers, processors, feeders, shippers and carriers. Rates will be collected from regulatory agencies. Truck costs will be synthesized from economic-engineering evidence. Regression analysis will be used for rate-cost comparisons. PROGRESS:

ACKNOWLEDGEMENT:
Science Information Exchange, GY 63941

054566
METHANOL AS MOTOR FUEL

INVESTIGATORS:
Harris, W.D. Davison, R.R. Holmes, R.

PERFORMING AGENCY:
Texas Engineering Experiment Station, College Station, Texas 77843

SPONSORING AGENCY:
Texas A&M University, College Station, Texas 77843

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974

Description: Methanol is an excellent high octane lead free motor fuel that has recently become competitive in price with gasoline. Since it can be produced from coal and since it is also much less polluting than gasoline, its use could have tremendous economic impact. This study involves the economics of producing methanol in quantity and introducing it as motor fuel. The technology of adapting automobiles to burn methanol with satisfactory performance and with low emissions is being investigated. Research includes instrumentation of internal combustion engine for evaluation of effectiveness.

ACKNOWLEDGEMENT:
Science Information Exchange, NTA 36

018954
STUDY OF RELIABILITY IN RAILROAD NETWORK OPERATIONS

INVESTIGATORS:
Sussman, J., Assistant Prof of Civ Engineering

PERFORMING AGENCY:
Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
West, J.B., Tel. 202-4261677

STATUS: Active START DATE: Jan. 1971 COMPL. DATE: June 1974 TOTAL FUNDS: $228793 FUND TYPE: Contract- CONTR. NO.: DOT-FR-10006

To identify and evaluate factors which affect railroad network reliability.

ACKNOWLEDGEMENT:
Federal Railroad Administration

019706
IMPROVEMENT OF AUTOMATIC COUPLING-UP PERFORMANCE IN MARSHALLING YARDS

INVESTIGATORS:
Kerr, C.N.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario Canada

SPONSORING AGENCY:
Canadian Pacific, Windsor Station, Montreal 3, Quebec Canada
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario Canada

STATUS: Active COMPL. DATE: Jan. 1971

OBJECTIVES AND SCOPE:
A Monte Carlo approach has been used in this study of damaging impacts in hump-yards, revealing the dependence of severe impacts and wasted track length on the gradient profile in the classification tracks and on the use made by the yard computer of "distance-to-go" indications. Features included: practical distributions of rolling resistances, weights, release times; occurrence of overspeed impacts, primary and secondary stalls, overtakings, arrivals; variable gradient in the yard. Predicts substantial (around 75%) reduction in damage is possible by slight modification of yard design.

ACKNOWLEDGEMENT:
Roads and Transportation Association of Canada

036281
DEVELOP METHODS OF IMPROVING UTILIZATION OF GENERAL SERVICE FREIGHT CARS

PERFORMING AGENCY:
Penn Central Transportation Company, 6 Penn Central Plaza, Philadelphia, Pennsylvania 19104

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Smith, R.J., Tel. 202-4260772

STATUS: Obligated START DATE: June 1972 TOTAL FUNDS: $233108 FUND TYPE: Contract CONTR. NO. : DOT-FR-20081 CONTR. TYPE: CR

A working group will be formed to (1) study the existing system, (2) develop an effective demand forecasting system, (3) develop a supply forecasting system, (4) define optimum car distribution, and (5) install each system for testing.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036356
NATIONAL CONTAINER NETWORK FEASIBILITY STUDY

PERFORMING AGENCY:
Reebie (Robert) and Associates, Incorporated, Greenwich, Connecticut 06830

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: June 1972 COMPL. DATE: Aug. 1973 TOTAL FUNDS: $539987 FUND TYPE: Contract- CONTR. NO.: DOT-FR-20065 CONTR. TYPE: CPFF

Historical analysis of current TOFC-CDFC service, container traffic flow identification container network operating costs, network service differential criteria, network route and node specifications, network line, terminal and facility analysis, network investment requirements, network service package and profitability, network organization and funding requirements, analysis of network benefits.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036895
STUDY OF TRANSPORTATION OF SMALL SHIPMENTS

PERFORMING AGENCY:
American University, 5475 Woodward Avenue, Washington, D.C.

SPONSORING AGENCY:
Office of Policy and International Affairs, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Norris, J.T., Tel. 202-4262900

STATUS: Active START DATE: June 1972 COMPL. DATE: June 1974 TOTAL FUNDS: $371967 FUND TYPE: Contract- CONTR. NO.: DOT-OS-20211

Define the term "small shipments" in the vernacular of the market place of transportation and physical distribution. Evaluate scope of problem and impact of value of solution, and percent to distribution dollars involved and percent to total, etc. Develop a concise understanding of the overall "small shipments problem" and subproblems apart thereof. Prepare action program to deal with the "small shipments problem" and its subproblems.

ACKNOWLEDGEMENT:
Office of Policy and International Affairs, PR# DOT-OS-20211

038379
ASSIGNMENT OF EMPTY RAILROAD FREIGHT CARS

PERFORMING AGENCY:
Decision Systems Associates, Incorporated, 11428 Rockville Pike, Rockville, Maryland 20852

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
West, J.S., Tel. 202-4261677

STATUS: Active START DATE: Oct. 1972 TOTAL FUNDS: $299721 FUND TYPE: Contract CONTR. NO. : DOT-FR-30013 CONTR. TYPE: FFP

The contractor is required to develop a Computer Based Model for the assignment of empty railroad freight cars. The model will be developed after a detailed analysis of assignment requirements and based upon these requirements. The model will be tested and evaluated against actual class 1 railroad procedures and results.

