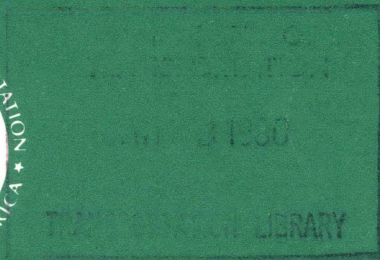


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Ref



# RAILROAD RESEARCH BULLETIN



Spring 1979  
Volume 6 Number 1

RRIS accessions between  
August 1978 and January 1979

U.S. DEPARTMENT OF TRANSPORTATION  
Federal Railroad Administration

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Railroad Research Information Service  
Transportation Research Board

25 - R&D Management

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The Transportation Research Board is an agency of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 150 committees and task forces composed of more than 1800 administrators, engineers, social scientists, and educators who serve without compensation. The program is supported by state transportation and highway departments, the major administrations of the U.S. Department of Transportation, the Association of American Railroads, and other organizations interested in the development of transportation.

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# Foreword

This *Bulletin*, containing 1078 abstracts of journal articles, research reports, computer programs, and magnetic tape data sets and 442 summaries of ongoing research activities, covers material accessioned by the Railroad Research Information Service between August 1978 and January 1979.

The *Railroad Research Bulletin*, published semiannually, contains material added to the RRIS file during the preceding 6 months. Previous editions should be retained. Although 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 "Acknowledgment" 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.

The scope of RRIS includes rail rapid transit and light rail 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" in the Subject Term Index, where the document record numbers for such items are given.

The RRIS Cumulative Subject Index 1973-1975 is available from the Railroad Research Information Service along with most of the editions of the *Railroad Research Bulletin*. Some RRIS publications are available from the National Technical Information Service at somewhat higher prices. In addition to acquisition and selection, RRIS work includes the classification, indexing, storage, retrieval, and dissemination of abstracts and summaries.

## RRIS FILE SEARCHES

The RRIS file is maintained on magnetic computer tape and is available for searches for information related to specific inquiries. The key to searching is RRIS categories, appropriate subject terms, dates, performing agencies, or other data elements. The search is performed by computer. Output may include abstracts of articles and reports, descriptions of computer programs, and summaries of ongoing research. The output is computer printed and similar in format to citations that appear in this publication.

The fee schedule for RRIS title searches reflects the primary support for the service from the Federal Railroad Administration and the nonprofit nature of all National Research Council information services. The charge for computer retrieval from the RRIS file is \$50 per request plus

\$0.25 per citation after screening by RRIS. A written authorization or purchase order is required before the retrieval is made.

## 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 section, Abstracts of Reports and Journal Articles. The material in this section is arranged by RRIS subject areas. The subject area and the subject area number are listed in the Contents and appear at the top of each page.

If you are interested in ongoing research projects, turn to the section, Ongoing Research Summaries. These summaries are also arranged by subject areas, which with the subject area number appear at the top of each page. An A after the subject area number identifies ongoing research project summaries.

If you can identify your interest by subject, turn to the Subject Term Index. Each term in this index is followed by the document record number, which consists of the two-digit subject area number and the six-digit TRIS accession number that identifies the individual document under that subject area. An A after subject area numbers indicates that the item is a summary of ongoing research. The items are arranged in order of ascending accession numbers within each subject area.

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 and Investigator Index and look for the individual's last name in the alphabetized listing. Again the document record number is used to find the item in the abstract or summary 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 organization, turn to the Source Index. Again, use the document record number to find the item in the abstract or summary section.

Although the Subject Term Index gives a general idea of the scope of the RRIS classification system, information is available on many other terms that do not appear in this edition.

# Availability of Documents

An availability statement is included with most abstracts. Addresses for ordering documents are given with the abstracts or with the publisher listing in the Source Index. Copies of reports and articles listed 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 as well as the title and

other information. When no availability is specified with an abstract, consult an established transportation library. A loan service for publications and a photocopy service for articles and papers are available at two TRISNET Centers as explained on page vi. Because a large number of documents are available from a few sources, space and printing costs have been reduced by abbreviating those sources as follows:

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Association of American Railroads  
1920 L Street, N.W.  
Washington, DC 20036
- AAR**  
For technical reports identified by a report number such as R-253:  
Association of American Railroads  
Technical Center  
3140 South Federal Street  
Chicago, IL 60616
- AIAA**  
American Institute of Aeronautics and Astronautics  
Technical Information Service  
750 Third Avenue  
New York, NY 10017
- AREA**  
American Railway Engineering Association  
59 East Van Buren Street  
Chicago, IL 60605
- ASCE**  
American Society of Civil Engineers  
345 East 47th Street  
New York, NY 10017
- ASME**  
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345 East 47th Street  
New York, NY 10017
- CIGGT**  
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U.S. Department of Transportation  
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Canada
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Urban Mass Transportation Administration  
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Washington, DC 20590
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The objective of the TRISNET Centers is to provide the documents identified through search of the Transportation Research Information Service (TRIS) abstracting and indexing services (RRIS and the Air, Highway, and Maritime Transportation Research Information Services).

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Berkeley, CA 94720  
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# Abbreviations

AAR*	Association of American Railroads	OECD*	Organization for Economic Cooperation and Development
AIAA*	American Institute of Aeronautics and Astronautics	ORE*	Office for Research and Experiments, UIC
AREA*	American Railway Engineering Association	OST*	Office of the Secretary of Transportation
ASCE*	American Society of Civil Engineers	PB	Prefix identifying an NTIS accession number
ASME*	American Society of Mechanical Engineers	Phot	Photographs
CIGGT*	Canadian Institute of Guided Ground Transport	Ref	References
CNR	Canadian National Railways HQ Library	Repr PC	Paper copy of original document
DOT*	U.S. Department of Transportation	RP	RRIS Repository (DOTL)
DOTL	U.S. Department of Transportation Library, Washington, D.C.	RPI*	Railway Progress Institute
ECMT*	European Conference of Ministers of Transport	Rpt	Report
EI	Engineering Index	RTAC*	Roads and Transportation Association of Canada
ESL*	Engineering Societies Library	SAE*	Society of Automotive Engineers
Fig	Figures	Shaw	Shaw Publishing Company Ltd.
FRA*	Federal Railroad Administration	SNAME*	Society of Naval Architects and Marine Engineers
FY	Fiscal year	Tab	Tables
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IRF	International Road Federation	TsNITEI*	Central Scientific Research Institute of Information and Technical and Economic Research
IRRD	International Road Research Documentation	UIC*	International Union of Railways
IT*	Transport Publishing House	UITP*	International Union of Public Transport
JC	Journal Collection (DOTL)	UMI*	University Microfilms International
MPS*	USSR Ministry of Railways	UMTA*	Urban Mass Transportation Administration
NAE*	National Academy of Engineering		
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NRC*	National Research Council		
NTIS*	National Technical Information Service		

\*See page v for availability of papers and research reports.

# Examples of Abstracts and Summaries

Abstracts are classified according to an eight-digit document record number: The first two-digits indicate the RRIS subject area number and the last six digits indicate the TRIS accession number, which is a unique number assigned to each document. The subject area number and the subject area appear at the tops of the pages in the abstract and summary

sections. The document record number appears at the top of each abstract. Abstracts within each subject area are listed in ascending order of the accession numbers, although these usually will not be consecutive. Examples of research report abstract and of a journal article abstract of both U.S. and non-U.S. journal articles appear below and on the next page.

## Abstract of a research report

Document record number	
TRIS accession number	
Subject area code	02 128640
Title	<b>TEST TRAIN PROGRAM SIXTH PROGRESS REPORT</b>
Research report abstract	This report describes the progress of the Rail Research Program involving operation of the FRA test cars and the performance of other rail research efforts during the period 1 July 1973 to 30 June 1974. Highlights of the work reported include operation of the FRA test cars to perform track surveys and other rail research activities; test car upgrading; expansion of the Rail Research Program; and data management and data analysis tasks which have been undertaken to benefit railroad technology. The Rail Research Program primarily involves the operation and instrumentation of the FRA test cars. This research program is designed to provide high-speed measurement of railroad track characteristics, development of comprehensive track measurement techniques, development of special testing instrumentation, and data evaluation through analysis and electronic processing. Sponsorship was from FRA, DOT.
Supplementary notes	
Authors, publication data, document data	Peterson, C Kaufman, WM Yang, TL Corbin, JC ENSCO, Incorporated, (DOT-FR-74-19) Prog Rpt. FRA- ORD&D-75-25, June 1974, 124 pp, 36 Fig.
Activity data	Contract DOT-FR-20032
Source of abstract	ACKNOWLEDGMENT: FRA
Availability	PURCHASE FROM: NTIS Repr. PC, Microfiche PB-247084/AS, DOTL NTIS
NTIS accession number	
Washington, D.C., availability with RP, JC, or call number	

## Abstract of a U.S. journal article

Document record number	
TRIS accession number	
Subject area code	02 131315
Title	<b>INVESTIGATION INTO CAUSES OF RAIL CORRUGATIONS</b>
Journal article abstract	Heavy traffic density and high-capacity cars increased wear and abrasion on curves which CP Rail countered with lubricators that cut flange abrasion but produced rail corrugation with a wavelength of 8 to 28 inches on the low rail. Plastic flow or rail head metal combined with surface fatigue are predominately responsible for rail corrugation. Recommendations for overcoming the problem includes improved wheel rail contact geometry through elimination of wide gauge, elimination of false flanges on wheels, reduction of railhead curvature and modification of the AAR wheel profile; cutting of lateral frictional force by use of self-steering trucks; changes in rail metallurgy to increase resistance to surface fatigue and plastic flow, reduction of dynamic loadings and improved flange lubrication techniques.
Author, publication data, document data	Kalousek, J Klein, R <i>AREA Bulletin</i> Vol. 77 Bulletin, Jan. 1976, pp 429-48, 15 Fig., 2 Tab., 7 Ref.
Source of abstract	ACKNOWLEDGMENT: AREA Bulletin
Availability	PURCHASE FROM: ESL Repr. PC, Microfilm
Washington, D.C., availability with RP, JC, or call number	

DOTL JC

**Abstract of a non-U.S. journal article**

Document record number  
 TRIS accession number  
 Subject area code

Translated title

Title in original language

Journal article abstract

Language of full-text article

Author, publication data, document data

Source of abstract

Availability

Washington, D.C., availability with RP, JC, or call number

**09 141649**  
**EXPERIMENTAL ANALYSIS OF THE DYNAMIC BEHAVIOR OF A MECHANICAL STRUCTURE. CONCEPT OF MECHANICAL IMPEDANCE [Analyse experimentale du comportement dynamique d'une structure mecanique. Concept d'impedance mecanique]**  
 The experimental method of analysis called "mechanical impedance" (the concept of mechanical impedance is of the same nature as that of electrical impedance) is used to study the dynamic behavior of the structure of the material. It reveals the vibration pattern in any given area of a component. The SNCF Testing Division uses this method to analyse stress patterns in components, to limit the amplitude of certain vibrations, or to monitor the condition of a metallic structure during operation. The applications of this method are shown by means of examples. [French]

Butteaud, B *Revue Generale des Chemins de Fer* May 1976, pp 304-323, 40 Fig., 3 App.

ACKNOWLEDGMENT: UIC  
 ORDER FROM: ESL

DOTL JC

The summaries of ongoing research describe research activities currently in progress or recently completed. Each summary indicates who is performing the project, who is funding it, and how the research goal is to be attained. A summary is not a document surrogate; that is, there may not

be a full report published on the project. The summaries are in the format shown below, although each one may not contain all the elements given in this sample. The document record numbers and the order listing are the same for both summaries and abstracts.

**Summary of ongoing research**

Document record number  
 TRIS accession number  
 RRIS subject area number

Project title

Project summary

Agency performing the work

Project investigators

Project sponsors

Contract monitor

Project data

Source of this summary

**02 058303**  
**FREIGHT CAR TRUCK DESIGN OPTIMIZATION**  
 The Truck Design Optimization Project (TDOP) is a multiyear project intended to evaluate performance characteristics of existing railroad freight car trucks; determine through cost-benefit analysis the feasibility of improving truck performance by mechanical modification of existing type trucks or through introduction of new truck designs that respect carbody/suspension system interfaces or are otherwise compatible with existing freight train systems; provide performance and testing specifications for use in the development of freight car suspension systems, and study concepts of integrated carbody support systems and advanced designs in anticipation of future railroad requirements.

PERFORMING AGENCY: Southern Pacific Transportation Company  
 INVESTIGATOR: Byrne, R (Tel 415-362-1212X-22547)  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
 RESPONSIBLE INDIVIDUAL: Fay, GR (Tel 202-426-0855)

Contract DOT-FR-40023  
 STATUS: Active NOTICE DATE: Feb. 1976 START DATE: June 1974 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$2,000,000

ACKNOWLEDGMENT: FRA

# Abstracts of Reports and Journal Articles

## 00 Right-of-Way

00 053302

### INVESTIGATION OF BRIDGE DECKS WITH CONCRETE ENCASED GIRDERS

This final report is primarily devoted to the comparison between theoretical calculations and the results of measurements made on different bridge deck models with concrete encased girders. Some recommendations are then formulated concerning the calculation methods which seem better suited to this type of bridge deck. Various lessons are then drawn from the tests carried out on bridge deck models forming variants to the conventional type of bridge decks with concrete encased girders, e.g. those concentrating the steel at the lower fibre or those formed of prefabricated elements assembled by transverse prestressing.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways Final Rpt. D 123/RP 10, Apr. 1978, 86 p., 29 Fig., 4 Tab.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

00 053303

### FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES. TESTS ON LARGE I-BEAMS AT LOW STRESSES

This report describes the results of three spectrum loading tests on large butt-welded I-beams, with plates welded longitudinally and transversely to the compression flanges. Two sources of endurance data and the method of Maximum Likelihood were used to analyse the results but insufficient data existed to discriminate between the endurance curves.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D 130/RP 7, Apr. 1978, 53 p., 37 Fig., 4 Tab.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

00 095218

### PROBLEMS IN LATERAL PRESTRESSING APPLIED TO PRESTRESSED CONCRETE BRIDGES

Fractures have been observed in the lateral prestressing bars of prestressed concrete railway T-girder bridges, built by the post-tensioned structural system. They were caused by stress corrosion, owing to inadequate grouting. Systematic investigations were then carried out on all bridges of this type, by random examination of the grouting where possible, and by field radiography using an iridium-192 gamma ray source. Inadequate grouting of the bars inside the sheaths, allowing air and moisture to enter, was found in many cases. The report gives an account of this inspection, together with a study of the causes of inadequate grouting, suggestions for improvements, and a very short discussion on the respective merits of solid prestressing bars or wire tendons.

Tamura, S *Permanent Way* Vol. 15 No. 4, June 1974, pp 9-30, 35 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of  
ORDER FROM: ESL

DOTL JC

00 167258

### USING CROSS-BOREHOLE ELECTROMAGNETIC PROBING TO LOCATE A TUNNEL

Theoretical and experimental studies of electromagnetic interaction with a tunnel found that signal minima can be used to detect and locate the tunnel. These minima are found on the transmission side of the tunnel, the side opposite the signal transmitter. From the appearance of the signal and comparison with Fresnel diffraction, the main mechanism of signal interaction with the tunnel seems to be diffraction rather than refraction or reflection. Experiments were made around a tunnel near Gold Hill, Colorado. The tunnel was horizontally and vertically located within three feet. (ERA citation 02:033061)

Lytle, RJ Lager, DL Laine, EF Davis, DT  
California University, Livermore, Department of Energy DOT/  
TST-77-76, Oct. 1976, 45 pp, 18 Ref.

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

UCRL-52166

00 172876

### FROST HEAVING RATE OF SILTY SOILS AS A FUNCTION OF PORE SIZE DISTRIBUTION

The purpose of this study was to examine the relation of frost heave to pore size distribution of compacted silty soils, and to propose that frost susceptibility criteria based upon texture and grain size. Rapid freezing laboratory tests were conducted to evaluate the heaving rate. The soils were compacted at different energy levels and water contents, and consisted of three different combinations of silt and kaolin. Mercury intrusion tests were performed to obtain the pore size distributions of the compacted soils. Since this procedure requires the soil to be free of moisture, the soil samples were freeze dried. This type of driving almost eliminated the volume change and structural modification expected from air or over drying. The relation of frost heave to pore size was obtained using the method of linear regression.

Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration. Report on the Effects of Pore Size Distribution on Permeability and Frost Susceptibility of Selected Sub-Grade Materials. Sponsored in part by Indiana State Highway Commission, Indianapolis.

Reed, MA

Purdue and Indiana State Highway Commission JHRP Intrm Rpt.  
FHWA/M-0455, Sept. 1977, 116 pp, 39 Fig., 12 Tab., Refs., 3 App.

HP&R 1(15) Part II

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-281025/7ST

00 176249

### DEVELOPMENT OF ECONOMIC FACTORS IN TUNNEL CONSTRUCTION

The escalating cost of underground construction of urban transportation systems has made transit planning, especially construction cost estimating, difficult. This is a study of the cost of construction of underground, rapid transit tunnels in soft ground and is sponsored by UMTA's Office of Rail Technology. Twenty-two tunnels from the San Francisco Bay Area Rapid Transit District (BART), the Chicago Metropolitan Sanitary District, and the Washington, DC, Metropolitan Area Transit Authority (WMATA)

have been analyzed to determine what factors influence the Rate of Advance (ROA) through the ground. A statistical study of factors that influence tunnel construction costs was made to determine the magnitude of the major factors involved in construction cost. Tunnel construction data on cost and resources expended was collected and used to develop relations between construction ROA and physical variables. The data is also used in an analysis of the cost impact of institutional factors such as: availability and analysis of geologic conditions; flexibility and quality of engineering specifications; conditions for obtaining right-of-way and construction and entry permits; potential contractor liability; and labor agreements. Utilization of the study results are expected to better the accuracy of cost estimating procedures for further tunnel construction. The Appendices contain numerous charts and tables illustrating such items as: Case History Data/format; Ring and Face Log Data/sheets; Average Weekly Progress Data/keypunch forms; Systems Calculations for estimating tunnel construction cost; Rate of Advance Calculations; Calculations of Downtime Hours; Mexico City Tunnel Data; and References.

Damskey, LR Gin, GT  
Bechtel Corporation, Transportation Systems Center, Urban Mass  
Transportation Administration, (UMTA-MA-06-0025) Final Rpt.  
DOT-TSC-UMTA-77-37, Dec. 1977, 183 pp

Contract DOT-TSC-1104

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-280878/OST

00 176258

#### THE TRANSPORTATION OF TUNNEL MUCK BY PIPELINE

The view reflected herein is that if the advancement of the technology of muck removal does not keep pace with advances in tunneling machine technology, muck removal can become the limiting constraint on the forward movement of the tunnel face, and hence on the growth of tunneling. The objective of this study is to advance the technology of tunnel excavation by increasing the rate of muck removal from the tunnel face. The highlights in this report are on muck haulage systems by pipeline, and the emphasis is on investigating better techniques and technology, rather than costs. This report updates muck quantities and to some extent muck quality (in terms of its hardness and geology). Crushing equipment is examined as is extensible conveyor belt equipment. A survey of extensible equipment is made to aid in suggesting approaches for their application in tunnels to pipeline muck haulage. Recent headloss data for coarse slurries are presented for the hydraulic muck haulage system. Consideration is given to a jet pump eductor for feeding a centrifugal pump from a mixing tank. A more compact and less expensive dewatering system is also analyzed. Appendixes A through D provide background material for the systems and concepts herein and include: Pneumatic Pipeline Systems, CONOCO-CONSOL System, Dewatering Equipment, and Coal Hoisting in the U.K. A previous and related study, 'Pneumatic-Hydraulic Material Transport System for the Rapid Excavation of Tunnels' (DOT-TSC-75-17), suggested a transportation system for muck haulage with a pneumatic pipeline or a slurry pipeline.

Faddick, RR Martin, JW  
Colorado School of Mines, Transportation Systems Center, Urban Mass  
Transportation Administration, (UMTA-MA-06-0025) Final Rpt.  
DOT-TSC-UMTA-78-7, Jan. 1978, 174 pp

Contract DOT-TSC-1114

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-281103/2ST

00 179846

#### FATIGUE OF WELDED STEEL BRIDGE MEMBERS UNDER VARIABLE-AMPLITUDE LOADINGS

This report contains the findings from an extensive laboratory investigation of fatigue effects in welded steel beams subjected to variable-amplitude loadings similar to those that occur in actual bridges. This report is based on the results of an experimental program that included constant and variable-amplitude fatigue tests of both small specimens and relatively large beams of various steels, with structural details similar to those tested in NCHRP Project 12-7. Extensive test results showed that variable amplitude random-sequence stress spectrums can be conveniently represented by a single constant amplitude effective stress range that would result in the same fatigue life as the variable amplitude stress range spectrum. A review of

available field data on stresses in actual bridges showed that the passage of a truck across a bridge usually produces a single major stress cycle with small superimposed vibration stresses. The field data also showed that Raleigh probability-density curves can be used to approximate the frequency of occurrence of major stress cycles in most highway-bridge stress spectrums. A possible new approach for bridge-design fatigue specifications is outlined in this report. This new approach is based on a fatigue-design truck placed in realistic positions to calculate a design stress range. To provide realistic fatigue specifications, the fatigue limit on the fatigue behavior at low stress ranges must be accurately known for various details. Effective methods of performing variable-amplitude random-sequence fatigue tests on large specimens were developed as part of the program and are described in the report.

Sponsored by the American Association of State Highway and Transportation Officials in cooperation with DOT, Federal Highway Administration.

Schilling, CG Klippstein, KH Barsom, JM Blake, GT (United States Steel Corporation) *NCHRP Report* No. 188, 1978, 113 pp, Figs., Tabs., 7 App.

ORDER FROM: TRB Publications Off

00 180253

#### LAUNCHING NOSE METHOD OF REGIRDING OF GIRDER BRIDGES

This paper describes the work of regirding 30 ft and 40 ft span cantilever bridges under traffic conditions by the quick and economical "launching nose" method. The advantage of the method is that it can be used at all times of the year, without being interrupted for example by heavy floods.

Matrubhutam, TN *Indian Railway Technical Bulletin* Vol. 34 No. 205, May 1977, pp 73-78, 1 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Research Design and Standards Organization, Alambagh,  
Lucknow 5, India

DOTL JC

00 180254

#### CONSTRUCTION OF A CULVERT WITHOUT INTERRUPTION TO TRAFFIC [Keretid epitese a forgalom kismerteku zavarasaval]

An experiment was conducted in 1977 on construction using the pushing system. The basis of this consists of a prefabricated structure with each element of the culvert being pushed into place under a temporary rail frame work. The advantage of this system is that there is no need to stop traffic or break up track structure. The article describes the site, the construction of the shuttering and the machinery used for pushing.

Nemeskeri-Kiss, G *Vasut* Vol. 27 No. 11, Nov. 1977, pp 23-24, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Railway Scientific Research Institute, Muzeum 11, Budapest 8, Hungary

00 180260

#### USE OF SYNTHETICS IN TRACK STRUCTURES [Kunststoffe im Eisenbahnbau]

No Abstract. [German]

See also Vol. 29 No. 3, March 1978, pages 122-135.

Keim, D *Eisenbahningenieur* Vol. 29 No. 2, Feb. 1978, pp 60-66, 10 Tab., 31 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzfohallee 33, 61 Darmstadt, West Germany

00 180264

#### RENEWAL OF A FLYOVER STRUCTURE AT THE DB'S NUREMBERG MARSHALLING YARD WITHOUT INTERRUPTION OF TRAIN WORKING [Erneuerung eines Kreuzungsbauwerkes der DB im Rangierbahnhof Nurnberg bei Aufrechterhaltung des Eisenbahnbetriebs]

Owing to age and infirmity, the vaulted bridge carrying the hump and the sorting sidings at Nuremberg marshalling yard, which also spans the approach tracks as well as a local railway line and an approach road, had to be renewed. As proposed by Messrs Held & Francke, it was decided that the replacement should be a single-span bridge. A feature of the procedural method adopted was that all preparatory work--foundations, abutments,

readying of the structure for sliding into place--could proceed at both levels without interfering with railway working, while changing of the bridge equipment including the tracks could be carried out within a possession time of 54 hours (possible only once a year at the Whitsun holiday). In view of the very tight work schedule, the use of explosives was of great advantage both in connection with the foundation work and in demolishing the old structure. Disposal of the excavated material was effected by 250 DB's cars and the necessary loading equipment. [German]

Kraus, A *Eisenbahntechnische Rundschau* Vol. 27 No. 6, June 1978, 6 pp, 13 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

00 180271

#### AN EXAMPLE OF DETERIORATION IN DOLOMITE STONES IN RAILWAY TUNNEL [Un exemple d'alteration des moellons de dolomie dans un tunnel ferroviaire]

Study into the deterioration over a period of time in the lining of the tunnel at Nanteuil, 70 km from Paris on the line between Paris and Strasbourg. Details are given of reactions in the dolomite and alkali reactions that occur when dolomite is in contact with mortar. [French]

Pellerin, M *Tunnels et Ouvrages Souterrains* No. 26, Mar. 1978, pp 58-66, 18 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

00 180283

#### ON THE USE OF CARDED MATERIALS AS FILTERS IN TRACK LAYING [Zur Anwendung von Filtervliesmatten im Gleisbau]

The CFF have for some time now been using layers of carded materials as filters on various line sections. It must however be conceded that this filtering is inadequate. In point of fact, few are the types of carded material now available on the market that can ensure complete filtering. Hence the need to define criteria taking into account both the thickness of the filtering layer and of track stress. Before reliable solutions can be put into application, measurement bases must be devised for the types of soil that may be encountered. [German]

Schmutz, G *Schweizerische Bauzeitung* Vol. 96 No. 20, May 1978, pp 427-428, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Verlag der Akademischen Technischen Vereine, Staffelstrasse 12, Zurich 45, Switzerland

00 180290

#### USE OF DEEP-FREEZING FOR TUNNEL CONSTRUCTION [Anwendung des Gefrierverfahrens beim Bahntunnelbau]

The Olten (Switzerland) railway junction modernisation program involved, among other things, the construction of a 810 m tunnel on a new line section 5,971 m long. The tunnel extremities are located in areas of loose rock, which meant complex problems for the builders to solve. To overcome the difficulties, use was made for the first time in Switzerland of the deep-freeze technique developed in West Germany. [German]

Mayer, CM *Tiefbau* Vol. 20 N 1978, pp 63-67, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Bertelsmann Fachverlag, Friedrichsdorfer Strasse 75, Gutersloh, Westfalen, West Germany

00 180329

#### REVIEW OF GUIDEWAY DESIGN CRITERIA IN EXISTING TRANSIT SYSTEM CODES

This paper is considered a necessary first step in preparing a new transit code. Basic design philosophies and criteria adopted by some of the light rail and heavy rail transit authorities in North America are reviewed and compared. The more familiar highway and railway transportation authorities are included for direct comparison. Relevant design criteria of the British Standards Institute are also included as a reference to European systems.

Dorton, RA (Ontario Ministry of Transportation & Communic, Can);  
Groni, HN *American Concrete Institute, Journal of* Vol. 75 No. 4, Apr. 1978, pp 134-144, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 180331

#### TTC REPLACES VIADUCT BEAMS BY DRILLING HOLES THROUGH ROADWAY ABOVE

The paper reports how the Toronto Transit Commission successfully replaced four 9 t precast concrete beams on the subway under the Bloor Viaduct by drilling holes through the roadway above and lowering and raising the beams by two mobile cranes.

Hancock, N *Engineering and Contract Record* Vol. 91 No. 4, Apr. 1978, pp 44-45

ACKNOWLEDGMENT: EI  
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00 180332

#### WRIGGLE SURVEY FOR HONG KONG METRO

The alternatives that have become available as a result of recent developments in survey methods and instrumentation were investigated. The method used for the metro that uses EDM tacheometry for taking the measurements which are then processed on a minicomputer is described. The initial route length of an underground railroad is 15 km, and the journey time for that distance is expected to be 40 minutes. It includes 26 km of tunnels and 6 km of overhead structures. The nominal diameter of the tunnels is 4.9 m. The advantages of the new method are outlined.

Eales, NJ (Longdin and Browning (Surveys) Limited) *Consulting Engineer* Vol. 42 No. 2, Feb. 1978, pp 29-31, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 180350

#### BEHAVIOR AND TREATMENT OF PEATY SUBSURFACES UNDER EMBANKMENTS

The engineering properties of peat clods, peaty subsurface layers and the topology of peaty ground under embankments have been investigated. From this study a classification system for peat soils was developed and the effectiveness of various methods for stabilization under embankments was examined.

Watanabe, S *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 2, June 1978, pp 58-65, 5 Fig., 2 Tab., 5 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

00 180382

#### SOME ASPECTS OF THE DESIGN OF THE VENTILATION AND DRAUGHT RELIEF REQUIREMENTS FOR THE RAIL TUNNEL UNDER THE ENGLISH CHANNEL

Ventilation design aspects of a long tunnel are discussed. The length of the tunnels was 52km from portal to portal with an undersea section of 34km. The tunnel would carry fast passenger and freight trains between all parts of Great Britain and the rest of Europe.

Hanson, DA (Mott, Hay and Anderson, England); Lowndes, JFL *Building Services Engineer* Vol. 46 No. 2, May 1978, pp 35-40, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 180391

#### LINING AND WATERPROOFING TECHNIQUES IN GERMANY

Since 1967 in the Federal Republic of Germany the improvement of public mass transit has been financially promoted in overcrowded regions and city centers. Without including road tunnels and sewers,--solely in the area of railway transit an enormous volume of tunnel construction work has been carried out. Various technical research and development programs have been combined with this volume of construction work. Whereas in the sixties the tunnels were almost exclusively constructed in open cut because of the, in most cases, rather difficult soil conditions, the underground excavation method has been increasingly used in the seventies. This, of course, is a consequence of technical developments, which have had a considerable effect

on the cost. The article discusses three problem areas and developments that have taken place in them; they include tunnel lining and especially, reinforced concrete lining; joint sealing with special consideration of the waterproofing of concrete segmental lining; tunnelling costs and the most important factors that influence them.

Girnau, G *Tunnels and Tunnelling* Vol. 10 No. 3, Apr. 1978, pp 36-45

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 180392

**RESEARCH AND DEVELOPMENT NEEDS FOR SYSTEMS AND MANAGEMENT IN UNDERGROUND TRANSPORTATION CONSTRUCTION**

Relative to other sectors of the U. S. economy, construction is experiencing a higher rate of inflation, technological stagnation, and a decreasing physical share of the gross national product. This at least in part results from the lack of incentives for and activity in research and development. This paper focuses primarily upon the consequent problems faced in urban transportation construction. At this stage it appears that some of the major obstacles that impact costs, slow productivity and inhibit the implementation of innovations result from: decisions made and policies set during the planning and design phases; and the contractual and organizational structure chosen for project administration. There are also major opportunities for improvements through wider and more effective use by construction contractors of existing methodologies and management techniques that have already proven to be successful.

Paulson, BC, Jr (Stanford University) *Underground Space* Vol. 2 No. 2, Dec. 1977, pp 81-89, 41 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 180727

**LIST OF COMPUTER PROGRAMS FOR COMPUTER-AIDED STRUCTURAL ENGINEERING**

This report contains a list of structural engineering and structures-related computer programs that are available with the U.S. Army Corps of Engineers. The list is arranged by structure-types and contains the computer program name, the author/contract person and office, library (if applicable), program number, computer and mode, information as to whether the program is documented or not, and a short description of the main objective of the program. Twenty-two structure groupings are provided and programs that fall in more than one subject category have been listed in all appropriate categories. (Author)

Radhakrishnan, N Kaufman, D Price, WA May, DB  
Waterways Experiment Station Final Rpt. WES-TR-K-78-1, Feb. 1978, 119 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A052789/5ST

00 181203

**SOIL STABILIZATION**

The book introduces readers to the soil stabilization methods used in road construction, and also to the problems of soil mechanics, which determine the course of further development of these methods. It gives recommendations on the most effective use of the stabilized soils for constructing different types of road surfaces, taking into account climatic and soil conditions. The book may be useful for highway designers and engineers, scientists, and students specializing in the field of soil stabilization.

Bezruk, VM  
Bureau of Reclamation, National Science Foundation TT-70-57767, 1977, 402 pp

Contract NSF-C466

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-280290-T/ST

00 181443

**OCONEE BASIN PILOT STUDY-TRAIL CREEK TEST, AN INVESTIGATION OF CONCEPTS AND METHODS FOR BROADENED SCOPE FLOOD PLAIN INFORMATION STUDIES. PHASE I**

In early 1975 the Hydrologic Engineering Center undertook the task of creating technology which would enable the Corps of Engineers to assist local and regional planning agencies to evaluate alternative future land use patterns from a hydrologic, flood damage and environmental view point. The report describes the technology developed and the data flow which enables an expedient and consistent evaluation of specific site proposals or entire alternative future land use patterns. (Author)

Davis, DW Burnham, MW Webb, RP  
Hydrologic Engineering Center Res Rpt. Sept. 1975, 141 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A054845/3ST

00 181580

**SOIL EROSION CONTROL (A BIBLIOGRAPHY WITH ABSTRACTS)**

Soil erosion sources and control methods are reviewed in these research reports. Abstracts are included of reports relative to beach and highway erosion control and forward area airfield dust control. (This updated bibliography contains 282 abstracts, 28 of which are new entries to the previous edition.)

Habercom, GE, Jr  
National Technical Information Service June 1978, 288 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0641/7ST

00 181601

**SOIL STABILIZATION. VOLUME 2. 1975-JUNE, 1978 (A BIBLIOGRAPHY WITH ABSTRACTS)**

Soil stabilization methods and materials are reviewed in the citations. Pavement bases, beach sands, highway slopes, and foundation stabilization are investigated. (This updated bibliography contains 162 abstracts, 45 of which are new entries to the previous edition.)

Habercom, GE, Jr  
National Technical Information Service July 1978, 168 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0724/1ST

00 181949

**SIMULATION OF BRIDGE COLLISION INCIDENTS INVOLVING INLAND WATERWAY TOWS: PROGRAM USERS DOCUMENTATION**

A mathematical model has been formulated to simulate the motion of a river barge flotilla maneuvering in an inland waterway. The mathematical model includes the inertial and hydrodynamic forces due to the motion of the flotilla through the water, as well as applied forces due to rudder and propeller action, wind and current effects. The layout of virtually any river channel boundaries, along with arbitrary wind and current speed and direction (including cross currents, non-uniform currents and eddys) can be easily described in the model coordinate system. In the present formulation, bank suction and shallow water effects are neglected. The mathematical model has been implemented in a FORTRAN computer program. The program is written to run in a conversational mode, periodically displaying the present status of the simulation to the user, and prompting for input of updated rudder and speed commands. The program has been structured to permit different tow characteristics and steering strategies to be evaluated with a minimum of difficulty. A sample program input deck and output listing are shown. This volume includes a program listing. (Author)

Companion report to Report No. HMC-7764 dated May 1978.

Petrie, GL  
Hoffman Maritime Consultants Incorporated Final Rpt. HMC-7764C, USCG-D-49-78, June 1978, 61 p.

Contract DOT-CG-72402-A

ACKNOWLEDGMENT: NTIS



ORDER FROM: NTIS

AD-A058321/1ST

00 182560

**DRAINAGE OF GROUND WITH CAVITIES LEFT FROM MINE WORKINGS NEAR THE SURFACE IN THE COURSE OF CONSTRUCTION OF THE DORTMUND S-BAHN****[Baugrunderneuerung bei oberflächennahem Bergbau im Zuge des Stadtbahnbaues in Dortmund]**

Drainage work on ground with cavities, carried out during construction of Line 1 of the urban railway has been successful so far, in spite of the presence of partially filled in underground mine workings on deposits lying close to the surface. Details are given on buildings, construction methods, planning, invitation to tender and the execution and evaluation of drainage work. [German]

Dittrich, RR *Nahverkehrspraxis* Vol. 26 No. 4, 1978, pp 126-138, 6 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Arnold Verlag, Siegburg Strasse #5, 4600 Dortmund, West Germany

00 182567

**USE OF POLYMERS IN RAILWAY TRACK FORMATION, PERMANENT WAY AND STRUCTURES [Polymerwerkstoffe im Eisenbahnerbau,-unterbau und in Kunstbauten]**

Among the materials used for the construction of parts forming the railway track bed and permanent way, as well as bridges and tunnels, polymers are becoming increasingly popular when they offer technical and economic advantages. The development of their use has not however been the same on all railways. From the answers to a questionnaire, a UIC working party has obtained a general picture of the use of polymers by 16 UIC member railways. The analysis of the 60 cases when polymers have been adopted has been published in the form of a UIC leaflet. [German]

Tresnak, Z *Schiene der Welt* Vol. 9 No. 6, June 1978, pp 392-396

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

00 182568

**EFFECTIVE METHOD FOR COMBATTING SAND BUILD-UP ON THE RAILWAYS [Effektivnyj sposob bor'by s pescanymi zanosami]**

The article describes the use of heavy fuel as a way of preventing sand build-up. [Russian]

Mirahmedov, M Fazilov, TI *Transportnoye Stroitel'stvo* No. 5, May 1978, pp 6-7, 3 Tab., 1 Phot., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Mezhdunarodnaya Kniga, Smolenskaya Sennaya Pl 32/34, Moscow G-200, USSR

00 182574

**INVESTIGATION OF SNOW CONTROL SYSTEMS ON AN AVALANCHE SLOPE**

A system of snow-deflecting fences for avalanche control, has been constructed for the first time in the USSR in 1971 on one of the avalanche slopes in Southern Sakhalin and has proved to be very effective. Despite the fact the snowfalls and blowing snow occur on Sakhalin almost frequently at temperatures from -10 to -2 degree C and the snow is wet, cornices have ceased to form at snow-deflecting fences and in some cases the slope remained bare throughout the winter below them. The operation of snow-deflecting fences and snow control systems on mountain slopes has been investigated by the Scientific Research Institute of Railroad Transportation since 1969. Systems for regulating snow deposition have been installed along railroads in several avalanche areas of Southern Sakhalin in 1971-1972 with allowance for the results of simulation in wind tunnels and of anemometer surveys. The method and some results of investigations are reported here.

Isayenko, EP Vasil'yev, AB *Soviet Hydrology: Selected Papers* Vol. 15 No. 3, 1976, pp 218-225, 10 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 182579

**PREDICTING FATIGUE LIFE AND TECHNICAL AND ECONOMIC EFFICACY OF RAILROAD BRIDGE STRUCTURES OF HIGH-STRENGTH STEEL [Prognozirovanie ustalostnogo resursa i tekhniko-ekonomicheskoi effektivnosti konstruktssii zheleznodorozhnykh mostov iz vysokoprochnoi stali]**

An engineering method of predicting fatigue life of projected metallic span structures of railroad bridges made of modern high-strength materials is proposed. An analytical solution of the problem takes into account the unsteady process of loading of span structures by rolling loads, as well as the results of a generalization of the data of fatigue tests of structural elements from a probabilistic-statistical point of view. The method is illustrated by examples. It is shown that, in comparing the technical and economic efficacy of metallic span structures, their costs of construction are of decisive importance. [Russian]

Novozhilova, NI (Institute of Railroad Transport Engr, USSR) *Problemy Prochnosti* No. 1, Jan. 1978, pp 45-50, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 182605

**OPTIMIZATION OF ELASTIC RAIL FOUNDATIONS**

Efforts must be made to obtain the same elastic track properties in all permanent way constructions, a task to be accomplished by the rubber cushion in ballast-free bridges. Studies aimed at optimizing the cushion profile were made by means of photoelasticity. Variations of the shape factor and hardness of the cushion are intended to bring an optimum fixation of the shape of cushion. [German]

Bussert, R Bothe, G *DET Eisenbahntechnik* Vol. 26 No. 5, May 1978, pp 199-201

ACKNOWLEDGMENT: British Railways  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

00 182630

**MODERN MEASURING AND DRAWING OF CLEARANCE PROFILES**

There are many methods for measuring and drawing clearance profiles. These are in two groups, which are mechanical methods and photographic methods. Examples of application on the DB and SJ are given. A new method has been developed by the DB and its principles are explained. The pros and cons of the two methods are summarised and the conclusion reached that all methods represent a compromise between technical possibilities and operating requirements.

Siems, E *Rail International* No. 6, June 1978, pp 397-406, 7 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

00 182777

**BEHAVIOUR OF TUNNELS IN SOFT GROUND**

This report covers work completed during the period October 1976 to September 1977 under a research contract between the Transport and Road Research Laboratory and the Cambridge University Engineering Department for investigations into the behaviour of tunnels and tunnel linings in soft ground. The work carried out on the development of finite element techniques is covered in detail in a supplementary report by Gunn, MJ which should be read in conjunction with this one. A brief description of the experimental and theoretical work undertaken is given. The work described is primarily concerned with the effects during tunnel construction and therefore deformations and stability of unlined tunnels under undrained conditions were being studied. Some of the other experimental work described deals with: model tunnel headings in clay; behaviour of model tunnels in soft clay; centrifugal model tests and a comparison is made of behaviour of model tunnels under surface and gravity loading. /TRRL/

Mair, RJ  
Cambridge University, England Monograph Sept. 1977, 21 pp, 20 Fig., 15 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231066)  
ORDER FROM: Cambridge University, England, Department of Engineering, Trumpington Street, Cambridge CB2 1PZ, England

00 182833

**MISSOURI RIVER BRIDGE GETS EPOXY-BONDED  
PRESTRESSED SLAB DECK**

Alterations to approaches, one 2000 feet long, avoid need for even more extensive repairs and also give increased lateral rigidity and improved riding characteristics.

Haven, P *Railway Track and Structures* Vol. 74 No. 9, Sept. 1978, pp 40-42, 4 Phot.

ORDER FROM: ESL

DOTL JC

00 182837

**FIRST RAIL BRIDGE IS STABILISED BY RESIN GROUT  
SYSTEM**

Details are given of the restoration work being carried out on what is possibly the oldest railway bridge in the world, the Causey arch at Tarfield near Stanley, County Durham. The contractor, Balfour Beatty, is stabilising the underside of the single 32 m-span sandstone arch using the balvac resin-grouting process. The bridge was originally built to link 2 collieries but is now being restored so it can become the centrepiece of a new country park. The main object of the restoration is to prevent further spalling of the stonework, which would endanger people in the vicinity.

Burr, N *New Civil Engineer* No. 281, Feb. 1978, pp 18-19, 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-232998)

ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England

00 182840

**EUROPE'S FIRST CABLE-STAYED RAILWAY BRIDGE**

A brief description is given of a bridge under construction to carry a railway over the M25 motorway between Virginia Water and Chertsey. The whole structure, including abutments, is of concrete construction with two continuous 55 M skew spans comprised of solid pre-stressed concrete edge beams with a reinforced concrete deck. The stay cables supporting the deck are anchored to two towers, rising 26 M above the track, which are directly above the mid-support piers. The construction methods are outlined.

*Surveyor - Public Authority Technology* Vol. 4484 No. 151, May 1978, p 14, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-233435)

ORDER FROM: IPC Building and Contract Journals, Limited, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ, England

00 182841

**REPAIR OF THE CENTOVALLI RAILWAY TUNNEL**

[Instandstellung der Centovalli-Bahntunnel]

Between 1969 and 1974, ten tunnels on the Swiss section of the Locarno-Domodossola railway were repaired using shotcrete. The report includes an introduction (containing details of the significance, construction, setting out, operation and repair of railway lines) and chapters on geology and geotechnics (with comments on the causes of the damage), the condition before the repairs (description of the types of damage), the operation, the results of the repair measures and the cost. The section dealing with the operation includes details of the plant and materials used to carry out the work, the personnel required and the time involved. The use of shotcrete had the effect of consolidating masonry and rock, sealing the masonry, correcting the tunnel profile and reinforcing the tunnel lining. [German]

Golta, A Teichert, P *Schweizerische Bauzeitung* Vol. 94 No. 17, Apr. 1976, pp 209-214, 3 Fig., 1 Tab., 9 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-306794), Federal Institute of Road Research, West Germany, Association of Swiss Road Specialists

ORDER FROM: Verlag der Akademischen Technischen Vereine, Postfach 630, 8021 Zurich, Switzerland

00 182843

**THREE RAILWAY BRIDGES IN PRESTRESSED CONCRETE**

[Tres puentes de ferrocarril de hormigon pretensado]

The characteristics of three prestressed concrete railway bridges are described. Firstly the conclusions relating to the design of railway bridges are mentioned, and the three bridges in question are reviewed. A railway bridge differs from a road bridge in two fundamental points: (a) the live load is much greater; (b) such live load is fixed in a given direction, whereas in

the case of a road bridge the load can be distributed in any manner. In the calculation of a railway bridge, it is essential to take account of the following: (1) the best adapted section is the double "T"; (2) the presence of the railway influences the morphology of the bridge; (3) the permanence of the live load on a line facilitates the distribution of the materials in a transverse section in order to accommodate it; (4) these bridges are not as slender as road bridges; (5) the increase of live load constitutes an advantage during construction. Three bridges constructed at Gerona are discussed, on the Guadalimar river, and the Villaverde-Vicalvara viaduct, across the Manzanares in Madrid. The construction methods of the bridge over the Guadalimar for the Linares-Almeria line and the bridge characteristics are emphasized: (A) launching; (b) construction area; (C) thrust rams; (D) neoprene-teslon launching slides. Paper presented to the symposium on prestressed concrete railway bridges at the Eduardo Torroja Institute, Madrid, May 1975. [Spanish]

Manterola, J Fernandez, L *Hormigon y Acero* No. 118, Jan. 1976, pp 41-52, 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-106001), Central Laboratory of Bridges &amp; Highways, France, Ministry of Public Works, Spain

ORDER FROM: Instituto Eduardo Torroja, Costillares, Chamartin, Madrid 33, Spain

00 182844

**APPLICATION OF PREFLEX BEAMS TO RAILWAY BRIDGES**

[Aplicacion de las vigas preflex a los puentes de ferrocarril]

Among the possible designs for railway bridge, a special type of mixed prestressed beam, already well known and called preflex, is being increasingly used. Its basic principle and fabrication are briefly discussed, and the advantages presented by its utilisation for railway bridges is stressed. Such advantages are of two types; operation and construction. The former concerns the internal stress introduced into the beam during the fabrication process. The advantages with respect to the latter are numerous: the beams are light and easy to handle, their large bearing capacity increases the scope of this type of bridge, construction time is reduced, maintenance is facilitated, and finally noise is reduced as compared to steel bridges. Paper presented to the symposium on prestressed concrete railway bridges at the Eduardo Torroja Institute, Madrid, May 1975. [Spanish]

Alvarez, C *Hormigon y Acero* No. 118, Jan. 1976, pp 59-70, 9 Fig., 9 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-106003), Central Laboratory of Bridges &amp; Highways, France, Ministry of Public Works, Spain

ORDER FROM: Instituto Eduardo Torroja, Costillares, Chamartin, Madrid 33, Spain

00 182849

**BORRODALE ARCH-80-YEAR-OLD ENGINEERING WONDER**

The 127 ft 6 inch long mass concrete railway bridge over the Borrodale Burn is described. It was the longest in the world of its type when constructed in 1898. Rock excavated from the nearby tunnel and cuttings was used in the construction. Further economies on shoring were achieved by a method designed by its builder, Robert McAlpine, using concrete to act compositely with the shuttering. The segmental arch has a rise of 23 ft, stands 86 ft high and springs from the solid rock on each side. Only lightweight centering was possible, the first layer was only 3 inches thick. After this had set a further 6 inch layer was placed to be followed by a 9 inch layer and successive 1 ft layers to form the final 4 ft 6 inch thickness. The concrete proved to be perfectly homogeneous. No joints were made for expansion or contraction. The arch has shown no signs of movement and is without a crack.

Barfoot, RJ *Concrete* Vol. 12 No. 3, Mar. 1978, pp 22-23, 1 Fig., 6 Phot., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233543)

ORDER FROM: ESL

DOTL JC

00 182850

**STUDY OF METHODS OF IMPROVING THE STABILITY OF  
RAILWAY SUBGRADE [Issledovanie sposobov povysheniya  
stabil'nosti zemlyanogo polotna]**

This collection of work undertaken at the Federal Research Institute for Railway Research in the USSR, comprises 13 articles dealing with the following points: study of dynamic forces acting on soil embankments, study of hydro-thermal regimes in the case of soil swelling due to frost, application of geophysical prospecting. [Russian]

Zolotarskij, AF Titov, VP *Trudy TsNIIMPS* Monograph No. 565, 1976, 184 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-106278), Central Laboratory of Bridges & Highways, France

ORDER FROM: Kamkin Bookstore, 12224 Parklawn Drive, Rockville, Maryland, 20852

00 182852

#### BR LEAD WITH CABLE STAYED BRIDGE

An account is given of the building of a new bridge at Lyne in Surrey to take existing railway lines over the M25. Factors leading to the choice of a cable stayed bridge on spread footings are discussed and include restrictions on depth of superstructure, a span of 110 M and minimal disruption to rail traffic. Brief construction details are given of the foundations, abutments, bridge deck, edge beams towers and cable stays. Two towers are central to the bridge and each has anchorages for eight cable stays, placed at two levels. Post tensioning of the edge beams and cable stays is by the BBRV system.

Heywood, P *Contract Journal* Vol. 283 No. 5150, May 1978, pp 34-35, 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-233673)

ORDER FROM: IPC Building and Contract Journals, Limited, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ, England

00 183290

#### ROADBED STABILIZATION UTILIZING SUBSURFACE SOILS EXPLORATION

Attempts at stabilizing track structures by the various available means should be preceded by a thorough surface and subsurface investigation. Not only should soils and moisture content be determined in the field, but laboratory tests should show if the foundation can be chemically stabilized. All results should be combined in an engineering report which will give sufficient information for a railroad to determine how it can bring a distressed track section up to standards.

Proceedings of the 89th Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 26-28, 1977 in Chicago, Illinois.

Perdue, GW (Rone Engineers, Incorporated)

Roadmasters' & Maintenance of Way Assn of America Proceeding 1977, pp 60-69, 19 Phot.

ACKNOWLEDGMENT: Roadmasters' & Maintenance of Way Assn of America  
ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 183294

#### THE RESTORATION OF THE CISCO BRIDGE

The track structure across the open-deck steel arch bridge of Canadian National in British Columbia had been disturbed prior to installation of welded rail. After a passing train derailed when it spread the rails, the wooden deck took fire and heavily damaged the steel structure. Clearing of the wreckage, design and contracting of replacement spans and the on-site work are described. The 812-ft structure was returned to service in 41 days.

Proceedings of the 77th Annual Technical Conference, AREA, Palmer House, Chicago, Illinois, March 20-22, 1978.

Morris, LR (Canadian National Railways, Mountain Region)

American Railway Engineering Association Proceeding Vol. 79 Bulletin 668, June 1978, pp 325-340, 14 Phot.

ACKNOWLEDGMENT: AREA

ORDER FROM: ESL

DOTL JC

00 183299

#### REPLACING OR MAKING HEAVY REPAIRS TO BRIDGES HAVING CONTINUOUS WELDED RAIL

This committee report discusses the laying of continuous welded rail on bridges and methods for replacing ties and stringers, of repairing water-proofing of ballast deck bridges and of restoring top flanges of steel bridges.

Proceedings of the 82nd Annual Conference of the American Railway Bridge & Building Association, Chicago, Illinois, September 26-28, 1977.

American Railway Bridge & Building Association Proceeding Volume 82, 1977, pp 39-41

ACKNOWLEDGMENT: American Railway Bridge & Building Association  
ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 183300

#### EFFECT OF UNIT TRAIN OPERATION ON BRIDGES

This committee report includes a survey of 21 railroads which operate unit trains with the major problems being concerned with timber trestles. The movement of rail on such flexible structures is a major concern with much attention being given to rail anchoring. Longitudinal bracing is strengthened and blocks placed between all ties.

Proceedings of the 82nd Annual Conference of the American Railway Bridge & Building Association, Chicago, Illinois, September, 26-28, 1977.

American Railway Bridge & Building Association Proceeding Volume 82, 1977, pp 42-46

ACKNOWLEDGMENT: American Railway Bridge & Building Association  
ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 183302

#### SYMPOSIUM ON FIRE RETARDATION FOR BRIDGE DECKS

Fireproofing divides into two categories--in-place coating of existing timbers and impregnation of new timber during the treating process. This symposium includes the following: Pressure Impregnation of Fire Retardant Materials by W.T. Henry; Applications of Fire Retardant Treated Wood by H.J. Mader; Coating Open-Deck Bridges for Prevention of Fire by J.B. Ledingham; Field Application of Fire Retardant Materials by K.J. Norton.

Proceedings of the 82nd Annual Conference of the American Railway Bridge & Building Association, Chicago, Illinois, September 26-28, 1977.

Hyma, WR Henry, WT Mader, H Ledingham, JB (Ocean Coatings Limited, Vancouver, Canada); Norton, KJ (Osmostone Company)  
American Railway Bridge & Building Association Proceeding Volume 82, 1977, pp 84-94

ACKNOWLEDGMENT: American Railway Bridge & Building Association  
ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 183303

#### MOPAC CONCRETE PRODUCTS YARD

The major function of the Missouri Pacific's manufacturing facility is production of components for standardized concrete trestles but other concrete products such as backwalls and ballast retainers are also produced. Prestressed concrete piling and girders are manufactured on production lines using ready-mix concrete.

Proceedings of the 82nd Annual Conference of the American Railway Bridge & Building Association, Chicago, Illinois, September 26-28, 1977.

Chambers, JW (Missouri Pacific Railroad)

American Railway Bridge & Building Association Proceeding Volume 82, 1977, pp 104-108

ACKNOWLEDGMENT: American Railway Bridge & Building Association  
ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 183304

#### DESIGN AND PRODUCTION OF PRE-STRESSED CONCRETE GIRDERS

The design and manufacture of the new T-section prestressed concrete bridge girder for Missouri Pacific's standardized trestles is described. The prestressed girder is more economical than previous MP designs. It is produced in standard lengths; increased demand is expected as aging timber trestles used by today's trains must be replaced.

Proceedings of the 82nd Annual Conference of the American Railway Bridge & Building Association, Chicago, Illinois, September 26-28, 1977.

Thielemier, RL (Missouri Pacific Railroad)

American Railway Bridge & Building Association Proceeding Volume 82, 1977, pp 109-112

ACKNOWLEDGMENT: American Railway Bridge & Building Association  
ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

00 183316

**PLACING CONCRETE IN TUNNELS**

The article discusses the factors which determine the method of transportation and placement of concrete in tunnels. Such factors to be considered include section length, type of tunnel excavation method (i.e. Blasting or machine driven) and whether a dry or wet mix is required. In small section tunnels of up to 12 sq M in section, where it is impossible to mix concrete inside the tunnel section, special transit rail wagons (concrete remixers) are used. The same equipment and methods can be used in medium tunnels of up to 25 sq M section. In large tunnels of up to 100 sq M section a concrete mixer can be installed inside the tunnel. The mixer can then be filled by silo rail wagons fitted with a conveyor running the length of the train for discharge straight into the mixer. A development in concrete placing equipment is the lorry-mounted concrete placing boom manufactured by Schwing. Suitable for all tunnels of various diameters the equipment can be unfolded in a limited space and withdrawn horizontally from the shutter. Using this equipment concrete can be placed from inside the shuttering, through ports or from outside. /TRRL/

Muehlhaeuser, HP (Kh Muehlhaeuser Limited) *Civil Engineering* Nov. 1977, pp 41-43, 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-233936)

ORDER FROM: ESL

DOTL JC

00 183319

**USING FABRICS TO THE FULL. THE USE OF POLYMERIC FABRICS IN CIVIL ENGINEERING**

The article examines the development of impermeable and permeable fabric materials for a range of applications in civil engineering. For linings of reservoirs and canals the chemical resistance of butyl rubber or polyolefin materials offers a cost-benefit advantage over polyethylene and pvc materials which, although cheaper, need protection against abrasion, ultraviolet light and ozone to avoid degradation. In reinforced earth applications polyethylene tapes anchored to butyl rubber form the body of the structure while glass-fibre panelling is attached to the irregular face of the reinforced earth. The most common use for permeable fabric is for interceptor or cut-off drains set vertically in a slit trench. The introduction of permeable fabrics into road construction, for temporary as well as permanent constructions, offers instant stability for soft subgrade materials. /TRRL/

*Civil Engineering* Dec. 1977, pp 59-65, 2 Fig., 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-234722)

ORDER FROM: ESL

DOTL JC

00 183328

**BULLETIN OF THE INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY, NUMBER 16 DECEMBER 1977: SYMPOSIUM--LANDSLIDES AND OTHER MASS MOVEMENTS, 1977**

Proceedings of this symposium contain 70 papers and reports which center around the general theme of landslides and other ground movements. 24 papers are indexed separately. Specific subjects covered include: tentative correlation between rainfall and landslides in a humid tropical environment; processes of colluvial slope development at McMechen, West Virginia; an empirical method for the evaluation of relative landslide risk; the systematic evaluation of landslide incidence and susceptibility in the United States.

Symposium held in Prague, Czechoslovakia, September 15-16, 1977.

*Bulletin of the Intl Assn of Engineering Geology* No. 16, 1977, 256 pp

ACKNOWLEDGMENT: EI

ORDER FROM: International Association of Engineering Geology, De-Greif-Strasse 195, Postfach 1080, D415 Krefeld 1, West Germany

00 183329

**BEHAVIOR OF THE VEGETATION IN SLOPE STABILITY: A CRITICAL REVIEW**

The role of vegetation in ensuring slope stability is discussed based on the authors' personal experience and the rather scarce bibliography dealing with the subject. Mechanical aspects of the vegetation of slopes, as well as those related to the hydrologic balance are analyzed, and a multi-disciplinary approach is recommended to provide additional knowledge on the subject. A method is suggested for studying the effects of forests on the stability of slopes.

Symposium held in Prague, Czechoslovakia, September 15-16, 1977.

Prandini, L Guidicini, G Bottura, JA Poncano, WL Santos, AR  
*Bulletin of the Intl Assn of Engineering Geology* No. 16, 1977, pp 51-55, 14 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: International Association of Engineering Geology, De-Greif-Strasse 195, Postfach 1080, D415 Krefeld 1, West Germany

00 183330

**HORIZONTAL DRAINAGE BORINGS AND CAST-IN-SITU PILE WALLS AS STABILIZATION TREATMENTS OF LANDSLIDES IN SEDIMENTARY ROCKS**

The details and the effectiveness of the stabilization of landslides by means of horizontal drainage boreholes and the cast-in-situ pile walls are analyzed. The study is based on the experience gained by treating 70 landslides having different geologic characteristics in Czechoslovakia. The mechanism of the landslide and the degree of its development are identified as the main problems.

Flimmel, I (Geoindustria, Czechoslovakia) *Bulletin of the Intl Assn of Engineering Geology* No. 16, 1977, pp 168-170

ACKNOWLEDGMENT: EI

ORDER FROM: International Association of Engineering Geology, De-Greif-Strasse 195, Postfach 1080, D415 Krefeld 1, West Germany

00 183331

**CONSTRUCTION AND ANALYSIS OF A FABRIC REINFORCED LOW EMBANKMENT**

This paper describes a field test of fabric reinforced roads across muskeg and presents the results of a finite element analysis of the test section. The fabric used was a nonwoven, needle-punched, spunbonded polypropylene (Fibretext) of 420 g/m<sup>2</sup> weight. This fabric has a tensile strength of 800 to 900 lb/ft for 100 to 200 percent elongation.

Int Conference on the Use of Fabrics in Geotech, Paper and Discussion, Paris, France, April 20-22, 1977.

Bell, JR (Oregon State University); Greenway, DR Vischer, W  
Assoc Amicale Ing Anc Eleves de l'Ec Natl de PC Volume 1, 1977, pp 71-75, 2 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Assoc Amicale Ing Anc Eleves de l'Ec Natl de PC, 28 rue des Saints-Peres, 75007 Paris, France

00 183332

**INFLUENCES OF NON-WOVEN FABRIC INCLUSIONS ON THE STRESS STRAIN BEHAVIOR OF A SOIL MASS**

A study of the influence of various types of inclusions in soil systems was given to the behavior of soil systems incorporating fabrics and in particular ICI fibers melt-bonded TERRAM membranes. These investigations have considered firstly, the stress-strain behavior of a unit cell of sand when tested under plane strain conditions, with and without a fabric membrane inclusion; secondly, the plane strain load-deformation behavior of a model footing resting on dense and loose sand and dense sand over loose sand or soft compressible rubber, chosen to replicate clay.

Int Conference on the Use of Fabrics in Geotech, Paper and Discussion, Paris, France, April 20-22, 1977.

McGown, A (Strathclyde University, Scotland); Andrawes, KZ  
Assoc Amicale Ing Anc Eleves de l'Ec Natl de PC Volume 1, 1977, pp 161-166, 9 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Assoc Amicale Ing Anc Eleves de l'Ec Natl de PC, 28 rue des Saints-Peres, 75007 Paris, France

00 183333

**EFFICIENT NUMERICAL TECHNIQUE FOR ONE-DIMENSIONAL THERMAL PROBLEMS WITH PHASE CHANGE**

A new numerical scheme for one-dimensional heat flow problems with phase change is presented. The technique, which continuously monitors the progression of the phase interface, is unusual for the high accuracy achieved without sacrifice to computing efficiency. These data are needed by designers of roadways in cold climates for calculating the depth of frost or thaw penetration.

Goodrich, LE (National Research Council of Canada) *International Journal of Heat and Mass Transfer* Vol. 21 No. 5, May 1978, pp 615-621,

17 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 183334

**PROCEEDINGS OF THE WESTERN SNOW CONFERENCE,  
45TH, 1977**

15 papers by various authors were presented at this snow conference. The papers covered the following areas: snow avalanches and slides--warning programs, zoning, acoustic emissions investigation; weather modification; stream flow predictions, value of water supply forecasts to irrigated agriculture; microwave and remote sensing used for snow monitoring; and application of aerial and satellite snow mapping techniques. Selected papers were abstracted separately.

Direct requests to Mr Robert P. Davis, Secretary, Soil Conservation Service. Proceedings of the 45th Annual Meeting of the Western Snow Conference, Albuquerque, New Mexico, April 18-21, 1977.

Washichek, JN

Western Snow Conference Proceeding 1977, 114 pp

ACKNOWLEDGMENT: EI

ORDER FROM: Western Snow Conference, Soil Conservation Service, U.S. Courthouse, Room 360, Spokane, Washington, 99201

00 183335

**ACOUSTIC EMISSIONS IN THE INVESTIGATION OF  
AVALANCHES**

Over the past several years we have been investigating the role of acoustic emissions in the deformation and failure of snow. Our investigations began in the laboratory by studying the acoustical activity associated with snow subjected to various states of stress. With the experience and knowledge gained from our laboratory work, the authors have been able to apply acoustical emission techniques in the field to investigate the stability of avalanche prone snow slopes. For the purpose of this paper we will describe in general terms the methods and equipment used in our investigation and some of the results we have obtained to date. Although we are working with snow, many of the processes involved in the failure of snow slopes should relate directly to the failure of soil and rock slopes.

Direct requests to Mr. Robert P. Davis, Secretary, Soil Conservation Service. Proceedings of the 45th Annual Meeting of the Western Snow Conference, Albuquerque, New Mexico, April 18-21, 1977.

Bowles, D (Montana State University; Bozeman); St. Lawrence, W  
Western Snow Conference Proceeding 1977, pp 88-89, 4 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Western Snow Conference, Soil Conservation Service, U.S. Courthouse, Room 360, Spokane, Washington, 99201

00 183336

**OVERVIEW OF MECHANICAL TUNNELING MACHINES AND  
TECHNIQUES FOR SOFT GROUND**

This paper covers the construction of tunnels by mechanical excavators in soft ground and includes equipment such as shields and excavators and major subsystems, including excavation ground support, and materials handling. The paper is intended as an introduction to the subject for persons not specifically associated with soft-ground tunneling. Only the most common tunneling methods are described.

For Meeting held April 10-12, 1978.

Morrell, RJ (Bureau of Mines)

Society of Automotive Engineers Preprint n 780480, 1978, 17 pp

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

00 183338

**RETAINING WALLS: TAKING IT FROM THE TOP**

Fully anchored curtain walls have been used increasingly to retain slopes in Brazil where topographic, climatic, and geologic conditions are extremely favorable to landsliding and mass wasting. The wall consists of a thin slab of reinforced concrete tied-back into the hillside with earth or rock anchors. Anchored curtain walls provide high retention capacity and can be anchored at as many points as desirable. The method has been used successfully to construct walls over 25-m high. In Brazil, these walls are constructed from the top downward, so the slope can be cut and continuously retained. For foundation excavations, shoring and bracing are not required and the excavation remains free of obstructions.

Hunt, RE (Tecnosolo, Rio de Janeiro, Brazil); da Costa Nunes, AJ *ASCE Civil Engineering* Vol. 48 No. 5, May 1978, pp 73-75

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

00 183339

**CONTROLLING TUNNEL-LINING COSTS--TIPS FOR OWNERS  
AND DESIGNERS**

This article discusses the special characteristics of tunnel design and suggests how a tunnel design program can be implemented. It gives emphasis to those aspects of design that may lead to significant cost savings and to the avoidance of "unanticipated" extra cost during construction.

Brierley, GS (Haley and Aldrich, Incorporated) *ASCE Civil Engineering* Vol. 48 No. 7, July 1978, pp 51-53, 3 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

00 183341

**MOTION OF SNOW AVALANCHES IN THE CONDITIONS OF  
LIMITING FRICTION**

The equations of motion of large snow avalanches are investigated, taking into account the fact that the dry friction can reach a critical value above which the snow in the avalanche or the underlying material cannot sustain the friction. Asymptotic solutions are found for long times after the part of the snow moves in the conditions of limiting friction over a tilted plane with a uniform layer of snow. The equations which are used to find these asymptotic solutions have the property that for certain depths the flow velocity of small perturbations decreases with increasing depth. In particular, on relatively gentle slopes two zones are formed in the avalanche: the forward part, with a large velocity and thickness of the moving layer, and the rear part, which is significantly slower and thinner. The two parts are separated by a narrow region characterized by a sharp decline in velocity and thickness of the moving layer.

Danilova, EM Eglit, ME *Fluid Dynamics* Vol. 12 No. 5, Sept. 1977, pp 666-672

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

00 183342

**GROUND SUPPORTS FOR TUNNELS IN WEAK ROCKS**

The various factors and how they influence the loading and deformation of supports needed in deep tunnels in weak rocks are presented. These are the rock and water conditions and their response to excavation, the excavation and support timings and procedures, and the support details and their workmanship. Particular attention is drawn to the need to consider the truly three-dimensional influence of rock discontinuities on excavation collapse mechanisms with the aid of models and field observation as a guide to support and safety requirements; to consider during construction the positioning and timing of support placement in relation to the rate of advance of the face (another three dimensional effect); to allow a degree of rock yielding by means of yielding supports on the basis of concepts developed from simple yielding rock/support interaction theory combined with construction monitoring; and to consider quantitatively the real load-deformation properties of the structural supports and their interface with the rock. The effects of these variables are illustrated by observations from tunnel projects in hilly and high mountain areas.

Ward, WH (Building Research Establishment) *Geotechnique* Vol. 28 No. 2, June 1978, pp 135-171, 32 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

00 183565

**APPLICATIONS OF THE PRE-STRESSING ON THE BRIDGES  
OF THE BELGIAN RAILROADS [Les applications de la  
precontrainte aux ouvrages d'art des chemins de fer belges]**

The author accentuates particularly the efforts which were made by the Belgian Railways in the matter of standardization of the road-and railbridges with pre-fabricated and pre-stressed concrete beams and with preflexed steel beams encased with concrete. [French]

Winand, A (Brussels University, Belgium) *Annales des Travaux Publics de Belgique* No. 1-2, 1978, pp 27-31

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 183566

**CABLE-STAYED RAILROAD BRIDGE OVER THE SAVA RIVER IN BELGRADE [Eisenbahnschraegseilbruecke ueber die Save in Belgrad]**

A description is given of the design and construction of a new double track cable-stayed railroad bridge consisting of two box beams with two pylons on each side of the main opening. In this case each pylon is inserted in the corresponding box beam and serves to take up four anchor cables. The two cables coming down on the river side give the required elastic support to the box beam, while the cables on the land side serve as back-anchoring. In addition, the bridge is ballasted to increase the ratio between the bridge's own weight and the train weight. [German]

Hajdin, N Jevtovic, LJ *Stahlbau* Vol. 74 No. 4, Apr. 1978, pp 97-106, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

00 183584

**USE OF LARGE-DIAMETER PILES DRIVEN THROUGH COMPACT CLAY ON THE ROME-FLORENCE "DIRETTISSIMA." PROJECTS AND BEHAVIOR [Pali trivellati di grande diametro in argille compatte per la costruzione della direttissima Roma-Firenze. Progettazione e comportamento]**  
No Abstract. [Italian]

Cicognani, M *Ingegneria Ferroviaria* Vol. 31 No. 4, Apr. 1978, pp 356-364, 18 Phot., 12 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

00 183586

**OUTLINE OF TUNNELS; MEASURES AGAINST DEFORMATION OF TUNNELS; MAINTENANCE OF TUNNELS**  
No Abstract.

Shirai, K *Permanent Way* Vol. 20 No. 74, June 1978, 22 pp, 1 Fig., 4 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Japan Railway Civil Engineering Association, 1-18-7 Higashiueno, Taito-ku, Tokyo 110, Japan

DOTL JC

00 183587

**TOPOGRAPHICAL AND GEOLOGICAL CLASSIFICATIONS OF WATER SEEPAGE IN TUNNELS**  
No Abstract.

Ishii, M Sakuma, F *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 32-33, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo 110, Japan

DOTL JC

00 183588

**PRIMARY STUDY FOR NECESSARY WIDTH OF ICICLE PREVENTION WORK BY ADIABATIC TREATMENT OF TUNNEL SURFACE**

In the past, ice forming in tunnels was removed manually. A new method has been developed in which the heat insulating material is sprayed directly or indirectly on the surface of the lining, and by reducing the release of geothermal heat as far as possible, the lining is kept warm. Some useful data has already been obtained although the tests have not yet been completed.

Okada, K *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, 31 pp, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo 110, Japan

00 183590

**COMPUTER CALCULATIONS OF TRACK MEASUREMENTS [Berechnungen der Oberbau-Vermessung mit EDV]**

An EDP "data sequence" program has been developed to provide the optimum solutions for line layout in OBB stations. [German]

Holzinger, R *OBB-Journal* No. 2, 1978, pp 6-9, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Austrian Federal Railways, Elisabethstrasse 9, 1010 Vienna, Austria

DOTL JC

00 183591

**A STANDARD HP 9830 PROGRAM TO CALCULATE RAILWAY LINE STAKING MEASUREMENTS [Ein HP 9830-Standardprogramm zur Berechnung von Absteckmassen fuer vermarktete Gleise]**

Description of a standard Basic program for the HP 9830 B computer console. The program is designed for calculation of line staking measurements. The formulae chosen for line layout the track deformation calculations require only a small number of positions in the memory. After all of the input data has been entered and the points of intersection at the ends of the chords have been calculated, it is possible to proceed with deflection calculations without any manual intervention. [German]

Schuur, P *Eisenbahningenieur* Vol. 29 No. 7, July 1978, pp 327-331, 6 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 183680

**A REAPPRAISAL OF AMBIENT CONDITIONS SATISFACTORY FOR SITE PAINTING OF STEEL BRIDGES**

Current codes, if rigidly enforced, preclude highway bridge painting on site throughout the winter and much of the spring and autumn in an average year. The temperature must be not less than 4 deg C and the relative humidity not above 90%. As the real criterion is to avoid painting on wet surfaces a change of emphasis away from relative humidity measurements is suggested. A simple wetness detector has been developed using the principle of a resistance change between two electrodes in the presence of moisture. The complete system enabled readings of surface wetness, air and steel surface temperatures to be collected over monthly intervals on a battery operated chart recorder. The results of 14 months measurements on four structures is described. Steelwork sheltered by concrete decks on tall compositely constructed viaducts over land was dry for a very large proportion of the year. It is implied that the painting season for some structures could be extended. /Author/

Bishop, RR Winnett, MA  
Transport and Road Research Laboratory TRRL Lab Report 839, 1978, 6 pp, 9 Fig., 1 Tab., 4 Phot., 12 Ref.

ACKNOWLEDGMENT: TRRL  
ORDER FROM: TRRL

00 183894

**ASSISTANCE OF NEW YORK STATE DEPARTMENT OF TRANSPORTATION TO RAILROAD IN SOLVING SOILS AND FOUNDATION PROBLEMS**

This paper describes the informal assistance that soils engineers from the New York State Department of Transportation have provided to the Delaware and Hudson Railway Company for the solution of several embankment failures that interrupted traffic operations. Under the present New York State Railroad Service Preservation Bond Act, engineering assistance is available to the railroads, and soils engineers are investigating areas of recurring track maintenance problems caused by soils and water conditions. The goal is to develop solutions for permanent stabilization that will be more economical than continual maintenance. Geotechnical engineering can have a significant input into reducing some of the costs of track operation and maintenance caused by soils, water, and foundation problems. In this case, the service was provided by a highway geotechnical organization. Highway and railroad soils and foundations problems are shown to be similar.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Schultz, HE McDermott, TJ (Delaware and Hudson Railway Company); Lamb, SE (New York State Department of Transportation) *Transportation Research Record* No. 653, 1977, pp 48-51, 7 Fig.

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00 183898

**IMPROVED SEATINGS FOR BALLASTED TRACKS [Verbesserung des Schotteroberbaus in Tunneln und auf Bruecken mit elastischen Polyurethan-Matten]**

When the track ballasting is laid on a hard surface this not only produces higher stressing, but also increases the level of sound transmission. The problem is particularly acute in tunnels and on bridges carrying high-speed traffic. The fitting of flexible mats--especially SYLOMER matting--has an ameliorative effect as follows: deadening of solid-borne noise on underground railways (passing below built-up areas), reduced noise reflection from steel bridges, reduced dynamic stressing of the ballast, especially at high speeds, retention of the correct track level for considerably longer periods in tunnels and on bridges, reduced maintenance costs. The article describes the properties of the matting and various laboratory and practical test results. [German]

Keim, D Kohler, KA Schober, W *Eisenbahntechnische Rundschau* Vol. 27 No. 9, Sept. 1978, pp 543-548, 10 Fig., 1 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

00 183899

**SURVEY WORK IN THE BUILDING OF THE STUTTGART S-BAHN REVERSING TUNNEL [Vermessungsarbeiten beim Bau des Wendetunnels der S-Bahn Stuttgart]**

The work of the survey engineer is of particular importance in tunnel construction, when high demands are placed on practical experience and expertise in overcoming problems and preventing errors. Modern surveying equipment, particularly the electronic distance meter and the tunnel laser apparatus for driving data, ease the work of the survey engineer, but the difficult working conditions (dust, noise, bad lighting) still place great demand on him. That such a satisfactory job, completed within the contract period, was made of the reversing tunnel for the Stuttgart S-Bahn can be attributed to the good co-operation with the contractor's survey staff and the other experts (geologists, construction engineers, etc.). The article describes the project, the geodetic conditions, the survey work for tunnel driving and the building of the tunnel shell, and the special survey work involved in the building of the tunnel.

Kunz, K Rilling, H *Eisenbahntechnische Rundschau* Vol. 27 No. 9, Sept. 1978, pp 575-580, 8 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

00 184597

**PERMEABLE SYNTHETIC FABRIC MEMBRANES 1. THEIR USE IN THE STRENGTHENING OF SOILS**

This article describes some of the uses these fabrics are put to in soil "strengthening". They are frequently incorporated at subgrade level for temporary road construction or for gaining access over very poor ground conditions. Their dominant function in this case is to separate the soft subgrade from the subbase and thus prevent contamination of the subbase (i.e. the subgrade working its way up under repeated traffic loads) leading to its failure. For the fabric to give any significant reinforcing action to the pavement (i.e. an increase in its bearing capacity, large deformation of the soil-fabric system must generally be accepted. These large deflections make the use of fabrics unacceptable for permanent pavements under normal conditions, although they would be of use with weak soils such as low density sands and very soft clays. The load distributing properties of the fabric can be of value for temporary pavements or for permanent pavements during construction where local soft-spots occur in a subgrade. In these cases, the soil-fabric system deforms locally and the fabric redistributes load onto the surrounding area there by limiting local deflection and thus limiting local pavement failure and reducing differential settlements. Similar separa-

tion and reinforcing benefits occur when the fabric is placed under mass fill, e.g. embankments built on soft foundations. In view of the wide-ranging types fabrics available with greatly different properties, it is not surprising they have also been considered and used as an alternative to steel or aluminum in reinforced earth. Some woven fabrics have strengths, extension moduli, break strains and creep properties similar to steel mesh; while some non-woven have relatively low strengths and extension moduli less than soil. The choice of fabric for a given purpose must consider the environment and conditions in which it will be used. Basically, there are cases where large strains must be accepted as unresistable in the soil mass, and for these extensible fabrics, e.g. non-woven, might be ideal. Where strains in the soil mass must be contained or restricted, the use of a stiffer woven fabric is applicable. The need for a fabric to provide a drainage path or act as a filter in addition to separation and reinforcement will sometimes occur and for this a different type of fabric will be required.

Hoare, DJ (Birmingham University, England) *Ground Engineering* Vol. 11 No. 5, July 1978, pp 33-36, 2 Fig., 2 Phot., 3 Ref.

ACKNOWLEDGMENT: Ground Engineering

ORDER FROM: ESL

00 184665

**A REVIEW OF TUNNEL LINING PRACTICE IN THE UNITED KINGDOM**

This report outlines the several methods used in the United Kingdom for lining tunnels and gives brief details of some of the more recent tunnels constructed with each form of lining. The different methods available for lining tunnels are discussed taking into account the tunnel usage and the ground conditions. Methods of waterproofing tunnels, use of secondary linings and cost data are included. The approximate annual length and volume of tunnels constructed for the period 1970-76 are given, broken down into different types of lining and tunnel usage. The instrumentation of tunnel linings and of ground movements during the construction of tunnels have been examined and the design methods are discussed. Recommendations are given for research and development of tunnel linings. /TRRL/

Craig, RN Muirwood, AM (Sir William Halcrow & Partners, England)

Transport and Road Research Laboratory Monograph TRRL Suppl Rpt 335, 1978, 371 p., Figs., Tabs., 55 Phot., 176 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234640)

ORDER FROM: ESL

00 184674

**LYNE CABLE-STAYED BRIDGE: CHEAP BUT NOT EASY**

This bridge is being constructed to carry the railway line between Chertsey and Virginia Water in Surrey over the proposed M25. With two equal spans of 54.9 M and a width of 11.6 M, the bridge is relatively small, but site conditions are such that the bridge is heavily skewed. The angle between the centre-line of the bridge and that of the motorway is something less than 28 degrees. Designed for economy rather than ease of construction, the concrete structure is described as Britain's first cable-stayed rail bridge. Lyne bridge's deck is 650 mm deep, and the use of intermediate support from cable-stays was considered to be both economically and structurally desirable. The stays have a double function. At working load they provide about 40 percent of the bridge's prestress and, working as diagonals, they increase the structure's stiffness by about 10 percent. The design and construction of the bridge is briefly discussed and illustrated.

Byrd, T *New Civil Engineer* No. 294, May 1978, pp 34-35, 1 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-234791)

ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England

00 185346

**NEW "LIMIT STATE" STANDARD FOR RAIL BRIDGES**

A new British Standard (BS-4500) takes account of virtually every condition which the bridge will encounter during its life. The special requirements for railway bridges will thus be strongly reflected in new designs.

*Railway Engineer International* Vol. 3 No. 5, Sept. 1978, pp 11-12, 1 Fig., 2 Tab., 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

00 185361

**CLEANING OF SNOW AND ICE FROM SWITCHES WITH STATIONARY DEVICES [Ochistka strelok ot snega i P'da stacionarnymi ustroystvami]**

This book, based on a summarization of both domestic and foreign experience, presents recommendations for selection of efficient types of designs of stationary devices for cleaning snow and ice from switches. The book is designed for engineering and technical workers; railroad track, signaling and communication, and electrification and power departments; railroad stations; and planning organizations. [Russian]

Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Zakatalov, YV Pirin, VI

All-Union Labor Red Banner Railway Research Inst 1973, 72 p., 23 Tab., Ref.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

00 186104

**SEISMIC RESPONSE OF BRIDGES-CASE STUDIES**

Presented are the results of 6 case studies conducted on each of three bridges (the Route 80 Onramp Undercrossing, the Northwest Connector Overcrossing, and the Southwest Connector Overcrossing designed by the California Department of Transportation) when subjected to strong seismic excitation. The dynamic responses of each bridge for separate excitations in the longitudinal and transverse directions were determined using the response spectral, linear time-history, and nonlinear time-history approaches. Maximum response values are interpreted in terms of current design procedures and code provisions.

Imbsen, RA Nutt, RV Penzien, J

California University, Richmond, Federal Highway Administration UCB/EERC-78/14, June 1978, 204 p.

Contract DOT-FH-11-7798

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-286503/8ST

00 188076

**EPOXY REPAIRS FOR WIDE CRACK IN CONCRETE PIER**

The unusual width of the crack in a bridge pier under a truss of Conrail at Columbus, Ohio, necessitated use of special epoxy formulations coupled with installation of reinforcing bars in the concrete pier which was not reinforced when built in 1913. Cost was a tenth of any other repair method investigated.

*Railway Track and Structures* Vol. 74 No. 12, Dec. 1978, pp 28-30, 5 Phot.

ORDER FROM: ESL

DOTL JC

00 188100

**RAILWAY MAPS: AN AID TO INFORMATION, PLANNING AND DECISION-MAKING [Eisenbahnkarten: eine Informations-, Planungs- und Entscheidungshilfe]**

The DB Cartographic Centre at the Central Transport Headquarters in Mainz establishes general-purpose Railway maps in accordance with up-to-date cartographic principles, for the benefit of the DB's customers as well as for internal departmental use, and updates them regularly. The centre has modern equipment with which it can produce standard maps on a sound economic basis. The DB's general-purpose maps are designed to enable details relating to other specific fields to be entered on them. [German]

Koethe, K *Die Bundesbahn* Vol. 54 No. 8, Aug. 1978, pp 633-640, 2 Tab., 17 Phot., 12 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

12

00 188101

**REVIEW OF RESEARCH INTO THE DYNAMIC-INCREASE FACTOR USED IN RAILWAY BRIDGE DESIGN [Resumen de las investigaciones sobre el coeficiente de mayoracion dinamica a utilizar en el calculo de puentes de ferrocarril]**

No Abstract. [Spanish]

Piguet, P *Boletin Bibliografico de Ingenieria Civil* No. 26, Apr. 1978, pp 29-30, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Boletin Bibliografico de Ingenieria Civil, Madrid, Spain

00 188103

**HEATING, VENTILATION AND AIR-CONDITIONING INSTALLATIONS FOR THE RHINE/MAIN S-BAHN NETWORK: PHASE 1 CONSTRUCTION [Heizungs-, Lueftungs- und Kluemaanlagen fuer die S-Bahn Rhein-Main; 1. Baustufe]**

The sizeable dimensions and various uses of underground tunnels on the Rhine/Main S-Bahn network including the North wing of Frankfurt main station that has been re-built are such that large heating, ventilation and air-conditioning installations have had to be put in. In addition to details of these aspects, the article describes the installations for heat recovery, control, regulation, electric power supply and fire protection. [German]

Helfrich, W *Eisenbahningenieur* Vol. 29 No. 8, Aug. 1978, pp 354-363, 3 Tab., 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

00 188111

**SNOW DEPOSIT ON THE MODEL OF OPEN BED TYPE BRIDGE STRUCTURE FOR ELEVATED TRACK; OBSERVATION IN SHINSAPPORO EXPERIMENTAL SITE**

With the construction of Shinkansen in a snowy region, removal of snow from the track is an important problem. Tests have been carried out under various conditions. The article gives an account of the tests performed and presents the data collected.

Shinojima, K *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 2, June 1978, p 85, 1 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

00 188126

**MOMENT AND SHEAR TABLE FOR HEAVY DUTY CARS ON BRIDGE**

AAR Bridge Program No. 1, thoroughly updated, determines maximum values of bending moments, end reactions, and floor beam reactions occurring in a simply supported beam subjected to a number of moving concentrated loads. It is possible to analyze a maximum of 250 loads on spans up to 400 ft long. Train makeup may be varied to include solid trains of special cars, special cars in conventional trains, and other possible combinations.

Chen, MT Garg, VK

Association of American Railroads Technical Center AAR Rpt R-330, Oct. 1978, 36 p., 12 Fig.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

00 188127

**COMPUTER PROGRAM FOR ANALYSIS OF RAILWAY TRUSS BRIDGES**

AAR Bridge Program No. 2, thoroughly updated, calculates maximum bar forces and support reactions of general railway truss bridges under stationary or moving loads. Trusses may be simple supported, continuous over several supports, internally indeterminate or contain counter diagonals. Maximum span length cannot exceed 620 ft for a Standard Cooper E loading, of 1000 ft for other types of moving loads. Truss can have no more than 25 panels and number of panels with counter diagonals cannot exceed



10. There are restrictions on trusses containing counter diagonals. Input required is truss geometry, cross sectional areas, dead loads, live loads. Output includes dead load, live load, AREA impact and total forces in each member and truss reactions.

Chen, MT Garg, VK  
Association of American Railroads Technical Center AAR Rpt R-331,  
Oct. 1978, 44 p., 8 Fig., 1 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

00 188128

#### ANALYSIS OF PRATT, HOWE AND WARREN TYRE RAILWAY TRUSS BRIDGES

AAR Bridge Program No. 3, thoroughly updated, calculates maximum bar forces and support reactions in simply supported and symmetrical Pratt, Howe and Warren trusses under stationary or moving loads. The program is a modification of AAR Bridge Program No. 2 and requires that Warren trusses have vertical members and that maximum span length of any bridge be 600 ft with no more than 20 panels.

Chen, MT Garg, VK  
Association of American Railroads Technical Center AAR Rpt R-332,  
Oct. 1978, 44 p., 7 Fig.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
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South Federal Street, Chicago, Illinois, 60616

DOTL RP

00 188304

#### STRESS GRADIENT AND CRACK SHAPE EFFECTS ON STRESS INTENSITY AT WELDED DETAILS

The magnitudes of stress intensity correction factors are estimated for use in both fatigue and fracture analyses of welded bridge details.

Zettlemoyer, N (Exxon Products Research Company); Fisher, JW  
*Welding Journal* Vol. 57 No. 8, Aug. 1978, pp 246-250, 27 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

00 188312

#### TWIN CABLE-STAYED BRIDGES IN ARGENTINE ROAD-RAIL COMPLEX

Two identical bridges have been built in the Zarate-Bruzo Largo road over the Palmas and Guazu arms of the River Parana in Argentina. Each bridge has a total length of 550 M, with two equal 110 M side spans carrying a four-lane highway and one railway line on the same deck. The main towers, 120 M high are of rectangular hollow sections built by slipforms. The concrete pile cap is supported by 2 M diameter piles up to 73 M long. Details of the design and method of construction are given. The steel deck is made of continuous longitudinal members of trapezoidal box sections and main transverse members with a plate girder to coincide with the lower anchoring points of cables. Because of the height above the river, long approach viaducts were required. Viaduct support columns are of square hollow section spaced at 65 M intervals. The structure required 360 beams weighing 200 tons to support the railway track and 600 beams each weighing 110 tons for the carriageways. Erection methods requiring some special heavy lifting gear are described. /TRRL/

*Highways and Road Construction International* Vol. 46 No. 1820, July 1978,  
pp 7-9, 3 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-236051)  
ORDER FROM: Embankment Press, Building 59, GEC Estate East Lane,  
Wembley, Middlesex, England

00 188316

#### RECENT DEVELOPMENTS IN CONCRETE BRIDGES IN JAPAN

Several examples of concrete bridges which have prominent features, built in Japan during the last decade, are cited and may be considered to have served as guide posts and inspiration for the builders of the many bridges erected since. The outlines of these bridges and the experiments and studies undertaken with regard to their structural designs and construction practices

are described, while the contributions made and problems remaining for future clarification are discussed. /Author/TRRL/

Ozaka, Y (Tohoku University, Japan); MacHida, F (Japanese National Railways) *Structural Engineer* Vol. 56A No. 10, Oct. 1978, pp 291-297,  
13 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-236307)  
ORDER FROM: ESL

DOTL JC

00 188323

#### TUNNELLING IN JAPAN

The article discusses the problems associated with tunnel construction in Japan. The natural rock formation of the country affected by ancient tectonic action coupled with volcanic activity has resulted in mixed geological conditions of very hard rock and decomposed weak ground. As most of the country's cities are located on river deltas, tunnelling construction encounters low strength fluvial deposits and high water levels. Ground treatment such as grouting, dewatering and freezing are required to aid excavation and to protect the work face. Details are given of tunnelling construction in progress in Japan including railway, highway, underground railway and water supply tunnels. /TRRL/

*Tunnels and Tunnelling* Vol. 10 No. 5, June 1978, pp 19-22, 7 Fig., 2 Tab.,  
1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-236906)  
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00 188328

#### DYNAMIC TEST ON MODEL BRIDGE DECK

This article describes some of the findings of report D123/RP6 published by ORE, Utrecht. A model bridge deck with a span of 3.6 M was subjected to tests designed to check whether ultimate strength would be affected by the cracks expected to develop during service. After approximately 200000 load cycles, measurements were made of maximum deflection, strain in upper and lower edges of the girders and the upper surface of the concrete. Based on the measured material characteristics, calculation using plastic theory or elastoplastic theory gave lower predictions of failure moment. Effects of cracking under repeated service loading tended to stabilise.