ACKNOWLEDGEMENT:
Federal Railroad Administration

044568
YARD AND TERMINAL SUBSYSTEM (YATS)

INVESTIGATORS:
Bryan, L.M., Tel. 314-6222075

PERFORMING AGENCY:
Missouri Pacific Railroad, Missouri Pacific Building, 210 North 13th Street, St Louis, Missouri 63103

SPONSORING AGENCY:
Missouri Pacific Railroad, Missouri Pacific Building, 210 North 13th Street, St Louis, Missouri 63103

RESPONSIBLE INDIVIDUAL:
Shattuck, J.A., Tel. 314-6222376

STATUS: Active START DATE: July 1971 COMPL. DATE: Jan. 1975 FUND TYPE: In-House

YATS is a subsystem of Missouri Pacific's Transportation Control System (TCS) and is designed to increase the efficiency of railroad operations at major terminals. YATS will assist operations by maintaining a computerized car inventory, supporting local management information requirements, generating car classification work orders, relieving the clerical data entry burden, and providing a real-time, online data base for local operations analysis. YATS is being developed on a Digital Equipment Corporation (DEC) PDP-11 minicomputer.

ACKNOWLEDGEMENT:
Missouri Pacific Railroad

044569
CARS: CAR ACTIVITY REGULARIZING SCHEDULER

INVESTIGATORS:
Fuller, J.H., Senior Systems Analyst, Tel. 314-6222566
Keller, D.C., Senior Systems Analyst, Tel. 314-6222566

PERFORMING AGENCY:
Missouri Pacific Railroad, Missouri Pacific Building, 210 North 13th Street, St Louis, Missouri 63103

SPONSORING AGENCY:
Missouri Pacific Railroad, Missouri Pacific Building, 210 North 13th Street, St Louis, Missouri 63103

RESPONSIBLE INDIVIDUAL:
Fuller, J.H., Senior Systems Analyst, Tel. 314-6222566

STATUS: Active START DATE: Jan. 1971 COMPL. DATE: Dec. 1974 FUND TYPE: In-House

The purpose of the CARS model is to simulate the over-the-road portion of the Missouri Pacific's on-line car scheduling system and to evaluate the data used to drive this on-line system. A pilot program which simulates car scheduling over a portion of the Missouri Pacific network is operational. Current and future efforts are directed towards insuring compatability of the model with the on-line system and expanding the model's data base to include the entire Missouri Pacific system. The CARS model is made up of three major subprograms–the Preprocessor, the Simulator and the Post processor. The Preprocessor accepts train schedules and blocking policy as input and builds the scheduling files required by the Simulator. The Simulator runs the network for a specified period of time. It accepts car-dependent records as input and schedules these cars to the through and local train required to move them to their respective destinations. Statistics from the Simulator are bled off for analysis by the Postprocessor. The Postprocessor measures the efficiency of the scheduling data base by generating reports on yard and train performance and on transit time reliability. 800 REPORTS ISSUED:
Yoakum, R.L; Beaumont, L.H., Railroad Car Scheduling System Incorporating Car Scheduling, Missouri Pacific Railroad, Jan. 1972

ACKNOWLEDGEMENT:
Missouri Pacific Railroad

045142
INSTALLATION OF A RAIL TERMINAL MANAGEMENT SYSTEM (RTMS)

PERFORMING AGENCY:
Kansas City Southern Railway, 114 West Eleventh Street, Kansas City, Missouri 64105
Louisiana and Arkansas Railway

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Ditmeyer, S.R., Tel. 202-4261227

STATUS: Active START DATE: July 1973 COMPL. DATE: July 1976 TOTAL FUNDS: $400000 FUND TYPE: Contract- CONTR. NO. : DOT-FR-30047

The Railway Terminal Mangement System and Intermodal Terminal Management Systems are developmental systems. This installation represents the first full-yard implementation and encompasses the use of automatic car identification scanners, wheel directional sensors, mini-computers and other related equipment at Deramus Yard, Shreveport, Louisiana and will permit a real-time inventory of the terminal to be maintained. As cars enter the yard a switch list preparation is automatically prepared and when trains are dispatched, an accurate consist list is immediately available. The Railway Terminal Management System and Intermodal Terminal Management Systems are expected to be beneficial, both to the railroad in the form of increased efficiency and to the general shipping public in reduced delays and improved service.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-175

048495
AN EXAMINATION OF THE EFFECTS OF CHANGES IN RAIL TRANSPORT TECHNOLOGY UPON GREAT LAKES BULK SHIPPING ACTIVITY

INVESTIGATORS:
Beimborn, E. Garvey, W.A.

PERFORMING AGENCY:
Wisconsin University, Milwaukee, Milwaukee, Wisconsin 53201

SPONSORING AGENCY:
National Oceanic and Atmospheric Administration, Sea Grant Office/Department of Commerce, Main Commerce Building, Washington, D.C. 20230 PROJ. NO. R/PC-5

STATUS: Active COMPL. DATE: Sept. 1972 FUND TYPE: Grant CONTR. NO. : 04-3-158-5

Related projects are: PC-1, PC-2, PC-6, PC-7.

OBJECTIVES AND SCOPE:
To investigate the economic and technical aspects of unit train systems as they relate to Great Lakes shipping activities. 1. In the identification of the crucial parameters that affect cost of transport and in the second phase of the analysis wherein a cost model will be developed which could be used to predict the costs associated with shipping a given bulk good between two points by different means of transport. 2. In providing information on the future of Great Lakes bulk movements as they relate to unit train substitution, which may have serious implications upon the planning of new facilities for bulk movements on the lakes. 3. In the development of policy and plans for the management of Great Lakes shipping.

PROGRESS AND RESULTS:
Efforts thus far have been concentrating upon a review of the current levels of information available and detailed planning of the project--such as government policy, rate making procedures, amortization techniques. A number of case studies have been found which have added further insight into the nature of the problems to be studied. Preliminary work is underway on a cost model of the program.

ACKNOWLEDGEMENT:
National Oceanic and Atmospheric Administration

048497
CONTAINERIZATION AND THE GREAT LAKES TRANSPORTATION SYSTEM

INVESTIGATORS:
Schenker, E. Brockel, H.

PERFORMING AGENCY:
Wisconsin University, Milwaukee, Milwaukee, Wisconsin 53201

SPONSORING AGENCY:
National Oceanic and Atmospheric Administration, Sea Grant Office/Department of Commerce, Main Commerce Building, Washington, D.C. 20230 PROJ. NO. R/PC-2

STATUS: Active COMPL. DATE: Sept. 1972 FUND TYPE: Grant CONTR. NO. : 04-3-158-5

Related projects are: PC-1, PC-5, PC-7.

OBJECTIVES AND SCOPE:
1. To update data previously collected on the effects of containerization on the Great Lakes area. 2. To present governmental policy recommendations for the shipping and port industries. State, Regional and Federal government policy making agencies will be provided this information to aid in developing rational policies toward the shipping and port industries. This information will also be useful to officials in the shipping and port industries in meeting the problems posed by expanding containerization.

PROGRESS AND RESULTS:
A report published in 1967 using 1964 data by E. Schenker entitled, "Effects of Containerization on Great Lakes Ports" has been updated. The purpose of this updating was to determine whether the conclusions are still valid in accordance with present more recent data (1970) concerning the general cargo traffic in the Great Lakes ports; or, in other words, have the trends upon which the projections and recommendations were based continued through the years after the study was made?

ACKNOWLEDGEMENT:
National Oceanic and Atmospheric Administration

048568
IMPROVED FREIGHT SERVICE

INVESTIGATORS:
Hopkins, J., TME, Tel. 617-4942048

PERFORMING AGENCY:
Transportation Systems Center, Department of Transportation, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Stauffer, J.B., Tel. 202-4262965

STATUS: Active START DATE: Sept. 1973 COMPL. DATE: Oct. 1974 TOTAL FUNDS: $271000 FUND TYPE: PPA CONTR. NO. : PPA-RR-X16/0

The basic objective of this project is support of FRA in development and implementation of an overall research program directed toward improvement of freight service. This will be carried out within a framework of three separate but closely related tasks: Terminal systems, Line-Haul Systems, and Environmental Impact. Each effort will include identification and preliminary analysis of general research needs, based upon consultation with FRA, AAR, railroads, suppliers, consultants, etc.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-74-RR

054698
IMPROVEMENT IN COUPLING-UP PERFORMANCE IN AUTOMATIC MARSHALLING YARDS

INVESTIGATORS:
Kerr, C.N.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada PROJ. NO. 3.7

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

In classification yards of the North American pattern, the free-running cars do not always couple as intended: stalls and overspeed impacts cause $10 million annual avoidable damage to freight and cars in Canada, and $100 million annually in the U.S.A. A "Monte Carlo" simulation has been constructed using the IBM 360/50 which is extremely realistic in its simulated assembly of trains. Using it, better methods of constructing and instrumenting the yard are shown to be possible, realizing a 75% reduction in the damage figures.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

054702
CANADIAN FREIGHT TRANSPORT MODEL

INVESTIGATORS:
Fullerton, H.V. Turner, R.E. Peterson, E.R.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada PROJ. NO. 5.10

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active START DATE: May 1971 COMPL. DATE: Apr. 1974

The aim of this research is to model the flow of commodity freight in Canada, in order to assist industry and government planners in evaluating future changes to the transport system. The rail transport mode is emphasized, but the effects of competition by other modes are included. An optimizing network flow model of the main-line operation of a railroad is developed. This model predicts the optimal routing of traffic and the congestion at each yard and over each track section in the system. Congestion-dependent expressions are included for time delays in the yards and over-the-road. The time-optimal assignment pattern for railcar flow is then obtained for a given set of origin-destination demands for railcar movement, using a new assignment algorithm. The mainline Canadian rail networks of both CN and CP are modelled. Historical railcar tracing data are summarized and compared with model predictions. A model of modal choice by shippers is also developed in order to obtain modal splits of commodity forecasts. Relative usage of various modes is represented as a function of both modal and shipment characteristics, and the relationships are tested statistically. To provide the necessary empirical data, an extensive data base has been collected incorporating historical commodity freight data on volume, cost, time and location of rail, ship and for-hire truck movements in Canada. Common codes for commodity grouping are developed to integrate the diverse modal schemes currently used, and the data are transformed to a common regional basis.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

054704
DEVELOPMENT OF INTERMODAL NORTHERN TRANSPORTATION NETWORKS

INVESTIGATORS:
Dunford, F.E.