*Rail International* Vol. N May 1978, pp 361-362, 1 Fig., 2 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 236073)  
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00 188329

#### BRIDGE UNDER HIGH-SPEED RAILWAY LINE

The methods used to build a major bridge for the a5 at Milton Keynes under the main London to Rugby main line are described. The installation sequence, using pipe jacking methods to install two-tier concrete box units under the rail tracks is illustrated. It is the first time large precast units have been jacked one on top of another from opposite sides of a rail track. The abutments and slide-in paths were then constructed prior to the slide-in of the bridge deck. Separate portal framed decks were rolled in, one from each side of the track. The decks were cast on the wingwalls of the bridge. Total track possessions were 52 hours for the first slide-in, requiring excavation of the embankment and 39 hours for the second slide-in. The material under the new bridge was then excavated; abutments and wing walls were faced with brickwork.

Langdon, D *Construction* No. 24, Dec. 1977, pp 2-4, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 236056)  
ORDER FROM: ESL

00 188330

#### BOXING CLEVER UNDER THE RAILS

Weight restrictions over a culvert driven through a railway embankment have been overcome by using a new jacking technique. In situ construction of the 6 M long 3.35 M X 3.30 M sections in the jacking pit was not possible because of their large size and short driving period allowed. Five 1.2 M long segments were pre-cast, lifted separately into the jacking pit and clamped together before jacking. Joints between the segments were designed to withstand jacking forces. The jacked section of the culvert was elongated by 10 M more than was first planned to ease the piling of head walls. An

intermediate jacking station was fitted between each 6 M section so that they could be moved independently reducing drag and stress. Difficulties were experienced when the sand of the embankment proved to be more free-running than expected and removal of the end of an old wooden pile using a chain saw set up vibration causing settlement to occur between the two sets of tracks. Sand tables were then incorporated in the shield to cope with the loose sand conditions.

Heywood, P *Contract Journal* Vol. 285 No. 5166, Sept. 1978, pp 32-33, 1 Fig., 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 236055)

ORDER FROM: IPC Building and Contract Journals, Limited, Surrey House, 1 Throwley Way, Sutton, Surrey SM1 4QQ, England

#### 00 188338

##### RAILWAY BRIDGING PROBLEMS ACROSS SIBERIA

Construction of a second railway across Siberia, the 3200 km Baikal-Amur Line to the north of the existing Trans-Siberian railway, entails building 3200 engineering structures on the main line including 32 km of bridges, and many tunnels including the 15.3 km Severo-Muisky tunnel. Some 2670 km of motorway to serve the railway have also been constructed. The problems associated with geological-engineering work are described by reference to severe climatic conditions, winter and monsoon and the difficulties encountered with permafrost. Brief details are provided on construction techniques employed to build the bridges and tunnels, bearing in mind that the construction sites are remote from any industrial centre.

Pechenyuk, I *Highways and Road Construction International* Vol. 46 No. 1821, 7808, pp 29-30, 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 237140)

ORDER FROM: Embankment Press Limited, Building 56, GEC Estate, East Lane, Wembley, Middlesex, England

#### 00 188340

##### BLADE SHIELD TUNNELLING IN ESSEN

The article describes the excavation and lining of the fourth construction section of Essen's underground railway. The tunnel is located in an area of green sand and coarse silt in which the water table is located 5 M above the tunnel floor. As compressed air tunnelling methods could not be used because of thin cover and the soil structure, it was necessary to lower the water table by sinking wells. Tunnel excavation was performed with blade shield tunnelling equipment designed for use in unstable ground conditions. The article gives details of excavation methods used with this equipment in a built-up area and evaluates the resulting ground settlements.

Gruner, H *Tunnels and Tunnelling* Vol. 10 No. 5, June 1978, pp 24-28, 5 Fig., 4 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 236907)

ORDER FROM: ESL

DOTL JC

#### 00 188369

##### CONSIDERATIONS ON THE REVISION OF THE TUNNEL CONSTRUCTION RULES [Gedanken zur Neubearbeitung der Tunnelbauvorschriften]

The author outlines the development of tunnel construction rules in the German-speaking countries. The concept of the "tunnel" can be variously interpreted. The fundamental change in tunnel building methods in the last twenty years is described (so-called "New Austrian Tunneling Practice"). The article concludes with a consideration of the proposed revision of "Tunnel Construction Rules (DV 802)", "Rules for Structures of Underground Railways, Enclosed Type (DV 802)" and the DB's design manual for structures, which must be seen in relation to each other. [German]

Martinek, K *Eisenbahntechnische Rundschau* Vol. 27 No. 11, Nov. 1978, 6 p., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

01 053293

**UP-DATING OF TECHNICAL SPECIFICATIONS FOR THE SUPPLY OF RAILS. PROPOSAL FOR A NEW TEXT FOR TECHNICAL SPECIFICATION UIC 860**

This report primarily consists of a new text proposed for Technical Specification UIC 860: Technical Specification for the supply of Vignole (flat-bottom) rails in non-treated steel. The text has been amended on account of the need for revising certain sections and--concerning tolerances--as a result of numerous dimensional measurements on rails, carried out in the works of the rail manufacturers to verify the manufacturing possibilities.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways Final Rpt. D 144/RP 2, Oct. 1977, 46 p., 12 Fig., 16 Tab.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

01 053295

**BRAKING AND ACCELERATION FORCES ON BRIDGES AND INTERACTION BETWEEN TRACK AND STRUCTURES. MEASURING METHODS ADOPTED IN THE STUDY OF THERMAL PHENOMENA ASSOCIATED WITH INTERACTION BETWEEN CWR TRACK AND BRIDGES**

This report outlines the various methods for measuring and theories for evaluating thermal stresses in CWR. The object of the report is to enable conclusions to be drawn and recommendations to be formulated on the basis of preliminary experiments.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D 101/RP 12, Apr. 1978, 39 p., 26 Fig.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

01 053299

**UNIFICATION OF THE GEOMETRY OF SWITCHES AND CROSSINGS WITH UIC 60 RAILS PERMITTING HIGH SPEED ON THE DIVERGING TRACK. TESTS ON EXISTING TURNOUTS OR THOSE ESPECIALLY DESIGNED AT THE PROPOSALS OF THE D 121 SPECIALISTS COMMITTEE-SUPPLEMENTARY CONCLUSIONS**

This report gives the results of the programme of measurements carried out from January 1976 to October 1977 on the SNCB, CFF, DB and SNCF networks. It deals primarily with the negotiation of crossovers suitable for speeds of 130 km/h and 160 km/h on the diverging tracks. Further information is given concerning the effect of check-rails with different entry slopes.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D 121/RP 3, Apr. 1978, 23 p., 22 Fig.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

01 180268

**METHODS OF DEALING WITH RAIL SURFACE DEFECTS [Le traitement des défauts de surface du rail]**

The introduction by J. Alias, giving a brief definition of vertical geometric track defects and methods used to overcome them, is followed by a number of articles dealing mainly with rail corrugation: Colson, F.: Reprofile of rails; Colson, F.: Detection and treatment of rail corrugation using a dynamic process; Fortin, J.P. and Fourcade, J.: Measurement of short wavelength defects using a geometric process. [French]

*Revue Generale des Chemins de Fer* Mar. 1978, pp 164-183, 35 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

01 180287

**THE ZELTWEG-TYPE, DOUBLE-INSULATION POINT STRETCHER USED FOR CLIPPED SECTOR LOCKS [Die zweifach isolierte Schieberstange Bauart Zeltweg zum Klammerspitzenverschluss]**

This new point-stretcher does away with the drawbacks inherent in models used up to now, which particularly precluded adjusting of the sector lock in the factory. The new device, which takes much less time to install, was adopted in 1974 as a standard component for curved switches. [German]

Czuba, W *Eisenbahntechnik* Vol. 12 No. 4, 1977, pp 72-73, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Bohmann Verlag, Canovagasse 5, A-1010 Vienna, Austria

01 180297

**HOW TO MEASURE RAIL CORRUGATION [Kak izmerjat' volnoobraznyj iznos]**

No Abstract. [Russian]

Gnilomedov, VV *Put'i Putevoye Khozyaistvo* No. 4, 1978, pp 41-42, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmannaya Ulitsa 2, Moscow B-174, USSR

01 180301

**BALLAST AS A COMPONENT OF THE SUPERSTRUCTURE [Die Bettung als Bauteil des Oberbaus]**

No Abstract. [German]

Schewe, D *Deine Bahn (DB)* Vol. 6 No. 3, 1978, pp 154-160, 1 Tab., 16 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Eisenbahn-Fachverlag, Am Linsenbergr 16, 6500 Mainz, West Germany

01 180308

**PROBE TESTS BUTT WELDS ULTRASONICALLY**

Thermite-type butt welds in rail are tested in track ultrasonically, using a device developed jointly by the Canadian National and CANAC Consultants, Ltd. It is reported that the newly developed equipment can be used for testing the entire rail section for transverse defects, bolt-hole cracks and other faults.

*Railway Track and Structures* Vol. 74 No. 4, Apr. 1978, p 25

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

01 180321

**CONSEQUENCES OF VARIATIONS IN ULTRASONIC WHEEL PROBES FOR AUTOMATED RAIL FLAW DETECTION SYSTEMS**

At the Transportation Systems Center, an ongoing project is the development of a computer-based Automated Rail Flaw Detection System. The core of this system is ultrasonics. An ultrasonic signal is both transmitted and received by one or more transducers that are mounted in fluid-filled wheels that scan the rails. The wheels and associated electronics are mounted on a Track Inspection Vehicle. At present, one of the technological problems that is holding back the development of the Automatic Flaw Detection System is the lack of standardization in the production of the wheel probes. Minor variations in the wheel probe significantly affect the rail area to be measured. Similarly, small differences in signal strength, water path length and internal fluid temperature also significantly affect results.

Ultrasonic Symposium Proceedings, Phoenix, Arizona, October 26-28, 1977.

Bush, MW (Transportation Systems Center)  
Institute of Electrical and Electronics Engineers Proceeding n 77CH1264-1 SU, 1977, pp 20-23

ACKNOWLEDGMENT: EI  
ORDER FROM: Institute of Electrical & Electronics Engrs, Inc, 445 Hoes Lane, Piscataway, New Jersey, 08854

01 180323

**CWR FROM LONG RAILS AT NEWEST BUTT-WELDING PLANT**  
Burlington Northern has built a rail-welding facility adjacent to the steel plant at Pueblo, Colo., which can produce rails in lengths up to 82 ft (25

meters). The BN facility assembles these long rails into strings up to 1540 ft in length. Provision is also made for handling and welding rails in widely varying lengths (from 25 to 82 ft); there are five production stations centered around the electric flash welding machine.

*Railway Track and Structures* Vol. 74 No. 7, July 1978, pp 24-27, 5 Phot.

ORDER FROM: ESL

DOTL JC

01 180325

#### STATUS REPORT-PRESTRESSED CONCRETE TIES

A series of four articles summarize the situation with concrete crossties in the U.S. in 1978. Prestressed concrete tie: The U.S. story from the beginning by G. M. Magee tells how as a researcher he helped to introduce the concept into the U.S.; after discussing such problems as interspersions with wood ties, designs of fasteners, tie pads and ballast, and with damage from derailments he concludes that an improved track structure can be achieved with concrete ties. Service tests on the "new" concrete ties by J. W. Weber describes recent inspections made of installations of these ties on the Alaska, Chessie, Santa Fe and Norfolk & Western. Fastenings for concrete ties describes nine designs involving threaded or threadless clips that clamp or are rail free to suit varying situations. What's happening among the concrete tie manufacturers describes the production and facilities of five North American organizations designing and manufacturing concrete ties.

*Railway Track and Structures* Vol. 74 No. 8, Aug. 1978, 1 pp

ORDER FROM: ESL

DOTL JC

01 180328

#### FOR A MODERN YARD: MODERN CONSTRUCTION, MODERN METHODS

Methods of construction of a classification yard for Seaboard Coast Line at Waycross, Ga are reported. New tracks are CWR with welded closure joints, glued insulated joints, preplated ties. Track raising and lining is done with power tampers utilizing laser-beam control for final lift and alignment.

*Railway Track and Structures* Vol. 74 No. 3, Mar. 1978, pp 20-24

ACKNOWLEDGMENT: EI

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DOTL JC

01 180336

#### TRIAxIAL TESTS ON DOLOMITE RAILROAD BALLAST

Triaxial static compression and extension tests using low confining pressures have been performed on a fine mineral grained tough dolomite railroad ballast. The shear strength and tangent modulus increased significantly with both confining pressure and density increase, indicating the importance of both crib depth and compaction in maintaining the stability of unloaded track (i. e., preventing sun kinks). Of particular importance is the high apparent cohesion at the low cell pressure in comparison with tests reported elsewhere on sands and rounded gravels indicating the importance of a high percentage of crushed faces which is contrary to tests reported by others at high cell pressures where crushed material has lower strengths. A similar contradiction was also noted for particle size. Comparison with other results indicates larger particles probably give higher strengths at low cell pressures. The volume and axial strains are also reported in terms of initial pseudo-Poisson's ratio and in terms of stress dilatancy.

Raymond, GP (Queen's University, Canada); Davies, JR *ASCE Journal of the Geotechnical Engineering Div* Vol. 104 No. 6, June 1978, pp 737-751, 19 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

01 180390

#### METHODOLOGY AND TECHNOLOGY OF THE PERMANENT WAY MAINTENANCE ON THE GERMAN FEDERAL RAILWAYS (DB)

The structure of the permanent way installations, the organizational structure of the permanent way department and the systematic supervision of the permanent way installations as the bases of the permanent way maintenance on the DB, are described. After defining the permanent way maintenance works the methodology of the permanent way maintenance on

the DB is explained by demonstrating the planning of the permanent way maintenance as well as the structure and development of the permanent way program. The technology of the permanent way maintenance on the DB is dealt with. In this connection in particular a complex of questions in production technology as well as the structural and operational detailed plannings are considered.

Froehlich, P (German Federal Railway) *Rail International* Vol. 9 No. 4, 1978, pp 258-271, 3 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

01 180393

#### SUPER TRUCKS MEAN M/W COST SAVINGS

The paper reports how in pilot program small gangs, equipped with High-rail vehicles, each mounting a crane and carrying a variety of power tools, have capability of doing any maintenance job.

*Railway Track and Structures* Vol. 74 No. 5, May 1978, pp 46-48

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

01 181032

#### AUTOMATIC BASE GATE POSITIONING CIRCUIT

An automatic base gate positioning circuit for use in rail flaw detection is disclosed which includes the generation of a string of uniformly spaced pulses corresponding to known rail depth, correlating said pulses with sonic echoes, averaging and storing the correlated signals, and developing a signal representing the rail depth for comparison with an echo from the rail base.

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Rudis, RP Cecon, HL

Department of Transportation PAT-APPL-903 518, DOT/CASE-TSC-10116, No Date, 21 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281419/2ST

01 182076

#### TRACK GEOMETRY MEASUREMENT SYSTEM SOFTWARE MANUAL

The Track Geometry Measurement System (TGMS) was developed through the United States Department of Transportation's, Urban Mass Transportation Administration by the Transportation Systems Center in Cambridge, Massachusetts under its Test and Evaluation studies to aid transportation planners and maintenance personnel to better assess the quality of track for rapid rail, light rail, and commuter rail systems. The purpose of this document is to describe the TGMS real-time software and provide operating instructions for its use. The TGMS real-time software collects and stores raw data from the TGMS sensors, processes the raw data to compute track geometry parameters, and records and displays the processed data. All of these functions are performed in real time as the raw data is being collected. The current version of the TGMS real-time software is designated TGM6C.

Brownell, D

Transportation Systems Center, (UMTA-MA-06-0025) Final Rpt. DOT-TSC-UMTA-78-26, UMTA-MA-06-0025-78-6, Apr. 1978, 110 p.

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-285558/3ST, DOTL NTIS

01 182085

#### AN EXPERIMENTAL EVALUATION OF TECHNIQUES FOR MEASURING THE DYNAMIC COMPLIANCE OF RAILROAD TRACK. PHASE I

This report covers the initial track measurement task of a 3-phase program to design and fabricate equipment for measuring track dynamic characteristics. The objective of this task was to evaluate techniques for measuring the dynamic compliance and to identify general trends in the behavior of the track structure. Some of the results obtained were a high degree of nonlinearity of vertical track stiffness with vertical preload and a settling phenomenon of the track structure due to the constant preload and dynamic

excitation. This settling yields a stiffer track structure for a constantly applied preload as compared to a cyclic preload. The information in this report is intended for use by research personnel who have an interest in railroad track performance as related to vehicle/track interaction and track maintenance, and in the measurement of track deflections and dynamic characteristics for developing track analysis models and evaluating track structure condition.

See also report for June-December 73, PB-250547.

Nessler, GL Prause, RH Kaiser, WD  
Battelle Columbus Laboratories, Federal Railroad Administration Final  
Rpt. FRA/ORD-78/25, July 1978, 141 p.

Contract DOT-FR-30051  
ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-285559/1ST, DOTL NTIS

**01 182587**  
**REPEATED LOAD TRIAXIAL TESTS ON A DOLOMITE BALLAST**

Triaxial repeated load saturated drained compression and extension tests at low cell pressures on a fine mineral grained tough dolomite railroad ballast are reported. Both plastic strains and ballast breakdown were found to be related to the stress difference factor cycled. This may be associated with track improvement due to higher factors of safety with respect to the tie-ballast interaction and thus broader ties and a smaller spacing-breadth ratio. Cycling the stress difference also caused a stiffening of the ballast confirming the practice of using trains subject to slow orders to further compact ballast in track after maintenance. In the extension repeated load tests failure was observed at stress difference factors of 0.5 confirming the problems of track lateral instability associated with curves and the importance of regular maintenance where lateral track forces are high.

Raymond, GP (Queen's University, Canada); Williams, DR *ASCE Journal of the Geotechnical Engineering Div* Vol. 104 No. 7, July 1978, 17 pp, 22 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**01 182604**  
**THE PRESTRESSING FORCE IN THE PRESTRESSED-CONCRETE SLEEPER**

Prestressed-concrete sleepers are units subjected to extremely high loads, one of the most important elements for the load-carrying capacity being their prestressing force. Losses of prestressing force between 15 and 30 p.c. were found to be within the limits assumed after a maximum service life of 13 years for sleepers made by the immediate bond method. Influences extremely reducing the prestressing force are therefore not likely to exist. [German]

Sens, H *DET Eisenbahntechnik* Vol. 26 No. 6, June 1978, pp 252-253

ACKNOWLEDGMENT: British Railways  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

**01 182606**  
**EXPLODING LONGER LIFE INTO FROGS**

The life of cast manganese railway frogs is doubled using "Detasheet" in an explosive-hardening technique developed by Du Pont.

*Du Pont Magazine* Vol. 71 No. 6, Nov. 1977, pp 26-27

ACKNOWLEDGMENT: British Railways  
ORDER FROM: Du Pont de Nemours (EI) and Company, Incorporated, Du Pont Building, 1007 Market Square, Wilmington, Delaware, 19898

**01 182629**  
**CONSTRUCTION AND MAINTENANCE OF THE RAILWAY TRACK FOR OPERATING SPEEDS OF 140-160 KM/H**

The authors give an overall description of problems connected with the construction of railway track and explain development prospects for track construction. They go on to discuss present maintenance methods and describe a new method for maintaining high-speed lines. They end by giving the advantages of this method involving a new type of rail fastening. With this method track maintenance work can be done without touching the ballast.

Ivanov, G Mirtchev, M *Rail International* No. 6, June 1978, pp 422-426

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**01 182805**  
**WELDING ASPECTS OF THE SISHEN-SALDANHA RAILWAY LINE**

This paper gives a description of how the rails were welded for the track and a technical description of the reasons for certain precautionary measures which were required to ensure that adequate welding quality was achieved. The rails for the Sishen-Saldanha Project were produced by three German Steelworks according to the UIC 60 specification and have a mass of 60 jg/m. The UIC 60 rails of 25 m length were flash butt-welded in a stationary welding depot at the Saldanha marshalling yard to form so-called long welded rails of 300 m. These long lengths were then loaded onto a set of flat railcars and transported to the railhead where they were off-loaded, placed in position and thermit welded to form the fully welded track. In addition, friction welding was used in the attachment of earth return connections to the rails.

Murray, GB *FWP Journal* Vol. 18 No. 3, Mar. 1978, 2 pp, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**01 182812**  
**WHAT FASTENING SYSTEM FOR USE ON CURVES?**

In attack on gage-widening, rail rollover and spike-killed ties, both bolted and threadless clips in conjunction with plates secured independently to the ties were service-tested in main-line track.

*Railway Track and Structures* Vol. 74 No. 6, June 1978, pp 37-39

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**01 182831**  
**BIG UNDERTAKING BRINGS SOME BIG CHALLENGES**

Upgrading of 450-mile high-density, multiple-track route for higher speeds is now proceeding following a period of organization, machinery acquisition and manpower recruitment.

*Railway Track and Structures* Vol. 74 No. 9, Sept. 1978, pp 26-31, 10 Phot.

ORDER FROM: ESL

DOTL JC

**01 182832**  
**TRACK-LAYING MACHINE, FIRST IN U.S., PUTS IN CONCRETE TIES**

The Canron P-811 Track Laying Machine is now being used in reconstructing Northeast Corridor high-speed track with concrete ties and welded rail. Production, initially at 1200 ft per hr, is to be increased to 2000 ft per hr. In addition to the 222-ft, 168-ton TLM, 16 special flat cars loaded with sufficient concrete ties for a days track laying accompany the self-powered, self-propelled unit. Procedures used in advance and after the machine are described along with its operation and manning.

*Railway Track and Structures* Vol. 74 No. 9, Sept. 1978, pp 32-35, 7 Phot.

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**01 182834**  
**WEAKEST POINT NEEDS CAREFUL ATTENTION**

Turnouts are the vulnerable part of any track structure and pointers are given on conditions and maintenance involving every part.

Berryman, P *Railway Track and Structures* Vol. 74 No. 9, Sept. 1978, 3 pp, 8 Phot.

ORDER FROM: ESL

DOTL JC

01 182889

**TORONTO TRANSIT COMMISSION USES CONCRETE CROSSIES**

As a result of extensive testing on a 1000-foot section of track, the Toronto Transit Commission has installed concrete crossies on an open cut section of its new Spadina subway extension and the use of concrete ties is also planned for the tangent track areas of its Bloor Danforth extension.

*Concrete* Vol. 23 No. 5, May 1978, p 292

ACKNOWLEDGMENT: DOT

ORDER FROM: ESL

DOTL JC

01 183291

**TRACK ABANDONMENT AND TRACK RETIREMENT**

When a line is to be removed, careful planning must determine how and by whom the track will be taken up. While rail and ties constitute the largest quantities of materials to be handled, other track material must be considered along with bridges, culverts, fences, pole line, ballast, buildings and signal equipment. Approaches for main lines and branchlines with some costs are described.

Proceedings of the 89th Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 26-28, 1977 in Chicago, Illinois.

Roadmasters' & Maintenance of Way Assn of America Proceeding 1977, pp 100-107

ACKNOWLEDGMENT: Roadmasters' & Maintenance of Way Assn of America  
ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 183292

**ACHIEVING PRODUCTIVITY WITH TIE GANGS**

Missouri Pacific has reduced the number of gangs doing tie renewals from 26 to 6 and has been inserting 1.5 million ties per year. Costs have been reduced. Assignments of manpower and equipment, development of teamwork and competition, assurance of maximum on-track time for the work and cooperation with equipment manufacturers are identified as essential in this track maintenance function.

Proceedings of the 89th Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 26-28, 1977 in Chicago, Illinois.

Bertel, DJ (Missouri Pacific Railroad)  
Roadmasters' & Maintenance of Way Assn of America Proceeding 1977, pp 108-113

ACKNOWLEDGMENT: Roadmasters' & Maintenance of Way Assn of America  
ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 183293

**REHABILITATING YARD LEADS--HUMP UPGRADING--BODY TRACKS--INERT RETARDERS**

Yards and terminals do not get priority in track maintenance planning. This committee report discusses when to rehabilitate, the use of panel track in yard rehabilitation, use of mechanized gangs, types of equipment that can be used and the materials and planning which go into such operations.

Proceedings of the 89th Annual Conference of the Roadmasters' and Maintenance of Way Association of America held September 26-28, 1977 in Chicago, Illinois.

Harris, HP  
Roadmasters' & Maintenance of Way Assn of America Proceeding 1977, pp 149-155

ACKNOWLEDGMENT: Roadmasters' & Maintenance of Way Assn of America  
ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

01 183295

**FACTORS WHICH AFFECT THE STABILITY, TESTING, SELECTION AND PERFORMANCE OF SUITABLE AGGREGATES FOR RAILROAD BALLAST**

The function and new specification for ballast are discussed. The need for further study of ballast economics is emphasized.

Proceedings of the 77th Technical Conference, AREA, Palmer House, Chicago, Illinois, March 20-22, 1978.

Lynch, JK (Vulcan Materials Company)

American Railway Engineering Association Proceeding Vol. 79 Bulletin 668, June 1978, pp 368-377

ACKNOWLEDGMENT: AREA

ORDER FROM: ESL

DOTL JC

01 183296

**DEVELOPING THE MAINTENANCE WORKLOAD AND FORCE REQUIREMENTS USING A MODIFIED EQUATED MILEAGE PARAMETER TAKING INTO ACCOUNT THE VARIOUS VARIABLES**

Canadian National measures its track maintenance workload and necessary force levels required to maintain its plant in adequate condition for traffic demands. A computerized inventory of components of the track on the system was developed. AREA track equivalents were related to today's traffic and CN experience. The factors such as speed, tonnage and curvature were used to modify the track equivalents. Values obtained from this analysis were used for track maintenance planning.

Proceedings of the 77th Technical Conference, AREA, Palmer House, Chicago, Illinois, March 20-22, 1978.

Naylor, JA (Canadian National Rail)  
American Railway Engineering Association Proceeding Vol. 79 Bulletin 668, June 1978, pp 378-390

ACKNOWLEDGMENT: AREA

ORDER FROM: ESL

DOTL JC

01 183297

**FAILURE ANALYSIS OF RAILS FROM FACILITY FOR ACCELERATED SERVICE TESTING**

Failure analyses have been made of three rails from the Facility for Accelerated Service Testing (FAST). A standard 115 lb (57 kg/m) rail showed severe wear from heavy wheel loads of 100 ton (90.7 Mg) cars. This rail also had a detailed fracture. A high-strength chromium-molybdenum steel rail showed poor fracture toughness. Test results indicate it might be desirable to lower the alloy content of this steel to get a better combination of strength and toughness. The third rail failed by fatigue initiated at a badly ground weld reinforcement. This points up the importance of grinding welded rail very carefully to avoid stress-raising notches.

Proceedings of the 77th Technical Conference, AREA, Palmer House, Chicago, Illinois, March 20-22, 1978.

Park, YJ Stone, DH (Association of American Railroads)  
American Railway Engineering Association Proceeding Vol. 79 Bulletin 668, June 1978, pp 413-446, 27 Fig., 2 Tab.

ACKNOWLEDGMENT: AREA

ORDER FROM: ESL

DOTL JC

01 183298

**STRESS CONCENTRATION EFFECT OF NONMETALLIC INCLUSIONS AND ITS EFFECT ON FATIGUE CRACK INITIATION IN RAIL STEEL**

Fatigue crack initiation has been examined under reverse bend loading conditions to determine the effect of sulfide stringer inclusions in fully pearlitic rail steels. All the specimens were machined either from the head of rails or from the web or tread of wheels. Fatigue initiation occurs at sulfide inclusions located near the surface. The initiation data show that the endurance limit in the rail steels is a function of the inclusion content when the sulfide stringer inclusions are aligned parallel to the specimen axis. The endurance limit is greatly reduced, and becomes independent of the inclusion content in the rail material, when the stringer inclusions are aligned perpendicular to the specimen axis. The endurance limit for the wheel material, which has a random sulfide orientation, is independent of inclusion content for the narrow range in inclusion content considered. A correlation between the endurance limit and the finite failure is proposed for these steels. The difference in the endurance limit and the failure between the rail and wheel steels can be explained in terms of an effective stress concentrator arising from the variation in inclusion morphology and orientation.

Proceedings of the 77th Annual Technical Conference, AREA, Palmer House, Chicago, Illinois, March 20-22, 1978.

Fowler, GJ Tetelman, AS (Failure Analysis Associates)

American Railway Engineering Association Proceeding Vol. 79 Bulletin 668, June 1978, p 447, 13 Fig., 4 Tab., 17 Ref.

ACKNOWLEDGMENT: AREA  
ORDER FROM: ESL

DOTL JC

**01 183301****SYMPOSIUM ON CROSSTIES**

This symposium consisted of three presentations: Timber Ties by G.M. Titus; Concrete Ties by J. Weber; and Reconstituted Timber Ties by E. Potter. Of 873 million cross ties in the U.S., 99.8% are timber. Concrete cross ties have been produced in three major types and installations on four railroads and the FAST track are described. The evolution of a concept for using sawmill waste into a method for recycling cross ties is described and a series of laboratory and service tests of reconstituted wood ties is included in the final section.

Proceedings of the 82nd Annual Conference of the American Railway Bridge & Building Association, Chicago, Illinois, September 26-28, 1977.

Titus, GM (Railway Tie Association); Weber, J (Track Systems);  
Potter, E (Cedrite Corporation)

American Railway Bridge & Building Association Proceeding Volume 82, 1977, pp 66-82

ACKNOWLEDGMENT: American Railway Bridge & Building Association  
ORDER FROM: American Railway Bridge & Building Association, 18154 Harwood Avenue, Homewood, Illinois, 60430

**01 183308****CN PUTS CONCRETE INTO CURVES**

Based on its Canron P-811 Track renewal train, Canadian National is pushing the installation of concrete ties, a projected 1.5 million in 5 years, on its heavy-traffic lines handling at least 25 MGT per mile per year in 100-ton cars and having curvature exceeding 2 degrees. Tests extending back six years have proved the superiority of concrete ties on such track.

*Progressive Railroading* Vol. 21 No. 9, Sept. 1978, 5 pp, 8 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

**01 183528****RESILIENT RESPONSE OF RAILWAY BALLAST**

The resilient responses of five typical open-graded aggregate materials (dolomitic limestone, blast-furnace slag, granitic gneiss, basalt, and gravel) that are used for railway ballast were measured in a triaxial cell. Three levels of compaction and seven stress levels were used. The results were used in regression analyses to develop equations relating the resilient modulus of a specimen to its first stress invariant. They were also used in correlation analyses attempting to relate the resilient response to the physical properties (particle index, specific gravity, Los Angeles abrasion, gradation, flakiness, soundness, and crushing index), but no consistent relations were established. It is concluded that (a) the resilient response of a specimen is essentially independent of its stress history, (b) the resilient moduli of no. 4 and no. 5 ballast-gradation specimens are usually lower than that of a well-graded aggregate, (c) the resilient moduli of open-graded ballast materials are virtually insensitive to changes in gradation or compaction level and (d) the variable that most directly influences the resilient moduli of granular materials is stress level. /Author/

This paper appeared in Transportation Research Record No. 651, Concrete, Aggregates, Marking Materials, Corrosion, and Joint Seals.

Knutson, RM (Kansas University); Thompson, MR (Illinois University, Urbana) *Transportation Research Record* No. 651, 1977, pp 31-39, 20 Fig., 2 Tab., 12 Ref.

ORDER FROM: TRB Publications Off

**01 183574****KCS'S SECOND GENERATION CONCRETE TIES**

Kansas City Southern first installed concrete cross ties to counter moisture-caused deterioration of wooden ties in the Gulf region where low temperatures presented no problem. After having greatest success with concrete ties under welded rail, KCS redesigned its tie and the fastening system so that these ties are now scheduled for use on every district of the railroad. The 1978 program involved 10,000 concrete and 362,000 wooden ties.

*Progressive Railroading* Vol. 21 No. 10, Oct. 1978, 3 pp, 4 Phot.

ACKNOWLEDGMENT: Progressive Railroading  
ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

**01 183576****MEASUREMENTS ON THE BALLASTLESS TRACK AT RHEDA**

[Messungen am Schotterlosen Oberbau in Rheda]

Many measurements at up to train speeds of 250 km/h have been made on the ballastless track in Rheda station which was built in 1972 as part of the wheel-rail research project. The authors report here on some of these measurements, also on the effect of the longitudinal waves on the rails and defects in the track supports. The deformation characteristics of the concrete deck are also discussed. One outcome of these measurements is a recommendation that the dynamic influence should also be recorded in track measurement work. [German]

Eisenmann, J Duwe, B (Technical University of Munich, West Germany)  
*Eisenbahntechnische Rundschau* Vol. 27 No. 7-8, July 1978, 5 pp, 8 Fig., 3 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**01 183577****COMPUTER-ASSISTED WORK PLANNING AND CONTROL IN**

**THE WAY AND WORKS DEPARTMENT [Rechnerunterstuetzte**

**Fertigungsplanung und-steuerung im Oberbaudienst]**

In a single year the Way and Works Department of the DB has to renew about 1,600 to 2,500 km track, 4,000 to 6,000 switch points, and do systematic maintenance on 8,000 to 10,000 km track and 4,000 to 5,000 switch points. This large volume of work, its co-ordination with train-running requirements, the handling of the materials, the high capital employment and wage costs, call for exact and responsive planning and work preparation, also the examination of variants and a good-functioning information system on costs and adherence to target dates. In order to master all these tasks, the DB decided to introduce computer-assisted work planning and control in the Way and Works Department. In considering the optimal procedure, attention was centered on the three aspects of planning, control and monitoring. Work progress is the focal point, and all other aspects such as capacity planning for men and machines, operational arrangements, material requirements, target dates and cost control, are subservient to it. The system chosen, which is to be operated jointly by the Way and Works Department and the Data Processing Service, is described here. It will be introduced in stages, and all personnel concerned, including those at executive levels, will be given thorough training. [German]

Hock, D Stuchly, H *Eisenbahntechnische Rundschau* Vol. 27 No. 7-8, July 1978, 5 pp, 3 Fig., 3 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**01 183578****MEASURING AND ANALYZING EQUIPMENT OF THE 725/726**

**TRACK-RECORDING RAILCAR [Die Mess-und Anlysierereinrichtung des Gleismesstriebzuges Baureihe 725/726]**

Since the beginning of 1976 there have been five railcar units employed as track-recording vehicles on the DB. Their vehicular details were described in ETR No. 7/8, 1976, pp 462-467. The present article describes the measuring and recording equipment. [German]

Weigend, M *Eisenbahntechnische Rundschau* Vol. 27 No. 7-8, July 1978, 5 pp, 8 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**01 183592****RAIL CORROSION [La corrosion des rails]**

After a brief study into the resistance of rail steels to corrosion, the authors list the various types of corrosion encountered in track, and examine more

particularly the remedies, which involve using protective coatings. SNCF experience in this field spans 15 years of research and observation. [French] Gence, P Fedrizzi, J *Revue Generale des Chemins de Fer* May 1978, pp 320-330, 21 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

01 183608

**USE OF PLASTIC PLATES IN CONCRETE SLEEPERS ON THE CSD [Pouzitie plastickyh vloziek do betonovych podvalov u CSD]**

The search for design and materials for plates for concrete sleepers is an important and complex matter for the CSD, which is proposing to use plates made of hardened plastic. Results have been obtained both in the laboratory and on the track. They are highly positive, from both the technical and economic points of view, and also with respect to operating and traffic safety. [Czech]

Brida, J *Zbornik Prac* No. 11, 1977, pp 183-204, 7 Fig., 2 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Vysoka Skola, Dopravna v Ziline, Moyzesova 20, 010 00 Zilina, Czechoslovakia

01 183705

**RAIL ANALYSIS. VOLUME 2: ENGINEERING COST-RISK ANALYSIS OF DEFECTIVE RAIL**

This report develops a program that is aimed at reducing costs associated with rail failures and defects. The approach taken is to develop a computer model which takes into account the defect growth, detector car inspection, and rail failure processes. With accurate input data, such a model will permit the identification of the most cost-effective approach for controlling rail failures and derailments. Modifications in inspection and maintenance procedures, material selection and rail loadings can be explored.

Johnson, DP Besuner, PM  
Failure Analysis Associates Tech Rpt. R-265, June 1978, 170 pp, Figs., Tabs., 47 Ref., 8 App.

Contract FAA-75-1-1(B)

ACKNOWLEDGMENT: Failure Analysis Associates  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 183706

**RAIL ANALYSIS. VOLUME 3: STATISTICAL ANALYSIS OF RAIL DEFECT DATA**

Rail defect data from six locations on American railroads are summarized and analyzed using Weibull probability distributions. A five-fold difference in rail sites was found to be statistically significant. Rail defect life was found to vary with the fourth power of stress which explains high defect rates in lighter rail under the same loading conditions. Equations for defect occurrence as a function of traffic and stress are given.

This report covers a portion of the AISI-AREA-AAR Rail Research Program.

Besuner, PM Stone, DH DeHerrera, MA Schoeneberg, KW  
Association of American Railroads Technical Center, Failure Analysis Associates R-302, June 1978, 79 pp, 38 Fig., Tabs., 63 Ref., 1 App.

Contract FAA-75-1-1 (C)

ACKNOWLEDGMENT: Association of American Railroads Technical Center, Failure Analysis Associates  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 183707

**RAIL ANALYSIS. VOLUME 4: METALLURGICAL EXAMINATION OF RAILS WITH SERVICE-DEVELOPED DEFECTS**

A metallurgical analysis was made of 33 carbon-steel rail samples selected from service, 31 of which had service-developed defects. The program was formulated to attempt to establish the metallurgical characteristics that promoted the defects and to establish possible interrelationships among these characteristics, the in-location service stresses, and the defects. This

work was performed by U.S. Steel Research under contract with the Ad Hoc Committee on Rail Research, which is comprised of representatives of the American Railway Engineering Association (AREA), the Association of American Railroads (AAR), and the American Iron and Steel Institute (AISI) Committee on Railroad Materials. The present report describes chemical analyses, hardness and tension tests, and the results of wear, deformation, metallographic, and fractographic analyses. A companion report describes the results of Charpy V-notch impact tests, fracture-toughness tests, and fatigue tests. The results of this investigation showed that (1) all the service-developed defects in the rail samples examined were fatigue cracks and (2) all these fatigue cracks initiated at sharp internal notches such as inclusions. A correlation between the metallurgical properties of the rail samples and defect formation could not be made. Overall, it is reasonable to conclude that the service lives of the rails investigated would have been longer if the inclusions responsible for crack initiation had not been present. However, it should be noted that most of these rails had service lives lasting 16 years (500 million gross tons or 455 million metric tonnes), with one sample lasting 22 years (755 MGT or 685 MMT). Furthermore, the service stresses, although unknown, were apparently severe, as evidenced in the deformation of the rail heads.

Work performed as part of AISI-AREA-AAR Rail Research Program.

Sonon, DE Pellegrino, JV Wandrisco, JM  
United States Steel Corporation Res Rpt. R-300, Mar. 1978, 69 pp, Figs., 7 Tab., 13 Ref., 3 App.

ACKNOWLEDGMENT: United States Steel Corporation  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 183708

**RAIL ANALYSIS. VOLUME 5: FATIGUE AND FRACTURE BEHAVIOR OF CARBON-STEEL RAILS**

The Ad Hoc Committee on Rail Research, which is composed of representatives from the American Railway Engineering Association (AREA), the Association of American Railroads (AAR), and the American Iron and Steel Institute (AISI) Committee on Railroad Materials, formulated a program to investigate the effects of metallurgical properties, mechanical properties, and applied-stress conditions on the service fracture behavior of carbon-steel rails. This report on work conducted under contract with the AAR and the AISI, describes the fatigue and fracture behavior of five rails having extremes in room-temperature tensile properties and Charpy V-notch toughness, and gives an analysis of the effect of this behavior on the in-service useful life of carbon-steel rails. These five rails were selected from a population of about 90 rails that were removed from service because they contained service-developed defects. A companion report describes the results of chemical analysis, of hardness and tension tests, and of wear, deformation, metallographic, and fractographic analysis. The results of the fractographic investigation (also conducted under AAR-AISI contract), which are presented in the companion report, showed that in-service fatigue cracks initiated from inclusions having a width of about 1.0 mil (0.025 mm). The results of the present investigation showed that fatigue-crack initiation from such small discontinuities occurs when the magnitude of the stress fluctuations applied to the rail head with the passage of each wheel is about equal to the tensile strength of the steel. The thin inclusion stringers from which fatigue cracks initiated in the long-service-life rails of this study cannot be detected with current nondestructive inspection procedures, and production of rails without such inclusion would be economically prohibitive. The results also showed that the fatigue-crack-propagation behavior of the various carbon-steel rails was essentially identical, and was independent of chemical composition or mechanical properties. Moreover, the dynamic fracture toughness of these rails at the minimum operating temperature of about minus 30 F (minus 35 C) was about 25 ksi/sq in. (27.5 MPa/sq m) and a significant increase in the fracture toughness of the rails would result in a negligible increase in their useful fatigue life.

Work performed as part of AISI-AREA-AAR Rail Research Program.

Barsom, JM Imhof, EJ, Jr  
United States Steel Corporation Res Rpt. R-301, Mar. 1978, 50 pp, 17 Fig., 1 Tab., 9 Ref.

ACKNOWLEDGMENT: United States Steel Corporation  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP



01 183884

**METHODOLOGY FOR QUANTIFICATION AND MEANS OF IMPROVEMENT OF TRACK STRUCTURE CONDITION WITH A PARTICULAR INTEREST TO ITS HETEROGENEITY**

After Phase I showed that maintenance did not remove the varying track conditions which existed previously, Phase II was undertaken to determine how the varying conditions are affected by the different track maintenance operations and the sequence in which they are performed. Investigated were the ballast compacting time, the penetration of the tamping tool and the position of the ballast cleaner in the consist of M/W machinery. Rules were suggested for quality control between the respective M/W operations and for acceptance of an overhauled track.

Report on Phase II of the Project under the USA-DOT Project Agreement No. 5.

Polish State Railways RRD-1, 1978, 52 pp, Figs., Tabs., 15 Ref.

ORDER FROM: Polish State Railways, Institute for Railway Research, Warsaw, Poland

DOTL RP

01 183886

**EFFECT OF DESIGN PARAMETERS ON TRACK SUPPORT SYSTEMS**

A finite-element structural-analysis model for conventional railway-track support systems previously developed was used as the basis of a study of design parameters to establish the effects of the various parameters on the instantaneous-elastic response of a support system. The parameters studied were type and depth of ballast, type and depth of subballast, subgrade-support conditions, rail size, tie spacing, wheel loading, and number of missing ties. The study indicated that type of ballast and rail size do not significantly affect the instantaneous-elastic response of a support system, but the stabilized subballast, the subgrade-support condition, and the wheel loading are major parameters that do.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Tayabji, SD (Drexel University); Thompson, MR (Illinois University, Urbana) *Transportation Research Record* No. 653, 1977, pp 2-11, 7 Fig., 10 Tab., 19 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

01 183887

**IMPROVEMENT IN RAIL SUPPORT**

An on-going investigation on rail support material is briefly summarized. Static and repeated-load triaxial compression and extension tests on a dolomite ballast are reported, and their significance to track design is discussed. Model tests using static and repeated loading on a small scale with Ottawa sand as a foundation material and on a large scale with rail track, ballast, subballast, and sandy subgrade were made, and the significance to tie and track design of their results is discussed.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Raymond, GP (Queen's University, Canada) *Transportation Research Record* No. 653, 1977, pp 11-21, 17 Fig., 6 Ref.