PERFORMING AGENCY:
Queen's University, Kingston, Ontario K7L 3N6 Canada

SPONSORING AGENCY:
Transportation Development Agency of Canada

The research will examine alternate structures of freight transport networks in the Western Canadian Arctic. Intermodal combinations will be examined to determine the minimum cost pattern of transport investment that will at the same time stimulate economic development.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

045166
STUDY OF SHIPPER DEMAND CONCERNING EMPTY RAILROAD FREIGHT CARS NEEDED FOR MATERIAL AND COMMODITY LOADING

PERFORMING AGENCY:
Association of American Railroads, 1920 L Street, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
West, J.B., Tel. 202-4261677

STATUS: Active START DATE: June 1973 COMPL. DATE: Feb. 1975 TOTAL FUNDS: $171699 FUND TYPE: Contract-CONTR. NO.: DOT-FR-30058 CONTR. TYPE: CR

Create a functional design of the elements and processes (system architecture) necessary for a technically advanced system to collect and predict shipper requests (orders for freight cars to load). Such a system must be operationally suitable and economically justifiable for use by individual Class I railroads as part of their system-wide empty freight car distribution activity. These are related to current FRA project reports on Car Management Studies.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 3039

052066
FREEZING PROBLEMS DURING RAIL TRANSPORTATION

INVESTIGATORS:
Colijn, H.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada

SPONSORING AGENCY:
Canadian National Railways, 935 la Gauchetiere, West, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

Study to determine methods processes or equipment to eliminate or minimize delays in discharging granular bulk materials (coal ore, etc.) from rail cars under freezing conditions.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

054568
IMPROVING TRAILER VANS AND CONTAINERS FOR TRANSPORT OF PERISHABLE FOODS

INVESTIGATORS:
Goodard, W.F.

PERFORMING AGENCY:
Department of Agriculture, Horticultural Research Laboratory, Orlando, Florida 32804

SPONSORING AGENCY:
Department of Agriculture, Agricultural Research Service, Transport & Facil Res Div

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974 FUND TYPE: ID

OBJECTIVE: Develop design criteria and specifications necessary for improving environmental control systems in transport vehicles and develop, test, and evaluate such improvements. APPROACH: Standard testing methods for rating performance of loaded refrigerated trailers and van containers will be developed. Development of this method and its related empirical data will provide a basis for realistic design and performance specifications for such vehicles and as a yardstick for evaluating improved refrigerated vehicles and modifications of conventional equipment. Shipping experiments will be made to develop additional performance data and data on cost of fuel, servicing, and maintenance to determine operating and ownership cost of improved equipment. PROGRESS: Stationary tests on prototype van container with simulated load by loading patterns to determine air circulation efficiency and cooling efficiency were completed; concurrently, simulated load test methodology was developed to a point where its evaluation must await results from field tests of real loads. Modifications on the prototype have been completed. Field testing with shipments of real loads originating from Texas to domestic markets has commenced.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 22041 2

054569
IMPROVED PACKAGING OF CELERY FOR EXPORT TO EUROPE

INVESTIGATORS:
Hale, P.W.

PERFORMING AGENCY:
Department of Agriculture, Horticultural Research Laboratory, Orlando, Florida 32804

SPONSORING AGENCY:
Department of Agriculture, Agricultural Research Service, Transport & Facil Res Div

STATUS: Active START DATE: July 1973 COMPL. DATE: June 1974 FUND TYPE: ID

OBJECTIVE: Improve packaging of celery to reduce costs of packing, handling, and transport to overseas markets and to increase foreign market acceptance. APPROACH: Develop better packages and shipping containers. Test in laboratory, commercial packing plants, transport vehicles—trucks, railroad cars, and ships,—terminal warehouses, and wholesale and retail stores. By time studies, interviews, container and product examination, and from records and tariffs, gather data on container and celery damage, foreign market acceptance, and costs of materials, packing handling, storage, and transport. Compare cost of using new and presently-used packages and shipping containers. PROGRESS: A dispute over high ocean freight rates for celery has reduced exports to a very low level. One test shipment was made of celery that was trimmed to 11'' and individually sleeved and packed 36 stalks to the box. The load arrived in excellent condition with no damage or decay. The arrival temperatures ranged from 36 to 38 F (thermostat on the van container was set at 37). Consumer acceptance was high and the receiver immediately reordered. Several commercial shipments were made after the initial test shipment.

ACKNOWLEDGEMENT:
Science Information Exchange, GY 21702 2

011903
INVESTIGATE ENVIRONMENTAL CONTROL IN UNDERGROUND RAPID TRANSIT SYSTEMS

INVESTIGATORS:
Reinhardt, W.J., Tel. 202-8720055

PERFORMING AGENCY:
Transit Development Corporation, Incorporated, 1000 Connecticut Avenue, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Urban Mass Transportation Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590 PROJ. NO. DC-MTD-7

RESPONSIBLE INDIVIDUAL:
Mora, J., Tel. 202-4260090

STATUS: Active START DATE: Oct. 1970 COMPL. DATE: Apr. 1974 TOTAL FUNDS: $3796414 FUND TYPE: Grant CONTR. NO. : DOT-UT-290

The objective of this project is two-fold. First, it will develop a handbook for subway system planners, designers, and operators which contains detailed information on environmental criteria, analysis and control. Its second objective is to reduce the cost of subway ventilation systems and to provide criteria for the possible retrofit of existing ventilation systems. The output of the project will be a handbook.

ACKNOWLEDGEMENT:
Urban Mass Transportation Administration, DC-06-0010

019578
SURVEY TO DETERMINE POTENTIAL FOR IMPROVED RAIL ADVANCED VEHICLE SERVICE

PPS# 5.C.

PERFORMING AGENCY:
Peat, Marwick, Mitchell and Company, 1025 Connecticut Avenue, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
DeBoer, D., Tel. 202-4269682

STATUS: Active START DATE: Aug. 1971 COMPL. DATE: July 1973 TOTAL FUNDS: $446709 FUND TYPE: Contract-CONTR. NO. : DOT-FR-20005 CONTR. TYPE: FFP

No Abstract.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 71-118

036355
STUDY TO DEVELOP A PLAN AND TECHNIQUES TO MEASURE THE EFFECTIVENESS OF THE NATIONAL RAIL PASSENGER SERVICE

PERFORMING AGENCY:
Ernst and Ernst, 1225 Connecticut Avenue, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Harding, J.T., Tel. 202-4260808

STATUS: Active START DATE: June 1972 COMPL. DATE: Mar. 1973 TOTAL FUNDS: $130329 FUND TYPE: Contract-CONTR. NO. : DOT-FR-20068 CONTR. TYPE: CPFF

Research study to develop a plan and techniques to measure the effectiveness of the National Rail Passenger Service in accordance with the RFP dated May 24, 1972.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-43

036731
IMPROVED PASSENGER TRAINS VS. TRACKED LEVITATION VEHICLES

PERFORMING AGENCY:
Pan-Technology Consulting Corporation, 1771 N Street, NW, Washington, D.C. 20030

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Ditmeyer, S.R., Tel. 202-4261227

STATUS: Obligated START DATE: Aug. 1972 COMPL. DATE: Oct. 1972 TOTAL FUNDS: $104920 FUND TYPE: Contract-CONTR. NO. : DOT-FR-20080 CONTR. TYPE: FFP

Study and formulate information concerning freight interference and right-of-way availability of improved passenger trains vs. tracked levitation vehicles (Magnetic or air). Information is to be long range planning and budgetary for OST/FRA FY-74 budget and future projections of 1975, 1985, 1995 traffic preference.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-05

038055
DATA REPORTS

PERFORMING AGENCY:
SofreRail, 37-39 Rue DeLa Bienfaisance, Paris-VIII France

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Lawson, K.L., Tel. 202-4262965

STATUS: Active START DATE: Oct. 1972 COMPL. DATE: Oct. 1974 TOTAL FUNDS: $200000 FUND TYPE: Contract-CONTR. NO. : DOT-FR-30006 CONTR. TYPE: FF

SofreRail will furnish data reports and access to High Speed Train Tests.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-211

038716
GENERAL SUPPORT TO IMPROVE URBAN TRANSPORTATION THROUGHOUT THE NATION

PERFORMING AGENCY:
Transit Development Corporation, Incorporated, 1000 Connecticut Avenue, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Urban Mass Transportation Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Silien, J.S., Tel. 202-4260090

STATUS: Active START DATE: Jan. 1973 COMPL. DATE: Jan. 1974 TOTAL FUNDS: $200000 FUND TYPE: Contract- CONTR. NO.: DC-06-0082

The objective of the project is to provide general support to the TDC program in its contribution to the improvement of urban transportation throughout the nation and to perform specific tasks as follows: (1) provide support and guidance to UMTA and its systems managers, the Vertol Division of the Boeing Company in the form of one full-time senior representative plus such assistance from member properties as may be required and establish a committee of specialists on rail car properties to provide formal reviews and advice on the program and for selective consultation throughout the program as requested by UMTA, and (2) arrange for a transportation panel to provide technical service upon UMTA's request to the Administrator and his Associate Administrators.

ACKNOWLEDGEMENT:
Urban Mass Transportation Administration, DC-06-0082

038728
FIVE YEAR PLAN FOR GROUND TRANSPORTATION

PERFORMING AGENCY:
Mitre Corporation, Westgate Research Park, McLean, Virginia 22101

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: Aug. 1971 COMPL. DATE: Nov. 1971 TOTAL FUNDS: $35641

The Contractor shall provide a study of Candidates for a Five Year Plan for Ground Transportation. The study will supercede and update MITRE Technical Report MTR-6036 provided under contract DOT-FR-10054. The study shall include: predictions of patronage and revenues for demonstration routes, refined estimates of costs for demonstration projects, Tracked Air Cushion Vehicle implementation schedule updating, and recommendations for improvement of Northeast Corridor Rail, Improved Passenger Trains, Air Cushioned Vehicle–Arctic Operations, and Suspended Vehicles' markets.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 72-90

051253
DESIGN OF URBAN TRANSPORTATION INTERFACE FACILITIES

INVESTIGATORS:
Hoel, L.A.