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01 183888

**TRACK STRUCTURE SYSTEMS**

The railway track-system concept is a way of looking at things that takes into account secondary and tertiary effects in the totality of cause and effect. A track system is not simply a collection of curves, tangents, switches, frogs, turnouts, crossings, and crossovers, but includes the interrelations among the various components--the rails, ties, ballast, fasteners, and subgrade. One of the earliest railway engineers to employ system thinking was Robert L. Stevens of New Jersey, who in 1830 conceived the flat-bottomed-tee rail and the first cut spikes and joint bars. Later, he evolved the idea of wooden crossties. He single-handedly developed the basic system of mutually complimentary components used in railroad trackage today. The next system thinker to have a profound influence on track technology in North America was Arthur N. Talbot of the University of Illinois, who developed the concept of the modulus of elastic track support, first reported in 1918. This was a quantifiable response to load of ties, ballast, fasteners, and

subgrade material that can be used to predict track deformation under vertical load. The Stevens' legacy was a system design of railway track, and Talbot's contribution was a system analysis of track structure. Talbot also left a challenge because, while track performance can be predicted when the modulus is known, how to design to a modulus has not yet been learned. The rate of return on incremental investment in individual track components can be determined only by full-scale experiments. The new full-scale laboratory the Association of American Railroads is building in Chicago should bring about validation of mathematical models of track that are being developed. This new laboratory will permit applications of calibrated loads to full-scale test sections of track, and the resulting deformations and stresses can be measured. The really important system is not the track system nor the equipment system, but the train-and-track system. An example of train-and-track system thinking occurred in 1934 when the Pennsylvania Railroad chose the GG-1 locomotive over its competitor because of lower wheel and axle loadings. Technical decisions must be influenced by economic and political factors, and track systems are no exception. An example today is the question of proper superelevation on curves, and the answer depends in part on the kind and amount of intercity rail passenger service that will be provided, which is a political question. Even more significant is the question of right-of-way ownership. Would a private company choose a lower axle-load locomotive if it were to be operated over track the company did not own?

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Way, GH, Jr (Association of American Railroads) *Transportation Research Record* No. 653, 1977, pp 21-24

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01 183889

**PROBLEMS AND NEEDS IN TIE AND FASTENER RESEARCH**

The advantages of the timber crosstie--relatively low cost; traditional ready availability; toughness, resilience, and strength; allowance for a flexible system of support; relatively long useful life; and availability of a relatively inexpensive fastening system--are compared with its disadvantages--increasing cost; decreasing availability; economic relation to competing demands for timber; suitability for timber; suitability for increased train lengths, equipment configurations, and wheel loads; and availability of satisfactory substitutes. Similarly, the advantages of the crosstie fastening system used in North America--relatively low cost, ease of application, satisfactory service for many years, and flexibility of tie loading--are compared with its disadvantages--selective loading of individual ties and mechanical wear in the tie plate and spike holes. Areas for research suggested by the disadvantages are enumerated.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Hutcheson, TB (Seaboard Coast Line Railroad Company) *Transportation Research Record* No. 653, 1977, pp 24-26, 1 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

01 183890

**TRACK-STRUCTURE ANALYSIS: METHODOLOGY AND VERIFICATION**

Track behavior under traffic and environmental conditions can be predicted by using appropriate methods of analysis. Well-developed concepts and procedures in the structural engineering field are used to illustrate methods of track analysis. These procedures are based on assumptions that often require verification by laboratory or field tests. In this paper, some of the approaches to the analysis of track structure and the methods for laboratory and field tests are discussed.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Hanna, AN (Portland Cement Association) *Transportation Research Record* No. 653, 1977, pp 26-32, 16 Fig., 16 Ref.

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01 183891

**TRACK STRUCTURE AT FACILITY FOR ACCELERATED SERVICE TESTING**

An overview of the track structure at the Federal Railroad Administration Facility for Accelerated Service Testing is presented in this paper. The facility consists of a 7.7-km (4.8-mile) loop of relatively conventional railroad track at the U.S. Department of Transportation's Transportation Test Center near Pueblo, Colorado. In September 1976, a loaded freight train began traveling the loop 16 h/d and was scheduled to continue doing so for 1 year, subjecting the track to as much loading as is hauled over an average freight line in 10 years. Many types, makes, sizes, and arrangements of track components (rails, ties, fasteners, and ballast) are used in the 22 track sections of the loop. The rail elements being tested include five types of rails with varying metallurgy or heat treatment, various frogs and guardrails, jointed and continuously welded rail, insulated and glued joints, and four turnouts. Steel, prestressed concrete, reconstituted, and laminated ties were installed, in addition to several kinds of wooden ties. Differing arrangements of cut, elastic, screw, and lock spikes are used, as are various special rail fasteners and tie plates. Granite, limestone, traprock, and slag ballasts of varying depths and shoulder widths are included. The accelerated service test will provide information on the durability and maintenance requirements of these components. An extensive system of observations and measurements has been scheduled to ensure safety and collect data for immediate and long-range analysis. The results should provide the industry with new tools and knowledge to improve railroad safety, reliability, and operating economy.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Nussbaum, E (Mitre Corporation) *Transportation Research Record* No. 653, 1977, pp 32-37, 6 Fig., 1 Tab., 2 Ref.

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DOTL JC

01 183892

**PROBLEMS AND NEEDS IN TRACK STRUCTURE DESIGN AND ANALYSIS**

This paper reviews the design aspects of old and new track systems, the research needs in track structure design, and methods of track analysis.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Kerr, AD (Princeton University) *Transportation Research Record* No. 653, 1977, pp 38-45, 9 Fig., 62 Ref.

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01 183893

**USE OF FLOATING-SLAB TRACK BED FOR NOISE AND VIBRATION ABATEMENT**

Underground rail rapid transit systems can produce ground-borne vibration and noise from trains that creates intrusion in buildings located close to the underground facilities. This intrusion is usually a low-frequency (31.5- to 125-Hz range) noise or rumble transmitted via the intervening ground to the building structure. The use of floating-slab track bed, concrete slabs supported on resilient elements, to isolate the vibration of the rail support from the subway structure has been effective in reducing the transmission of vibration and noise to the surrounding ground and nearby buildings. This paper presents details on two types of lightweight floating-slab track bed; i.e., the continuous and the discontinuous designs. Some sections of continuous floating-slab track bed are in service at the Washington Metropolitan Area Transit Authority Metro System, and measurements of the reduction of the noise and vibration levels are presented.

This article appeared in Transportation Research Record No. 653, Track Systems and Other Related Railroad Topics.

Wilson, GP (Wilson, Ihrig and Associates) *Transportation Research Record* No. 653, 1977, pp 45-58, 8 Fig.

ORDER FROM: TRB Publications Off

DOTL JC

01 183900

**STRESSES AND DEFORMATIONS IN RAILWAY TRACK**

An investigation conducted during the period May 1976 to April 1977 to study the behaviour of granular-type materials used in railroad track is

reported. This work entailed three sections: investigations of the properties of ballast, which include oedometer repeated loading tests, vibration tests, and triaxial static and repeated loading tests on four sample ballast materials; testing of model plane strain footings of different widths under static and repeated loading conditions; and testing of a circular footing under static loading. The work on the properties of ballast represents an extension of that reported in CIGGT Report No. 75-10 and especially in CIGGT Report No. 76-11. An orthogonal experiment based on the hardness-toughness dimensions identified during the past year was designed, with one ballast representing each quadrant of the matrix.

Raymond, GP

Canadian Institute of Guided Ground Transport Final Rpt. CIGGT-77-15, Nov. 1977, 105 pp, Figs., Tabs., Refs., 1 App.

ACKNOWLEDGMENT: CIGGT

ORDER FROM: CIGGT

DOTL RP

01 183902

**A FORMATION OF BITUMINOUS CONGLOMERATE FOR THE NEW LINES: THE EXPERIENCE GAINED ON THE ROME-FLORENCE "DIRETTISSIMA"**

Impermeability, resistance to frost and to fatigue and the property of self-repair form the most important characteristics which have favoured the use of bituminous conglomerates, as an alternative to the ballast foundation of cemented aggregate, for the construction of the formation on the new Rome-Florence "Direttissima" of the Italian Railways. The thickness of the layer was determined by a method of calculation based on the dynamic characteristics of the material and checked by means of the tables for the dimensioning of flexible pavings, then verified in situ by means of tests, the most outstanding features of which are described.

Celard, B (ESSO France, France); Conti Puorger, A Pisani, M (ESSO Italiana, Italy); Zocca, A *Rail International* No. 5, May 1978, pp 300-320, 25 Fig.

ACKNOWLEDGMENT: Rail International

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DOTL JC

01 183905

**THE STRESSES OF THE TRACK UNDER MIXED TRAFFIC AND THE ADVANTAGES RESULTING FROM INTERCONNECTED SYSTEMS (ROME-FLORENCE LINE)**

For new lines the idea of mixed traffic with speeds beyond 200 km/h, even apart from the more severe conditions to be imposed on the alignment both from the geometric and from the kinematic aspect, means nothing less than a more complex problem in regard to the track concerning the possibility of maintaining high standards of quality and the innovating trends aimed at strengthening the permanent way. After having dealt with the most prominent features of the dynamics of the track with regard to the stability of the lateral bed under the effect of transverse dynamic stresses transmitted by the vehicles through the wheel-rail interaction, the article refers to the first results of new tests carried out under dynamic load, recently finalized by the FS, and which have a considerable interest. The levels of stresses corresponding to the various types of existing vehicles for fast and "slow" traffic are quoted and then the advantages resulting from the interconnected lines are defined, by referring more particularly to the putting in hand of the project, already partially completed, of the Rome-Florence "Direttissima" suitable from its nature, for the adoption of the optimum operating solutions within the limits of its compatibility with the traditional permanent way.

Pandolfo, A *Rail International* No. 6, June 1978, pp 407-421, 15 Fig.

ACKNOWLEDGMENT: Rail International

ORDER FROM: ESL

DOTL JC

01 183909

**BS11 RAILWAY RAILS**

This revised standard specifies requirements for flat-bottom rail and for the only bullhead rail still used in significant quantities, thus superseding BS9, the former standard for bullhead rail. Both traditional ingot casting and continuous casting practices are catered for in the revision, and wear-resistant rail grades appear for the first time. Metric sizes and dimensions make their appearance also, but imperial dimensions are retained as all rail profiles are based on imperial designs.

British Standards Institution No Date, n.p.

ACKNOWLEDGMENT: Railway Gazette International  
ORDER FROM: BSI Sales Department, 101 Pentonville Road, London N1 9ND, England

01 184620

**M/W PROBE 6--BURLINGTON NORTHERN**

Three articles describe the philosophy and practices of the maintenance of way department of the longest U.S. railroad. Charting the direction; keeping on course is an interview with W.S. Johnston, vice president-maintenance and engineering discusses managerial viewpoint in the midst of a huge trackwork program. M/W practices reflect merger factors, traffic growth is an interview with top engineering officers on track strengthening, gang mechanization, effects of heavy loads; search for harder rail and track standards. Design advances, railroad needs dictate bridge practices discusses use of weathering steel, welded fabrication, prestressed concrete girders, and in-place treatment of timber trestles. Unit coal trains required reconstruction of long bridge across Missouri River.

*Railway Track and Structures* Vol. 74 No. 11, Nov. 1978, pp 21-31, 6 Phot.

ORDER FROM: ESL

DOTL JC

01 184653

**WELDING MAINTENANCE AND REPAIRS TO RAILS AND CROSSINGS ON BRITISH RAIL TRACKS**

The introduction of high speed trains with faster acceleration and deceleration has resulted in a growing incidence of wheelburns on the rails and accelerated wear on crossings which has increased the number of repairs that have to be made by welding. Another important point is that modern power units deliver their power through smaller driving wheels. Both of these factors contribute to an increase in the rate of wear on the rails and permanent way. The welding maintenance operations and equipment for this purpose in use by British Rail are described in detail.

*Welder* Vol. 41 No. 207, 1978, pp 6-9

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

01 184738

**IOWA GRAIN SHIPPERS HELP THEMSELVES BY HELPING RAILROADS**

Branch-line rehabilitation in northwestern Iowa is being financed with interest-free loans from grain shippers and the state. Improved transportation has opened up new markets and is producing major benefits for participating grain elevator operators. The specific case of a shipper organization and Rock Island's rehabilitation of a 110-mile branch line is described.

Malone, F *Railway Age* Vol. 179 No. 22, Nov. 1978, 4 p., 2 Phot.

ORDER FROM: ESL

DOTL JC

01 184951

**RAILWAY BALLAST QUARRIES IN NEW SOUTH WALES**

The required particle size distribution and characteristics of railway ballast are listed. The principal sources of rail ballast in NSW are described and comments are made on the petrology of the different rock types used and on geological factors which affect the operation of the quarries.

Workshop on the Geology of Quarries. ARRC, February 1977.

Chesnut, W (New South Wales Geological Survey, Australia); Wylde, LJ

Australian Road Research Board, (0313-3842) *Proceeding* 1978, pp 17-22, 1 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 235048), Australian Road Research Board

ORDER FROM: ESL

01 185342

**DYNAMIC STABILIZATION TO FOLLOW TRACK RENEWALS**

The article describes tests conducted on a track under renewal after ballast cleaning and lifting due to tamping on a somewhat unconsolidated track. It also describes the geometry and lateral resistance of the track before and after its stabilization, together with the effect of the vibrations produced by the dynamic track stabilizer on the neighboring track.

Fortin, JP *International Railway Journal* Sept. 1978, 2 p., 3 Fig., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Simmons-Boardman Publishing Corporation, 508 Birch Street, Bristol, Connecticut, 06010

DOTL JC

01 185347

**DESIGN IMPROVEMENTS IN TRACK MAINTENANCE MACHINES AND HYDRAULIC EQUIPMENT FOR USE IN COLD CLIMATES [Soversenstvovot' putevye masiny i gidravlicheskiy instrument dlja rabot zimoj]**

In the past few years, the SZD has carried out railway construction work in northern and eastern areas of the country where severe climatic conditions make work of this type extremely difficult. On some sections of the Baikal-Amur line, the ground thaws out for only 70 days in the year and this is not sufficient time to carry out track laying and ballasting work. Therefore, some of this work must be carried out in winter weather conditions and special machines are required for this purpose. [Russian]

Svadrnov, VA *Transportnoye Stroitel'stvo* No. 8, Aug. 1978, pp 25-27, 1 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Mezhdunarodnaya Kniga, Smolenskaya Sennaya Pl 32/34, Moscow G-200, USSR

01 185348

**INTEGRAL BALLAST-TRACK BED (CATALOGUE OF TRACK SECTIONS) [El diseno integral del sistema balasto-plataforma (catalogo de Secciones Estructurales)]**

Introduction to the catalogue prepared by the RENFE which describes the specific features on the Spanish rail network and is aimed at providing information on the appropriate ballast and track bed measurements in order to reduce track maintenance costs. The essential parameters take the volume of traffic and track, geometric and technical characteristics into account. [Spanish]

Lopez, A *AIT-Revista* No. 23, Aug. 1978, pp 8-24, 10 Tab., 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

01 185349

**DYNAMIC STABILISER FOR BALLAST BED COMPACTING [Maquina de nueva concepcion para la compactacion de lecho de balasto]**

Description of a new machine, the DGS model, which is used for dynamic compacting of the ballast bed. Tests have shown that after compacting the ballast bed with this machine, the track geometry was found to be of a good standard and the track showed uniform vertical elasticity and high resistance to lateral displacement; traffic could be moved on the line immediately after maintenance work without the need for temporary speed restrictions. [Spanish]

Riessberger, K *AIT-Revista* Vol. N No. 3, Aug. 1978, pp 25-34, 25 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

01 185356

**METHODS FOR DETERMINING THE OPERATIONAL QUALITY OF TRACK, AND TECHNICAL DEVICES USED TO CHECK AND EVALUATE TRACK CONDITION [Metody opredeleniya ekspluatatsionnykh kachestv puti i tekhnicheskije sredstva, primenyaemye dlja proverki i otsenki sostoyaniya puti]**

The system of track inspection (including frequency of inspection, methods used, and components checked) guarantees a timely detection of deviations from established maintenance standards and of defects in the track; such deviations and defects may have an adverse impact on the regularity of train traffic. Given are the types of track inspections and checks, which are subdivided according to the times at which they are performed. A table is included that presents the priorities and times for track inspections and checks by officials. Listed are the areas for which inspections reveal visually perceptible violations of the soundness of track components, and their

deficiencies and failures in meeting maintenance standards. Given are the types of track-measuring devices used to identify places where there are gross divergencies from standards and tolerances for rail gage maintenance and to identify parameters that do not lend themselves to visual inspection. Specified are the conditions considered to be sufficient for maintaining mainline, receiving, and departure tracks in good working order. The procedure for evaluating the operational quality of track in terms of the track's strength and condition is described. [Russian]

Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

All-Union Labor Red Banner Railway Research Inst 1977, 10 p., 1 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

01 188075

**THE BALLAST STORY: II--THE ALTERNATIVES TO FOULED BALLAST**

This installment lists the alternative actions available to the track engineer dealing with fouled ballast. Each of the options is examined in detail, including their limitations and relative costs.

Burns, DR *Railway Track and Structures* Vol. 74 No. 12, Dec. 1978, pp 22-25, 1 Tab.

ORDER FROM: ESL

DOTL JC

01 188077

**VERTICAL "S" CURVE GUIDES CWR STRING TO SUBWAY TUNNEL**

Fabrication of welded rail strings above the tunnel site in which they would be installed for Washington Metro necessitated a delivery arrangement which saw the rail placed in a vertical reverse curve of sufficient radius to avoid exceeding the elastic limit that could have produced permanent kinking. A Soviet-developed portable welder was used in a fixed position with other stations generally found in a butt-welding plant. The string then passed over rollers in a trench and through an entry into the subway where roller supports at varying heights completed the 45-ft drop to the tunnel invert. On the floor, rollers were used to move the strings to their installation sites.

*Railway Track and Structures* Vol. 74 No. 12, Dec. 1978, pp 31-33, 5 Phot.

ORDER FROM: ESL

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01 188082

**PAVED TRACK**

In Tokyo and in other large cities where the frequency of electric trains is high, work on the track has to be done at night after the passage of the last train and before the first train the next morning since the intervals between trains during the day is insufficient. Starting in 1978 the Japanese National Railways began using paved track on these lines to reduce maintenance requirements. With development of efficient construction equipment, it is planned to install 20 km of this asphalt-filled track structure annually.

Inoh, T *Japanese Railway Engineering* Vol. 18 No. 2, 1978, pp 9-10, 2 Fig., 1 Phot.

ORDER FROM: ESL

DOTL JC

01 188085

**A COMPUTER APPROACH TO EJ&E'S UNUSUAL M/W PROBLEMS**

Elgin, Joliet and Eastern combines complete mechanization of its maintenance of way operations with a computerized support system that includes a standard cost format for planning and monitoring the work and management by objectives to help ensure performance within that format.

Malone, F *Railway Age* Vol. 179 No. 23, Dec. 1978, pp 22-24, 3 Phot.

ORDER FROM: ESL

DOTL JC

01 188099

**INTEGRATED MANAGEMENT SYSTEM FOR RAILWAY TRACK MAINTENANCE. DESCRIPTION OF THE SYSTEM AND SUB-SYSTEMS [Système de gestion intégrée de la maintenance des voies ferrées. Description du système et des sous-systèmes]**

The system has twelve subsystems that are closely linked for capturing, arranging, storing and processing the basic information for judging the state of the track, deciding on what work is to be done and on priorities, planning in terms of time and space, and monitoring what has been done and the administrative aspects. [French]

Rivier, RE Ho, QM

State University of Lausanne, Switzerland 1977, 94 p., 8 Tab., 21 Phot., 43 Ref., 24 App.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: State University of Lausanne, Switzerland, Technical Institute of Transportation, Lausanne 1007, Switzerland

01 188115

**EFFECT OF COLD WORKING OF BOLT HOLES ON RAIL LIFE**

Fatigue tests were conducted to evaluate the effectiveness of cold working bolt holes to retard cracking. No cracks were produced in rails either with or without cold-worked holes. In the tests, the joints were subjected to bending stresses only. It is recommended that tests be made on equipment which will produce tensile as well as bending stresses to more nearly simulate conditions in track.

AAR Project No. H-119.

Wisnowski, MJ Linn, TB

Association of American Railroads Technical Center Res Rpt. AAR Rpt R-311, June 1978, 12 p., 1 Fig., 1 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188118

**FATIGUE ANALYSIS OF RAIL SUBJECT TO TRAFFIC AND TEMPERATURE LOADING**

This report utilizes a fatigue analysis methodology in the prediction of rail service life. The occurrence of transverse rail defects under longitudinal rail stresses is particularly addressed. This methodology, which has been successfully applied to various types of structures subject to complex load spectra, uses a three dimensional characterization of the load environment in conjunction with material properties, presented in the form of Modified Goodman Diagrams. The fatigue analysis, which is based on linear cumulative damage theory, utilizes the three dimensional stress spectra obtained by combining the contact, bending and temperature stresses, to predict the occurrence of transverse defects in the rail head. This analysis is performed for several different rail sections, of similar metallurgy, to show the effect that rail section has on fatigue life. This predicted fatigue life is then compared to defect occurrence data obtained from U.S. mainline service.

Zaremski, AM Abbott, RA

Association of American Railroads Technical Center AAR Rpt R-315, July 1978, 40 p., 38 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188119

**FAILURE ANALYSIS OF RAILS FROM FACILITY FOR ACCELERATED SERVICE TESTING**

Failure analyses have been made of three rails from the Facility for Accelerated Service Testing (FAST). A standard 115 lb (57 kg/m) rail showed severe wear from heavy wheel loads of 100 ton (90.7 Mg) cars. This rail also had a detailed fracture. A high-strength chromium-molybdenum steel rail showed poor fracture toughness. Test results indicate it might be desirable to lower the alloy content of this steel to get a better combination of strength and toughness. The third rail failed by fatigue initiated at a badly ground weld reinforcement. This points up the importance of grinding welded rail very carefully to avoid stress-raising notches.

AAR Project No. K-102.

Park, YJ Stone, DH  
Association of American Railroads Technical Center Res Rpt. AAR  
Rpt R-316, July 1978, 45 p., 27 Fig., 2 Tab., 7 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188120

#### EVALUATION OF PLAIN AND HEAT-TREATED RAIL MANUFACTURED BY NIPPON KOKAN KK

Evaluations were made of metallurgical and mechanical properties of 136RE rail manufactured by Nippon Kokan K. K. Un-heat-treated, quenched and tempered, and slack-quenched specimens were examined. It was found that all mechanical properties tested were satisfactory and that the impact resistance of the slack-quenched specimen was superior to that of the conventionally treated (quench and temper) specimen. However, potentially detrimental inclusions of an anomalous nature in all three kinds of rail were found. The hardness variation within the head of the slack-quenched specimen was found to be somewhat irregular. The anomalous inclusions could probably be eliminated by minor adjustments in the steel making process or equipment. The irregular hardness profile is apparently inherent in the application of slack-quenching to rail steel.

AAR Project No. H-111.

Fleming, LD  
Association of American Railroads Technical Center Res Rpt. AAR  
Rpt R-318, Aug. 1978, 46 p., 28 Fig., 5 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188122

#### FAILURE ANALYSIS OF A HEAD-HARDENED RAIL FROM FAST

The failure of a head-hardened rail at the Facility for Accelerated Service Testing (FAST) was attributed to fatigue. The failure occurred at a flash-butt welded joint in a 136 lb/yd (67.5 kg/m) section which had been on the high side of a curve. The failure began on the gage side of the rail at the highly stressed head-to-web fillet. Metallurgical examination showed evidence of plastic flow and surface roughness resulting from shearing the weld flash from the rail, and some decarburization associated with the welding. It was recommended that close control be exercised in flash welding to avoid decarburization and other weld defects, and that weld surfaces be carefully finished off to be as free as possible of surface defects.

AAR Project No. K-102.

Park, YJ  
Association of American Railroads Technical Center Res Rpt. AAR  
Rpt R-326, Sept. 1977, 16 p., 4 Fig., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188123

#### FATIGUE TESTING OF RAIL BOLT HOLES COLD-EXPANDED BY BOEING COMPANY

The Association of American Railroads investigated the improvement in resistance to fatiguing at rail bolt holes by cold expansion of the hole diameter. The specimens were prepared by the Boeing Company using their "Split Sleeve Expansion System" to cold-work the bolt holes. The loading cycle was selected to simulate the cyclic reversal of flexure of rails in service. However, the loads were much higher than service loads to accelerate fatigue crack nucleation. It was found that the cold-worked specimens failed at other locations before bolt hole failure could occur while un-cold-worked specimens failed at the bolt holes.

AAR Metallurgy Division, Project No. H-120. Sponsored by Boeing  
Commercial Airplane Company, Seattle, Washington.

Wisnowski, MJ Fleming, LD  
Association of American Railroads Technical Center Res Rpt. AAR  
Rpt R-327, Oct. 1978, 24 p., 12 Fig., 1 Ref.

Contract P.O. Y311716-0935 N

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188124

#### EVALUATION OF FRENCH RAILS

Rails produced by Sacilor Steel Company, in France, were subjected to a battery of tests to determine whether they met the American Railway Engineering Association's specifications for rail of comparable weight, and to some additional tests not specified by the AREA. The French steel did not conform to the AREA requirements for chemical composition, but the rails showed a better combination of strength, hardness, and toughness. The composition used by the French would be more expensive in the United States than the standard AREA analysis.

AAR Project No. H-111.

Fleming, LD Bawdle, EJ  
Association of American Railroads Technical Center Res Rpt. AAR  
Rpt R-328, Oct. 1978, 26 p., 9 Fig., 5 Tab.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188125

#### ANALYSIS OF FIVE RAIL FAILURES FOR CONRAIL

A detailed failure analysis has been conducted on five rails from Conrail track. In four rails with split webs, the test results indicate that spike maul blows caused the development of the horizontal web cracks. The cracks initiated from deep stampings on the webs in three cases, while the crack started from an inclusion near the web surface in the other case. The result of this study strongly suggest the necessity of taking such steps as will insure that rails are not struck with spike mauls or other tools, especially during cold weather. If it is difficult to enforce such steps, the depth and acuteness of the stampings should be restricted to reduce the occurrence of the web failures by spike maul blows.

AAR Project No. H-124.

Park, YJ  
Association of American Railroads Technical Center Res Rpt. AAR  
Rpt R-329, Oct. 1978, 37 p., 18 Fig., 3 Tab., 4 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

01 188130

#### DETERMINATION OF ADMISSIBLE TEMPERATURE INCREASES TO PREVENT VERTICAL TRACK BUCKLING

An analysis is presented for the determination of the range of "safe" temperature increases in a railroad track, in order to prevent vertical buckling. A general nonlinear formulation of the problem is derived by using the theory of elasticity, the principle of virtual displacements and the variational calculus for variable matching points. In order to simplify the solution it is shown, on a closely related problem, that a number of highly nonlinear terms may be neglected without affecting the final results. The obtained nonlinear formulation for the railroad track is simplified accordingly. The resulting nonlinear equations are then solved, in closed form, and the obtained results are presented graphically.

Kerr, AD (Delaware University, Newark); El-Aini, YM *ASME Journal of Applied Mechanics* Vol. 45 No. 3, Sept. 1978, pp 565-573, 10 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

01 188339

#### TRACK STRUCTURE-OPTIMIZATION OF DESIGN

The South African railways has entered the field of low-speed high-axle-load transportation. The disadvantage is an increase in the track structure maintenance cost or first cost or both. A design procedure based on classical theories, permissible stresses and some qualitative and quantitative performance correlations is explained. This procedure is considered useful for the selection of track standards for a given traffic mix and maximum axle load

on the basis of an equivalent maintenance requirement in comparison to a known index condition. The results can thus be utilized to determine the increase in first cost of the track structure for comparison with capitalized operating savings. The procedure lacks a prediction of rail life but attempts to quantify running top performance and tamping maintenance requirements as a function of ballast and formation stresses. For this purpose different traffic mixes are reduced to a common denominator of equivalent theoretical traffic consisting of 18.5 t axles only.

Lombard, PC (South African Railways) *Civil Engineer in South Africa* Vol. 20 No. 9, Sept. 1978, pp 231-238, 10 Fig., 3 Tab., 19 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 237132)  
ORDER FROM: ESL

01 188346

**SOLUTION TO THE PROBLEM OF RAIL CORRUGATION**

Corrugation of rails was first observed in India over 80 years ago and the only known remedy was grinding. So far a more satisfactory solution could not be found. Corrugation is undesirable as it increases the fuel consumption (by as much as 10 percent) and maintenance expenditure. A solution for prevention of corrugation of rails by increasing the track modulus is presented.

Srinivasan, M *Institution of Eng (India) Journal, Civ Eng Div* No. 58, Jan. 1978, pp 195-201

ORDER FROM: Institution of Eng (India) Journal, Civ Eng Div, 8 Gokhale Road, Calcutta 20, India

01 188349

**TEST EVALUATION AND OPERATIONAL EXPERIENCE WITH MOBILE FLASH-BUTT RAIL WELDER ON AUSTRIAN RAILWAYS**

High standards established by dynamic fatigue, bend and hardness tests which proceeded application in depot and open-line with laying-in of continuous-welded rail and providing longitudinal freedom during de-stressing subsequent to welding long batch-lengths to accelerate working rate.

*Railway Engineer International* 1978, pp 57-58, 5 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

01 188370

**INTERSESSION ACTIVITIES OF THE IRCA 1977-1978. QUESTION 2--TECHNICAL AND ECONOMICAL COMPARISON OF THE DIFFERENT TYPES OF TRACK LAYING: BALLASTED TRACK WITH SPECIAL CONSIDERATION OF THE DIFFERENT TYPES OF SLEEPERS TO BE ENVISAGED--UNBALLASTED TRACK. COMMON CONCLUSIONS**

This is a synthesis of two surveys conducted among member administrations of the International Railway Congress Association about technical and economic considerations in track structures--both of conventional ballasted designs with various types of ties and of ballastless designs. Track is classified by the nature of the traffic it carries--mixed traffic with fast passenger and medium freight, only heavy freight, and predominately fast passenger. Three categories of information are extracted--Track structures, conditions of installation, and maintenance. Considered in the study are rail weight, ties, fasteners, ballast, subgrade and track laid without ballast, usually in tunnels and on elevated structures.

Albrecht, VG (Soviet Railways); Janin, GJ (French National Railways) *Rail International* No. 9, Sept. 1978, pp 543-547

ACKNOWLEDGMENT: Rail International  
ORDER FROM: ESL

DOTL JC

01 188371

**INTERSESSION ACTIVITIES OF THE IRCA 1977-1978. QUESTION 2--TECHNICAL AND ECONOMICAL COMPARISON OF THE DIFFERENT TYPES OF TRACK LAYING: BALLASTED TRACK WITH SPECIAL CONSIDERATION OF THE DIFFERENT TYPES OF SLEEPERS TO BE ENVISAGED--UNBALLASTED TRACK**

This is the report of a survey conducted for the IRCA on track structures, track laying and track maintenance on the following railways: Australia,

Great Britain, Japan, Ireland, USA (Southern Railway), Mexico, New Zealand, Kenya, South Africa, Nigeria, Rhodesia and USSR. With exception of high-speed lines, the criteria determining to a considerable extent the design of rail track is freight traffic density. The Sections: Main operating parameters; Descriptions of various railway track elements, Technical and Economic comparison of various kinds of permanent way and its elements; Conclusions. Among conclusions: Welded track is superior and may be used with concrete or wooded ties; jointed track can be recommended only with wooden ties; rail weight is increasing; rail fasteners still require technical development; hard crushed stone is the preferred ballast; main track rails may be used for relay on secondary lines; track overhauls are fixed by service life of rail; running maintenance can be cyclical or spot with small gangs performing all required repairs.

Albrecht, VG (Soviet Railways) *Rail International* No. 9, Sept. 1978, pp 549-590, Figs., 22 Tab., 1 App.

ACKNOWLEDGMENT: Rail International  
ORDER FROM: ESL

DOTL JC

01 188372

**INTERSESSION ACTIVITIES OF THE IRCA 1977-1978. QUESTION 2--TECHNICAL AND ECONOMICAL COMPARISON OF THE VARIOUS TYPES OF TRACK LAYING: BALLASTED TRACK WITH SPECIAL CONSIDERATION ON THE DIFFERENT TYPES OF SLEEPERS TO BE ENVISAGED; UNBALLASTED TRACK**

This is a report of a survey conducted for the IRCA on track structures, track laying and track maintenance on the following railways: Algeria, German Federal Republic, Argentina, Austria, Belgium, Camerouns, Chile, Ivory Coast, Denmark, Spain, France, Italy, Luxemburg, Morocco, Mauritania, Netherlands, Switzerland and Hungary. For virtually all types of heavy and fast traffic the following are found to be the trends: Rail is 50 to 60 kg/m installed in welded strings and inspected ultrasonically at the mill. Ties may be hardwood, twin-block concrete or monoblock concrete with choice primarily economic. Fasteners must be elastic. Ballast must be of very hard crushed stone at least 20 cm thick. Slab track technology still is evolving. Maintenance costs are lower with concrete cross ties. Conventional track, optimized from the choice of ties on each railway, still remains the most reliable structure.

Janin, GJ *Rail International* No. 10, Oct. 1978, p 669, 15 App.

ACKNOWLEDGMENT: Rail International  
ORDER FROM: ESL

DOTL JC

01 188676

**DESIGN AND ANALYSIS OF A TRACK COMPLIANCE MEASUREMENT SYSTEM. PHASE II**

This report covers the design of a vehicle for measuring the static and dynamic compliance of railroad track. The static compliance system uses the rail deflections due to different axle loads to calculate the track compliance. The static compliance measurements are taken continuously as the vehicle travels a section of track. The dynamic compliance system utilizes an electrohydraulic excitation system capable of cyclically applying in-service wheel loads simulating a passing train and superimposing either pulse, random, or sinusoidal dynamic excitation on the wheel load to dynamically excite the track structure. The excitation and resulting response of the system are analyzed using a digital Fast Fourier Transform program. From these data, the dynamic characteristics of the track structure can be determined. The information in this report is intended for use by research personnel who have an interest in railroad track performance as related to vehicle/track interaction and track maintenance, and in the measurement of track deflections and dynamic characteristics for developing track analysis models and evaluating track structure condition.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Kaiser, WD Meacham, HC Tuten, JM  
Battelle Columbus Laboratories Final Rpt. FRA/ORD-78/57, Nov. 1978, 85 p., 12 Fig., 5 Tab., 3 Ref., 3 App.

Contract DOT-FR-30051

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

01 188679

**THERMAL BUCKLING OF STRAIGHT TRACKS:  
FUNDAMENTALS, ANALYSES, AND PREVENTIVE MEASURES**

This report, written mainly for the practicing railroad engineer, explains the phenomenon of thermal buckling of straight tracks, shows how to analyze it, and describes measures for preventing it. Following an introductory discussion of track buckling problems caused by a temperature increase in the rails, the report describes the distribution of axial forces in the track rails caused by temperature changes. It reviews briefly track buckling test results obtained by a number of railroads. The method of analysis for the determination of a "safe temperature increase", recently developed by the author, is then discussed. To simplify the use of this analysis, the results are presented graphically for a wide range of track parameters, and the use of the presented graphs is demonstrated with examples. It is shown how the graphs may also be used for the determination of the rail installation temperature. The paper concludes with a description of track tests for obtaining the needed parameters, and a discussion of measures adopted by various railroads to prevent thermal track buckling.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Kerr, AD

Princeton University Intrm Rpt. FRA/ORD-78/49, DOT-TSC-FRA-78-14, Sept. 1978, 58 p., 23 Fig., 2 Tab., 28 Ref., 2 App.

Contract DOT-TSC-1149

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

01 188681

**EFFECT OF TORSIONAL FASTENER RESISTANCE ON THE  
LATERAL RESPONSE OF A RAIL-TIE STRUCTURE**

The use of the classical beam bending equations for the analysis of the track response in the lateral plane is of questionable validity, when the used fasteners exhibit a noticeable torsional resistance. To remedy this situation, recently a variety of other track equations were proposed and used. The purpose of the present study is to establish the effect of fastener resistance on the lateral response of the rail-tie structure and also to determine whether a fourth order differential equation, which includes a rotational resistance term, is sufficiently accurate for describing its lateral response. To achieve this aim deflection tests were conducted on a rail-tie structure with adjustable fastener rigidities, then this test-structure was analyzed using a fourth order equation with and without a rotational resistance term, and subsequently the analytical and test results were compared. The test results revealed that with an increasing rotational resistance of the fasteners, the deviation of the test curves, from the case of zero fastener resistance, also increases; thus, the beam bending equation is not suitable, in general, for the analysis of the lateral track response. The comparison of the analytical and test result showed that the measured deflection shapes of the test structure, for a variety of fastener rigidities, agree closely with the deflection shapes obtained using a fourth order differential equation which includes a rotational resistance term, provided the coefficient of this additional term contains the effect of the fastener rigidity and the bending rigidity of the cross-ties.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Kerr, AD

Princeton University, (77-TR-8) Intrm Rpt. FRA/ORD-78/35, DOT-TSC-FRA-77, Sept. 1978, 28 p., 10 Fig., 10 Ref., 1 App.

Contract DOT-TSC-1149

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-290734/AS, DOTL NTIS, DOTL RP

01 188688

**ECONOMICS OF CONCRETE-AND WOOD-TIE TRACK  
STRUCTURES**

This report presents results from an evaluation of the economic benefits of concrete-versus wood-tie track. The analysis includes the life-cycle capital, maintenance, and renewal costs for concrete-and wood-tie track for four specific test cases and traffic ranges from 15 to 40 annual million gross tons (MGT). The sensitivity of the justifiable first cost of concrete ties as a function of parametric changes in service and maintenance variables has also been determined.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

White, DW

Battelle Columbus Laboratories, Bechtel, Incorporated, (TSC-744) Intrm Rpt. FRA/ORD-78/2, DOT-TSC-FRA-78-2, Aug. 1978, 76 p., 3 Fig., 18 Tab., Refs., 4 App.

Contract DOT-TSC-1044

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

01 188689

**EVALUATION OF IMPROVED TRACK STRUCTURAL  
COMPONENTS UNDER SUB-ARCTIC CONDITIONS**

One area of concern to railroads in the northern third of the United States is the effect of frost heave and subsidence on track geometry. The purpose of this study was to evaluate two methods of improving track geometry and reducing maintenance in sub-arctic environments. Test track sections were installed in frost heave areas of the Alaska Railroad. One installation was designed to evaluate concrete ties with adjustable fasteners. The other installation was designed to evaluate the effect of including an elastic polymer stabilizer in the ballast. The concrete tie adjustable fastener section performed satisfactorily. Ties withstood bending stresses induced by the unfavourable frost heaving support conditions. The fasteners provided an acceptable means of adjusting track during frost heave. Stabilized ballast effectively reduced track subsidence due to weak foundation support. However, other problems such as hardening of the binding material and migration of the unstabilized ballast layer, made the particular system used unacceptable at this time.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Weber, JW

Portland Cement Association Final Rpt. FRA/ORD-79/01, Jan. 1979, 100 p., Figs., Tabs., 7 App.

Contract 69-25-0003-4144

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

01 188691

**FLAW DETECTION IN RAILS**

The Physical principles and techniques of magnetic and ultrasonic flaw detection in rails are given. The intended use, working principles and layout of various rail flaw detector systems and the procedure for working with them are described. The methodology of rail inspection, both in the field and at railwelding facilities is also described. The repair of flaw detection equipment on the railroads is examined. The book has been approved by the Chief Administration of Educational Institutions of the MPS (Ministry of Railroads) as a textbook for rail transportation technical schools and by the Academic Council of the State Committee of the USSR Council of Ministers responsible for professional-technological education as a manual for individual-team instruction production workers. It will be helpful to track facility workers involved in the inspection of rails.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. Third Edition (1971), revised and expanded, translated from the Russian by Robert J. Karriker.

Gurvich, AK

Oklahoma University FRA/ORD-77/10, Dec. 1978, 578 p., 246 Fig., 19 Tab., 1 App.

Contract DOT-OS-40091

ACKNOWLEDGMENT: FRA  
ORDER FROM: FRA

DOTL RP

02 053284

**RUNNING SAFETY OF VEHICLES FITTED WITH THE AUTOMATIC COUPLER. COMMENTARY ON INTERIM REPORT RP 5**

The longitudinal compressive force which a vehicle can accept without being derailed is a practicable criterion for assessing the suitability of the vehicle in service when equipped with the automatic (centre buffer) coupler. The methods of calculating the longitudinal compressive force are described in ORE Report B 125/RP 5. The methods of calculation were agreed by UIC and OSJD and those for bogie wagons jointly produced by the two organisations. The calculations are based on specified assumptions, which are explained and proved in this report.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 125/RP 6, Oct. 1977, 39 p., 1 Fig., 2 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

02 053285

**RUNNING SAFETY OF VEHICLES FITTED WITH THE AUTOMATIC COUPLER. METHODS FOR CALCULATING PERMISSIBLE LONGITUDINAL COMPRESSIVE FORCES FOR WAGONS**

This report deals with the methods of calculating the permissible longitudinal compressive forces of wagons in service which are equipped with the automatic (centre buffer) coupler, the methods of calculation having been agreed on between UIC and OSJD. These methods of calculation and also the initial conditions from which the calculations proceed differ from the methods given in Reports RP 3 and RP 4 or ORE Specialists Committee B 125. The agreed method of calculation also covers the two-stage suspension springs for two-axled wagons. Comparative calculations made in accordance with the agreed method of calculation produced the same results. A method of calculation was also agreed on for bogie wagons with two two-axled bogies, taking into account the two-stage suspension spring and the clearance of the elastic side bearers. Consequently, methods of assessment which have been agreed on jointly by UIC and OSJD are available for two-axled wagons and bogie wagons with two-axled bogies to determine the permissible longitudinal compressive force.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 125/RP 5, Oct. 1977, 105 p., 2 Fig., 6 Tab., 3 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

02 053286

**RUNNING SAFETY OF VEHICLES FITTED WITH THE AUTOMATIC COUPLER. SURVEY PROBLEMS--PRESENTATION OF QUESTIONS COVERED**

This report states the reasons which led to the study of Question B 125, though its principal subjects are the problems concerning the safety against derailment of wagons equipped with the automatic coupler. The results obtained using the calculation methods of the B 125 Specialists Committee are discussed. The set of diagrams being prepared for UIC Leaflet 530-2 is explained and clearly illustrated with the aid of some diagrams. The problem of "passenger coaches in a freight train" is treated, and indications are given for the calculation of the permissible longitudinal compressive forces for specified types of wagon.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways Final Rpt. B 125/RP 7, Oct. 1977, 75 p., 21 Fig., 5 Tab., 9 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

02 053290

**PREVENTION OF DERAILMENT OF GOODS WAGONS ON DISTORTED TRACKS. DERAILMENT ON CURVES WITH HIGH CANT AND SMALL RADIUS**

An enquiry was made to investigate whether the conditions of equal value to all the parameters of the track system which has been taken as the basis for the method of calculating the standard characteristics values of freight rolling stock (ORE Report B 55/BP 6) are adequate, and whether the track cant should be introduced as another condition. The report contains the results of an enquiry concerning the derailments having occurred on super-elevated tracks of the different railways and also concerning the laws applied by them to the layout of tracks.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 55/RP 7, Apr. 1978, 19 p., 5 Fig., 11 Tab.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

02 053291

**COMPARATIVE TESTS CONCERNING THE ADHESION OF 3 KV D.C. MULTIPLE UNIT TRAINS (THYRISTOR CONTROLLED AND CONVENTIONAL TYPES)**

Application of the "simplified comparison method" for evaluating the influence of two control systems on the traction efficiency--considered from the adhesion aspect--of multiple unit trains fed with 3 kV d.c.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways DT 69 (B 44), Dec. 1977, 13 p., 5 Fig., 3 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

02 053292

**UPDATING OF THE BIBLIOGRAPHY OF THE PUBLICATIONS ON WHEEL-RAIL ADHESION WITH A SUMMARY OF EACH ARTICLE IN EACH OF THE THREE LANGUAGES. UPDATING OF THE DEFINITIONS USED IN ADHESION TECHNOLOGY**

Updating of the bibliography of the publications on wheel-rail adhesion with a summary of each article in each of the three languages. Updating of the definitions used in adhesion technology.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways Supplement DT 28 (B 44), Dec. 1977, 114 p.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

02 176196

**SHOCK AND VIBRATION ENVIRONMENTS FOR LARGE SHIPPING CONTAINER DURING TRUCK TRANSPORT (PART I)**

The purpose of this study was to obtain vibration and shock data during truck shipment of heavy cargo. Currently available data were taken on trucks bearing lighter loads than the loads of current interest. In addition, the new data are expected to be useful in the determination of any trends of vibration and shock environments with increased cargo weight. These new data were obtained on a "piggyback" basis during truck transport of 195 700 N (44,000 lb) cargo which consisted of a spent fuel container and its supporting structure from Mercury, Nevada, to Albuquerque, New Mexico. The routes traveled were US 95 from Mercury, Nevada, to Las Vegas, Nevada; US 93 from Las Vegas to Kingman, Arizona; and I-40/US66 from Kingman to Albuquerque, New Mexico. Speeds varied from very slow during hill climbs to 101 km/hr (63 mph). A comparison of these data with a collectively reduced set of data for cargo weights varying from no-load to 133 400 N (30,000 lb) showed that the zero to peak amplitude levels of vibration were significantly lower for frequencies less than 40 Hz in the vertical axis and that there was a reduction in the vibration amplitude levels in all axes for frequencies greater than 500 Hz. The shock response amplitude was less severe for the entire frequency spectrum in the vertical axis, but it



was not significantly different in the other axes. Data measurements were made on a truck shipment of a 249 100 N (56,000 lb) container over the same routes as were used for the shipment discussed in this report. These data will be presented in a subsequent report along with any additional data trends that result from studies of trucks carrying increased cargo weight. (ERA citation 03:019441)

Magnuson, CF  
Sandia Laboratories, Department of Energy Sept. 1977, 21 pp  
Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

SAND-77-1110

**02 180267**

**STUDY OF A MATHEMATICAL MODEL TO FORECAST THE CRITICAL SPEED OF A VEHICLE RUNNING ON A STRAIGHT TRACK WITH NO DEFECTS** [Studio di un modello matematico per la previsione della velocita critica di un veicolo ferroviario su un binario rettilineo senza difetti]

In this theoretical study, the authors deal successively with the partial phenomena relating to railway dynamics: oscillation, creep and running conicity to obtain an outline view of the whole vehicle. Reference is also made to recent work carried out on the subject, particularly by ORE Committee C116. [Italian]

Casini, C Tacci, G *Ingegneria Ferroviaria* Vol. 33 No. 3, Mar. 1978, pp 262-275, 25 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**02 180273**

**PRESENT STAGE OF DEVELOPMENT OF THE "AXLE SHAFT" MEASURING METHOD FOR DETERMINING THE FORCES BETWEEN WHEEL AND RAIL** [Der heutige Entwicklungsstand der Messmethode "Radsatzwellenverfahren" zur Bestimmung der Kraefte zwischen Rad und Schiene]

No Abstract. [German]

Ostermeyer, M *Glaser's Annalen ZEV* Vol. 102 No. 2, Feb. 1978, pp 53-61, 10 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**02 180281**

**INFLUENCE OF THE DIFFERENCES IN WHEEL LOADS ON THE TRACTIVE EFFORT OF RAIL VEHICLES WHEN RUNNING THROUGH CURVES** [Einfluss des Radkraftunterschiedes Schienenfahrzeugen bei Fahrt durch Gleisboegen]

No Abstract. [German]

Kail, E *Glaser's Annalen ZEV* Vol. 102 No. 4, Apr. 1978, pp 106-112, 8 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**02 180292**

**PASSIVE PRESSURE OF THE SLEEPERS ON THE BALLAST. SHIFTING EFFECT** [Empuje pasivo que resiste el balasto al ser solicitado por una traviesa. Efecto de ripado]

Owing to its effects on the maximum operating speed of vehicles and because of the difficulties inherent in its study, lateral track resistance is the subject of permanent investigation. The purpose of this article is to analyze the forces transmitted from the sleeper to the ballast, using as a basis the classical "wall-pressure" theory, which up to now has not been envisaged in the railway field. [Spanish]

Blanco, C *AIT-Revista* No. 21, Apr. 1978, pp 16-19, 2 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

**02 180298**

**COMPUTER PROGRAMME FOR RAIL STRESS CALCULATIONS**

Maximum rail stress, maximum fishplate stress, maximum formation pressure often need to be calculated before permitting running of new rolling stock or speed increase of the existing ones. This is a time-consuming calculation. These computations could be speedily done by computer. This article describes a computer program which can easily be run on 12 k capacity, IBM 1401 computers.