PERFORMING AGENCY:
Carnegie-Mellon University, Transportation Research Institute, Frew Avenue and Margaret Morrison, Pittsburgh, Pennsylvania 15213

SPONSORING AGENCY:
National Science Foundation, Division of Social Systems & Human Resources, 1800 G Street, NW, Washington, D.C. 20550 PROJ. NO. GI-39223

STATUS: Active START DATE: June 1973 COMPL. DATE: May 1974 TOTAL FUNDS: $24800

Improved mobility for urban residents is a recognized national need. As new transit systems are built to meet this need, the performance of the facilities where new and existing systems meet, or where various modes of transport intersect, becomes critical. Smooth and comfortable transition from mode to mode within urban networks and between urban and intercity service facilities, is essential to integrated transportation system performance. The objective of the proposed research is to develop a framework for an integrated and systematic analytical methodology for designing any type of urban transit interface facility. The ultimate output of this design process would be the specification of various facility components in a particular spatial configuration which would in some sense be the best of all alternatives considered. As a step towards the accomplishment of this objective, the project will examine current practice in detail through available documentation and through a seminar on transit interface facility design. The technical issues that will be raised by these two tasks should provide guidance in fashioning and appropriate systems-analytic design process.

ACKNOWLEDGEMENT:
Science Information Exchange, GSQ 651

051263
TRANSPORTATION SYSTEMS

INVESTIGATORS:
Neigut, E.G.

PERFORMING AGENCY:
National Bureau of Standards, Department of Commerce, 180 N. Michigan Ave., Washington, D.C. 20234

SPONSORING AGENCY:
National Bureau of Standards, Department of Commerce, Washington, D.C. 20234 PROJ. NO. 4314128

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973 TOTAL FUNDS: $10000

Reasons For Starting Or Progress Last Year: To identify and briefly review transportation planning methodologies, techniques, and tools which have a potential for transfer between different area of transportation technology and transfer to other geographical areas. As a result of TAD's current evaluation of the Shirley Bus-On-Freeway project, various problems related to the development of transportation survey forms, sampling techniques and procedures, and the development and utilization and network simulation models all appear to be areas in need of additional research and analysis. In particular, the accuracy of network models, the proper uses and utility of such models, and an analysis of alternatives to simulation for various types of information require investigation. Approach: Specific methodologies, techniques and tools will be identified both as the result of a literature search and as a "spin off" of existing projects. Applicable areas of potential will be briefly evaluated in order to assess the need and utility for further research and analysis. Expected Results: Identification of potential areas of research; outline and initiation of work statement by which this program area can present solutions to the problems identified.

ACKNOWLEDGEMENT:
Science Information Exchange, ZBA 5800

018951
STUDY TO EVALUATE AND COMPUTE APPROPRIATE RATES AND CHARGES FOR A DEMURRAGE SYSTEM

PERFORMING AGENCY:
Reebie (Robert) and Associates, Incorporated, 12 Havemeyer Place, Greenwich, Connecticut 06830

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Williams, J.H., Tel. 58

STATUS: Active START DATE: June 1971 COMPL. DATE: July 1972 TOTAL FUNDS: $237076 FUND TYPE: Contract-CONTR. NO. : DOT-FR-10038

To evaluate and compute appropriates rates and charges for a demurrage system based upon the specification and analysis of relevant economic and financial factors, and to quantitatively assess the resultant effects upon rail carriers and the shipping public.

OBJECTIVES AND SCOPE:
To evaluate and compute appropriate rates and charges for a demurrage system based upon the specification and analysis of relevant economic and financial factors, and to quantitatively assess the resultant effects upon rail carriers and the shipping public.

ACKNOWLEDGEMENT:
Federal Railroad Administration

036747
RAILROAD ECONOMICS PLANNING AND MANAGEMENT SUPPORT

INVESTIGATORS:
Troup, K.F, I.I.I., Tel. 617-4942795

PERFORMING AGENCY:
Transportation Systems Center, 55 Broadway, Cambridge, Massachusetts 02142

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Hagen, J., Tel. 202-4260933

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973 TOTAL FUNDS: $50000 FUND TYPE: PPA CONTR. NO. : PPA-RR-313

TSC will support the Office of Economics and the Office of Policy and Planning of the Federal Railroad Administration in the preparation analysis, review, and conduct of the research and development programs within these organizations. The programs deal with pricing, cost, labor and operational considerations freight and passenger transportation of conventional railroad. Specifically, TSC will assist in future year program and budget planning cycles, assist in evaluation of proposals submitted against RFP's let by the FRA Office of Economics, and assist in the technical program management of research and development contracts within the Office of Economics.

ACKNOWLEDGEMENT:
Federal Railroad Administration, GWA-73-RR

038959
DEVELOPMENT OF NEW FREIGHT RATE STRUCTURES UTILIZING THE MODERN DESTRIBUTION MANAGEMENT

INVESTIGATORS:
Taylor, M.H.

PERFORMING AGENCY:
Utah State University, Business Building, Room 503, Logan, Utah 84322

SPONSORING AGENCY:
Office of Systems Development and Technology, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Nupp, B.L., Tel. 202-4264447

STATUS: Active START DATE: May 1973 COMPL. DATE: Mar. 1974 TOTAL FUNDS: $35000 FUND TYPE: Contract-CONTR. NO. : DOT-OS-30116 CONTR. TYPE: CS

This research and demonstration project shall develop marketing, cost, and management criteria for the development of rail and motor carrier freight rate structures applying to selected commodities produced in the State of Utah and demonstrate their application through conferences with carrier representatives, and marketing and transportation specialists. The principal objective of the project is to utilize the state of the art in modern distribution management to improve relationships among carriers, producers and distributors and provide a basis for a wider application of such improvements, both as a basis for producer-carrier discussion and participation in regulatory cases.

ACKNOWLEDGEMENT:
Office of Systems Development and Technology, PR# PUR-1-30002

048012
AN ANALYSIS OF FACTORS AFFECTING THE SUPPLY AND DEMAND FOR LIVESTOCK TRANSPORTATION

INVESTIGATORS:
Hutchinson, T.Q., Project Leader, Tel. 202-4478171

PERFORMING AGENCY:
Department of Agriculture, Economic Research Service, Marketing Economics Division, 12th & Independence Avenue, SW, Washington, D.C. 20250 PROJ. NO. ME 11-25-54-00

SPONSORING AGENCY:
Department of Agriculture, Economics Research Service, Marketing Economics Division, 12th & Independence Avenue, SW, Washington, D.C. 20250

RESPONSIBLE INDIVIDUAL:
Manley, W.T., Director of Marketing Economics Div, Tel. 202-4478831

STATUS: Active START DATE: Feb. 1973 COMPL. DATE: Feb. 1975 FUND TYPE: In-House

OBJECTIVES AND SCOPE:
Identify the major flows of livestock and the extent of seasonality in these movements. Determine the rates paid by livestock shippers for transportation and the variability in these rates as related to distance, seasonality and area of operation. Determine the extent of private carriage in the transportation of livestock. Compare revenues of for-hire livestock truckers with their estimated costs.

APPROACH AND METHODS:
Interview a sample of livestock dealers, feedlots and slaughter plants located in selected States to obtain data pertaining to rates, flow patterns, types of carriage and the names and addresses of truckers used. Interview a sample of livestock truckers to obtain information concerning their operational practices, experiences and their rate-making policies. Conduct a comparative-analysis of the information obtained to determine the relationships between factors affecting the supply and demand for livestock transportation.

ACKNOWLEDGEMENT:
Department of Agriculture

036730
URBAN RAILROAD RELOCATION: ESTIMATION OF NATIONWIDE NEEDS AND METHODOLOGY FOR FUTURE RELOCATION STUDIES

PERFORMING AGENCY:
Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

STATUS: Active START DATE: June 1972 COMPL. DATE: Mar. 1974 TOTAL FUNDS: $364831 FUND TYPE: Contract- CONTR. NO.: DOT-FR-20037 CONTR. TYPE: CPFF

Identify relocation parameters and criteria, make preliminary assessment of nationwide railroad problem, review existing and potential methods of relocation analysis, develop tentative benefit-cost methodology, make field investigation of relocation problems, make survey of urban areas, make cost benefit analysis allocate costs to public and private sectors, draft relocation study handbook, demonstrate handbook and prepare final versions.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-31

036738
IMPLEMENTATION OF THE FEDERAL RAIL SAFETY AND TECHNOLOGY RESEARCH

INVESTIGATORS:
Morris, R.E.

PERFORMING AGENCY:
Westinghouse Air Brake Company, 1200 18th Street, NW, Washington, D.C. 20036

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Regan, L.G., Tel. 202-4261510

STATUS: Obligated START DATE: Sept. 1971 COMPL. DATE: June 1972 TOTAL FUNDS: $63094 FUND TYPE: Contract- CONTR. NO.: DOT-FR-20008 CONTR. TYPE: CPFF

Professional services with expertise in rail safety R&D planning and control to assist the FRA in implementation of the railroad safety and technology research program.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# RP-8

045167
SOLE SOURCE NEGOTIATION WITH BRITISH RAILWAYS FOR RAILRAOD TECHNOLOGY ACCESS AND CONSULTING SERVICES

PERFORMING AGENCY:
British Railways Board, Melbury House, London NW1 6JW England

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Ullman, K.B., Tel. 202-4260855

STATUS: Active COMPL. DATE: Dec. 1975 TOTAL FUNDS: $500000 FUND TYPE: Contract CONTR. NO. : DOT-FR-30066 CONTR. TYPE: FFP

The British Railways Board (BRB) will prepare state-of-the- art summaries together with appropriate reports on the research topics covered by this contract. In addition, BRB will supply data on their past, present and future research, development, tests, evaluation, and experimentation work in rail technology.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 73-143

048566
RAIL ABANDONMENT CASES

PERFORMING AGENCY:
Simat, Helliesen & Eichner, Incorporated, 345 Boylston Street, Newton Center, Massachusetts 02159

SPONSORING AGENCY:
Federal Railroad Administration, Department of Transportation, 400 7th Street, SW, Washington, D.C. 20590

RESPONSIBLE INDIVIDUAL:
Kestenbaum, M.I., Tel. 202-4269644

STATUS: Active START DATE: Dec. 1973 COMPL. DATE: Mar. 1974 TOTAL FUNDS: $5000 FUND TYPE: Contract CONTR. NO.: DOT-FR-4-5002

The contractor shall furnish the necessary facilities, materials and such other services as may be required, and in consultation with the Government evaluate five rail abandonment cases experienced in the recent past. The research will center on abandonments that occurred in the 1967-1971 period.