Deepak, D *Indian Railway Technical Bulletin* Vol. 34 No. 205, May 1977, pp 79-82, 3 Phot., 3 Ref., 3 App.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Research Design and Standards Organization, Alambagh, Lucknow 5, India

DOTL JC

**02 180299**

**THE TECHNIQUE OF INDEPENDENT WHEELS TO ELIMINATE LATERAL INSTABILITY OF RAILWAY VEHICLES** [La tecnica delle ruote indipendenti al fine di eliminare l'instabilita laterale nei veicoli ferroviari]

No Abstract. [Italian]

Panagin, R *Ingegneria Ferroviaria* Vol. 33 No. 2, Feb. 1978, pp 143-150, 8 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**02 180300**

**PARAMETERS FAVOURABLE TO OBTAINING GOOD RUNNING QUALITIES IN RAIL VEHICLES** [Guenstige Parameter fuer gute Laufeigenschaften]

The author first expounds a theory which makes it possible to study vertical vibrations in rail vehicles in relation to random movements caused by irregularities in the track. He determines the relevant values and then gives technical construction data the observation of which will result in good running qualities in vehicles. [German]

Nguyen, HK *DET Eisenbahntechnik* Vol. 26 No. 4, 1978, pp 162-166, 9 Fig., 5 Tab., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

**02 180309**

**OPTIMUM NONLINEAR SUSPENSION FOR RAILROAD FREIGHT VEHICLES**

In this paper the multivariable optimization technique is employed to find the optimum suspension parameters of a nonlinear model of the railroad freight vehicle. The optimum suspension elements are determined with an objective to minimize the maximum transient response of the freight car rocking angle in the critical frequency range when undergoing periodic excitation from the rails.

Samaha, M (Concordia University, Quebec); Sankar, TS  
British Columbia University, Canada Proceeding 1977, pp 969-970, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: British Columbia University, Canada, Vancouver V6T 1W5, British Columbia, Canada

**02 180349**

**IMPROVEMENT OF RUNNING SAFETY OF FREIGHT CARS**

Freight car derailments resulting from a combination of vehicle and track conditions have been difficult to analyze. A computerized simulation for two-axle and four-axle cars on various track configurations has been useful in explaining derailments. When altered with additional car parameters, the simulation will be even more useful in assuring trouble-free operation.

Ikemori, M Sugiyama, T *Railway Technical Research Inst. Quarterly Reports* Vol. 19 No. 2, June 1978, pp 49-57, 8 Fig., 2 Tab., 2 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

02 180356

**AERODYNAMICS OF TRAINS IN TUNNELS**

Decisions on bore-size and general configurations of future tunnels, especially those of great length or for high speeds, will rely heavily on combined aerodynamic and thermodynamic considerations. Measures are under study to alleviate the worst pressure effects.

Gawthorpe, RG (British Railways Board) *Railway Engineer International* Vol. 3 No. 4, July 1978, pp 41-47, 20 Fig., 27 Ref.

ORDER FROM: ESL

DOTL JC

02 180458

**SPEED, ACCELERATION, AND PULSE PREDICTION CALCULATIONS ON TEST VEHICLES WITH WHEEL PULSE GENERATORS**

The use of microprocessors for calculation of dynamic quantities such as speed and acceleration on land based test vehicles which use wheel pulse generating probes is discussed. Methods of pulse prediction and windowing are presented along with formulas for determining the existence of the next pulse. Considerations in actual implementation of a microprocessor for these tasks are brought out. (ERA citation 03:021859)

IEEE Vehicular Technology Conference, Denver, CO, USA, 24 March 1978.

Kraft, CH

Sandia Laboratories, Department of Energy CONF-780303-1, 1977, 6 pp

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

SAND-78-0030C

02 181033

**DYNAMIC ANALYSIS TO ESTABLISH NORMAL SHOCK AND VIBRATION ENVIRONMENTS EXPERIENCED BY RADIOACTIVE MATERIAL SHIPPING PACKAGES**

Initial efforts to develop a two-dimensional, multi-degree-of-freedom model of a spent fuel shipping cask-car rail system are described. The model consists of nine equations of motion, one derived for each degree of freedom (generalized coordinates), and supplementary auxiliary equations. The energy method which applies Lagrange's equation is used and is described. The entire model is written in Advanced Continuous Simulation Language. Six simplified coupling analysis were simulated to test the model, and the results are described.

Fields, SR

Hanford Engineering Development Laboratory, Nuclear Regulatory Commission Prog Rpt. HEDL/TME-78/19, NUREG-CR-0071, May 1978, 38 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281854/OST

02 181339

**DEVELOPMENT OF TECHNIQUES AND DATA FOR EVALUATING RIDE QUALITY. VOLUME II. RIDE-QUALITY RESEARCH**

Ride-quality models for city buses and intercity trains are presented and discussed in terms of their ability to predict passenger comfort and ride acceptability. This, the second of three volumes, contains a technical discussion of the ride-quality models developed during the research effort using the data gathered on city buses and intercity trains. The methods and procedures employed to derive the models are also presented, together with examples of how models are used to evaluate the ride quality of existing and future transportation systems. The raw data used as a basis for the models are presented in the appendixes to this volume.

See also Volume 1, PB-282326.

Pepler, RD Vallerie, LL Jacobson, ID Barber, RW Richards, LG Dunlap and Associates, Incorporated, Transportation Systems Center Final Rpt. ED-77-1(II), DOT-TSC-RSPD-77-1-II, Feb. 1978, 164 pp

Contract DOT-TSC-1090-2

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-283019/8ST, DOTL NTIS

02 182004

**VSS DEMONSTRATION PROGRAM. PART 1: SYSTEM PERFORMANCE EVALUATION**

The Vertical Shaker System (VSS) is the initial test program to be conducted at the Rail Dynamics Laboratory. The objectives of this program are to demonstrate the performance and capabilities of the VSS and to accumulate test data to be used in checking the validity of analytical models. The experiments are performed on three different load configurations of a trailer-on-flatcar. The test program was found to be successful. Pretest planning, to specify input levels and motion requirements, was essential to effective VSS operation. Log books, used to record program events as they occurred, were found to be invaluable in post test analyses.

Wyle Laboratories, Federal Railroad Administration Final Rpt. FRA-/ORD-78/43, July 1978, 134 p.

Contract DOT-FR-64200

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-284980/OST, DOTL NTIS

02 182083

**KALKER'S SIMPLIFIED NONLINEAR CREEP THEORY (COMPLETE SOLUTION). SOFTWARE**

The conversion of the computer program, 'Simplified Theory of Rolling Contact', (used for calculation of a nonlinear creep force-creepage relationship) from the original Algol language to Fortran is considered. The Algol program was written by Professor J. J. Kalker and was derived from the paper, 'Simplified Theory of Rolling Contact', Delft Progr. Rep., Series C: Mechanical and Aeronautical Engineering and Shipbuilding, 1 (1973), pp. 1-10. A significant number of changes was made in the program for more convenient use; however, the fundamental equations remain unchanged. The results were checked in detail to insure agreement with the original solution. The program gives an appropriate solution for the resultant tangential creep forces and spin moment acting between two bodies of equal linearly elastic material properties. The creep forces and spin moment are due to lateral, longitudinal, and spin creepages. Assumptions corresponding to the Hertz contact theory are implied and two additional simplifying assumptions are made, resulting in a significant reduction in computation time as contrasted with previous solutions. Two separate computer codes were developed, the first being the general solution with extended input and output, and the second a shortened version primarily intended for use as a subroutine. Surprisingly good agreement is found to exist between the 'Simplified Theory' and published experimental results for a wide range of contact ellipse eccentricity. The user's manual for these programs is presented in the report 'User's Manual for Kalker's Simplified Nonlinear Creep Theory', by James G. Goree and E. Harry Law, PB-279 503.

Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB-279 503.

Goree, JG Law, EH

Federal Railroad Administration DOT/DF-78/002, Dec. 1977, n.p.

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-285467/7ST

02 182084

**KALKER'S SIMPLIFIED NONLINEAR CREEP THEORY (SUBROUTINE FORCES). SOFTWARE**

The conversion of the computer program, 'Simplified Theory of Rolling Contact', (used for calculation of a nonlinear creep force-creepage relationship) from the original Algol language to Fortran is considered. The Algol program was written by Professor J. J. Kalker and was derived from the paper, 'Simplified Theory of Rolling Contact', Delft Progr. Rep., Series C: Mechanical and Aeronautical Engineering and Shipbuilding, 1 (1973), pp 1-10. A significant number of changes was made in the program for more convenient use; however, the fundamental equations remain unchanged. The results were checked in detail to insure agreement with the original solution. The program gives an appropriate solution for the resultant tangential creep forces and spin moment acting between two bodies of equal linearly elastic material properties. The creep forces and spin moment are due to lateral, longitudinal, and spin creepages. Assumptions corresponding to the Hertz

contact theory are implied and two additional simplifying assumptions are made, resulting in a significant reduction in computation time as contrasted with previous solutions. Two separate computer codes were developed, the first being the general solution with extended input and output, and the second a shortened version primarily intended for use as a subroutine.

Source tape is in EBCDIC character set. Tapes can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, track, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, PB-279 503.

Goree, JG Law, EH  
Federal Railroad Administration DOT/DF-78/003, Dec. 1977, n.p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-285468/5ST

#### 02 182124

##### USER'S MANUAL FOR PROGRAM COUNTACT. (COUNTERFORMAL CONTACT STRESS PROBLEMS)

COUNTACT (Counterformal Contact of Two Elastic Bodies) is an all Fortran computer program for the solution of stress analysis between two elastic bodies in counterformal contact. It is used to find the pressure distribution between the two bodies, the boundary of contact patch, and the total load corresponding to a given depth of penetration. The program COUNTACT has two versions: COUNTACT-1 for those bodies with a contact patch having one axis of symmetry, and COUNTACT-2 for those bodies whose contact patch has two axes of symmetry. Descriptions of the program variables, input, output, and method of analysis are given. Instructions for problem modelling, preparation of input data, and solutions of sample problems, are included. The general approach to writing a user-supplied subroutine required by the program is discussed.

See also report dated December 76, PB271033.

Paul, B Hashemi, J  
Pennsylvania University, Philadelphia, Department of Transportation,  
Federal Railroad Administration Tech Rpt. FRA/ORD-78/27,  
MEAM-77-2, Sept. 1977, 37 p.

Contract DOT-OS-60144

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286097/1ST, DOTL NTIS

#### 02 182565

##### ANALYSIS OF THE MATHEMATICAL MODEL OF THE RAILWAY TRACK BED [Analyse du modele mathematique de la plate-forme de la voie ferree]

This article deals with the analysis of the dynamic vibration effects of rolling stock movements on the behaviour of railway track and infrastructure, as well as the action of water and frost on the variations in the geotechnical parameters of track bed foundations. [French]

Marowski, G *Rail International* Vol. 9 No. 6, June 1978, pp 397-431, 34  
Phot., 166 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

#### 02 182569

##### PERMISSIBLE CAR IMPACT SPEEDS DURING GRAVITY HUMP SHUNTING [Povyshenie dopustimyh skorostej soudarenija vagonov pri rospuske s gorok]

No Abstract. [Russian]

Rudanovskij, VM *Zheleznodorozhnyi Transport* No. 4, 1978, pp 35-36, 1  
Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmannaya Ulitsa 2,  
Moscow B-174, USSR

#### 02 182576

##### STABILITY OF MOTION OF RAIL VEHICLES

The stability of undistributed motion of track vehicles (locomotives and cars) is considered mainly according to the first (linear) approximation. In order to widen the region of applicability of the first approximation, the right

sides of the equations of disturbed motion are replaced by their best linear approximation according to Chelyshev. Methods of selection of a structure and values of the parameters of the mechanical system that would result in the undisturbed motion being stable within a set range of velocities are pointed out. A design method of simplification of the systems of nonlinear differential equations by eliminating rapidly attenuating solutions is presented. Results of natural-size experiments carried out with a fast laboratory car to check the theory are described.

Lazaryan, VA (Academy of Science of the Ukraine SSR, USSR) *Soviet Applied Mechanics* Vol. 13 No. 10, Oct. 1977, 6 pp, 18 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 02 182608

##### IMPROVED SIGNAL CONDITIONING METHODS FOR MEASURING THE VERTICAL FORCES AT THE WHEEL/RAIL INTERFACE

Continuous recording of the vertical forces arising at the wheel/rail interface has been desirable already for some time. To do this, the output signals of two vertical force measuring bridges displaced at an angle of 45 degrees are combined by electronic means to form a continuous signal with a residual ripple of less than plus or minus 5% of the rated wheel force. The measuring device was developed for the Series Rc 4 wheel centres of Swedish State Railways (SJ). It has proved successful both in laboratory tests and during trial runs conducted in Sweden and USA. [German]

Eriksson, S Nellgran, A *Glaser Annalen ZEV* Vol. 102 No. 5, May  
1978, pp 143-146

ACKNOWLEDGMENT: British Railways  
ORDER FROM: ESL

DOTL JC

#### 02 182618

##### AERODYNAMICS OF TRAINS IN THE OPEN AIR

Faster operating speeds and lightweight construction have forced designers to research the comparatively new field of train aerodynamics in order to maintain standards of comfort and safety. The author deals with trains in the open air.

See also 02 180355 and 02 180356.

Gawthorpe, RG *Railway Engineer International* Vol. 3 No. 3, May 1978,  
pp 7-12, 10 Phot., 34 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

#### 02 182627

##### AERODYNAMICS AND THE RAILWAYS. SURVEY OF PROBLEMS AND TASKS [Aerodynamik bei der Eisenbahn. Eine Uebersicht ueber Probleme und Aufgaben]

Operating at speeds approaching or exceeding 200 km/h requires resistance to forward motion and the consequences on vehicles, passengers and the environment to be taken into account. An aerodynamic effect produced by trains travelling up to 11 m/s is acceptable for passengers on the platform and speeds up to 17 m/s for staff. Resistance to air, in the case of a fast train, accounts for nearly 95 percent of overall resistance to forward motion. The specific problem of aerodynamics in tunnels is also dealt with in detail. [German]

Glueck, H *Leichtbau der Verkehrsfahrzeuge* Vol. 22 No. 1-2, Jan. 1978,  
pp 7-10, 12 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145,  
Munich 80, West Germany

#### 02 182860

##### THE EFFECT OF SOME DESIGN PARAMETERS AND OPERATIONAL TOLERANCES ON THE RELIABLE MOVEMENT OF A FREIGHT CAR [Vliyaniye nekotorykh konstruktivnykh parametrov i ekspluatatsionnykh dopuskov na ustoychivost' dvizheniya gruzovogo vagona]

The results are given of theoretical studies of the influence of a freight car's parameters on stability of movement on turn out curves of a section of track, as a function of the gap between truck side bearings, the rigidity of the spring

group, the car body, and the rail. A calculation is made of the lower limits of total play between side bearings for cars of different types. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Survillo, AB *Trudy TsNII* Proceeding No. 459, 1972, pp 105-115, 3 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182865

**THE DYNAMICS AND STRENGTH OF PROSPECTIVE CARS**  
[Dinamika i prochnost' perspektivnykh vagonov]

This proceeding presents 14 technical papers: (1) Dynamic Tests of a Car of the RT200 Train on the Leningrad-Moscow Line; (2) Theoretical Investigations of the Dynamics of a Four-Axle Car with Asymmetric Loading of the Body Bolster; (3) Determination of Optimum Principles for Regulating Lateral Oscillation of Cars; (4) Algorithm for Segregation of Variables in the Process of Studying Lateral Oscillations of Cars; (5) Study of the Dynamic Qualities of Empty Freight Cars; (6) Criterion for Vehicle Resistance to Derailment; (7) System for Fully Automating the Processing of Data from Dynamic Tests of Rolling Stock; (8) Study of Dynamic Loading and Analysis of the Fatigue Resistance of the Supporting Components of Eight-Axle Gondola Cars; (9) Calculation of the Endurance Characteristics, Loading Parameters, and Reliability Indices of the Supporting Elements of the Design; (10) Impact Fatigue Tests of the Center Sill of a Four-Axle Tank Car with Welded Automatic Coupler Supports; (11) Foreign Research on the Dynamics of High-Speed Rolling Stock; (12) Analysis of Wear Resistance and the Development of Proposals for Increasing the Useful Life of Center Plate Components of Freight Cars; (13) Comparative Evaluation of the Properties of Oxygen Process and Open Health Steel Type 09G2D During Hardness Drop Tests on Full-Scale Samples at Low Temperatures; and (14) On the Problem of Studying the Dynamics of Car Generator Drive Taking Damping Factors into Account. [Russian]

Contains English abstracts of the different papers in RRIS 02 182866 through 182871, 182873, 182874 and 182876; RRIS 17 182872, RRIS 03 182875 and 182877, RRIS 09 182878 and RRIS 04 182879; Bulletin 7901. A copy of these proceedings is also available for reference purposes only at the Office of Research and Development, Federal Railroad Administration.

*Trudy TsNII* Proceeding No. 548, 1976, 182 pp, 27 Tab., 75 Ref.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182866

**DYNAMIC TESTS OF A CAR OF THE RT200 TRAIN ON THE LENINGRAD-MOSCOW LINE**  
[Dinamicheskiye ispytaniya vagona poyezda RT200 na magistrali Leningrad-Moskva]

The paper presents the results of dynamic performance tests of a car of the RT200 "Russkaya troyka" train at speeds up to 210 km/hr on the Leningrad-Chudovo stretch of the Oktyabr' railroad. A theoretical analysis of some of the car's technical characteristics is given. Conclusions are drawn as to the car's operating potential and recommendations are made for upgrading its dynamic qualities. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Vershinskiy, SV Usov, VE Krasnobayev, AM Berestova, VI *Trudy TsNII* Proceeding No. 548, 1976, pp 4-25, 2 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182867

**THEORETICAL INVESTIGATIONS OF THE DYNAMICS OF A FOUR-AXLE CAR WITH ASYMMETRIC LOADING OF THE BODY BOLSTER**  
[Teoreticheskiye issledovaniya dinamiki chetyrekhnosnogo vagona s nesimmetrichnoye nagruzkoye pyatnikov kuzova]

The paper sets forth the results of theoretical investigations using an analog computer. In contrast to other published works, this article reviews the problem of devising a method of compensating the asymmetric hang of the

body of a car with a two-stage spring suspension. This is achieved by installing sets of springs with a different force for the second stage. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Usov, VE *Trudy TsNII* Proceeding No. 548, 1976, pp 25-40, 3 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182868

**DETERMINATION OF OPTIMUM PRINCIPLES FOR REGULATING LATERAL OSCILLATION OF CARS**  
[Opredeleniye optimal'nykh zakonov regulirovaniya bokovykh kolebaniy vagonov]

In the paper, a method is developed that permits a determination of the optimum principles that should be used to establish a regulating effect on a controlled object. In developing an algorithm for the formation of a suitable control signal, the dynamic characteristics of a car in motion on straight and curved sections of track are optimized with respect to the value of the horizontal transverse forces. Principles of regulation obtained may be used in designing a regulator to stabilize the rocking motion of two-axle car trucks on straight and curved stretches of track. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Khokhlov, AA *Trudy TsNII* Proceeding No. 548, 1976, pp 41-50

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182869

**ALGORITHM FOR SEGREGATION OF VARIABLES IN THE PROCESS OF STUDYING LATERAL OSCILLATIONS OF CARS**  
[Algoritim razdeleniya peremennykh pri issledovanii bokovykh kolebaniy vagonov]

An algorithm is developed in the paper to permit the segregation of variables in the process of studying the lateral oscillations of cars. This will make it possible to simplify solution of the problem connected with finding optimum parameters for railroad vehicles in operation and for those being newly designed. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Khokhlov, AA *Trudy TsNII* Proceeding No. 548, 1976, pp 50-58

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182870

**STUDY OF THE DYNAMIC QUALITIES OF EMPTY FREIGHT CARS**  
[Issledovaniye dinamicheskikh kachestv porozhnykh gruzovykh vagonov]

The paper presents the results of dynamic tests of empty freight cars and unloaded trains on main line sections and on sections of track with artificial irregularities at running speeds up to 130 km/hr. A conclusion is drawn as to the possibility of operating unloaded trains at speeds up to 100 km/hr. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Vershinskiy, SV Kondrashov, VM *Trudy TsNII* Proceeding No. 548, 1976, pp 58-74

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmani Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182871

**CRITERION FOR VEHICLE RESISTANCE TO DERAILMENT**  
[Kriteriy ustoychivosti ekipazha protiv skhoda s rel'sov]

The paper presents an analysis of the equations proposed as a criterion for the resistance of a vehicle to derailment. The necessary and sufficient conditions for derailment are formulated. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Kondrashov, VM *Trudy TsNII* Proceeding No. 548, 1976, pp 75-86

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182873

**STUDY OF DYNAMIC LOADING AND ANALYSIS OF THE FATIGUE RESISTANCE OF THE SUPPORTING COMPONENTS OF EIGHT-AXLE GONDOLA CARS [Issledovaniye dinamicheskoy nagruzhennosti i otsenka ustalostnoy prochnosti nesushchikh uzlov vos'miosnykh poluvagonov]**

Data obtained in the course of dynamic tests of gondola cars on various long main line sections are summarized. A spectral analysis of stresses is carried out on the structural elements studied. The potential resistance of the components subject to greatest loading are evaluated. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Survillo, AB Plotkin, VS Bronivitskiy, AB *Trudy TsNII* Proceeding No. 548, 1976, pp 94-110, 5 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182874

**CALCULATION OF THE ENDURANCE CHARACTERISTICS, LOADING PARAMETERS, AND RELIABILITY INDICES OF THE SUPPORTING ELEMENTS OF THE DESIGN [Rachet kharakteristik vyнослиvosti parametrov nagruzhennosti i pokazateley nadezhnosti nesushchikh elementov konstrutsiy]**

The methods of evaluating the reliability of parts functioning under conditions of dynamic loading are examined. Using the side frame of a freight car as an example, the application of the methods is illustrated and the service life and indices of reliability are calculated. The results of the calculation are compared with statistical data on operational failures. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Prikhod'ko, AP Shakhov, VI Survillo, AB Asaturov, AA Kamaev, OB *Trudy TsNII* Proceeding No. 548, 1976, pp 110-129, 5 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182876

**FOREIGN RESEARCH ON THE DYNAMICS OF HIGH-SPEED ROLLING STOCK [Zarubezhnyye issledovaniya dinamiki vysokoskorostnogo podvizhnogo sostava]**

The paper sets forth prospects for the development of studies in the field of wheel and rail dynamics, flange profiling, and improving the construction of wheel sets. There is a comprehensive review of studies carried out in Japan on the selection of the so-called worn flange profile, which reduces the amplitude of rocking. Equations for calculating the rock process of a wheel set are given. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Tkachenko, VF *Trudy TsNII* Proceeding No. 548, 1976, pp 137-153

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 182880

**DYNAMIC LOADS OF FREIGHT CAR RUNNING GEAR**

[Dinamicheskiye nagruzki khodovykh chastey gruzovykh vagonov]

A description is presented of the procedure and the equipment used to study the dynamic loads acting on the running gear of freight cars. The results are derived from testing four-axle and eight-axle gondolas and tank cars on the primary routes of the railroad network under both service and experimental freight train operating conditions. Also given are the generalized determinants of the vertical and horizontal (lateral) forces and the prederailment reserve stability coefficients. The test data will be useful for further, more precise definition of the calculated norms when designing cars, considering the prospective operating conditions. The book is designed for scientific and technical workers involved in the construction, operation, maintenance, and

repair of freight cars. The technical papers included in this document are: (1) Measurement of vertical and horizontal forces acting on the car wheel pair; (2) Determination of the relationship of horizontal and vertical forces acting on the wheel during rail flange contact; (3) Experimental determination of the path of freight car wheel pair axle boxes; (4) Measurable magnitudes, recording of magnitudes, and processing of data collected; (5) Selection of test vehicles and methods of conducting tests; (6) Vertical dynamic forces acting on truck side frames; (7) Horizontal (frame) forces; (8) Dynamic forces acting on wheels and axles of freight car wheel pairs; (9) The correlation of vertical and horizontal forces acting on the running gear of freight cars; and (10) Evaluation of dynamic loading of freight car running gear. [Russian]

Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

*Trudy TsNII* Proceeding No. 572, 1977, 144 pp, 14 Tab., 25 Ref.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

02 183580

**RESONANT VIBRATION EFFECTS PRODUCED IN SINGLE-SPAN BRIDGES AND OTHER STRUCTURES BY RAILWAY WORKING [Erregung resonanzartiger Schwingungen an einfeldrigen Bruecken oder an Bauwerken durch Abstandswirkungen aus dem Eisenbahnbetrieb]**

Fast and heavy loads moving on railway tracks produce vibration and jarring in the immediate surroundings, just as in other dynamic processes such as the out-of-balance forces in rotary machines or the regular impact shocks from building equipment. The heaviest vibrations in railway bridges and line-side structures occur at certain train speeds. The reason for this is usually the coincidence of the structure's natural frequency with the excitation frequency from exactly determinable distance effects, i.e., resonance. Linkage of the vibratory conditions of both frequency modes in relation to certain bridge and vehicle data gives an insight into the relationships between speed-dependent vibration excitation and its effect on bridges and structures near the railway tracks. The annoyance to people in buildings nearby only seldom exceeds what is objectively acceptable in view of the brief duration of such resonance. [German]

Braune, W *Eisenbahntechnische Rundschau* Vol. 27 No. 7-8, July 1978, 3 pp, 2 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

02 183581

**WIRELESS TRANSMISSION OF MEASURED VALUES FROM THE MOVING RAIL WHEEL [Drahtlose Messwertuebertragung vom rollenden Eisenbahnrad]**

The Institute for Transport Planning and Route Construction (Railway and Tracked Local Transport) at the Technical University in Berlin has developed a system of Wireless transmission of measured values from the moving wheels of rail vehicles. For the first time this allows the detection on the wheel itself of the level and distribution of solid-borne noise as used in the study of wheel vibration. The influence of various parameters such as speed, spatial acceleration components, type of permanent way, rail condition where there is greater unevenness, etc., can be determined at the wheel. Some influences have been recorded and can be used to assess the effect of various parameters. The measured results can also be used for the investigation of various mechanisms which cause solid-borne noise in the rail/wheel system. This in turn allows determination of parameters of importance for altering the vibratory condition on rail vehicles. [German]

Heiss, P *Eisenbahntechnische Rundschau* Vol. 27 No. 7-8, July 1978, 4 pp, 5 Fig., 1 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

02 183598

**BASIC THEORIES OF THE BEHAVIOUR IN CURVES OF A BOGIE WITH INDEPENDENT WHEELS [Fondamenti teorici della marcia in curva di un carrello a ruote indipendenti]**  
No Abstract. [Italian]

Corazza, GR De Falco, F *Ingegneria Ferroviaria* Vol. 33 No. 5, May 1978, pp 449-458, 6 Phot., 16 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

02 183600

**DETERMINATION OF THE SPECIFIC FREQUENCIES OF A NON-RIGID STRUCTURE RESTING ON TWO SPRING SUSPENSIONS: APPLICATION TO RAILWAY VEHICLES [Determination des frequences propres d'une structure deformable reposant sur deux suspensions elastiques; application aux vehicules ferroviaires]**

Paper read during the GAMI 1978 seminar on Shocks and vibrations (Lyon, 13-15 June 1978), entitled: Theoretical study into the influence, on the specific frequencies of a system (in this case a railway vehicle), of the various parameters of the spring suspension supporting a deformable beam; consequences on the evolution of vehicle construction in the future. [French]  
Also available from Engineering Index.

Richard, J *Mecanique, Matériaux, Electricite* No. 341-342, 1978, pp 217-226, 9 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Editions Science et Industrie, 6 Avenue Pierre ler de Serbie, 75116 Paris, France

02 183614

**TEN YEARS' OPERATION OF THE DYNAMIC TESTING PLANT FOR SUSPENSIONS [Dix ans d'exploitation du banc d'essai dynamique des suspensions]**

The SNCF Testing Centre at Vitry-sur-Seine was provided with a dynamic testing plant for suspension gear in 1966, so that investigations could be carried out into problems of stability and comfort posed by the running of tractive and hauled stock. [French]

*Revue Generale des Chemins de Fer* May 1978, pp 312-319, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

02 183715

**PHASE 15 REPORT ON SWITCHYARD IMPACT TESTS**

Switchyard mishaps have occurred that have caused tank car head punctures and resulting loss of hazardous material. In some cases, flammable compressed gas is released and floods the yard. Moments later, it reaches a point of ignition with resulting catastrophic burning. These punctures are generally caused by empty freight cars with short truck centers and high centers of gravity. This Phase 15 test program was undertaken to assess the effectiveness of head shields, shelf couplers and a combination of head shields and shelf couplers toward reducing the vulnerability of tank car heads to puncture in this situation. This report details the full-scale destructive tests of 23 tank cars and 15 hopper cars under several possible conditions that can develop in a switchyard environment. Discussed also are: a description of car behavior under severe impacts; the influence on puncture vulnerability of head-to-sill attachment details and the failure of cars to couple, that can lead to loose car situations.

Schlink, LJ

Association of American Railroads Technical Center Res Rpt.  
RA-15-1-40, AAR R-304, Aug. 1978, 46 pp, 5 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

02 183904

**COMPUTER MODELS FOR RAILWAY VEHICLE OPERATION**

The paper summarizes the computer programs developed under the Track-Train Dynamics project, designed to study the dynamic interaction

of rolling stock and/or train-consist with track. The models describe the vehicle response on tangent and curved track and also discuss the phenomenon of lateral dynamic stability. Results obtained from lateral, vertical and longitudinal train action models, are presented. Analytical results are compared with field data. Possible application, of the computer program for train-handling and train-make up are also discussed.

Garg, VK (Association of American Railroads Technical Center) *Rail International* No. 6, June 1978, pp 281-296, 22 Fig., 1 Tab., 19 Ref.

ACKNOWLEDGMENT: Rail International  
ORDER FROM: ESL

DOTL JC

02 184158

**GENERALIZED RELATIONS FOR THE CREEP-ADHESION FUNCTION IN DRY CONTACT**

A dimensionless expression has been obtained for the adhesion creep curve that summarizes all the results obtained on a laboratory test facility. This expression seems valid in the case of dry contact, assuming smooth surfaces.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Sciammarella, CA Kumar, S Press, M Seth, BB (Illinois Institute of Technology)  
American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 35 pp, 17 Fig., 5 Tab., 7 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

02 184161

**POSSIBILITIES TO IMPROVE SENSITIVITY OF THE METHODS FOR THE Q-FORCE MEASURING BY MEANS OF SPOKE WHEELS AND DISK WHEELS**

Measurement of the vertical forces at wheels by means of transducers installed on spoked and solid wheels is described. The instrumentation is 5 to 10 times more sensitive than that described in the UIC/ORE Committee B10 Report 14. While it is possible to eliminate lateral effects from solid wheels, the spoked wheel continues to be influenced.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Burada, C Buga, M Nailescu, L Popistas, A (Institute for Res & Tech Design in Transp. Romania)  
American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 18 pp, 7 Fig., 5 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

02 184164

**THE LIMITS AND POSSIBILITIES OF TEST-RIG EXPERIMENTS IN THE DEVELOPMENT OF NEW WHEELSET TECHNOLOGIES WITH REGARD TO MATERIALS**

Wear and frictional behavior of pairs of materials is influenced by the properties of surfaces and the surface materials. Transfer of experimental results to practical situations is dependent upon the different states of the surface. It is possible to simulate the motions of real vehicles with the use of "corrected" elastic constants which take into account the range of different states of deformation of wheel treads and rails. A statistically sound determination of surface layer states in real wheel/rail systems and in test rigs must be established. Experiments carried out at Munchen-Freimann's WP II test rig are determining friction/creep curves with different surface states to insure proper elastic constants for actual conditions.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Krause, H Poll, G (Technical University of Aachen, West Germany)

American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 21 pp., 14 Fig., 21 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

**02 184165**  
**CONTROLLED MEASUREMENT OF WHEELSET TRUCK DYNAMICS USING SCALED TANGENT TRACK MODELS**

This research is to develop cost-effective and time-efficient experimental techniques for study of rail vehicle safety through use of scale models on level tracks, and to develop a structured experimental data base on the static and dynamic characteristics of car trucks. The program addresses directly the major gap that exists between contemporary theoretical analysis of truck dynamics and validation on full-scale vehicles in the field.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Sweet, LM Putman, WF Sivak, JA (Princeton University)  
American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 15 pp., 9 Fig., 1 Tab., 9 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

**02 184628**  
**SPECIAL PROBLEMS AFFECTING THE RAILWAY TRACK IN HIGH-SPEED RUNNING (RIGIDITY, DAMPING EFFECT, TRACK DEFORMATION) [Besondere Probleme des Oberbaus bei hohen Fahrgeschwindigkeiten (Steifigkeit, Daempfung, Gleislageverschlechterung)]**

Track displacement under the effects of high speed and the study of the mechanisms involved is the subject of new investigations. The development of suitable vehicle/track models plays an important part in this. Track rigidity and damping effect are determined under test-rig and practical operating conditions. From this the visco-elastic behaviour of the ballast bed is determined, i.e., the time-dependent deformation. Ballasted tracks generally have a greater damping effect than non-ballasted tracks, so that oscillations at defective places die away faster. The measured spectra are compared with the calculated spectra at the DB's high-speed test section. [German]

Birmann, F Seraphim, HP *Eisenbahntechnische Rundschau* Vol. 27 No. 10, Oct. 1978, 5 p., 7 Fig., 2 Tab., 12 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**02 184630**  
**TRIBOLOGIC PROCESSES BETWEEN WHEEL AND RAIL [Tribologische Vorgaenge Zwischen Rad und Schiene]**

For almost 150 years the railway wheel has been rolling over the tracks of the world and even now we have yet to discover the last detail secrets of the interplay between wheel and rail. A research programme initiated and supported by the Federal Ministry of Research and Technology (BMFT) is now in progress with the aim of investigating the wheel-on-rail phenomena and thus obtaining the essential knowledge for the entry into the high-speed era. In his article, however, the author shows how diverse and far-reaching are the problems to be mastered before the new railway age is ushered in. [German]

Haass, H *Eisenbahntechnische Rundschau* Vol. 27 No. 10, Oct. 1978, 7 p., 14 Fig., 10 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**02 184662**  
**STABILITY OF A SIMPLY-SUPPORTED BEAM SUBJECTED TO RANDOMLY SPACED MOVING LOADS**

Vibration problems of a simply-supported elastic beam subjected to randomly spaced moving loads with a uniform speed are treated under the assumption that the input load sequence is a Poisson process. In the case in which the inertial effect of moving loads is taken into account, the stability problem relating to the speed and the mass of loads is dealt with, considering the inertia force, the centrifugal force, and the Coriolis force of the moving loads. As an analytical result a stability chart of the mean-squared deflection is obtained for the moving speed and the moving masses.

For Meeting held September 26-30, 1977.

Kurihara, M (Keio University, Japan); Shimogo, T *ASME Journal of Mechanical Design* Vol. 100 No. 3, Paper No. 77-DET-78, July 1978, pp 507-513, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**02 184672**  
**RAILWAY VEHICLE DYNAMICS--THE EMERGENCE OF A PRACTICAL THEORY**

The purpose of this paper is to describe achievements made over the past 10 years by British railways in the field of railway vehicle dynamics. The authors feel that the significant change has been to bring the science of railway vehicle dynamics to the status of a practical engineering tool. The new theories permit the quantitative assessment of the behaviour of existing vehicles and the systematic exploration of possible new designs of advanced concept and performance. Section 2 of this report deals with interaction between wheel and rail, section 3 describes the equations of motion and subsequent sections cover in turn dynamic stability, motion in curves, and response to track irregularities and the mechanism of derailment. The nature of the engineering design problem is discussed wherein there are trade-offs between the principal performance indicators. Significant applications of this work to date are discussed.

Wickens, AH Gilchrist, AO  
*British Rail Monograph* 1977, 82 p., 22 Fig., 4 Tab., 7 Phot., 62 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-231078)  
ORDER FROM: British Rail, Research and Development Division, London, England

P7801104

**02 184963**  
**MUNICH-FREIMANN RUNNING TEST BENCH [Il banco di prova a rotolamento di Monaco Freimann]**

The trend towards the increase in the running speeds of guided means of transport has brought about the necessity for the construction of special installations in order to carry out practical tests to integrate the theoretical studies which are being parallelly developed. These installations are basically of two types: experimental tracks for non conventional means (magnetic or air-cushion suspension, propulsion mostly by linear induction motor) and railway test loops. The last-named offer the possibility of carrying out the tests independently from operation and with a considerable saving of time and expense, but do not make it possible to completely eliminate the influence of external elements or freely vary the individual parameters which affect the results of the tests. For this reason, there arose the running test benches, that is to say installations in which the track is simulated by pairs of rollers, suitably powered and braked, and having various degrees of freedom, on which the stock to be tested is placed. The most recent of these is that being completed at Munich-Freimann, of which a detailed description is given. [Italian]

Perilli, M *Ingegneria Ferroviaria* Vol. 33 No. 3, Mar. 1978, pp 276-286, 29 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

02 184969

**PROPAGATION OF SURFACE PERTURBATIONS IN RADially LOADED WHEELS ROLLING OVER EACH OTHER**  
 [Fortpflanzung von Oberflaechenstoerungen beim Aufeinander Abrollenden Radial Belasteten Raedern]

Rolling test-rig trials were conducted in which railway wheel sets ran under normal load without slip and at constant speed upon rail profiled wheel sets. The wheel sets experienced occasional interference owing to the occurrence of periodic pitting or grooving in the running surfaces. In every case the mating wheels indicated an equivalent number of wear periods. Although of equal periodic length, the wear phenomena were of varying character such that they could not have been due to a reciprocal pressure process. It was demonstrated that the length and pitch of the wear periods could be explained as being due to surface wave pulses of propagation velocity  $c = 2950$  m/s circulating on both wheels. Relations between wheel diameters, running speed and velocity  $c$  were formulated, under which (at adequate load application) periodic pitting or grooving could be expected to occur in the contact area. The surprising recurrence of extremely minute wear pits of less than 1 mm in size and the occurrence of pits and grooves at equidistant lateral intervals led to the assumption that, generally, interaction between acoustic emission and pitting can occur, in the course of which "coherent" ultrasonic waves are induced. [German]

Werner, K *Wear* Vol. 49 No. 1, July 1978, pp 85-118, 19 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

02 185762

**INITIAL CALCULATIONS FOR THE THEORETICAL INVESTIGATION OF THE HIGH SPEED LOCOMOTIVE E103**  
 [Pilotrechnung zur Theoretischen Untersuchung der Schnellfahrlokomotive E103]

Pressure and velocity distributions at the surface of a simplified model of the high speed locomotive E103 of the German railways were calculated using the panel procedure for compressible frictionless flow with sideslip angles of 0, 5, 10, 15, 20, 25, and 30 deg. The force and moment coefficients were obtained by integration of the pressure distribution over the vehicle surface. The overlap principle was used to develop a procedure with which the velocity and pressure distribution and the coefficients for random sideslip angles can be calculated from only two sideslip angle values obtained with the panel procedure.

Language in German.

Stoffers, G  
 Deutsche Forschungs- u Versuchsanst f Luft- u Raumft DLR-IB-151-77/15, Jan. 1978, 35 p.

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

N78-28063/3ST

02 186076

**AN IMPROVED NUMERICAL METHOD FOR COUNTERFORMAL CONTACT STRESS PROBLEMS. TECHNICAL REPORT NO. 3**

A numerical method is given for the solution of frictionless counterformal contact stress problems. By modifying the previously described simply-discretized method, and by introducing an automatic mesh generating procedure for the changing contact region, it has been possible to make major improvements in the generality, stability, accuracy, and efficiency of the numerical procedures. The method has been verified by comparison with known solutions for the Hertzian case. Numerical examples for non-Hertzian cases include the first known solution for non-Hertzian contact of a railroad wheel and rail. The mesh generation and boundary iteration procedure introduced is applicable to a wider class of problems with changing boundaries, such as determination of wheel-rail adhesion-slip boundary, determination of elastic-plastic interfaces for residual stress problems, etc.

Paul, B Hashemi, J  
 Pennsylvania University, Philadelphia, Federal Railroad Administration  
 FRA/ORD-78/26, MEAM-77-1, July 1977, 66 p.

Contract DOT-OS-60144

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-286228/2ST, DOTL NTIS

02 186210

**USERS' MANUAL FOR KALKER'S 'EXACT' NONLINEAR CREEP THEORY**

The conversion of the computer program, 'A Programme for Three-Dimensional Steady State Rolling' developed by Professor J.J. Kalker, from the original Algol language to Fortran is considered. This program determines the resultant creep forces and moment for steady state rolling of two bodies of equal or unequal linearly elastic material properties. A related manual for Kalker's 'Simplified Theory of Rolling Contact' is considered in the report 'User's Manual for Kalker's Simplified Nonlinear Creep Theory,' by James G. Goree and E. Harry Law, FRA/ORD-78/06 Contract DOT-OS-40018, December, 1977. The program considered in the present report concerns the same problem except for the extension to unequal materials. It is found that, for equal materials, the 'Simplified Theory' gives approximately the same results as the exact solution in most cases and in those instances where some difference was noted, the simplified theory appears to be in better agreement with experimental results. In addition, the simplified theory reduces the computation time by a factor of approximately 50 to 100.

See also report dated December 77, PB-279503.