ACKNOWLEDGEMENT:
Federal Railroad Administration, PR# 5002

051261
PUBLIC TRANSPORT PLANNING

INVESTIGATORS:
Wortman, R.H.

PERFORMING AGENCY:
Illinois University, Urbana, Department of Civil Engineering, Urbana, Illinois 61801

SPONSORING AGENCY:
Illinois University, Urbana, Urbana, Illinois 61801

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973

This study is investigating the methods that are employed in the planning of public transport systems. To date, a number of existing systems have been studied to determine the planning approaches that have been utilized. The intent of the project is focused on the determination of the application of goal oriented planning to public transport decisions.

ACKNOWLEDGEMENT:
Science Information Exchange, NIL 1229

051262
SOCIETAL EFFECTS OF TRANSPORTATION

INVESTIGATORS:
Wortman, R.H. Williams, T.E.

PERFORMING AGENCY:
Illinois University, Urbana, Department of Civil Engineering, Urbana, Illinois 61801

SPONSORING AGENCY:
Illinois University, Urbana, Urbana, Illinois 61801

STATUS: Active START DATE: July 1972 COMPL. DATE: June 1973

The purpose of transportation is to serve some broader societal goals and objectives. This study was undertaken to investigate the response of societal problems to changes in mobility which is afforded by transportation. Major emphasis is being placed on the nature and type of societal problems that can be solved by transportation.

ACKNOWLEDGEMENT:
Science Information Exchange, NIL 1243

054707
CONSTITUTIONAL AND GOVERNMENT ASPECTS OF TRANSPORTATION POLICY

INVESTIGATORS:
Burns, R.M.

PERFORMING AGENCY:
Canadian Institute of Guided Ground Transport, Queen's University, Kingston, Ontario K7L 3N6 Canada

SPONSORING AGENCY:
Canadian National Railways, Montreal, Quebec Canada
Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario Canada
Queen's University, Kingston, Ontario K7L 3N6 Canada

STATUS: Active

A brief examination from secondary sources of the historical, economic, political and legal influences which have governed the development of a transportation policy in Canada and examination of the intergovernmental aspects involved in any revision or development of it in the future.

ACKNOWLEDGEMENT:
Canadian Roads and Transportation Association

Subject Term Index

This Subject Term Index includes all of the subject terms that have been assigned to the abstracts listed in this issue of the RRIS Bulletin. Subject terms are listed alphabetically. Under each subject term are posted the reference numbers for the abstracts. These numbers consist of two digits that identify the subject area according to the RRIS classification scheme and six digits that identify the individual abstract under the subject area. When postings in the index are read from left to right and then from line to line, the reference numbers are in the same order as the abstracts are in the main body of this publication.

It is often useful to coordinate two or more terms in the search for abstracts on a particular subject. For example, if it is desired to locate abstracts of articles that deal with the impact of electrification on signaling and communications, the subject term Electrification should be coordinated with the subject term Signaling and the subject term Communications.

Subject terms are also useful if it is desired to review all of the abstracts pertaining to a certain area that is not a specific subject area in the RRIS classification scheme. Thus, the subject term Commuter Services will give reference numbers for all abstracts pertaining to railroad commuter services even though the main thrust of the documents may lie in other subject areas such as Vehicles and Components, Propulsion Systems, or Passenger Operations.

Author Index

The Author Index lists authors of reports included in this publication. Under each name are posted the reference numbers for the abstracts for which this person has been named as author or co-author. These numbers consist of two digits that identify the subject area according to the RRIS classification scheme and six digits that identify the individual abstract under the subject area. When postings in the Index are read from left to right and then from line to line, the reference numbers are in the same order as the abstracts are in the main body of this publication. Names are listed alphabetically.

Source Index

In this Source Index, the first line of each entry is the name of the source as it appears in the RRIS file. Sources include corporate authors, publishers, and publications. Under each source name are posted the reference numbers for the abstracts of documents from that source. These numbers consist of two digits that identify the subject area according to the RRIS classification scheme and six digits that identify the individual abstract under the subject area. When postings in the Index are read from left to right and then from line to line, the reference numbers are in the same order as the abstracts are in the main body of this publication. Names are listed alphabetically.

THE National Academy of Sciences is a private, honorary organization of more than 800 scientists and engineers elected on the basis of outstanding contributions to knowledge. Established by a congressional act of incorporation signed by Abraham Lincoln on March 3, 1863, and supported by private and public funds, the Academy works to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance.

Under the terms of its congressional charter, the Academy is also called upon to act as an official—yet independent—adviser to the federal government in any matter of science and technology. This provision accounts for the close ties that have always existed between the Academy and the government, although the Academy is not a governmental agency and its activities are not limited to those on behalf of the government.

The National Academy of Engineering was established on December 5, 1964. On that date the Council of the National Academy of Sciences, under the authority of its act of incorporation, adopted articles of organization bringing the National Academy of Engineering into being, independent and autonomous in its organization and the election of its members, and closely coordinated with the National Academy of Sciences in its advisory activities. The two Academies join in the furtherance of science and engineering ... the responsibility of advising the federal government, upon request, on any