Goree, JG  
 Clemson University, Association of American Railroads Technical Center, Federal Railroad Administration Intrm Rpt. FRA/ORD-78/50, Aug. 1978, 55 p.

Contract DOT-OS-40018

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-287472/5ST, DOTL NTIS

02 188059

**EMPIRICAL LOAD-RESPONSE ANALYSIS OF A RAILROAD TANK CAR**

Much has been done to analyze loads and responses of railroad tank cars; however; most work has been theoretical in nature and/or of limited scope. Union Tank Car Company (UTC) has attempted, through acquisition and analysis of road test data, to better understand cause and effect relationships of loads and their responses on stability and life of tank cars. Accomplishment of this objective involved design and construction of a new acquisition car and collection of over 4000 miles of road test data for an instrumented tank car.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Parsons, JD Wieneke, SA (Union Tank Car Company)  
 American Society of Mechanical Engineers Conf Paper 78/WA/RT-2, July 1978, 7 p., 15 Fig.

ACKNOWLEDGMENT: ASME  
 ORDER FROM: ESL

DOTL RP

02 188060

**THE TRAIN OPERATIONS SIMULATOR (TOS)--A TOOL FOR RAILROAD ACCIDENT INVESTIGATION**

A computer program, the Train Operations Simulator, (TOS), has been developed as part of a program on Track-Train Dynamics and has been extensively used for railroad accident investigations. This computer program simulates the operation of conventional freight trains while providing quasi-dynamic estimates of vehicle coupler forces and quasi-static lateral force computations. A description of the Train Operations Simulator, its features and its limitations, is given. Means of applying the simulation model to railroad accident investigations are described and case studies of accident investigation simulation are presented and discussed.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Low, EM Garg, VK (Association of American Railroads Technical Center)  
 American Society of Mechanical Engineers Conf Paper 78/WA/RT-3, July 1978, 8 p., 10 Fig., 3 Tab., 2 Ref.

ACKNOWLEDGMENT: ASME  
 ORDER FROM: ESL

DOTL RP



02 188063

**SIMILITUDE LAW FOR THE CREEP-ADHESION FUNCTION IN DRY CONTACT**

This paper describes an experimental study on the dry friction-creep phenomenon. The study has been carried out on a test-rig. The simulated wheel has an elliptical area of contact similar to the actual locomotive wheel and is made of a 1070 plain carbon steel. The testing was conducted with variable contact stresses up to approximately 200,000 psi and equivalent speeds of approximately 5 miles per hour. The results of the test show that all the different creep-adhesion curves obtained by changing the normal loads can be reduced to one single dimensionless curve. This can be achieved if the actual nominal areas of contact experimentally measured, is introduced in the corresponding expressions. A law of constancy of the product of the creep times the area of contact for dry, clean contact surfaces and a constant value of adhesion and normal load is presented.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Sciammarella, CA Nailescu, L Kumar, S Seth, BB (Illinois Institute of Technology)  
American Society of Mechanical Engineers Conf Paper 78/WA/RT-6, July 1978, 7 p., 11 Fig., 20 Ref., 2 App.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

02 188065

**THE EFFECT OF SPRING STIFFNESS, FRICTION DAMPING LEVEL, AND CAR BODY STIFFNESS UPON THE RIDE QUALITY OF RAILROAD FREIGHT CARS**

An over-the-road test was performed for the purpose of determining the effect of various levels of spring stiffness and friction damping upon the ride quality of three different types of railroad cars. The primary difference among the three cars was their bending stiffness. They were a 50-ft, 70-ton box car, a standard level piggyback flat car, and a wide body, fully enclosed, tri-level autorack car. Instrumentation consisted of spring deflection transducers, vertical and lateral accelerometers and strain gages. Data will be presented primarily in the format of plots of acceleration versus speed with supporting plots of spring displacement and roll angles.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Greenfield, LP Wolf, EJ (Trailer Train Company); Hengel, MF (Missouri Pacific Railroad)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-8, July 1978, 12 p., 25 Fig., 1 Tab.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

02 188068

**CARGO RESTRAINT CRITERIA FOR RAIL TRANSPORTATION**

This report discusses criteria for cargo restraint and cargo tiedown for the forces resulting from the rail transportation environment. The report covers methods for calculating the restraint forces for a broad range of cargo/rail-car combinations. Use of these methods will improve accuracy of restraint criteria and, in turn, will improve reliability of cargo restraints and reduce costs consequent to restraint over-design.

Kennedy, R  
Military Traffic Management Command Tech Rpt. MTMC Report TR 75-5, May 1978, 32 p.

ACKNOWLEDGMENT: Military Traffic Management Command  
ORDER FROM: Military Traffic Management Command, Transportation Engineering Agency, Newport News, Virginia, 23606

DOTL HE2311.K47

02 188074

**CARGO RESPONSE TO RAILCAR IMPACT AND TIEDOWN LOAD ANALYSIS**

An analytical study is described in which was investigated the loads produced during coupling of railcars carrying heavy shipping containers. The structural model of the impact event is represented by a lumped-paramete-

ter technique. Each discrete mass lump possesses longitudinal, vertical, and rotational degrees of freedom. The resulting computer simulation provides for nonlinear railcar coupler stiffness and linear damping forces in the coupler and container tiedowns. Results include response to parametric variations in container weight, impact speed, and tiedown stiffness. Container dynamic response and tiedown loads are found to depend heavily on these parameters. Also, railcar bending and subsequent vertical motion are shown to be important contributors to these responses. When experimentally substantiated, the model developed can serve as a useful tool in the design and evaluation of shipping container tiedown structures.

Bartholomew, RJ  
Los Alamos Scientific Laboratory LA-7469-MS, Sept. 1978, 54 p., 14 Fig., 5 Ref., 4 App.

Contract DOE-W-7405-ENG. 31

ORDER FROM: NTIS

DOTL RP

02 188091

**RAIL OVERTURNING**

The number of train accidents increased in recent years. This may be partially attributed to the use of high speed trains and elimination of expansion joints. Derailments are among the significant causes of accident and may be caused by overturning of rail. A better understanding of rail overturning is thus a significant step toward the safe operation and adequate design of the rail system. This paper is concerned with the identification of the significant parameters affecting the instability of the rail system and an improved method of solution. In the first part, the equations governing the behavior of the system are set up. Axial loads induced by a temperature change or braking of locomotives are included in the formulation in addition to the vertical and lateral loads. The torsional and lateral stiffness of the rail, fasteners and ties are represented by means of springs. A parametric study is performed by a direct variational method to establish the values of the significant parameters. The finite element method is then applied, using the derived stiffness matrix, to obtain an accurate solution.

Forty-seventh Symposium on Shock and Vibration, Albuquerque, New Mexico, October 19-21, 1976.

Arbabi, F (Michigan Technological University) *Shock and Vibration Bulletin* No. 47, Part 4, Sept. 1977, pp 149-154, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Shock and Vibration Information Center, Naval Research Laboratory, Washington, D.C., 20375

02 188092

**SIMULATION AND ANALYSIS OF RAIL VEHICLE DYNAMICS**

This paper discusses current U.S. simulation and analysis efforts in rail vehicle dynamics. It points out the direction that present research is taking, illustrates the scope and magnitude of the problem, and presents selected results from current research programs.

Simulation Council Proceeding Ser, Volume 7 No. 2, for Miniconference on Transportation: Overview of the Simulation in Highway Transportation, University of Michigan, Ann Arbor, April 20-22, 1977.

Hedrick, JK (Massachusetts Institute of Technology) *Simulation Councils Proceedings* Proceeding 1977, pp 127-135

ACKNOWLEDGMENT: EI  
ORDER FROM: Society for Computer Simulation, P.O. Box 2228, La Jolla, California, 92038

02 188107

**DETERMINATION OF THE QUANTITY AND QUALITY CHARACTERISTICS OF AIR FRICTION IN THE CASE OF HIGH SPEED TRAINS [Ocenka kolicestvennyh i kacestvennyh harakteristik vozdušnogo soprotivlenija skorostnogo poezoda]**

No Abstract. [Russian]

Sjuzjumova, EM Romanenko, GA *Vestnik VNIIZT* No. 4, 1978, pp 22-26, 4 Fig., 4 Tab., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

02 188108

**EFFECT OF THE DAMPING OF CROSSWISE OSCILLATIONS ON THE LATERAL STRESSES CREATED IN THE TRACK BY LOCOMOTIVES RUNNING AT HIGH SPEEDS [Vlijanie dempfovania poperecnyh kolebanij na bokovye sily vzaimodejstvija lokomotiva i puti]**

No Abstract. [Russian]

Sestakov, VN *Vestnik VNIIZT* No. 4, 1978, pp 17-21, 4 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

02 188113

**A DYNAMIC MODEL FOR LONGITUDINAL TRAIN ACTION**

A mathematical model has been derived for the longitudinal behavior of a train both as a whole and car by car. This is done by considering the train as a mass-spring system. Forces on each vehicle are identified and quantified. Newtonian equations of motion are written to provide a system of simultaneous ordinary differential equation. These equations are linearized. They are uncoupled by modal synthesis technique. They are integrated by numerical technique to give time history of displacements and velocities of the vehicles. The results are compared with steel coil train test data and Cardwell Westinghouse impact test data. The computational time requirements of this method are also compared with those of direct integration technique.

Gogineni, BR Garg, VK

Association of American Railroads Technical Center Thesis AAR Rpt R-297, Feb. 1978, 42 p., 14 Fig., 1 Tab., 12 Ref., 4 App.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

02 188114

**EFFECTS OF SPIRAL LENGTH ON REVERSE CURVE NEGOTIATION WITH MINIMUM TANGENT LENGTH FOR SLOW SPEED OPERATION**

The effect of spirals in slow speed reverse curve negotiation has been investigated with the Quasi-Static Lateral Train Stability Model. The reverse curves studied are 6, 8, 10, 12 and 14-degrees. The Lateral/Vertical (L/V) ratios for wheel climb and rail rollover and the maximum coupler lateral angles were analysed for each reverse curve. The effect of buff forces on the maximum L/V ratios and coupler lateral angles was also studied for negotiation of reverse curves at slow speeds. The United States Government assumes no liability for the contents of this report or the use thereof.

Sponsored by Federal Railroad Administration, Washington, D.C.

Chang, EH Shum, KL Abbott, RA Singh, SP  
Association of American Railroads Technical Center Tech Rpt. AAR Rpt R-309, Sept. 1978, 64 p., Figs., 6 Ref., 1 App.

Contract DOT-FR-64228

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

02 188116

**THE RESPONSE OF A SIX-AXLE LOCOMOTIVE TO RANDOM TRACK INPUT**

A mathematical model, for analyzing the dynamic response of a six-axle locomotive on tangent track, is developed using a spectral analysis technique. The locomotive is represented by a thirty-nine (39) degree-of-freedom model. The excitation includes vertical and lateral random inputs. The wheel-rail interaction, based on the linear theory proposed by Wicken, Joly and Blader is considered in the model. The response spectra of a representative six-axle locomotive subject to the selected vertical and/or lateral random track irregularities is analyzed. Mean square values for displacements, velocities and accelerations, and the statistical average frequencies of the system were calculated for each degree of freedom. It is also demonstrated that probability functions for the response, can be used as a measure for the riding quality of the locomotive, and for the calculation of the probability of derailment.

Garivaltis, DS Garg, VK

Association of American Railroads Technical Center Thesis AAR Rpt R-312, June 1978, 90 p., 49 Fig., 5 Tab., 12 Ref., 4 App.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

02 188117

**TRACK GAUGE WIDENING, A MODEL STUDY**

The paper contains a study of two models which represent the mechanisms of gauge widening and rail roll in a track subjected to vertical, lateral and longitudinal loading. The deformation mechanisms of the rail-fasteners-tie system under service loads was investigated, and the results compared with track test data. It was found that two distinct deformation mechanisms. Rail Translation and Rail Roll are mechanically coupled by the track system and can not be readily separated in any analysis.

Zarembski, AM Rassaian, M

Association of American Railroads Technical Center AAR Rpt R-314, July 1978, 33 p., 13 Fig., 7 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

DOTL RP

02 188133

**NONLINEAR KINEMATICS OF WHEEL-RAIL CONTACT**

Relations which describe the nonlinear geometry of contact between a railway vehicle wheelset and rail are derived and expanded about the central (rest) positions. These are solved for the rolling and vertical motions, instantaneous left and right wheel rolling radii, angles between the contact and horizontal planes, and lateral and longitudinal creepages. The results are given explicitly in terms of the lateral and yawing motions for mildly noncircular wheel and rail profiles. A kinematic (pure rolling) solution is obtained for the case where the wheel profile is sufficiently noncircular to invalidate the classical linear kinematic solution.

Burton, TD (General Electric Company); Whitman, AM *ASME Journal of Applied Mechanics* Vol. 45 No. 3, Sept. 1978, pp 664-668, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

02 188364

**WHEEL-ON-RAIL RESEARCH IN WEST GERMANY**

West Germany's Ministry for Research and Technology has reached a critical stage in its wheel-on-rail research program. With a more elaborate tests facility proposal abandoned, work is now concentrated on the sophisticated Munich roller-rig. A 23-km section of line has been designated for road tests to 350 kph. DB's long-term aim is to improve its competitive position. With 200 kph already achieved, research is geared to running at higher speeds on new lines in the post-1990 period. By the early 1980s, enough data will have been gathered to determine the shape of future high-speed guided transport in West Germany.

Michelfelder, W *Railway Gazette International* Vol. 134 No. 12, Dec. 1978, pp 971-975, 4 Phot., 3 Ref.

ORDER FROM: ESL

DOTL JC

02 188631

**LOCOMOTIVE RESPONSE TO RANDOM TRACK SURFACE IRREGULARITIES**

Evaluation of the tracking performance of a locomotive requires a knowledge of its response to typical rail inputs, at typical speed conditions. This paper presents an analytical model for calculating the response of a locomotive to random irregularities in track surface. Wide band track roughness spectra are considered, as well as narrow band contributions due to rail joints. Typical response results are computed for a sample locomotive, and evaluated against safety, ride quality, and adhesion performance criteria.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers, for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Rinehart, RE (General Electric Company)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-12,  
July 1978, 8 p., 10 Fig., 3 Tab., 6 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

02 188632

**EQUILIBRIUM STATES OF ECCENTRICALLY LOADED FLAT CARS TRAVERSING IRREGULAR CURVES**

A general static analysis, including the effects of centrifugal acceleration, is presented for an arbitrarily loaded freight car negotiating an arbitrary spiral curve. Two types of equilibrium states are investigated: one with and one without car side bearing clearance. Using a case study as an example, the analysis predicts lighter and lighter loads for a particular wheel set as the "roughest" part of the spiral curve is approached, just prior to derailment. Several possible causes for derailment, including lack of ballast and dynamic effects, are delineated.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Wilson, JF (Duke University)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-13,  
July 1978, 8 p., 8 Fig., 3 Tab., 3 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

02 188636

**ESTABLISHMENT OF DAMPENING REQUIRED FOR CONTROL OF RAILROAD TRUCK HUNTING**

All present analyses into "the hunting phenomenon" are based on evaluation of the effective conicity of the wheel tread and the resulting creep and friction forces, and their interaction with the various degrees of freedom of the dynamic system of freight car and its suspension. This paper offers a means to calculate the critical dampening that can control hunting, disregarding the geometry of wheel tread profiles which tends to change with wear. The equations for frequency and dampening required for control of the motion are based on the elasticity of the system at the area of contact between wheel and rail, and the casting characteristics of the railroad vehicle truck.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Guins, S  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-17,  
July 1978, 9 p., 9 Fig., 12 Ref., 1 App.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

02 188675

**FRATE, VOLUME I: USER'S MANUAL**

FRATE (Freight Car Response Analysis and Test Evaluation) is the name of a digital computer program which numerically solves the structural dynamic equations of motion of a single railroad freight car excited by wheel/rail interface motions. The Federal Railroad Administration (FRA) has sponsored its development for the purpose of applying it to freight car analysis and test problems. This manual has been written with the objective of providing the user with all of the detailed information needed as concisely and accessibly as possible. To this end the manual has been divided into two volumes: Volume I is a User's Manual containing basic user related information, Volume II is a Technical Manual containing more detailed technical information. FRATE is written to allow the simulation of a broad range of freight cars by only simple input data changes. A Trailer-on-Flatcar (TOFC) configuration is simulated in this manual. FRATE solves the equations of motion in the time domain and includes the following features; (1) nonlinearities which presently include separations, bilinear springs and no small angle assumptions, (2) five degree-of-freedom coordinate coupling (longitudinal motions have been omitted), (3) normal mode structural flexibility and (4) frequency response from simulated sweep testing. Although it has not been included in this report coulomb damping has been included and used in a trial version of FRATE.

Prepared for U.S. Department of Transportation, Federal Railroad

Administration, Office of Research and Development, Washington, D.C.  
Kachadourian, G Sussman, NE Anderes, JR  
Mitre Corporation Tech Rpt. FRA/ORD-78/59, MTR 7889, VI, Sept.  
1978, 97 p., 14 Fig., 12 Tab.

Contract DOT-FR-54090

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

02 188677

**THE APPLICATION OF QUASI-LINEARIZATION TECHNIQUES TO RAIL VEHICLE DYNAMIC ANALYSES**

The objective of the work reported here was to define methods for applying the describing function technique to realistic models of nonlinear rail cars. The describing function method offers a compromise between the accuracy of nonlinear digital simulation and the computational efficiency of linear methods. This work entailed the development of realistic describing function representations for nonlinearities such as the wheel/rail contact interaction and the development of algorithms for using these describing functions to predict the occurrence and stability of hunting and the forced response of rail vehicles to sinusoidal and statistical track irregularities. This report explains the describing function technique, demonstrates how it can be applied to nonlinear rail vehicle dynamics problems, describes algorithms that can be used for such problems, and presents results for typical nonlinear problems, including wheel profile and suspension nonlinearities.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Hedrick, JK Cooperrider, NK Law, EH  
Massachusetts Institute of Technology, Arizona State University, Tempe,  
Clemson University Final Rpt. FRA/ORD-78/56, DOT-TSC-  
FRA-78-6, Nov. 1978, 228 p., Figs., Tabs., 51 Ref., 1 App.

Contract DOT-TSC-902

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-289849/AS, DOTL NTIS, DOTL RP

02 188680

**USER'S MANUAL FOR PROGRAM CONFORM (CONFORMAL CONTACT STRESS PROBLEMS)**

CONFORM (Conformal Contact of Two Elastic Bodies) is an all FORTRAN Computer program for the solution of contact stress between two elastic bodies in conformal contact. It is used to find the pressure distribution between the two bodies, the boundary of contact patch, and the total load corresponding to a given depth of penetration. This program is a generalization of a previous program (CONTACT) which was restricted to the case of counterformal contact. This new program CONFORM will treat counterformal as well as conformal cases. Built into the program are specialized subroutines which enable the user to conveniently specify the surface profiles for railroad wheels and railheads. By reading dimensional information from conventional engineering drawings of wheels and rails the user need not do any programming. For wheel and rail profiles (e.g. worn wheels) which consist of other than straight lines and circular arcs (associated with standard new wheels and rails), the user may provide his own subroutines for describing the wheel-rail geometry. Descriptions of the program variables, input, output, and method of analysis are given. Instructions for problem modelling, preparation of input data, and solutions of sample problems, are included.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Program of University Research, Washington, D.C.

Paul, B Hashemi, J  
Pennsylvania University, Philadelphia Tech Rpt. FRA/ORD-78-40,  
MEAM 78-1, June 1978, 81 p., 18 Fig., 1 Tab., 7 Ref., 3 App.

Contract DOT-OS-60144

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

02 188682

**TRUCK DESIGN OPTIMIZATION PROJECT (TDOP) PHASE II-PHASE I DATA EVALUATION AND ANALYSIS PLAN**

This document describes a plan for evaluating and analyzing the TDOP Phase I test data for Type I freight car trucks. The plan proposes that the

initial tasks should include cataloging the Phase I data, refining the TDOP sorting routine, and converting and validating the government-furnished Phase I post processing program to run on Wyle's Interdata 8/32 computer. Once the software is operational, the Phase I data evaluation and analysis will begin with a pilot program to establish the validity of the techniques for establishing freight car truck performance indices. The plan states that a final report will be published sixty days after completion of the evaluation and analysis of the Phase I data.

Prepared for U.S. Department of Transportation, Washington, D.C. This report is the first of a series that will be published under the major title "Truck Design Optimization Project, Phase II as the multi-year program develops. A preliminary version of this plan was distributed at the first TDOP Phase II In-Progress Review held in Chicago, Illinois on March 21, 1978.

Gibson, D

Wyle Laboratories FRA/ORD-78/34, TDOP TR-01, Sept. 1978, 27 p.,  
13 Fig.

Contract D OT-FR-742-4277

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

DOTL NTIS, DOTL RP

02 188692

**AERODYNAMIC FORCES ON FREIGHT TRAINS--VOLUME III  
CORRELATION REPORT-FULL SCALE TESTS OF TRAILERS  
ON FLATCARS AND COMPARISON WITH WIND TUNNEL  
RESULTS**

Full scale measurements of the aerodynamic forces of trailers on flatcars have been performed at the Transportation Test Center in Pueblo, Colorado. These measurements were performed by mounting the trailers on the flatcar through force balances. In the two configurations that were tested the flatcar in front of the test car was loaded and unloaded. The tests were quite successful and resulted in consistent reproducible results. In addition to the full scale tests, wind tunnel tests were performed at Reynolds numbers up to 20% of full scale values for the same configurations. These wind tunnel tests supplemented previous wind tunnel tests similar to those previously reported in Volume I of this series. Reasonable agreement, to about 20%, was found between the wind tunnel and full scale tests. This agreement was about as good as between the wind tunnel tests themselves. Rolling resistance was also determined from the full scale tests as the difference between total and aerodynamic resistance. The results were degraded by hysteresis in the coupler force measurement but show good agreement with the Davis relation.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Hammitt, AG

Hammitt (Andrew G) Associates Final Rpt. FRA/ORD-76-295.III,  
AGH 11-002-78, Sept. 1978, 94 p.

Contract DOT-FR-756-4333

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-288137/AS, DOTL NTIS, DOTL RP

03 053282

**WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND STANDARDISATION. CALCULATION OF WAGON AXLES**

Commencing from the axle calculation methods used by different railway Administrations (or by axle manufacturers) and the measurements made during line tests, the report proposes vertical and lateral forces to be allowed for in the calculation of wagon-axles. The incidence of the forces introduced by braking (on the wheel or with axle mounted discs) has also been examined. Taking the experience of some major Administrations as a basis (experimental studies and service results) the report also proposes some recommendations on the subject of geometric forms to be adopted for the different constituent parts of an axle (relative dimensions and transitions between sections of different diameter) and the preferred surface conditions on the different parts. Finally, the values of permissible stresses to be taken into account at various sections of an axle and a simplified design sheet are given.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 136/RP 6, Apr. 1978, 37 p., 9 Fig., 6 Tab., 4 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

03 053287

**STANDARDISATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. STANDARDISATION OF BOGIE WAGONS WITH IMPACT DAMPERS AND A 60 FT LOADING LENGTH FOR THE TRANSPORT OF LARGE CONTAINERS IN ORDINARY TRAINS**

The report provides a survey of the bases of work and describes the work which was found necessary in standardising this type of wagon. Appended is also a description of the construction (descriptive note and plan) and a summary of the tests carried out (including service tests).

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 112/RP 15, Oct. 1977, 35 p., 16 Fig., 4 Tab., 2 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

03 053288

**STANDARDISATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. TECHNICAL CONDITIONS FOR DOOR-LOCKING AND LASHING COMPONENTS**

This report relates to the technical conditions for container door-locking systems and lashing devices which are applied in the development and construction of large containers for railway Administrations or their subsidiary companies. Technical conditions for door-locking systems and lashing devices for the following conventional closed types of containers: 10/8 ISO type 1D, 20/8 ISO type 1C, 20/8-1/2 ISO type 1CC, 30/8 ISO type 1B, 30/8-1/2 ISO type 1BB, 40/8 ISO type 1A, 40/8-1/2 ISO type 1AA.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 112/RP 16, Oct. 1977, 30 p., 5 Fig., 5 App.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

03 053289

**STANDARDISATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. INVESTIGATION INTO THE STRESSES EXERTED ON LARGE CONTAINERS DURING RAIL TRANSPORT AND INLAND TRANSFER WITH REFERENCE TO THE TEST CONDITIONS OF UIC LEAFLET 592-2**

This report investigates the stresses to which large containers are subjected in rail transport and during transfer by cranes, with a view to making a critical appraisal of the requirements of UIC Leaflet 592-2. This is an interim report.

Restrictions on the use of this document are contained in the explanatory

material.

International Union of Railways B 112/RP 17, Oct. 1977, 22 p., 3 Fig., 3 Tab., 6 App.

ACKNOWLEDGMENT: UIC  
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DOTL RP

03 053294

**STANDARDISATION OF WAGONS. BOGIE VAN WITH SLIDING WALLS (HABISS). SECOND EDITION**

This report describes the design of the covered bogie van with sliding walls, series Habiss, and contains the conditions applicable to the construction of these vans equipped with selected sliding wall devices and load protection systems.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 12/RP 22, Dec. 1977, 39 p., 2 Fig.

ACKNOWLEDGMENT: UIC  
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03 053298

**STANDARDISATION OF WAGONS. BOGIE WAGON WITH TELESCOPIC HOODS AND LOADING CRADLES FOR THE CARRIAGE OF STEEL SHEET COILS (SHIS)**

The present report describes the construction of bogie wagons with telescopic hoods and load cradles for the carriage of steel sheet coils affected by the weather (Shis) and gives the results of the tests carried out in accordance with ORE Report B 12/RP 17.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 12/RP 26, Apr. 1978, 41 p., 14 Fig., 10 Tab.

ACKNOWLEDGMENT: UIC  
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03 053301

**VIENNA ARSENAL VEHICLE TESTING STATION. REPORT ON THE ACTIVITIES OF THE VIENNA ARSENAL VEHICLE TESTING STATION IN THE YEAR 1977**

The present report briefly describes the activities of the Vehicle Testing Station Vienna Arsenal during the year 1977. Vehicles such as coaches and tractive vehicles from different countries were tested from the owner railways and manufacturers. Furthermore, a series of ATP tests for transport materials for easily perishable food products were carried out for the first time. The development and construction of a track measurement cell for measuring the track in different conditions is almost completed. The work on the standard programme for testing the behaviour of disc brakes in winter conditions is being continued. A model test for simulating a sand-storm for testing the functioning of units and vehicles in special conditions, as they occur in different countries, proved that practical studies at a more extended scale are possible.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways AZ 30/RP 18, Apr. 1978, 23 p., 7 Fig.

ACKNOWLEDGMENT: UIC  
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DOTL RP

03 053304

**STANDARDISATION OF WAGONS. STANDARDISATION OF CAST STEEL BOGIES SUITABLE FOR USE IN S AND SS TRAFFIC**

This report describes the construction of a cast steel bogie suitable for use in S and SS traffic for an axload of 20 t and with brake equipment accommodated under the vehicle body, as in the versions already standardised. The report also presents the results of strength tests.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways B 12/RP 27, Apr. 1978, 21 p., 9 Fig., 4 Tab.

ACKNOWLEDGMENT: UIC  
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DOTL RP

03 180269

**ROAD VEHICLES TRANSPORTED BY RAIL [Vehicules routiers transportes par le rail]**

Brief description of the combined road-rail transport techniques used in Europe: the UFR system, the Kangaroo technique and the piggyback system with "wippen", recess SGP or "rolling road" cars. [French]

See also No. 78, February 25, 1978 pages 32-33 and No. 79, March 25, 1978 pages 33-34.

Lallemand, A *Containers Actualites* No. 76, Dec. 1977, pp 32-33, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Containers Actualites, 6 rue Saint-Saens, 75015 Paris, France

03 180274

**NEW DB BALLAST WAGON [Neuartiger Schotterwagen der Deutschen Bundesbahn]**

Description of the new 268 type ballast car with a capacity of 40 cubic meters a payload of 59.5 t, a speed of 100 km/h and which is accepted in international services. [German]

Lange, K *Eisenbahntechnische Rundschau* Vol. 27 No. 1-2, Jan. 1978, pp 23-26

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 180280

**SYSTEMATIC RESEARCH INTO VEHICLE DEVELOPMENT USING THE EXAMPLE OF A HIGH-SPEED TRACTIVE UNIT FOR SPEEDS OF 300 KM/H [Die Systemtechnik bei Fahrzeugentwicklungen. Dargestellt am Beispiel eines Hochgeschwindigkeitstriebfahrzeugs fuer 300 km/h]**

Work to define the DB project for a tractive unit to run at 300 km/h is taking the form of a preliminary study to be followed by more extensive research to define the main characteristics of future types of stock. The author describes briefly the programme and pattern of operations and the first results of studies of this type. [German]

Luebke, D *Eisenbahntechnische Rundschau* Vol. 27 No. 4, Apr. 1978, pp 197-204, 1 Tab., 14 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 180317

**NOISE CONTROL OF THE STANDARD LIGHT RAIL VEHICLE**

The article discusses the acoustic requirements and testing involved in the development of a standard light rail vehicle for mass transportation. The term light rail is used to define a class of transit vehicles with characteristics derived from the hourly passenger capacity as well as the vehicles' axle loading.

Spencer, RH (Boeing Vertol Company) *Noise Control Engineering* Vol. 10 No. 1, Jan. 1978, pp 4-13, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 180540

**SHIPBORNE CONTAINERS AND CONTAINERIZATION (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)**

Shipborne container design and containerization utilization are investigated in these reports gathered from worldwide literature. Military and merchant ship logistics relative to containers, containership motion and maneuverability, and onboard/offboard loading requirements are among parameters studied. (This updated bibliography contains 101 abstracts, 24 of which are new entries to the previous edition.)

Habercom, GE, Jr  
National Technical Information Service May 1978, 109 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0462/8ST

03 180541

**SHIPBORNE CONTAINERS AND CONTAINERIZATION (CITATIONS FROM THE NTIS DATA BASE)**

Shipborne container design and containerization utilization are investigated in these Government-sponsored research reports. Military and merchant ship logistics relative to containers, containership motion and maneuverability, and onboard/offboard loading requirements are among parameters studied. (This updated bibliography contains 185 abstracts, 29 of which are new entries to the previous edition.)

Habercom, GE, Jr  
National Technical Information Service May 1978, 191 p.

ACKNOWLEDGMENT: NTIS  
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NTIS/PS-78/0461-0ST

03 181924

**COUPLING SYSTEM DESIGN OPTIMIZATION-A SURVEY AND ASSESSMENT OF AUTOMATIC COUPLING CONCEPTS FOR RAIL FREIGHT CARS. VOLUME I. EXECUTIVE SUMMARY**

The purpose of this study is to provide an independent identification, classification, and analysis of significant freight car coupling systems concepts offering potential for improved safety and operating costs over the present system. The basic method of approach was to make a comprehensive search as a prerequisite to establishing significant coupler concepts which would be used to formulate candidate coupling systems. The search program consisted of a literature search, a patent search, and railroad industry interviews. Coupling development efforts have been decreased due to changing usage and profitability of the American railroads. The functional concepts of existing development efforts range in sophistication from increasing the gathering range of the present coupler system to providing automatic train air connection and a complete redesign of the mechanical coupler. A sufficient number of new concepts were identified to derive coupling systems which represent a significant improvement over the present system.

Nyquist, AE Boydston, GD Chanoux, JJ Halagera, RT Hall, RK Kearney (AT) and Company, Incorporated, Transportation Systems Center, Federal Railroad Administration Final Rpt. DOT-TSC-FRA-77-30.I, FRA-ORD-78/11.I, May 1978, 49 p.

Contract DOT-TSC-1087-1

ACKNOWLEDGMENT: NTIS  
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PB-284159/1ST

03 181982

**COUPLING SYSTEM DESIGN OPTIMIZATION-A SURVEY AND ASSESSMENT OF AUTOMATIC COUPLING CONCEPTS FOR RAIL FREIGHT CARS. VOLUME II: TEXT AND APPENDICES**

The purpose of this study is to provide an independent identification, classification, and analysis of significant freight car coupling system concepts offering potential for improved safety and operating costs over the present system. The basic method of approach was to make a comprehensive search as a prerequisite to establishing significant coupler concepts which would be used to formulate candidate coupling systems. The search program consisted of a literature search, a patent search, and railroad industry interviews. Coupling development efforts have been decreasing due to changing usage and profitability of the American railroads. The functional concepts of existing development efforts range in sophistication from increasing the gathering range of the present coupler system to providing automatic train air connection and a complete redesign of the mechanical coupler. A sufficient number of new coupler concepts were identified to derive coupling systems which represent a significant improvement over the present system. This is the second of two volumes. Volume I, 48 pages, is an executive summary.

See also Volume I, PB-284159.

Nyquist, AE Boydston, GD Chanoux, JJ Halagera, RT Hall, RL Kearney (AT) and Company, Incorporated, Transportation Systems Center, Federal Railroad Administration Final Rpt. DOT-TSC-FRA-77-30-II, FRA-ORD-78-11.II, May 1978, 446 p.

Contract DOT-TSC-1087-1

ACKNOWLEDGMENT: NTIS  
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PB-284546/9ST, DOTL NTIS

03 182582

## CONTROL OF WELDING STANDARDS: CONSTRUCTION OF LOCOMOTIVES AND ROLLING STOCK

Welding has become an extensively used method of construction of structures for locomotives, rolling stock, plant and equipment. This paper describes the methods and practices adopted to overcome the many problems associated with fabrication of welded structures. It is not the intention to discuss the causes of weld failures in specific cases nor the particular remedies adopted, but rather to describe the general approach in terms of training and education, in welding and technology, the adoption of detailed specifications and procedure controls used for the control of welding standards.

Hurst, JK (British Railways Board) *Institution of Mechanical Engineers Proceedings* Vol. 192 Mar. 1978, n.p.

ACKNOWLEDGMENT: EI  
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DOTL JC

03 182588

## CLASS AM 6/6 DIESEL LOCOMOTIVES OF THE SWISS FEDERAL RAILWAYS

Although the network of the Swiss Federal Railways (SBB) is fully electrified, diesel locomotives are needed as a thermal operational reserve to assure train haulage in the event of a power failure on the overhead line, or in times of crisis. Normally, however, they are employed for heavy hump marshalling duties. The present article shows how both tasks can be accomplished by a single type of locomotive, by using static converters.

Roffler, M *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 717-729, 7 Ref.

ACKNOWLEDGMENT: EI  
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03 182589

## BO'BO'BO' LOCOMOTIVE CLASS RE 6/6 OF THE SWISS FEDERAL RAILWAYS (SBB)

The introduction of the sophisticated six-axle locomotive of class Re 6/6 for mountain service has provided the Swiss Federal Railways with sufficient capacity to meet the operational requirements for many years. The author offers a detailed description of this conventional locomotive of very high output.

Streiff, H *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 704-716, 13 Ref.

ACKNOWLEDGMENT: EI  
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03 182607

## FIRE-RESISTANT QUALITIES IN THE CHOICE OF MATERIALS USED FOR ROLLING STOCK [Choix des materiaux a l'egard de leur tenue au feu dans le domaine du materiel roulant]

After recalling the basic definitions concerning the fire-resistant qualities of materials, the authors explain the purpose, limits and interpretation of fire tests. They examine the rules that decided the SNCF to apply certain types of tests and describe the main methods used. They consider the difficulties involved when studying the toxicity of fumes and give, as an example, some of the choices made for modern coaching stock. [French]

Revillon, A Muraire, R *Revue Generale des Chemins de Fer* Vol. 97 Apr. 1978, pp 260-268

ACKNOWLEDGMENT: British Railways  
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DOTL JC

03 182628

## METHODS FOR CALCULATING RAIL VEHICLE STRUCTURES [Berechnungsverfahren fuer Schienenfahrzeugstrukturen]

No Abstract. [German]  
Kammerhofer, G *Leichtbau der Verkehrsfahrzeuge* Vol. 22 No. 1-2, Jan. 1978, pp 1-4, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Leichtbau der Verkehrsfahrzeuge, Rosenheimer Strasse 145, Munich 80, West Germany

03 182806

## TESTS UNDERTAKEN WITH TURBINE TRAIN TGV 001

The tests undertaken with train TGV 001 formed an essential part of the total SNCF high speed train research and yielded valuable information concerning bogie critical speed, factors affecting comfort, braking systems and train resistance. This information was valuable for the design of the high speed train sets for the new Paris-Lyons line but represents new fundamental knowledge of more general application.

Bouley, J (French National Railways) *Institution of Mechanical Engineers Proceedings* Vol. 191 No. 5, 1977, pp 45-57

ACKNOWLEDGMENT: EI  
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03 182853

## INCREASING THE RELIABILITY AND IMPROVEMENT OF THE ROUTINE MAINTENANCE OF FREIGHT CARS

[Povysheniye nadezhnosti i uluchsheniye tekushchego sodержaniya gruzovykh vagonov]

This proceeding presents 11 technical papers: (1) Investigation of the Characteristics of the Evaluation of Freight Car Reliability and the Fixing of Rates for Reliability Indices; (2) Towards an Evaluation of the Longevity of Freight Car Center Plates; (3) The Longevity of Freight Car Truck Springs; (4) Problems in the Evaluation of the Heat Engineering Condition of Refrigerator Cars; (5) Problems in the Improvement of Linkless Automatic Regulators of Brake Rigging; (6) Theoretical Research of the Stress-Deformed Condition of Open Box Car Unloading Hatch Covers; (7) The Effect of some Design Parameters and Operational Tolerances on the Reliable Movement of a Freight Car; (8) The Method for Calculating a Plan for Introducing and Organizing the Work of Bearing Shops in Car Depots; (9) The Method for Calculating the Optimal Parameters of Car Repair Machines for Preparing Cars for Loading; (10) The Fundamentals of the Scientific Organization of the Routine Maintenance of Car at Points of Technical Inspection; and (11) The Analysis of Certain Aspects of Forces Acting on Elements of Gondolas During Off-Loading on Car Dumpers. [Russian]

Contains English abstracts of the different papers in RRIS 03 182854 through 182859 and 03 182861 through 182864 and RRIS 02 182860; Bulletin 7901; a copy of these proceedings is also available for reference purposes only at the Office of Research and Development, Federal Railroad Administration.

*Trudy TsNII* Proceeding No. 459, 1972, 176 pp, 34 Tab., 59 Ref.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

03 182854

## INVESTIGATION OF THE CHARACTERISTICS OF THE EVALUATION OF FREIGHT CAR RELIABILITY AND THE FIXING RATES FOR RELIABILITY INDICES [Issledovaniye osobennostey otsenki nadezhnosti gruzovykh vagonov i normirovaniya nokazeteley nadezhnosti]

Problems of the theory of reliability applicable to freight cars are set forth. The distinctive features of estimating the reliability and life of cars, of systematizing the gathering of information, and of selecting a proving ground for gathering information are examined. Particular aspects are given of the distribution of car breakdowns resulting from malfunctioning of individual components, as well as the procedure for determining reliability standards for freight cars. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Orlov, MV Senderov, GK *Trudy TsNII* Proceeding No. 459, 1972, pp 4-35, 8 Tab.

ACKNOWLEDGMENT: FRA

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03 182855

**TOWARDS AN EVALUATION OF THE LONGEVITY OF FREIGHT CAR CENTER PLATES [K otsenke dolgovechnosti pyatinkov gruzovykh vagonov]**

A procedure is examined for estimating the life of parts operating under conditions of pulsed compression cycles. Application of this procedure is illustrated through the example of a car body center plate on a four-axle gondola and calculation is made of the service life of a mass-produced and reinforced plate. Calculated results are compared with service and experimental data. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Survillo, AB Radulov, NI *Trudy TsNII* Proceeding No. 459, 1972, pp 36-46

ACKNOWLEDGMENT: FRA

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03 182856

**THE LONGEVITY OF FREIGHT CAR TRUCK SPRINGS [Dolgovechnost' teletzhechnykh pruzhin gruzovykh vagonov]**

The results are given of studies of the life of new and used freight car truck springs. A discussion is given of the mechanism for buildup of fatigue damage to springs associated with the effect of cyclic loads in the process of use. A demonstration is given of the effectiveness of intermediate shot peening to increase the life resource of springs. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Shapiro, Ye A *Trudy TsNII* Proceeding No. 459, 1972, pp 47-67, 5 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

03 182857

**PROBLEMS IN THE EVALUATION OF THE HEAT ENGINEERING CONDITION OF REFRIGERATOR CARS [Voprosy otsenki teplotekhnicheskogo sostoyaniya refrizheratornykh vagonov]**

An analysis is provided of current criteria for evaluating the heat engineering properties of refrigerator cars. A summary is given of domestic and foreign experience in the use of thermography. Specifications are formulated for a system of monitoring the heat insulation qualities of cars. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Gamirov, VI Barabanshchikov, VF *Trudy TsNII* Proceeding No. 459, 1972, pp 68-77

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

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03 182859

**THEORETICAL RESEARCH OF THE STRESS-DEFORMED CONDITION OF OPEN BOX CAR UNLOADING HATCH COVERS [Teoreticheskoye issledovaniye napryazhenno-deformirovannogo sostoyaniya kryshek razgruzochnykh lyukov poluvagonov]**

Questions are dealt with relating to calculating stresses and strains in hatch covers. A procedure is given for calculating the operating reliability of a hatch cover. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Dubrovin, VG *Trudy TsNII* Proceeding No. 459, 1972, pp 92-104

ACKNOWLEDGMENT: FRA

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03 182861

**THE METHOD FOR CALCULATING A PLAN FOR INTRODUCING AND ORGANIZING THE WORK OF BEARING SHOPS IN CAR DEPOTS [Metodika rascheta plana vvoda u organizatsii raboty rolikovykh tsekhov v vagonnykh depo]**

A procedure is developed and presented for devising a schedule for introducing bearing shops at car depots from the viewpoint of economic feasibility. Estimates are made of production areas required for bearing shops and consideration is given to the optimal situation and organization of work of these shops at car depots. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Orlov, MV *Trudy TsNII* Proceeding No. 459, 1972, pp 116-131, 7 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

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03 182862

**THE METHOD FOR CALCULATING THE OPTIMAL PARAMETERS OF CAR REPAIR MACHINES FOR PREPARING CARS FOR LOADING [Metodika rascheta optimal'nykh parametrov vagonoremontnykh mashin dlya podgotovki vagonov k pogruzke]**

The results are given of an analysis of the extent of repair operations required when preparing cars for loading. A procedure is provided for optimizing the efficiency and utilization coefficients of the machinery. Basic requirements are formulated for machine specialization and procedure line arrangements. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Linchenko, VP Khil'chenko, VP Podshivalov, Yu S Kulaev, Yu F *Trudy TsNII* Proceeding No. 459, 1972, pp 132-153

ACKNOWLEDGMENT: FRA

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03 182863

**THE FUNDAMENTALS OF THE SCIENTIFIC ORGANIZATION OF THE ROUTINE MAINTENANCE OF CAR AT POINTS OF TECHNICAL INSPECTION [Osnovy nauchnoy organizatsii tekushchego soderzhaniya vagonov na punktakh tekhnicheskogo osmotra]**

The results are given of studies of equipment inspection stations of various types, such as service stations. An analysis is made of major losses associated with idle time of repair and inspection crews and idle time of consists or groups of cars awaiting their turn for inspection and minor repairs. Procedures are provided, as well as examples, for selecting the best variants of car servicing organization at stations of different types. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Nezgovorova, GG Khil'chenko, VP *Trudy TsNII* Proceeding No. 459, 1972, pp 154-163, 5 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

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03 182864

**THE ANALYSIS OF CERTAIN ASPECTS OF FORCES ACTING ON ELEMENTS OF GONDOLAS DURING OFF-LOADING ON CAR DUMPERS [Analiz nekotorykh osobennostey silovykh vozdeystviy na elementy poluvagona pri razgruzke na vagonoprokidnyat'yakh]**

Set forth are calculations and data from full-scale observations, characterizing the reasons for damage to elements of gondolas when unloading at car dumpers. Recommendations are given on maintenance and inspection of car dumpers to ensure that gondolas remain intact. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Senderov, GK Ivanova, NG *Trudy TsNII* Proceeding No. 459, 1972, pp 164-174

ACKNOWLEDGMENT: FRA

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03 182875

**IMPACT FATIGUE TESTS OF THE CENTER SILL OF A FOUR-AXLE TANK CAR WITH WELDED AUTOMATIC COUPLER SUPPORTS [Ustalostnye udarnye ispytaniya khebtovoy balki chetyrekhosnoy tsisterny so svarnymi uzlami uporov avtostseпки]**

The paper presents the results of fatigue tests for impact endurance on the center sill of a four-axle tank car of 60 cu m capacity with welded automatic coupler supports and a criterion for estimating fatigue strength. The criterion is determined by using a hypothesis of simple linear summation of cumulative damage with a fatigue curve obtained during the testing of welded support-component samples (mockups) of center sills, together with the operational dynamic loading spectrum. The fatigue tests were performed on a special automatic gravity-yard testing unit, which permits the continuous application of longitudinal compression impacts analogous to those sustained by rolling stock in operation--in trains and during switching operations. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Kotikov, VA *Trudy TsNII* Proceeding No. 548, 1976, pp 129-137, 3 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

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03 182877

**ANALYSIS OF WEAR RESISTANCE AND THE DEVELOPMENT OF PROPOSALS FOR INCREASING THE USEFUL LIFE OF CENTER PLATE COMPONENTS OF FREIGHT CARS [Analiz iznosostoykosti i razrabotka predlozheniy po povysheniyu dolgovechnosti pyatnikovnykh vzlov gruzovykh vagonov]**

The paper presents the results of a study of the wear resistance of freight car body center plate and truck center plate components; factors involved in wear are reviewed. The effectiveness of various methods for increasing wear resistance is demonstrated. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Survillo, AB *Trudy TsNII* Proceeding No. 548, 1976, pp 153-163, 3 Tab.

ACKNOWLEDGMENT: FRA

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03 182881

**DESIGN SPECIFICATIONS FOR TWO-AXLE FREIGHT CAR TRUCKS FOR LONG-TERM USAGE CONDITIONS [Trebovaniya k konstruktssii dvukhosnykh telezhek gruzovykh vagonov dlya perspektivnykh usloviy ekspluatatsii]**

An analysis is given of existing designs and trends in the modern design of freight car trucks. Criteria are formulated for making engineering estimates of the running gear of cars. The results are given of studies of the dynamics of freight cars for the purpose of improving their running and operating properties for increased speeds. Recommendations are given on the selection of key parameters for two-axle freight car trucks. The material presented in this monograph will be useful in solving problems in improving the design of modernizing running gear of existing cars, taking into account long-term usage conditions. The technical papers included in this document are: (1) Criteria for estimating Dynamic Properties and Performance of Freight Car Trucks; (2) Dynamic Properties and Performance of the TsNII-Kh3-0 Trucks and Improving the Design of Four-Wheel Trucks; (3) Theoretical Studies of the Dynamics of Freight Cars and Selection of Key Parameters of Running Gear; (4) Selection of Spring Suspension Parameters for the Purpose of Reducing the Rate of Lateral Oscillations of Cars. [Russian]

*Trudy TsNII* Proceeding No. 483, 1977, 96 pp, 8 Tab., 29 Ref.

ACKNOWLEDGMENT: FRA

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03 182882

**RESEARCH ON THE RELIABILITY OF FREIGHT CARS AND WAYS TO INCREASE THEIR EFFICIENCY [Issledovaniye nadezhnosti gruzovykh vagonov i puti povysheniya ikh rabotosposobnosti]**

Presented are the results of theoretical and experimental research on the effect of operating conditions on the efficiency and technical condition of

freight cars. Described are the methods and results of research into the reliability and technical condition of freight cars under general-purpose operating conditions. Provided are recommendations for further improving the system of routine maintenance and preparation of cars for shipments on an industrial basis. Presented is the methodology for evaluation of the capability for increasing the car in service time without having to stop for inspection and repair, as well as determination of the optimal length of a nonstop movement sector. The book is intended for engineering-technical and scientific workers in railway transportation who are involved with freight car operations and repair. The technical papers included in this document are: (1) Analysis of the Technical Condition and Routine Maintenance of Freight Cars; (2) Research on the Effect of Operating Conditions on Freight Car Efficiency; (3) Research into the Reliability and Technical Condition of Freight Cars; (4) Improving the System of Routine Maintenance and Preparation of Cars for Shipments; (5) Research into the Dependence of the Failure-Free Operation of Cars in Trains on the Level of Restoration of their Efficiency at the PTO (Inspection Point); (6) Substantiation of the Capability of Increasing the Operational Duration of Cars in Trains. [Russian]

*Trudy TsNII* Proceeding No. 524, 1974, 168 pp, 47 Tab., 22 Ref.

ACKNOWLEDGMENT: FRA

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03 183285

**MEASUREMENT METHOD FOR THE STRUCTURING OF WHEEL WEAR OF RAIL-BOUND VEHICLES. FINAL REPORT [Metmetod foer strukturering av hjulslitage hos raelisbundna fordon]**

In order to study wear on railway wheels a new method for wear measurements was developed especially adjusted to field measurements and to complex shapes of the subject measured. Maximum measuring error is plus or minus 10 micrometer for railway wheel measurements, resolving value about 1 micrometer. This report presents the development work and alternatives chosen together with the present method. In addition, the aim, carrying out and results from wear test are shortly described. In the new method, the yms-method, the subject measured is moulded in plastic before and after testing. The moulded profile is measured in an imaging-projecting test apparatus with coordinate table and data are recorded on a tape unit. Finally, wear calculations and plotting by means of computer and plotter are carried out. The method gives almost continuous measurement of the wear in a section of the subject measured and comparatively considerable resolution. This makes studies of the effects of various parameters on wheel wear possible. This was not possible by the use of previous methods. The method also is applicable to other objects and areas. By means of this method studies can be carried out for the optimization of structures in view of maintenance costs caused by wear. [Swedish]

Ekblom, G

National Swedish Board for Technical Development Monograph STU-Rapport NR764062, Sept. 1977, 18 pp, 13 Fig.

ACKNOWLEDGMENT: TRRL (IRRD-234385), National Swedish Road & Traffic Research Institute

ORDER FROM: National Swedish Board for Technical Development, Liljeholmsvagen 32, Fack, S-100 72 Stockholm, Sweden

78.0382

03 183306

**RAPID TRANSIT--NEW USE FOR HOT BOX DETECTORS**

Modification of a standard railroad hot box detector for detection of hot inboard journals on rapid transit cars is described. Installations have been made at scanner sites 1500 ft in advance of the line's two terminals. A dragging equipment detector is also part of the inspection facility. Car maintenance costs have been cut and utilization increased. The hot box detector is now being studied as a method of monitoring traction motor conditions.

*Progressive Railroadng* Vol. 21 No. 8, Aug. 1978, 3 pp, 6 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

03 183575

**COORDINATED SHOPPINGS**

To achieve more precise scheduling of required servicing and inspection, Missouri Pacific is implementing a locomotive maintenance information system drawing upon the data resources of the road's Transportation Control System (TCS) to achieve the highest possible availability. Phase I involved establishing a data base on MP motive power. Phase II expands the maintenance information; reliability is increased. Phase III will seek to analyze maintenance costs.

*Progressive Railroading* Vol. 21 No. 10, Oct. 1978, 3 pp, 1 Phot.

ACKNOWLEDGMENT: *Progressive Railroading*

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

03 183606

**ISO CONTAINER: FRIEND OR FOE?**

Standard sizes for containers and pallets could lead to a truly intermodal freight distribution system, with rail taking its rightful place as the prime long-haul land carrier. But it has not worked this way. European railways remain firmly opposed to the 1100 mm pallet, which is ideally-dimensioned for ISO Series 1 containers and increasingly used elsewhere, preferring the UIC 1200 mm pool pallet, which is tailored to the width of European wagons.

*Railway Gazette International* Vol. 134 No. 7, July 1978, pp 479-482, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

03 183709

**NSB'S COACHES FOR THE DISABLED**

Thirty passenger cars with special facilities for disabled persons and for mothers with babies are going into service on most major intercity trainsets of the Norwegian State Railways. In addition to compartments for mothers and for wheelchair passengers, there is a compartment for stretcher cases with access from a center-car baggage compartment which is fitted at both sides with elevators capable of handling either wheelchairs or luggage. Special toilets, a small kitchen and conductor's compartment are also installed in the cars.

*Railway Gazette International* Vol. 134 No. 10, Oct. 1978, p 754, 2 Phot.

ORDER FROM: ESL

DOTL JC

03 183895

**MECHANICAL TESTING AT FACILITY FOR ACCELERATED SERVICE TESTING**

Test operations are being conducted on the 7.7-km (4.8-mile) Facility for Accelerated Service Testing loop at the Transportation Test Center. The 9000-Mg (10,000-ton) test train operates 16 h/d at an average speed of 67 km/h (42 mph). The goal is an accelerated service test of track and rolling stock to determine comparative performances, wear rates, and maintenance and life-cycle costs. The consist is composed of 90 rail freight cars prepared in accordance with test specifications. Of the 90 test cars, 76 are available each day for testing. At least 1 year of test operations is planned. Four cars are removed daily from the cost for a 24-h period of test measurements and data collection. Inspection and gauging of components common to all cars occur every 22 d. Measurements of specific test components are made in accordance with the objects times during the test period so that a wear rate can be established for each component. The components involved in these experiments include wheels, journal roller bearings, adapters, trucks, springs, center plates, side bearings, brake shoes, wear plates, and couplers. The experiments and test measurements on each component are described.

This article appeared in *Transportation Research Record* No. 653, *Track Systems and Other Related Railroad Topics*.

Piotrowski, WL (OAO Corporation, Beltsville, Maryland) *Transportation Research Record* No. 653, 1977, pp 54-57

ORDER FROM: TRB Publications Off

DOTL JC

03 184148

**WHEEL SETS FOR SNCF HIGH-SPEED TRAIN SETS**

The development of the wheelset for the TGV trainsets of French National Railways is described. The axle is normalized carbon steel designed in accordance with SNCF and UIC Committee ORE B136 specifications with provision for two discs. Wheels are forged carbon steel with fully machined, heat treated rims and centers designed to counter speed-related dynamic stresses at speeds to 270 kph. It is concluded that the TGV wheelset barely differs from other SNCF wheelsets with two areas still under investigation: Use of mechanical or thermal surface treatments and of alloy steels in axles and use of dispersoid steel in wheels to minimize thermal problems while maintaining current hardness.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Revillon, A (French National Railways)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 11 pp, 9 Fig., 3 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute

ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184149

**WHEELSET RESEARCH AND DEVELOPMENT IN THE BRITISH STEEL CORPORATION**

This paper reviews recent activities of the Sheffield Laboratories. Metallurgical studies have shown thermal cracking in wheels increases with yield strength and reduces with ductility. Finite element analysis shows lower stresses in the typical European double-curved plate wheel than in the American straight-plate design. While high compressive residual stresses are generated in tread surfaces by service, tread braking does not affect residuals in plates. In disc braked wheels, however, high tensile stresses were found in plates. Axle compressive residual surface stresses were produced by water quenching after tempering. High residuals produced by cold rolling of wheelseats were reduced subsequently by surface grinding.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Babb, AS Hoddinott, DS Naylor, DJ (British Steel Corporation)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 27 pp, 18 Fig., 7 Tab., 15 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute

ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184150

**FATIGUE BEHAVIOR OF FRETTING CRACKS AT THE WHEEL SEAT OF CAR AXLES**

Fatigue strength of axles depends on press fits at wheel seats, gear seats and journal bearings. A full-scale axle test machine has been used at the Railway Technical Research Institute for a decade. This paper presents results on fatigue of axles from fretting corrosion and minute cracks at the wheel seat. The effects of fillets, induction hardening and crack depth are reported. Crack propagation and permissible crack depth are now under investigation.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Tanaka, S Hirose, F (Japanese National Railways)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 15 pp, 12 Fig., 1 Tab., 12 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute

ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184151

**FINAL RESULTS OF THE RESEARCH WORK ON A NEW SOLID WHEEL APT TO MOST SEVERE OPERATIVE CONDITIONS**

In developing a solid steel wheel for high-speed, heavy-load service, Italisider has worked to increase the resistance to thermal crack with tests on a brake simulation machine, followed by service tests in regular service. Using fracture mechanics principles, the design was checked. Vacuum degassed steel produces a metallurgical cleanliness which minimizes tendency to thermal cracking.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Brazzoduro, L Brozzo, P DeMartini, R Venturelli, T (Italisider SPA, Italy)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 13 pp, 2 Fig., 5 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184152

**RESEARCH ON OPTIMIZATION OF S.N.C.F. AXLES. PART II**

Research by SNCF to enhance the reliability of axles has continued. This reports the results of investigations into mechanical surface treatment, particularly prestressing by shot peening. Fatigue strength can be increased 20 percent by shot peening, but this effect may be negated by corrosion.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Revillon, A (French National Railways)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 11 pp, 9 Fig., 4 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184153

**DEVELOPING AND TESTING OF NEW WHEEL STEELS WITH IMPROVED WEAR AND THERMAL-SHOCK BEHAVIOR**

Fourteen alloy steels were tested for railway wheels primarily for high speed service where low wear, good resistance to thermal stress and high coefficient of friction were desirable. Metallurgical tests, laboratory testing on a simulator and actual service tests were all made. A manganese-molybdenum steel was found to optimize the various targets of the program.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Forch, K (Thyssen Henrichshutte AG, West Germany)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 13 pp, 6 Fig., 3 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184154

**COMPARISON OF PROPERTIES OF THE SOLID WHEELS AND TYRES IN RELATION WITH THEIR HEAT TREATMENT AND THEIR CHEMICAL COMPOSITION**

The solid wheel is replacing the tired wheel on freight and passenger cars. It is concluded, despite problems of residual stresses and difficulty in heat treatment, the solid wheel is superior. The effects of metallurgy, quenching, tempering and normalizing for both types of wheels are discussed. Changes in configuration are examined since it is pointed out that too often solid wheels are patterned after the tired wheel, when this may not be the optimum design.

Supported in cooperation with the Association of American Railroads,

Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Bil, A Mitura, K Kaloc, R Zarybnicky, O (Iron and Steel Research Inst, Czechoslovakia)  
American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 16 pp, 13 Fig.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184155

**PREDICTED AND MEASURED WHEEL STRAINS RESULTING FROM PROLONGED DRAG BRAKING**

This paper discusses the wheel strains produced by prolonged drag braking. Analytical and experimental results are compared. Residual stresses are determined to aid in the interpretation of the experimental data. It is suggested that the experimental results can best be explained by the complex initial residual stress field within the wheel.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Johnson, MR (Illinois Institute of Technology)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, n.p.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184156

**FRACTURE MECHANICS APPROACH TO THE STRENGTH OF WHEELSETS**

A fracture mechanics approach is made to two types of wheelset failures--brittle fracture of the rim and fretting corrosion at the axle wheel seat. In both cases conditions for crack growth and final failure could be analyzed experimentally. The effects of material properties and service conditions on critical strength can be evaluated.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Nishioka, K Nishimura, S Hirakawa, K Tokimasa, K Suzuki, S (Sumitomo Metal Industries, Japan)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 15 pp, 16 Fig., 2 Tab., 20 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184157

**ULTRASONIC INVESTIGATION OF THE MATERIAL PROPERTIES IN THE COLD-WORKED ZONE OF WHEELS AND RAILS**

The gradual development and character of the cold-worked zones on railroad wheels and rails can be studied nondestructively with surface waves propagated along the surfaces. This allows more samples to be examined at lower cost. Because the Poisson's ratio in a cold-worked layer increases and because two metals having different Poisson's ratios but joined at a common boundary behave differently in a fatigue environment, new significance may be given to studies of rail and wheel failures near to the rolling surfaces. Differing behavior of the wheel and rail surfaces when excited by transducers may be correlated with fundamental differences in the two cold-worked zones.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Bray, DE (Texas A&M University)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 14 pp, 14 Fig., 2 Tab., 7 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184159

**SOME EXPERIENCES OF WEAR, CORROSION AND CRACKING IN WHEELSET COMPONENTS OF A RAPID TRANSIT RAILWAY SYSTEM**

While fretting corrosion and wheelset cracking of axles have been overcome, deep fatigue cracks could form in axle bodies under exceptional circumstances. Ultrasonic testing must include the entire axle length. Quenching of an axle may extend the endurance of an axle containing a crack or other defect in the body and seems worthy of further investigation. London Transport's tests of various compositions and heat treatments of wheels and tires have shown nothing likely to eliminate formation of thermal cracks, although rim quenching shows some promise. Various factors in tread and flange wear are also discussed.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Shaw, J Ruttly, FG (London Transport, England)  
 American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 29 pp, 21 Fig., 2 Tab., 9 Ref., 2 App.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184160

**FREIGHT CAR WHEEL PERFORMANCE**

This paper illustrates the present performance of North American freight car wheels on an industry basis. It indicates areas where attention must be directed. Thin flange is found the predominant cause for wheelset removal and wheel/tread wear is the major cause of accidents. To reduce flange wear and improve service life, the following are recommended: Increased use of heat-treated wheels; application of constant-contact side bearings to minimize truck hunting; use of high-speed trucks; introduction of steering type trucks.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Hengel, MF (Missouri Pacific Railroad)  
 American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 26 pp, 16 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184163

**EXPERIMENTAL VERIFICATION OF COMPUTER-PREDICTED TEMPERATURES AND ELASTIC THERMAL STRAINS IN RAILROAD WHEELS**

A dynamometer verification of computer-predicted elastic thermal strains has been done. A 33-inch (845 mm) diameter wheel of the latest Abex design and a composition brake shoe were run on the dynamometer to develop temperature distributions and strains. Computer models were run based on these inputs and successful correlations of temperatures and strains were developed. Such verification allows increased confidence in computer models to accurately assist in railroad carwheel design.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Larson, HR Coughlin, JM Haley, MR Rusin, TM (Abex Corporation)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 20 pp, 8 Fig., 5 Tab., 13 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute

ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184166

**SAFE THERMAL LOADS**

The evaluation of a railway car wheel design should include studies of the wheel's response to thermal and mechanical loadings. The damage caused by these loadings is a major indication of the value of a given wheel design. Due to the complexity of the problem, there certainly does not appear to be a unique procedure for this analysis. At the University of Illinois we have proposed a simple model which retains the sophistication necessary to reasonably represent the problem. The method includes an elastic-plastic thermal stress analysis using material properties as a function of loading rate and temperature. Residual stress changes from the thermal loading are considered along with the oscillating stresses developed from the rail load that are conducive to fatigue damage. Experimental results are presented for comparison with theory.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Wetenskap, HR Kipp, RM (Illinois University, Urbana)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 29 pp, 13 Fig., 1 Tab., 11 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184167

**FIRST WHEEL EXPERIMENT ON FAST**

The initial wheel experiment on the Facility for Accelerated Service Testing involved four wheel factors (heat treatment, rim type, manufacturing process and wheel profile) and two truck factors (center plate diameter and truck design). The experiment involved 120 wheelsets on 100-ton loaded cars operated up to about 40,000 miles. Conclusions included: the most significant factor affecting wheel wear is heat treatment; thin flange has been the predominant reason for wheel removal, followed by flange cracking, tread shelling; rail lubrication is an important factor; work hardening of new rail and wheels is a factor in test results.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Grey, DE Spanton, DL (Federal Railroad Administration)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 16 pp, 14 Figs., 3 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184168

**METALLOGRAPHIC EXAMINATION OF CRACKED WHEEL FLANGES FROM FAST**

A major cause for condemnation of wheels at the Facility for Accelerated Service Testing has been flange cracking which developed in both cast and forged wheels with a higher incidence occurring in untreated and One-Wear type wheels and comparatively less in rim treated and Two-Wear types. The cracks nucleate beneath the surface in a region which has been plastically deformed and work hardened in the course of deformation. The phenomenon is identified as rolling contact fatigue similar to tread shelling. Wheel rail contact should be minimized near the flange apex.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Marich, S (BHP Melbourne Research Laboratories, Australia); Stone, DH (Association of American Railroads)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 17 pp, 11 Fig., 1 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
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DOTL RP

03 184169

**A PERSPECTIVE OF RAILCAR WHEEL TECHNOLOGY**

A brief history of the evolution of railway wheels is followed by an appraisal of recent developments. Included are finite element analysis, extension of elastic models to include inelastic effects, improved failure analysis, and future research requirements.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Eck, BJ Kucera, WJ (Griffin Wheel Company)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 8 pp, 25 Fig., 2 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184170

**SOUND EMISSION OF RAILWAY WHEELS AND TESTS ON NOISE-DAMPED WHEELS FOR LONG-DISTANCE AND LOCAL RAIL TRAFFIC**

Because noise emission of wheels is the major factor in total noise environment of railways, resonance absorbers were developed for application inboard of the wheel rim. Tests have shown rolling noise of mainline trains is considerably reduced and wheel screech of transit vehicles is eliminated. The absorbers are simple, easily installed and rugged.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Racquet, E Tacke, G (Krupp (Friedrich) Metallurgical Works, W Germany)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 13 pp, 19 Fig.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

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03 184171

**ANALYSIS OF STRESS OF MECHANICAL ORIGIN IN WHEELSETS. NUMERICAL CALCULATIONS AND APPLICATIONS**

Various methods of stress analysis have proved practical in studying the effects of external loading and wheel mounting pressures; Theoretical results have been validated with tests. Observations are made on rim thickness, plate designs, and hub and wheelseat configurations.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Ibarreta, F Gimenez, JG Jalon, JG de Muguerza, R (Construcciones y Auxiliar de Ferrocarriles, Spain)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 15 pp, 9 Fig., 1 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184172

**EXPERIMENTAL ANALYSIS OF THE ELASTIC CORRELATION IN A HORIZONTAL PLANE BETWEEN AXLE AND BOGIE ON A DIESEL ELECTRIC CO-CO LOCOMOTIVE**

The axial and radial characteristics of the elastomeric "silent blocks" between truck frames and journal boxes of the three-axle locomotives were

analyzed to minimize stresses and damage to these guiding elements. The effectiveness of injection-moulded blocks as compared with those pressed between inner and outer housing was appraised; moulded blocks were found to be more elastic. Analysis and measurement of these elements yields data useful on designing and optimizing such assemblies.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Ionescu, T Lie, A (Institute for Res & Tech Design in Transp, Romania)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 16 pp, 15 Fig., 1 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

03 184173

**CALCULATION BY NUMERICAL METHODS OF THERMALLY INDUCED STRESS IN AXISYMMETRICAL WHEELS: CONSIDERATIONS ON MEASUREMENT OF COEFFICIENT OF CONVECTION**

With higher speeds and heavier loads, the effects of heat generated in braking on wheels is becoming more severe. This reports an analytical study of how the heat is propagated and the temperature gradient through the wheel, irrespective of its shape. A simple test on a scale model was used to determine the coefficient of convection for each part of the wheel. Once thermal gradients are known, stresses can be assessed.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Jalon, JG de Bueno, R Ibarreta, F Gimenez, JG (Construcciones y Auxiliar de Ferrocarriles, Spain)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 15 pp, 15 Fig., 3 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
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DOTL RP

03 184174

**A REVIEW OF ELASTO-PLASTIC STRESS ANALYSIS OF RAILCAR WHEELS**

Analysis of pressure distribution when a loaded wheel rolls on a straight track involves a complex mixed boundary value problem. A large number of three-dimension finite element models are considered for elasto-plastic appraisal of the wheel. Separate investigations should be made for mechanical and thermal loads and the load-time history should be approximated by a small number of artificially linearized segments. A method is suggested for validation of the computer program.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Garg, VK (Association of American Railroads)  
 American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 13 pp, 3 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
 ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

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03 184175

**RAILROAD FREIGHT CAR ROLLER BEARING LUBRICATION EXPERIENCE**

Norfolk and Western has experimented with relubrication of freight-car roller bearings at intervals up to ten years. Results show that the FRA requirement for lubrication at four-year intervals not only requires undue maintenance attention but also increases bearing temperature and makes seal damage more likely. The federal requirement is justified by neither economics nor safety.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Miller, HD (Norfolk and Western Railway)  
American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 15 pp, 2 Phot.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

### 03 184176 TESTING AND DEVELOPMENT OF HIGH SPEED RAILWAY BEARINGS

The environment for high-speed journal bearings involves a number of complex interacting factors. A dynamic simulation has been developed that allows bearings to be assessed under relevant and reproducible test conditions. It has been shown that the bearing force environment can be divided into static, quasi-static and random dynamic components. Thermal considerations are important in determining high-speed roller-bearing performance. Friction torque measurements are useful in examining bearing behavior. A relevant test must consider both thermal and dynamic loads.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Beagley, TM (SKF Engineering and Research B.V., Netherlands)  
American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 14 pp, 10 Fig., 11 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

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### 03 184177 PRESS FITS FOR WHEELSETS UNDERLYING HIGHEST SERVICE LOADS

Assurance of the integrity of the press fit of wheels, gears and brake discs in wheelset assembly is vital. Stress analysis of such fits is possible; details of mounting all such elements are available. The interference and coefficient of adhesion are important in all press fits. Extreme conditions such as brake shoe heating are the principal threat to successful force fits. A conical wheelseat/hub assembled by hydraulics is practicable for locomotive driving axles.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Wiedemann, S (College of Transp & Commun-Friedrich List, E Ger)  
American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 15 pp, 12 Fig., 3 Tab.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

### 03 184178 PROFILE WEAR ON RAILWAY WHEEL SETS AND RELATED CONSEQUENCES WITH REGARD TO OPERATING CHARACTERISTICS, TRACTION POWER REQUIREMENTS AND SERVICE MILEAGE

This paper deals with study of worn wheel and rail profiles, their interaction and resulting consequences. The paper further analyzes the wear characteristics and traction power requirements. Several measures which can improve wheelset service life, reduce traction requirements and improve safety are suggested.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Nauman, HJ (Hegenscheidt GmbH)

American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 18 pp, 18 Fig., 9 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

### 03 184179 FRACTURE MECHANICS DATA FOR THREE CLASSES OF RAILROAD WHEEL STEELS

Three railroad wheel materials--Class LR rim, Class BR rim, and Class CE plate--have been studied by impact and fracture mechanics techniques. The Charpy impact testing was done to determine the 50% fibrous fracture appearance transition temperature (FATT), which was used in a correlation of the fracture toughness data that were obtained. Fracture toughness data were obtained on ASTM compact specimens: crack propagation rate data were obtained during the fatigue precracking stage. Log-log plots of crack propagation rate versus stress intensity factor range all have a slope of about three. The Class CE plate material had the lowest fracture toughness at room temperature, while the Class LR rim material had the highest. The Class BR rim material was also studied at 115 degrees F and 245 degrees F. The latter temperature is close to FATT for the material, and a J integral analysis was used to reduce those data. Fracture toughness data are presented for excess temperatures (excess temperature is the fracture toughness test temperature minus FATT) from about -240 degrees to 0 degrees F. Semilogarithmic plots of  $K_{Ic}$  and the  $K_{Ic}$ /yield strength ratio versus excess temperature yield reasonably straight lines, suggesting that determination of FATT for another railroad wheel steel can lead to a good estimate of the fracture toughness.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Opiński, AJ (Association of American Railroads)  
American Iron and Steel Institute Tech Paper Volume 2, Oct. 1978, 14 pp, 4 Fig., 6 Tab., 12 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute  
ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

### 03 184615 MECHANICAL BEHAVIOR OF WINDOWPANE OF SHINKANSEN CARS SUBJECTED TO PRESSURE DIFFERENCE

A theoretical analysis calculates the stresses and displacements of the new type window panes of Shinkansen cars subjected to pressure differentials between the inside and outside of the body. This analysis was verified by laboratory experiments and its effectiveness was proved by comparing it with actual road tests. It became clear that to calculate the true response, it is necessary to take into account the effects of the adhesive layer on the glass and a thickness of glass plates.

Suzuki, Y Satoh, S *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 3, Sept. 1978, pp 106-109, 7 Fig.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Japanese National Railways, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

### 03 184616 EFFECTS OF TYREFLATS ON FATIGUE STRENGTH OF CAR-AXLES

The results of studies on fatigue strength of car axles under impacts produced by flat wheels are reported. Fatigue tests were performed on one-fifth scale models of axles. The influence of speed and of the number of flat spots on axle life was established.

Tanaka, S Hatsuno, K *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 3, Sept. 1978, pp 110-113, 8 Fig.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Japanese National Railways, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

03 184657

**FATIGUE STRENGTH AND MAINTENANCE OF THE WHEEL-AXLE ASSEMBLY FOR THE JAPANESE FAST TRAIN (SHINKANSEN)**

Since the wheelset (wheel-axle assembly) is one of the most important components of the equipment used in the Shinkansen (new high speed line), high reliability is required to prevent severe railway accidents. Since service on Shinkansen started in 1964, continuous efforts have been made to raise its reliability still more, by examination for cracks in the fretted part of the wheel seat, improvement of the induction hardening method, improvement of the press-fitting method of the axle on the wheels, measurement of the stress distribution of the axle in service and their effects on the endurance life of the axle assemblies. The results of research on the fatigue strength of axle assemblies and the development of maintenance techniques based on this research are presented.

Ishii, K (Japanese National Railways) *ASME Journal of Engineering Materials & Technology* Vol. 100 No. 3, July 1978, pp 227-232, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

03 184668

**CRASHWORTHINESS OF VEHICLES**

The book reviews information concerning the mechanics of vehicular impact, the plastic deformation which follows and the consequences for vehicle occupants. How the destructive consequences can be reduced or minimized when a collision occurs is of particular concern. Vehicular impact is reviewed for motor vehicles, aircraft, ships and railway coaches in the following parts: (1) principally on motor car collisions; (2) severe damage to rolling stock; (3) aircraft impact; (4) ship collisions. The work is intended to illustrate and indicate the value of engineering design and also analytical aspects of stress waves and plastic deformation. /TRRL/

Johnson, W Mamalis, AG (Cambridge University, England)  
Mechanical Engineering Publications Limited, (0 85298 386 7) Monograph 1978, 129 p., 54 Fig., 23 Phot., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234503)  
ORDER FROM: Mechanical Engineering Publications Limited, P.O. Box 24, Northgate Avenue, Bury St Edmunds, Suffolk, England

03 184968

**RAILROAD CAR CONSTRUCTION AS STEEL CONSTRUCTION [Waggonbau als Stahlbau]**

After outlining the historical development leading to the steel construction in the production of railroad cars and cab driven units, a description is given of the principles of light-weight construction from the economical point of view. Starting from the state of the design loads, in particular with respect to the paramount importance of the buffer impact problem and the phenomenon of oscillations which are decisive for the comfort conditions in the construction of passenger vehicles, a description is given of the various types of construction of passenger and freight cars. The principal materials used in the construction of rail vehicles, i.e., steel and light metal are critically compared, first with respect to dominant stiffness requirements (e.g., as regards long-supported car bodies). Various supporting structures including those of bogies and from the special field of broad gauge mining vehicles are depicted as some characteristic examples of steel light construction. Problems of static and dynamic calculations of supporting structures are touched on briefly and a glance at the relevant testing procedures concludes this presentation on the use of steel light-weight construction in the production of rail vehicles. [German]

Haug, A *Stahlbau* Vol. 47 No. 6, June 1978, pp 161-169, 17 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 185362

**THE FLOW METHOD OF THE REPAIR OF GONDOLAS. THE SETTING OF RATES OF MATERIAL RESOURCES FOR THE REPAIR AND OPERATION OF CARS [Potochnyi metod remonta poluvagonov. Normirovanie material'nykh resursov dlya remonta i ekspluatatsii vagonov]**

The first portion of this booklet describes the experience of the car repair depot "Junction" of the Moscow Central Railroad in the repair of four-axle gondolas. Continuous flow conveyor line (assembly line) repair of gondolas,

trucks, couplers, wheels, and other parts of cars are described. The second portion presents the experience of the "Volnovakha" (Donetsk Railroad), "Tayga" (Western Siberian Railroad), "Dnepropetrovsk" (Dnepr Railroad), and "L'vov Passenger" (L'vov Railroad) car repair depots with regard to the setting of norms for material resources for the repair and operation of cars. [Russian]

In Cars and Car Business Booklet, Issue 6 (95). Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Central Scientific Res Inst of Info/Tech/Econ Res 1975, 32 p.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

03 185363

**THE FLOW METHOD OF THE REPAIR OF PASSENGER CARS. THE OPERATIONAL RELIABILITY OF MECHANIZED FLOW LINES [Potochnyi metod remonta passazhirskikh vagonov. Ekspluatatsionnaya nadezhnost' mekhanizirovannykh potochnykh liniy]**

The first portion of this booklet presents the experience in the organization of the repair of railroad passenger cars (car assembly shop, wheel-roller bearing shop, and the power shop)-of the Riga Passenger Depot of the Baltic Railroad. The second portion presents an evaluation of the operational reliability of flow lines (assembly lines, etc.). Questionnaire cards are presented that cover the reliability and productivity of lines of various types, as well as an analysis of the factors influencing the quality of railroad car repair. [Russian]

In Cars and Car Business Booklet, Issue 2 (97). Full Translation available at Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Central Scientific Res Inst of Info/Tech/Econ Res 1976, 44 p., 8 Tab.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

03 188058

**RELIABILITY AND FAILURE ANALYSIS OF HIGH UTILIZATION RAILWAY CARS**

Mathematical models for failures in high utilization cars manufactured in 1965 and 1966 have shown that the car failure rate and car reliability can be adequately described using a Weibull distribution. The reliability of Trailer Train high-utilization cars after ten years of operation exceeds 0.99. In other words, after ten years service, 990 of every thousand cars purchased would be operating without failure. For five years, the reliability has only slightly decreased from one. Fewer than two cars per thousand will have failed after only five years of operation. It has been clearly demonstrated in this study that failures can be reduced through proper inspection and maintenance. If a standard reliability or car failure rate were specified by federal standards, it would be a simple matter to establish a matching inspection interval. Unfortunately, these do not exist in the Federal Car Safety Standards.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Bray, DE (Texas A&M University); Stubbings, MD (North American Rockwell)  
American Society of Mechanical Engineers Conf Paper 78/WA/RT-1, July 1978, 7 p., 9 Fig., 4 Tab., 7 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

03 188062

**APPLICATION OF THE FINITE ELEMENT METHOD IN THE DEVELOPMENT OF IMPROVED RAILROAD CAR WHEEL DESIGNS**

This paper discusses the use of the finite element method in the development of an improved 33-inch (0.838 m) railroad wheel that has been introduced into service. Calculated elastic stresses resulting from the thermal and mechanical loads are presented for an existing wheel design and for the new

wheel design. Validation of the-calculated stresses is by experimental data developed on a railroad dynamometer. Drag test data for the new wheel design is compared to historical data.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Rusin, TM Kleeschulte, DG Coughlin, JM (Abex Corporation)  
American Society of Mechanical Engineers Conf Paper 78/WA/RT-5,  
July 1978, 7 p., 10 Fig., 1 Tab., 14 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

03 188066

#### TANKTRAIN TM--A HIGH VOLUME BULK LIQUID TRANSPORTATION SYSTEM

This paper describes the TankTrain TM system, a hi-volume distribution system for liquids via rail which, in operation, can be compared to a motive segmented pipeline on wheels. The TankTrain system is designed for loading/unloading via a single connection at high flow rates with a minimum of stationary facilities required. Because of high operational efficiency, movement of bulk liquids with TankTrain requires fewer tank cars than with a conventional tank car operation which requires loading/unloading of each separately. The TankTrain is typically both less capital and labor intensive than conventional tank cars. Further, it is a safer system because of controlled emission and less spillage of the commodity during the loading/unloading operation, climbing on top of each is not needed, and because of less exposure to the commodity by the workers, there is in all fewer opportunities for accidents.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Mowatt-Larssen, E (General American Transportation Corporation)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-9,  
July 1978, 7 p., 7 Fig.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

03 188067

#### TANKTAINER--A PORTABLE BULK LIQUID TANK CONTAINER FOR INTERMODAL SERVICE

This paper describes the "TankTainer," a portable liquid tank container for intermodal service. The TankTainer is designed for transport of bulk commodities in the Marine, Highway, and Railroad modes. It is of monocoque design, utilizing the inherent structural load-carrying capabilities of the cylindrical tank between integral tubular structural end frames.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Mowatt-Larssen, E (General American Transportation Corporation)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-10,  
July 1978, 7 p., 11 Fig.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

03 188080

#### MODERNIZATION TRENDS IN INSPECTION AND REPAIR EQUIPMENT FOR ROLLING STOCK WORKSHOPS OF JNR

JNR has been working to improve the precision of maintenance and repair of diesel and electric locomotives and electric cars, as well increasing the efficiency and economy of work carried on in shops. Modernization of shops has included production facilities for complete vehicles and for their components, development of information systems and new stores facilities.

Ishii, K (Japanese National Railways) *Japanese Railway Engineering* Vol. 18 No. 2, 1978, pp 17-19, 1 Fig.

ORDER FROM: ESL

DOTL JC

03 188083

#### DEVELOPMENT OF WHEEL SET MANUFACTURING TECHNIQUE

The wheel, an essential component of rolling stock, is subjected to increasing stress on high speed trains, JNR has worked with Sumitomo Metal, Japan's major wheel and tire fabricator, in developing the wheelset for the Shinkansen which is characterized by light weight and high fatigue strength and wear resistance. This article describes techniques used in wheel manufacture.

Masuko, Y Suzuki, S (Sumitomo Metal Industries, Limited) *Japanese Railway Engineering* Vol. 18 No. 2, 1978, pp 6-8, 2 Fig., 2 Phot.

ORDER FROM: ESL

DOTL JC

03 188084

#### FREIGHT-CAR TRUCKS: THE RADIALS ARE COMING--OR ARE THEY?

The performance of North American freight car trucks continues to be investigated. What is required are a graduated series of performance improvements matched to requirements of different classes of freight traffic and different track alignments, along with information on corresponding increments of truck investment that will provide them. Current advanced freight car trucks are discussed and the status of FRA's Truck Design Optimization Project, Phase II, is summarized. Still to be determined is whether there is a truck design that makes a significant improvement in overall performance within the perceived narrow confines of acceptable added cost.

Armstrong, JH *Railway Age* Vol. 179 No. 23, Dec. 1978, pp 14-19, 1 Phot.

ORDER FROM: ESL

DOTL JC

03 188121

#### STRESS ANALYSIS OF THE SUMITOMO METAL IND. J-36 STEEL WHEEL

The stresses on a J-36 steel wheel caused by mechanical and thermal loads are analyzed. Finite difference program "TRUMP" was used for temperature distribution and finite element program "WHEEL" was used for stress analysis.

Chen, MT Garg, VK  
Association of American Railroads Technical Center AAR Rpt R-325,  
Aug. 1978, 34 p., Figs., 2 Ref.

ACKNOWLEDGMENT: Association of American Railroads Technical Center  
ORDER FROM: Association of American Railroads Technical Center, 3140  
South Federal Street, Chicago, Illinois, 60616

DOTL RP

03 188136

#### GLASGOW UNDERGROUND--DESIGN, DEVELOPMENT AND CONSTRUCTION OF THE NEW CARS

Designing the new cars was a question of scale. With only 33 cars required, it was desirable to use established technology, but the tunnel diameter and track curvature decreed that no existing design was suitable. The article describes areas of the cars made special to the 'mini' system to overcome tunnel and track constraints.

Botham, GJM (Metro-Cammell Limited) *Railway Engineer International*  
Vol. 3 No. 3, May 1978, 5 p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

03 188362

#### HIGH-SPEED TRAINSETS READY FOR THE 1980S

Intensive development throughout the 1970s of trainsets with integral power has produced a variety of designs capable of 200 kph operation. Most are electric, but there are two serious diesel contenders--one of which is already operating in revenue service at speeds and frequencies surpassed only by the Japanese Shinkansen. Some trains have encountered technical problems; others designed for 200 kph cannot run at his speed because of track restrictions.

*Railway Gazette International* Vol. 134 No. 12, Dec. 1978, pp 959-963, 12 Phot.



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03 188363

**ELECTRIC TGVs SPOTLIGHT FRENCH LEAD IN HIGH-SPEED TECHNOLOGY**

The electric TGV establishes the leadership of French high-speed technology. The prototype TGV has attained a 260 kph speed during tests in Alsace. A second 10-car prototype, equipped with full passenger accommodation, is to begin commercial testing between Paris and Lyon.

*Railway Gazette International* Vol. 134 No. 12, Dec. 1978, pp 967-970, 4 Fig., 2 Tab., 2 Phot.

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DOTL JC

03 188365

**BASIS FOR DETERMINING THE MAIN DIMENSIONS AND LOAD FEATURES OF FREIGHT WAGONS [Grundlagen zur Bestimmung der Hauptabmessungen und Lastmerkmale von Gueterwagen (Teil 1)]**

In dealing with the bases of calculation for the main dimensions and load characteristics of freight wagons, the article can provide only a relatively brief survey of the contents and present state of the international rules and regulations, and no claim to completeness is made. The UIC leaflets dealt with here are subject to continuous revision in accordance with the progress of technology. Special reference may be made, for example, to the present investigations for drawing up a new and larger international vehicle gauge. Results already available show that the width cannot be increased, but substantial improvements can be expected in the higher, sloped area, and these can be applied later on new and improved routes in Europe. Since the demands of the railways' large customers in the iron and steel industries for an increase in axle loading from 20 to at least 22 tonnes are becoming ever more insistent, the UIC is now examining this problem in as far as it affects track and vehicle design. [German]

Molle, P *Eisenbahntechnische Rundschau* Vol. 27 No. 11, Nov. 1978, 5 p., 5 Fig., 2 Tab., 1 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 188366

**DEVELOPMENTS IN THE WELL-WAGON SECTOR [Neuentwicklungen auf dem Gebiet der Tiefladewagen]**

The author deals with the relationships between transport undertakings and shippers and forwarders. Compared with ordinary goods wagons, which are usually still serviceable after thirty years, specialized wagons can already be out-of-date after 15 years in respect of dimensions and weight of load that can be carried. The railways are then obliged to place orders for new designs, and because of the smaller numbers built of a given type, these wagons are very expensive. But since specialized wagons are much in demand the railways' investment risk is an acceptable one. [German]

Munske, H *Eisenbahntechnische Rundschau* Vol. 27 No. 11, Nov. 1978, 5 p., 14 Fig., 1 Tab., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 188367

**THE GOODS-WAGON BOGIES Y 25 AND 665 [Die Gueterwagen-Drehgestelle Y 25 und 665]**

The decision of the DB to adopt the standardized bogie Y 25 for goods wagons with axle loads of up to 20 t means a further expansion in the bogie's scope of application, and standardization is eased. For goods wagons with an axle load of more than 20 t, the 665 bogie is available, for which the strength tests gave very good results. No defects have occurred on bogies of the 665 type already in service, and wear at the wheelset treads was remarkably low. The interest of the DB and various other European railways in raising the axle loading for goods wagons to 22 t has resulted in extensive studies, especially by the SNCF and DB (UIC) "permissible load features" sub-committee, and in the setting up of two ORE expert committees D 141

and B 142. The latter committee's task is to determine the criteria for the conditions to be met by goods wagons for 22-tonnes axle load. In addition to stress measurements on the Y 25 bogie (welded and cast) and brake tests with ORE standard wheelsets, wear tests are being carried out on the Czechoslovak State Railways (CSD) test ring at Velim near Prague with wagons of the SNCF, SBB, SJ and DB. Several defects have appeared on the running gear designed for the 20-tonnes axle load. The difference in wheelset wear between longitudinally rigid and longitudinally flexible wheelset guides is clearly apparent. Four DB ORE wagons with the 665 bogie have been undergoing trials at the Velim test ring since October 1977 with a 22-tonnes axle load, and the results of the wear investigations are expected still in this year. [German]

Madeyski, T von *Eisenbahntechnische Rundschau* Vol. 27 No. 11, Nov. 1978, 5 p., 8 Fig., 6 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

03 188630

**LATEST ENGINEERING IN TANK CAR DESIGN**

In 1970, an ASME paper was presented by the author entitled "Evolution of Tank Car Design Through Engineering" (1970 PET-35). This current paper entitled "Latest Engineering in Tank Car Design" will supplement the 1970 paper and report on the current state of the art and hopefully dispel some prevalent misconceptions. Studies of accident experience and a comprehensive research program have resulted in a great advance in tank car technology in the areas of materials and design. Also, new U.S. Department of Transportation regulations introduced intriguing new problems that had to be solved. With industry assigning top priority to rail transportation safety, this paper will give one a new insight regarding the problem.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Heller, FJ (Phillips Petroleum Company)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-11, July 1978, 8 p.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

03 188633

**PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1977-78 REPORT OF SURVEY COMMITTEE) CARS AND EQUIPMENT**

This survey of the annual ASME report covers some of the major developments in rail freight and passenger equipment made public in the last calendar year. It covers developments worldwide. In the freight area, the main developments are for bulk transport as well as intermodal concepts. The passenger developments are mainly in the rapid transit and commuter areas with some new developments in sleepers.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Manos, WP (Chicago, Rock Island and Pacific Railroad)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-14, July 1978, 9 p., 23 Fig.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

03 188634

**THE ALUSUISSE TRUCK**

The reasons are given why Swiss Aluminium Ltd. started the development of freight car trucks ten years ago, followed by an outline of the different stages of development. Five versions of the truck are presented and thoroughly described with results of stress analysis, laboratory and on-road tests, including preparation of the truck for TDOP Phase II. Future development steps are outlined.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Zehnder, J (Swiss Aluminium Limited)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-156,  
July 1978, 8 p., 2 Fig., 2 Tab., 7 Phot.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

**03 188635**  
**PROGRESS IN RAILWAY MECHANICAL**  
**ENGINEERING--1977-1978 REPORT OF SURVEY COMMITTEE**  
**LOCOMOTIVES**

This report covers motive power designs that have been delivered and developments undertaken in the survey period of September 1, 1977 to September 1, 1978. Data and photographs for seven new diesel locomotives, one electric locomotive and one train set are presented as reported by builders.

Contributed by the Rail Transportation Division of The American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Baker, PH Schulze, FW (General Electric Company)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-16,  
July 1978, 9 p., 13 Fig., 3 Tab., 7 Ref.

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

**03 188674**  
**A METHODOLOGY FOR EVALUATING THE MAINTENANCE**  
**OF HIGH SPEED PASSENGER TRAIN TRUCKS**

This report describes the application of a methodology, the simulation cost model (SCM), to the economic aspects of maintaining high speed passenger train trucks. The methodology provides a description of truck maintenance, gives the annual costs for this maintenance, and allows sensitivity analyses and time projections to be made. The report first reviews and classifies present and near-term trucks for consideration by the methodology. The SCM methodology is then presented and described. It is applied to two trucks--the truck of the Metroliner (powered) and that of the Amcoaches (unpowered). These applications are used to indicate data requirements, to present the type of results obtainable from the technique, and to show how the results can be used. The relationship between the SCM and truck specifications is explored.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Krauter, AI Smith, RL  
Shaker Research Corporation Final Rpt. FRA/ORD-78/73,  
DOT-TSC-FRA-78-7, Dec. 1978, 234 p., Figs., Tabs., Refs., 7 App.

Contract DOT-TSC-1308

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

**03 188678**  
**TRUCK DESIGN OPTIMIZATION PROJECT PHASE II.**  
**INTRODUCTORY REPORT**

The Truck Design Optimization Project (TDOP) Phase II is being conducted to establish the performance and cost-effectiveness of premium freight car trucks with reference to the standard three-piece truck. This report sets up a framework for quantitative characterization of truck performance and outlines a method for collecting economic data. Means of achieving these objectives by road-testing, mathematical modeling, and review of maintenance and operational data are described. An important goal of the project is to supply the railroad industry with a basis for performance specifications for freight car trucks.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. This report is the first of a series that will be published under the major title "Truck Design Optimization Project, Phase II as the multi-year program develops. It will be distributed at the second TDOP Phase II In-Progress Review to be held in San Francisco, California on December 15, 1978.

Cappel, K  
Wyle Laboratories Tech Rpt. FRA/ORD-78/53, TDOP TR-03, Nov.  
1978, 110 p., 9 Fig., 8 Tab., 2 App.

Contract DOT-FR-742-4277  
ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-288739/AS, DOTL NTIS, DOTL RP

**03 188683**  
**SELECTED TOPICS IN RAILROAD TANK CAR SAFETY**  
**RESEARCH VOLUME I: FATIGUE EVALUATION OF**  
**PROTOTYPE TANK CAR HEAD SHIELD**

The characteristics of a prototype head shield for hazardous material tank cars were evaluated with respect to the maintenance of its structural integrity under normal service conditions. The primary concern was with the resistance to fatigue damage of head shield connections to the tank car. The evaluation was conducted by performing tests on a tank car equipped with the shield. The shield and its supporting structure were instrumented to determine the principal forces acting within the structure and at points of attachment to the tank car. Both car-coupling impact and over-the-road tests were conducted. The impact tests were conducted at speeds of from 3 to 8 mph. The over-the-road tests included 432 miles of operation at speeds up to 55 mph. Evaluation of the data revealed that the car-coupling impact environment was the most severe. A definite fatigue life was indicated for the most severely stressed region of the supporting structure. The most severe over-the-road environment occurred with the loaded car at speeds above 45 mph when the main suspension bottomed out. The loads associated with this phenomenon were below those of the car-coupling impact environment.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. This is the first volume of a two-volume report. Volume II Test Plan for Accelerated LIFE Testing of Thermally Shielded Tank Cars, has 72 pages.

Johnson, MR  
IIT Research Institute Final Rpt. FRA/ORD-78/32.I, DOT-  
TSC-FRA-78-12.I, Aug. 1978, 82 p., 36 Fig., 7 Tab., 5 Ref., 1 App.

Contract DOT-TSC-1043-1

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-289253/AS, DOTL NTIS, DOTL RP

**03 188684**  
**SELECTED TOPICS IN RAILROAD TANK CAR SAFETY**  
**RESEARCH VOLUME II: TEST PLAN FOR ACCELERATED LIFE**  
**TESTING OF THERMALLY SHIELDED TANK CARS**

A test plan for the accelerated life testing of thermally shielded tank cars is described. The test program would be conducted at the DOT Transportation Test Center in Pueblo, Colorado. Eighteen tank cars would be included in the program. Five cars would be equipped with a jacketed thermal shield, and 13 cars would be equipped with a spray-on chemical insulation coating. In addition, most cars would be equipped with head shield end-of-car protection systems. The goal of the tests is to simulate the effects of 10 years of normal service operations. This will involve subjecting the cars to a large number of coupling impacts as well as running the cars for a mileage representative of the 10 year period.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. This is the second volume of a two-volume report. Volume I, Fatigue Evaluation of Prototype Tank Car Head Shield, has 82 pages.

Johnson, MR Viergutz, OJ  
IIT Research Institute Final Rpt. FRA/ORD-78/32.II, DOT-  
TSC-FRA-78-12.II, Aug. 1978, 72 p., 11 Fig., 10 Tab., 2 App.

Contract DOT-TSC-1043-2

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-289254/AS, DOTL NTIS, DOTL RP

**03 188685**  
**ENGINEERING DATA ON SELECTED HIGH SPEED**  
**PASSENGER TRUCKS**

The purpose of this project is to compile a list of high speed truck engineering parameters for characterization in dynamic performance modeling activities. Data tabulations are supplied for trucks from France, Germany, Italy, England, Japan, U.S.S.R., Canada and the The United States.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C.

Shapiro, SM  
Budd Company Final Rpt. FRA/ORD-78/29, DOT-TSC-FRA-78-4,  
July 1978, 124 p., 30 Fig., 17 Tab., Refs., 2 App.

Contract DOT-TSC-1222

ACKNOWLEDGMENT: FRA  
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DOTL NTIS, DOTL RP

03 188694

## LOCOMOTIVE CAB DESIGN DEVELOPMENT--VOLUME IV: RECOMMENDED DESIGN

This report presents a synopsis of the background analyses leading to the design of a line haul locomotive crew compartment. The design was incorporated into a full scale mockup which was evaluated by a nationwide representation of locomotive engineers. The report includes an analysis of these evaluations and identifies those areas of the original design that are recommended for design refinement. Specifications are included for the

design being recommended as a nationally acceptable crew station for line haul freight locomotives. The reports in this series bear the general title: Locomotive Cab Design Development. The preceding volumes are: Volume I: Analysis of Locomotive Cab Environment and Development of Cab Design Alternatives, FRA/OR&D-76/275.I, October 1976, 206 p. PB-262976. Volume II: Operator's Manual, FRA/OR&D-76/275.II, October 1976, 42 p. PB-264114. Volume III: Design Application Analysis, FRA/OR&D-76/275.III, October 1976, 82 p. PB-264115. This volume Recommended Design, is the fourth and final report of this series.

Robinson, J

Boeing Vertol Company, (8-2792) Intrm Rpt. FRA/OR&D-76/275.IV,  
DOT-TSC-FRA-78-25, Nov. 1978, 132 p., 30 Fig., 27 Tab., 9 Ref., 3 App.

Contract DOT-TSC-1330

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

PB-290214/AS, DOTL NTIS, DOTL RP

04 180255

**THE EN57 THYRISTOR PROTOTYPE TRAINSET [Prototypowa jednostka tyrystorowa EN57]**

Description of the impulse speed-control system developed for the EN57-847 electric trainset. The article then explains the impulse system as a source of interferences caused to safety and telecommunications installations. [Polish]

Markowski, R *Przegląd Kolejowy Elektrotechniczny* Vol. 24 No. 11-12, Nov. 1977, pp 313-317, 7 Fig., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

04 180262

**THE PERFORMANCE OF RAILCARS AND THEIR POWER PLANTS [Die Leistungsfähigkeit von Schienentriebfahrzeugen und ihrer Antriebsanlagen]**

The dimensionless quantity "performance" allows us to describe the traction suitability of machines of the same output. The performance of the drive element determines the need of a transmission element. In conjunction with a definite statement of output, performance can characterise the traction capacity of the entire propulsion plant of the railcar. [German]

Gartner, E *Eisenbahntechnische Rundschau* Vol. 27 No. 6, June 1978, 5 pp, 3 Fig., 2 Tab., 10 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

04 180289

**RAILWAY THYRISTOR APPLICATIONS [Thyristoren im Bahnbetrieb]**

A thyristor blocks the current in one direction only like a diode, but it can be controlled in this direction. Capacity can be adjusted by dephasing the moment of starting controlled by the thyristor as well as the cut-out point with mains control or the pulse width with direct current. For 6 years the OBB have been using thyristor locomotives and have obtained interesting information on profitability, power factors and reductions in the number of problems. [German]

Breyer, W *OBB-Journal* No. 10, 1977, pp 15-18, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Austrian Federal Railways, Elisabethstrasse 9, 1010 Vienna, Austria

04 180291

**THE DECISIVE ROLE OF THYRISTORS IN ENERGY TECHNOLOGY [Thyristoren-Schlüsselbauelemente der Energietechnik]**

When considering the requirements of modern power electronics, there are four major factors to be noted in thyristor development: thyristors for top ratings; thyristors for high frequencies; turn-off thyristors and integrated power semi-conductors; visual-control thyristors. The article describes the manufacturing methods in detail, the properties of these different thyristor models and application possibilities. [German]

Ginsbach, KH Silber, D *Elektrische Energie Technik* Vol. 23 No. 2, 1978, pp 48-51, 10 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Elektrische Energie Technik, P.O. Box 102869, Wilckensstrasse No. 3, 6900 Heidelberg 1, West Germany

04 180313

**APPLICATION OF HYBRID COMPUTER SYSTEMS TO ANALYSIS AND SYNTHESIS OF TRACTION ELECTRIC MACHINES [Primenenie gibridnykh vychislitel'nykh sistem dlya analiza i sinteza tyagovykh elektricheskikh mashin]**

A method of application of an analog and digital system to optimize the parameters of a traction electric motor, taking unsteady operating conditions into account, is presented. The analog part of the system is used to simulate short-time processes, the digital part is employed for statistical processing of the results of slowly changing processes with improved precision, and to perform logical operations. [Russian]

Kurochka, AL Loginov, IY Khodyushin, VM *Izvestia Vysshikh Ucheb Zaved, Elektromekhanika* No. 1, Nov. 1977, 7 pp

ACKNOWLEDGMENT: EI

ORDER FROM: Engineering Society Library, 345 East 47th Street, New York, New York, 10017

04 180335

**CONVERTER PROPULSION SYSTEMS WITH 3-PHASE INDUCTION MOTORS FOR ELECTRIC TRACTION VEHICLES**

Converter systems are described, which neither drain reactive power from the supply line nor feed reactive power into the line. They also produce only a small amount of harmonics. These systems are very well suited for high power electric traction vehicles as well as for smaller vehicles, which are in service simultaneously in one district (e. g. rapid transit vehicles), and for industrial locomotives. Test and production vehicles with 3-phase induction motors, test data and experiences in service of such vehicles are described.

Conf Rec of Paper Presented at the IEEE/IAS (Ind Appl Soc) Int Semicond Power Converter Conf, Lake Buena Vista, Florida, March 28-31, 1977.

Kielgas, H (Brown, Boveri, Germany); Nill, R  
Institute of Electrical and Electronics Engineers Conf Pap n 77CH1183-3 1A, 1977, pp 305-319, 18 Ref.

ACKNOWLEDGMENT: IEEE  
ORDER FROM: IEEE

04 180337

**HIGH VOLTAGE TRANSISTOR INVERTERS FOR A.C. TRACTION DRIVES**

This paper describes the breakdown mechanisms occurring within transistors when operating at high voltage and power levels. It also describes techniques for using devices reliably at the extremes of their ratings. Techniques are also discussed for driving and protecting transistors operating in high power inverters; results are given for a recently constructed transistor inverter.

Conf Rec of Paper Presented at the IEEE/IAS (Ind Appl Soc) Int Semicond Power Converter Conf, Lake Buena Vista, Florida, March 28-31, 1977.

Stokes, RW (British Railways Res & Dev Division, England)  
Institute of Electrical and Electronics Engineers Conf Pap n 77CH1183-3 1A, 1977, pp 270-294, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

04 180387

**ELECTRICAL INTERFERENCE FROM THYRISTOR-CONTROLLED DC PROPULSION SYSTEM OF A TRANSIT CAR**

Analysis and measurement of radiated and conducted electromagnetic interferences were performed on a transit car equipped with chopper-controlled dc propulsion system. The measured values of the radiated interference showed significant disagreement with the calculated values. It was determined from the analysis of the measured data that the voltage drop caused by the dc propulsion-current harmonics contributed to the discrepancies. Extensive tests showed that the interference levels generated from the chopper-controlled propulsion equipment are acceptable. However, it is felt that the existing and impending electromagnetic compatibility (EMC) standards are, in some instances, neither technically sound nor realistic. Suggestions are made for the improvements of standards and measurement procedures.

Chowdhuri, P (Los Alamos Scientific Laboratory); Williamson, DF  
*IEEE Transactions on Industry Applications* Vol. 1A-1 No. 6, Nov. 1977, pp 539-550, 14 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

04 181074

**STIRLING TOTAL ENERGY SYSTEMS STUDY. FINAL REPORT, MAY 15, 1976-JUNE 13, 1977**

The application of Stirling cycle prime movers to total energy power generation systems was investigated. Electrical, heating, and cooling demand profiles for a typical residential complex, hospital, and office building were studied, and alternative Stirling total energy systems were conceptualized for each site. These were analyzed in detail and contrasted

with purchased-power systems for these sites to determine fuel-energy savings and investment attractiveness. The residential complex and hospital would be excellent candidates for total energy systems, and prime movers in the 1000 kW output range would be required. Stirling engines with so large an output have not been built to date, although there would be no fundamental technical barrier to prevent this. However, careful consideration must be given to the following technological decision areas before arriving at a final design, if its potential is to be realized: engine configuration, hot-side heat exchange interface, engine control system, internal gas seals, and advanced coal combustion technology. The principal advantage of a Stirling prime mover in this application, in view of national concern over present and future dependence on oil, is that it could utilize low-grade liquid fuels and coal.

Lehrfeld, D  
Philips Laboratories, Department of Energy Aug. 1977, 190 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

HCP/T2947-1

04 181988

#### A LIMITED INVESTIGATION INTO REGENERATIVE BRAKING AND ENERGY STORAGE FOR MASS TRANSIT SYSTEMS

This study examines the technical and economic aspects of a regenerative braking/flywheel energy storage subway system. In order to define the analytical models accurately, it was necessary to gather data on the trains, rail network, schedules, and ancillary equipment. Data on projected costs of flywheels, motors, rails, and other equipment were also gathered for use in the economic analysis. During this data gathering phase, it was decided that the Massachusetts Bay Transportation Authority (MBTA) Red Line would be the source of the most representative and complete data. The problem was to determine what, if any, combination of energy storage devices and high conductivity rails would yield a subway system with a lower life cycle cost. The primary goal of the study was to compare the system costs of wayside storage with those of on-board storage. Using data provided by MBTA, power levels vs. time and rail losses were calculated and used to determine the sizing and location of energy storage units. From the amounts of energy storage required, the costs of the flywheels and i/o equipment were calculated. Utilizing these modules for load leveling was also considered. However, since the energy storage required for load leveling is much greater than that required for regenerative braking, a separate study is needed to examine this in detail.

Eisenhaure, D O'Dea, S  
Draper (Charles Stark) Laboratories, Incorporated, Transportation Systems Center, National Science Foundation Final Rpt. DOT-TSC-UMTA-77-53, Mar. 1978, 47 p.

Grant

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-284611/1ST, DOTL NTIS

04 182561

#### ON THE OPTIMISATION OF HIGH-PERFORMANCE GEAR EQUIPMENT FROM THE TRIBOLOGICAL STANDPOINT [Zur Optimierung der Hochleistungsgetriebe von tribologischen Gesichtspunkten]

This article stresses the extreme importance of gear lubrication, and goes on to describe lubrication measurement and control. Lastly, it gives an account of gear tests carried out with electric locomotives on the Velim testing circuit. [German]

Basa, F *Glaser's Annalen ZEV* Vol. 102 No. 5, May 1978, pp 153-156, 7 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

04 182575

#### NO-LOAD LOSSES IN DC TRACTION MOTORS

Experimental no-load losses and individual components of these losses are compared for traction motors with slotless and toothed armatures; they are used in main-line electric locomotives.

Bocharov, VI Sedov, VI Kraizman, BN *Soviet Electrical Engineering* Vol. 48 No. 2, 1977, pp 17-20

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 182583

#### 2,400KW THYRISTORIZED AC ELECTRIC LOCOMOTIVES FOR ZAIRE NATIONAL RAILWAYS

Locomotives adopting thyristors for the power circuit are in increasingly wide use worldwide. They tend to constitute the mainstay of alternating current electric locomotives. This article presents the features, specifications and structure of such a locomotive. A schematic diagram of the power circuit is included. The main transformer secondary side is divided into two, each of which is provided with mixed bridge rectifiers consisting of thyristors and diodes. At dynamic braking, one of the two sets of rectifiers is used for control of motor field currents.

Kouno, T Toba, M Takahashi, H Matsutake, M Kiwaki, H Miura, S *Hitachi Review* Vol. 26 No. 8, 1977, pp 265-272

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 182585

#### DRIVE FOR RAILROAD VEHICLES OF MUNICIPAL MASS TRANSPORTATION WITH INDUCTION MOTORS [Pohon koljovych vozidel mestske hromadne dopravy s asynchronnimi motory]

The traction properties of an induction motor fed by a variable frequency from a thyristor converter are considered. The properties of the induction motor are derived from its impedance diagram reduced to a frequency of 1 cps. This measure eliminates the feeding frequency and the variable feeding voltage from the description of the properties of the motor. The method permits a simple derivation of the principal traction properties of the machine: the moment of the machine is proportional to the square of its current. The coefficient of proportionality between the square of the current and the moment depends on the rotor frequency, the parameters of the machine, and is independent of the feeding frequency and the voltage. The principles for an optimum control of the motor are derived. As a converter of frequency and output voltage, an inverter of voltage attached directly to the dc source is employed permitting both motor and generator operation. At lower output frequencies, the inverter is controlled by pulse-width-modulation; at higher frequencies by the method of rectangular control. Both methods are uniformly described by means of the three-dimensional Park vector, which permits a comparison and explains the physical principle of the control of the inverter. [Czech]

Cerovsky, Z Kamenicky, J *Elektrotechnicky Obzor* Vol. 66 No. 8, Aug. 1977, pp 463-473, 34 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 182586

#### ELECTRICAL ENGINEERING IN MUNICIPAL TRANSPORTATION--A WAY TO HEALTHIER LIVING CONDITIONS [Elektrotechnika v mestske dopravě--cesta k ozdravení životního prostředí]

The development of vehicles for mass transportation in cities is traced. Types and characteristics of electric vehicles and metropolitan railroads are described, along with the use of electronic circuits and equipment for modern vehicles. The use of fuel cells and light accumulators as power sources of future independent city vehicles is discussed. [Czech]

Jansa, F *Elektrotechnicky Obzor* Vol. 66 No. 8, Aug. 1977, pp 452-459, 21 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 182590

#### TRANSFORMERS AND SMOOTHING REACTORS FOR A.C. TRACTION VEHICLES

The authors deal with the special requirements that are decisive in traction transformers. Special reference is made to the design of transformers for feeding system-commutated and pulse-controlled rectifiers. Transformers have been developed and produced not only for the traction vehicles of the Swiss Federal Railways (SBB), the Norwegian State Railways (NSB) and the Austrian Federal Railways (BB) but also for the 25 Swiss private railways electrified at 16 2/3 Hz.

Bohli, WU Deng, HM Mueller, W *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 740-750, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 182591

**AXLE DRIVES FOR ELECTRIC RAIL VEHICLES**

The authors have compiled a summary of the various kinds of BBC axle drive, showing their specific design features and applications.

Blaser, E Moser, R *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 730-739

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 182594

**TECHNOLOGY OF DC REGULATING UNITS IN VEHICLES USED FOR LOCAL TRAFFIC [Gleichstromstellertechnik in nahverkehrsfahrzeugen]**

Use was made of the chopper control technique in conjunction with regenerative braking for the articulated multiple units delivered to the urban rapid transit system in Hanover, West Germany. This technique is explained with the aid of the example of the circuit used for the Hanover system. Guidelines are included for the rating and load of the main components. [German]

Voss, U *Elektrische Bahnen* Vol. 48 No. 7, July 1977, pp 162-167, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

04 182615

**DESIGN TRENDS IN LIGHT RAIL VEHICLES**

Because articulated trams offer a number of technical and operating advantages over single cars, their popularity is increasing. Power ratings of 10 kw per ton (tare) are now considered desirable to give 1.3 (m/s/s) acceleration and a top speed of 80 km/h. Chopper control is more costly and heavier than switched resistances and can only be justified when regenerative braking raises the level of energy saved through its use from 7 to around 30 percent.

Scholtis, G Waite, W *Railway Gazette International* Vol. 134 No. 6, June 1978, pp 380-383, 1 Tab., 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

04 182622

**CONSTRUCTION AND PUTTING INTO SERVICE OF BB 7200 AND BB 22200 CHOPPER LOCOMOTIVES [La construction et la mise en service des locomotives a hacheur de courant BB 7200 et BB 22200]**

A detailed study of the design, construction and use of BB 7200 1500 volt direct current, form a single group of locomotives which, together the BB 1500 50 Hz monophasic current form a single group of locomotives with identical bodies, bogies and traction motors. These locomotives are giving the SNCF considerable experience in the field of tractive units with thyristors, and are giving excellent results. [French]

*Revue Generale des Chemins de Fer* Vol. 97 Apr. 1978, pp 239-255, 31 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

04 182631

**VL 83 TYPE A.C. EIGHT-AXLE FREIGHT ELECTRIC LOCOMOTIVE WITH MONO-MOTOR BOGIES**

In 1976 the Novocheboksary electric locomotive plant built the VL83 prototype, an 8-axle freight electric locomotive with monomotor trucks. The main difference between this new locomotive and previous ones is that the traction motor for the axles of each truck is in the center. Another new feature is the unusually high axle-load of 26 tons. These two differences are basic to the entirely new arrangements of vehicle components and the electrical circuit and to the design of many parts.

Bondarenko, BR *Rail International* No. 6, June 1978, pp 373-380, 8 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

04 182879

**ON THE PROBLEM OF STUDYING THE DYNAMICS OF CAR GENERATOR DRIVE TAKING DAMPING FACTORS INTO ACCOUNT [K voprosu issledovaniya dinamiki privoda vagonnovo generatora s uchedom dempfirovushchikh faktorov]**

The paper describes the results of a study of the dynamics of the drive mechanism of a car generator, taking into account the damping factors embodied in a new drive. Critical (resonant) operating modes are discussed. A positive contribution by the damping factors from elastic couplings, which limit the amplitudes of dynamic loads on the drive, is observed. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Suzdal'tseva, M Ya Chernikov, VD *Trudy TsNII* Proceeding No. 548, 1976, pp 173-178

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

04 182883

**THE TEP60 PASSENGER DIESEL LOCOMOTIVE [Passazhirskiy teplovoz TEP60]**

This book deals with the design features of the 11D45 (11D45A) Diesel and its component units. The authors study the electrical machinery, describe the personnel functions, and supply information on the care of the Diesel. Also described are the care, operation and repair of the principal components, and the adjustment and regulation of the electrical equipment, and the care of the trucks. The chapters contained in this book are as follows: I. Make-up and basic parameters of the locomotive; II. Description and features of Diesel design; III. Basic units of the Diesel; IV. Servicing of the Diesel; V. Systems of the Diesel; VI. The cooling system; VII. Drives of the auxiliary systems; VIII. The electrical system; IX. Electrical machines; X. Electrical apparatus; XI. Tuning and rheostatic tests of electrical equipment; XII. Car bodies; XIII. Locomotive trucks; XIV. Brakes; and XV. Air-piping systems. [Russian]

Table of contents translated. Available for reference purposes only at the Office of Research and Development, Federal Railroad Administration.

Zhilin, GA Malinov, MS Rodov, AM Sulimov, II Shifrin, MG All-Union Labor Red Banner Railway Research Inst 3rd Ed. 1976, 376 pp, 32 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

04 182884

**REFERENCE MANUAL ON DIESEL LOCOMOTIVE REPAIR [Spavochnik po remontu teplovozov]**

The book supplies reference information on the organization and technology of diesel locomotive repair and testing upon return to service; also, the testing of individual parts and units. Basic information is supplied on parts and materials now being used in locomotives; also, information on repair costs. This second edition has been enlarged with materials on the TE10 and TEP60--Diesel locomotives. It is intended for the use of master workmen, brigade leaders and mechanics engaged in locomotive repair. In compiling this handbook, use was made of existing directives, instruments and rules for repair, as well as of various other documents dealing with the repair of locomotives such as having been devised and confirmed by the Ministry of Communications; also, of technological instructions developed by the Planning-and-Design Bureau of the Main Administration of the locomotive economy; also, of materials of the Red Banner of Labor Scientific--Research Institute of Rail Transport. This book is divided into four sections as follows: I. General Points of Repair of Diesel Locomotives; II. Repair of Diesel Engines; III. Repair of Diesel Electrical Equipment; and IV. Repair of Frames, Carbodies and Trucks of Diesel Locomotives. [Russian]

Table of contents translated. Available for reference purposes only at the Office of Research and Development, Federal Railroad Administration.

Kokoshinskiy, LV Klimenko, LV Gorbatyuk, VA Stetsenko, EG All-Union Labor Red Banner Railway Research Inst 1976, 304 pp, 152 Tab.

## ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

04 183564

**TWO-STAGE, TURBO-SUPERCHARGING SYSTEM FOR COMBINED INTERNAL COMBUSTION ENGINES**

[Dvukhstupenchataya sistema turbonadduva kombinirovannykh dvs]

Problems of development of the air supply system for new four-stroke engines are considered. The necessity of changing over to two-stage supercharging is demonstrated. [Russian]

Nikitin, EA (Kolomensk Works im. V.V.); Dekhovich, DA *Energomashinostroenie* No. 1, 1978, pp 1-3

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 183571

**A NEW CLASS OF LOCOMOTIVE**

South African Railways has acquired 3780-kw, 50 kv electric locomotives for handling the ore trains on its new 864-km iron ore line from Sishen to Saldanha. Three of these units in multiple handle the 20,200-ton trains. The thyristor locomotives have full-width cabs designed for long spells of duty under severe tropical conditions, including full air conditioning. The roof is lowered at the rear end of the narrow-gauge units for nearly half the length of the unit to give sufficient clearance for the 50-kv pantograph installation, vacuum circuit breaker and surge arrester.

*Railways* Aug. 1978, 7 pp, 12 Phot.

ORDER FROM: Thomson Publications South Africa Proprietary Ltd, P.O. Box 8308, Johannesburg, South Africa

04 183585

**THE SERIES EL 16 ASEA THYRISTOR LOCOMOTIVE OF THE NORWEGIAN STATE RAILWAYS [ASEA-Thyristorlokomotive Baureihe EL 16 der Norwegischen Staatsbahnen]**

This four-axle locomotive weighs 80 tonnes, can reach 140 km/h and has a continuous rating of 4,440 kW. To make the best use of its adhesion qualities, provision is made for continuous regulation, the fitting of direct-current motors with independent excitation and, consequently, individual control of each axle. All sliding surfaces have been avoided in the truck and rubber parts have been used widely. [German]

*Elektrische Bahnen* Vol. 49 No. 6, 1978, pp 158-162, 6 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

04 183617

**INTERFERENCE IN RAILWAY NETWORKS [Stoerbelastung in Bahnnetzen]**

The growing number of thyristor-controlled tractive units in service increases greatly interference to telecommunications equipment. The strongest harmonic waves are mainly responsible. By using double bridge connected converters in series with an ignition dephasing control unit and by sectioning, the disturbing current in 50 Hz electrification systems is greatly reduced. Draining transformers and filtering circuits along the line are also effective ways of reducing the disturbing current. [German]

Schwarzenau, R *Elektrische Bahnen* Vol. 49 No. 6, 1978, pp 150-158, 15 Phot., 21 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

04 183896

**SOLAR-POWERED REFRIGERATION SYSTEM FOR RAILWAY REFRIGERATOR CARS**

The potential of an available method to reduce the fuel consumption of the mechanically refrigerated railcars used for transporting perishable commodities has been investigated. An energy-oriented engineering analysis showed that a compact refrigeration system deriving its power from photovoltaic cells could be used in the design of railcar equipment for transporting perishable produce. Maximum load-respiration data and a heat-loss analysis for mechanically refrigerated railcars in service today were used to develop

the energy design requirements of an alternative system. A solar-energy system was used to eliminate the need for fossil fuels, which also eliminates the emission of air pollutants and reduces acoustical emissions. The results reflect the present state of the art for designing and supplying power to railcar refrigeration systems and the way in which these systems could be used to alleviate projected energy problems in refrigerated transport.

This article appeared in *Transportation Research Record* No. 653, Track Systems and Other Related Railroad Topics.

Conover, DR (Fruit Growers Express Company) *Transportation Research Record* No. 653, 1977, pp 58-65, 5 Fig., 1 Tab., 4 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

04 184617

**AUTOMATIC TRAIN OPERATION OF THE ELECTRIC RAILCARS FOR THE SHINKANSEN BY ON-BOARD CONTROLLER**

A method for automatic train operation of the electric cars of the Shinkansen by an on-board controller is described. Simulation results show that on-time performance with an energy saving can be achieved with this system.

Yasukawa, S Kaneda, H Endo, T Hasebe, T Sato, K *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 3, Sept. 1978, pp 114-119, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports

ORDER FROM: Japanese National Railways, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

04 184632

**NEW 16 2/3 HZ STANDARD GAUGE LOCOMOTIVE SERIES 250 FOR THE GERMAN STATE RAILWAY [Neue 16**

2/3-Hz-Vollbahnlokomotive Baureihe 250 fuer die Deutsche Reichsbahn]

A six-axle locomotive is discussed. The locomotive is constructed in conventional technique with single phase series-wound motors. The thyristor hv tap changer, however, permits quasi-continuous voltage control of the traction motors. With a maximum speed of 125 km/hr it is planned to use the tractive unit in the freight train as well as in the passenger train service. [German]

Narr, Detlev (VEB Lokomotivbau, Hennigsdorf, E Germany) *Elektrische Bahnen* Vol. 48 No. 9, Sept. 1977, pp 219-225, 2 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 184634

**MODERN THYRISTOR TECHNOLOGY REPLACES MERCURY ARC CONVERTERS ON AC OPEN-WORK MINING LOCOMOTIVES WITH REGENERATIVE BRAKING AT THE WEST GERMAN LIGNITE WORKS: RHEINISCHE BRAUNKOHLWERKE AG (RBW) [Moderne Thyristortechnik Ersetzt Quecksilberdampf-Stromrichter auf Wechselstrom-Tagebaulokomotiven mit Netzbremse bei den Rheinischen Braunkohlenwerken AG (RBW)]**

In 1974 RBW placed an order to convert eleven converter locomotives (6 kv 50 Hz) for heavy overburden and coal haulage to modern power electronics and control. The mercury arc converters will be replaced by modern thyristors with high reverse voltage rating in bridge connection. A prototype of this conversion, which forms part of a long-term modernizing program of the RBW, was the locomotive No. 500 which has been in service since 1965. This locomotive had been equipped with thyristor phase-angle control not only for driving operation but also for regenerative braking with feedback of energy. A description is given of the circuit arrangement of the power circuit and of the regulating and control devices by means of diagrams, charts and block diagrams. [German]

See also Volume 48 No. 11, November 1977 issue pages 242-249.

Mittmann, U Tietze, C *Elektrische Bahnen* Vol. 48 No. 10, Oct. 1977, pp 285-289, 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 184635

**NEW LOCOMOTIVE WITH DOUBLE SOURCE OF ENERGY WITH BBC THREE-PHASE TRANSMISSION FOR 600 V D.C. AND DIESEL OPERATION [Neue Zweikraft-Lokomotiven mit BBC-Drehstromantriebstechnik fuer 600-V-Fahrleitungs-und Dieselbetrieb]**

Electro-diesel locomotives with three-phase transmission which are able to haul 3500 t trains are described. It is possible to operate these locomotives at 600 v dc and a nominal power rating of 1000 kw or for nonelectrified lines with diesel operation with a nominal power rating of 475 kw. diesel generator set. The power rating is 260 kw and for is outlined. [German]

Teich, W *Elektrische Bahnen* Vol. 48 No. 10, Oct. 1977, pp 249-254, 9 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 184636

**NEW OPERATIONAL LOCOMOTIVE WITH DOUBLE SOURCE OF ENERGY PROVIDED WITH THYRISTOR CONTROLLED DC AND DIESEL MOTOR DRIVE [Eine neue Zweikraft-Arbeitslokomotive mit Thyristor-Gesteuertem Gleichstrom-und Dieselmotorantrieb]**

Suburban transport enterprises need besides their passenger tractive units special vehicles in order to perform locomotive and auxiliary services. A description is given of the electric equipment of such a locomotive which has two energy feeding systems: a 600/700 v overhead wire and a diesel generator set. The power rating is 260 kw and for both systems bearily equal. With overhead wire operation the traction motor if continuously controlled by a thyristor chopper which works with low losses. In the diesel mode the synchronous generator set supplies directly the traction motor through a silicon rectifier. [German]

Roeger, P *Elektrische Bahnen* Vol. 48 No. 10, Oct. 1977, pp 254-261, 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 184638

**TECHNIQUE FOR THE DIAGNOSIS OF MALFUNCTIONS IN DIESEL INJECTION SYSTEMS**

The majority of the faults studied during this work can be detected and distinguished from one another by measuring peak pressures (either in the pressure chamber of the unit injector or in the injector lines of the distributor injection system) at various speeds. All the data in this paper were taken at no load operating conditions, the most suitable conditions for the diagnosis of the engine while still in the vehicle. The peak pressure in the unit injector pressure chamber can be indirectly measured by mounting a strain gauge on an injector drivetrain component.

For Meeting held February 27-March 3, 1978.

Heinein, HA (Wayne State University); Rozanski, JD  
Society of Automotive Engineers Preprint n 780033, 1978, 16 p., 10 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

04 184961

**STEADY-STATE INVESTIGATIONS ON A MULTI-PHASE CHOPPER-MOTOR SYSTEM**

A general procedure for analyzing a multiphase chopper-motor system is presented. The analytical express to obtain complete solutions for load current, load voltage, and individual phase currents are developed. The validity of the analysis developed is checked for a two-phase chopper case. This analysis is claimed to be an improvement over all existing methods for predicting multiphase chopper-motor performance. Results of experimental investigation on a separately excited dc motor fed by a two-phase chopper show vividly the improvements achieved in the source current and the load current waveforms and hence in the machine operating characteristics as compared to those obtainable on the single-phase chopper. It is also shown that the torque-speed characteristics obtained with a two-phase chopper come very close to those obtained under dc mains operation.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Arockiasamy, R (Indian Institute of Technology); Bhatia, CM Jha, CS  
Institute of Electrical and Electronics Engineers Preprint Paper F 78 709-8, 1978, 8 p., 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL, IEEE

04 184962

**CHOICE OF THE ELECTRIC TRACTION SYSTEM IN THE LIGHT OF RECENT SOLUTIONS [La scelta del sistema di trazione elettrica al lume di recenti soluzioni]**

The advent of power electronics now makes it possible to modify, on board the locomotives, any characteristic of power taken from the contact line. Already for many years, contact lines in single-phase alternating current have fed almost exclusively locomotives with direct current motors. An era is now opening in which locomotives with three-phase motors will be fed from single-phase contact lines, but also direct current. The possibility of realizing systems "cross-bred" in any way makes it possible now to pursue optimization separately, in relation to the characteristics of the network studied, the individual components of the system: sub-stations and contact lines, on-board regulation, motors. The article examines the problem in the light of the latest solutions reached, in the phase of realization or, in any case, possible. [Italian]

Mayer, L *Ingegneria Ferroviaria* Vol. 33 No. 3, Mar. 1978, pp 251-261

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 184964

**HIGH PERFORMANCE LOCOMOTIVES: APPROPRIATE SELECTION FOR ECONOMIC OPERATION [Locomotive ad alta prestazione: scelta opportuna per un esercizio economico]**

In view of the higher economic costs of the so-called "distributed power traction" as against the traction of a single locomotive, the effective limits of the use of the latter, beyond which there are objective technical difficulties, are considered. The effect of thyristorized traction equipment on adhesion and utilization of the mass power are discussed. Practical considerations of operation and running dynamics and stresses on the track are examined. It is argued that with the use of lighter construction materials, operation of single-locomotive traction at high speeds is also possible. [Italian]

Camposanbo, P (Bologna University, Italy) *Ingegneria Ferroviaria* Vol. 33 No. 3, Mar. 1978, pp 308-312

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

04 184965

**IDEAS AND HYPOTHESES ON PLAIN-BEARING FAILURES**

The paper discusses plain-bearing defects and establishes hypotheses about correlations for plain-bearing failures. The low wear rates at continuous removal of material-- following a pronounced running-in wear--can be explained only by foreign matter included in the lubricant or by material fatiguing. Tests made with engines that suffered of a critical oil shortage revealed that a bearing seizure is not developed within fractions of a second, provided the bearing as such is in perfect condition. Great loads and insufficient cooling shorten the critical period until failure caused by heat. Normally, bearing defects that occur in practice are caused by foreign matter.

Twelfth International Congress on Combustion Engines, Tokyo, Japan, May 22-31, 1977.

Maass, H

International Council on Combustion Engines Vol. B No Date, 11 p., 6 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL, Japanese Internal Combustion Engine Federation, Tokyo, Japan



04 185350

**REMOTE-CONTROLLED SWITCHING LOCOMOTIVES**

[Telemekhanicheskaja sistema upravlenija manevrovymi marsrutami s lokomotive]

Description of installations and of equipment placed on the shunting locomotive together with wiring diagrams and operating principles. [Russian]

Kazakov, AA *Avtomatika, Telemekhanika i Svyaz* No. 6, June 1978, pp 7-10, 6 Fig.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmannaya Ulitsa 2, Moscow B-174, USSR

04 185352

**STATIC INVERTERS FOR RECOVERY OF BRAKING ENERGY ON RAILWAY ELECTRIC VEHICLES [L'onduleur statique pour la recuperation de l'energie de freinage des vehicules electriques ferroviaires]**

The authors describe the method of operation of these inverters and examine the conditions of use in a network together with the harmonics they cause. Thyristor inverters are expected to be used more and more frequently to replace mercury arc rectifiers because they are energy-saving and stress on mechanical brakes is reduced. [French]

Sauvain, H Lambin, E *Bulletin SEV/VSE* Vol. 69 No. 18, Sept. 1978, pp 990-994, 1 Tab., 7 Phot., 6 Ref.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Schweizerischer Elektrotechnischer Verein, Seefeldstrasse 301, Postfach, 8034 Zurich, Switzerland

04 185357

**MEASURES FOR ENSURING THE NORMAL OPERATION OF DIESEL LOCOMOTIVE COOLING SYSTEMS UNDER WINTER OPERATION CONDITIONS [Meropriyatiya po obespecheniyu normal'noy raboty teplovoznykh kholodil'nikov vimnikh usloviyakh ekspluatatsii]**

Given are the measures and recommendations developed at TsNII (the All-Union Order of the Red Banner of Labor Scientific Research Institute of Railroad Transport) of the U.S.S.R. Ministry of Railway Transport for the prevention of failures of air-oil cooling systems on paired-unit TE3 diesel locomotives in winter time. Design modifications made on the TE3 diesel locomotive for operating in very low temperatures are described; the principle employed is to raise the temperature of the ambient air around the cooling system by means of mixing cold outside air with air heated in the cooling system and blown by the ventilator. Provided are additional technical requirements developed for the operation of air-oil cooling systems with hydrodynamic and hydrostatic driven fans on 2TE10L and TEP60 diesel locomotives with outside temperatures as low as minus 55 degrees C. Findings from tests on a TE3 diesel locomotive are given; this locomotive is one of a series on which a mechanism is used to reduce rarefaction in the diesel compartment and engineer's cab. [Russian]

Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

USSR Ministry of Railways 1977, 8 p., 2 Ref.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Transport Publishing House, Basmanni Tupik, 6a, Moscow B-174, USSR

DOTL RP

04 188064

**LOCOMOTIVE ENGINE LIFE SUPPORT SYSTEMS**

Auxiliary support systems accomplish the essential purpose of providing an acceptable environment for the locomotive diesel engine necessary to permit reliable operation in temperatures ranging from -40 to 115 f (-40 to 46 C), representing extremes in ambient temperatures and also to be able to accommodate transient temperatures as high as 250 F (121 C) encountered in tunnel operation. The design philosophy guiding the development of these engine support systems has developed over a period of years to provide continuing over-the-road power under the most adverse conditions without damaging or decreasing the long life capability of the engine. The auxiliary system discussed in this paper are lube oil, fuel, air, cooling, and the various protective devices incorporated into the systems which also facilitate rapid detection and correction of indicated faults. The design of these systems has

been guided by the considerations imposed by weight, space, reliability, maintainability, and government environmental regulations.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Ali, MW Ten Eyck, RL (General Motors Corporation)  
American Society of Mechanical Engineers Conf Paper 78-WA/RT-7, July 1978, 15 p., 13 Fig.ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

DOTL RP

04 188081

**DEVELOPMENT OF MAIN RECTIFIERS FOR RAILWAY CARS**

When JNR began to utilize alternating current traction in the 1950s, mercury-arc rectifiers were used. Later as semiconductor rectifiers were developed in high capacities, these compact units could be installed under the floors of electric cars. Silicon-rectifier thyristors and diodes are now highly developed and reliable, but JNR continues to look for further improvements.

Numano, T (Japanese National Railways) *Japanese Railway Engineering* Vol. 18 No. 2, 1978, pp 15-16, 1 Fig., 3 Phot.

ORDER FROM: ESL

DOTL JC

04 188109

**ELECTRIC AND HYDRAULIC TRANSMISSION IN DIESEL LOCOMOTIVES. A WORLD-SCALE ANALYSIS [Elektrische und hydraulische Kraftuebertragung in Diesellokomotiven. Eine Analyse im Weltmassstab]**

No Abstract. [German]

Gaertner, E Dannehl, A *DET Eisenbahntechnik* Vol. 26 No. 8, Aug. 1978, pp 321-324, 3 Fig., 4 Tab., 9 Ref.ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

04 188129

**ELECTRIC-LOCOMOTIVE CONSTRUCTION DURING THE TENTH FIVE-YEAR PLAN**

An overview of the development of Soviet electric locomotive construction in 1976-1980 period is given. Presently, the annual freight traffic on Soviet railway lines amounts to nearly half the volume of world railway traffic and by 1980 is expected to exceed 4100 billion ton km. By 1980, 55% of all rail freight traffic movements will be handled by electric traction; 2500 km more of railway lines will be electrified. The basic developmental trends of the industry for 1976-1980 provide for the development and beginning of series production of three types of main-line electric freight locomotives: the type VL84 ac locomotive for operation on the Baikal-Amur main line (BAM): the type ET42 dc locomotive for delivery to Poland; the type VL14 3 kV dc locomotive. There are three main electric-locomotive plants at Novocherkassk, Tbilisi, and Drepropetrovsk. The one-hour characteristics of the VL84 locomotive are as follows: output 7576 kW (10,300 horsepower); tractive effort 452.8 kN; speed 52.3 km/hr. The locomotive will be equipped with electric braking and there will be provision for smooth voltage control. Prototype ET42 locomotives have 4680 kW output, 325.4 kN tractive effort, speed of 50.5 km/hr with regenerative electric braking. The VL14 locomotive, with output in excess of 7355 kW (10,000 horsepower) frame-suspended has traction motors and regenerative braking.

Berdichevskii, GA *Soviet Electrical Engineering* Vol. 48 No. 3, 1977, pp 1-3ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 188335

**FRICITION POWER LOSS OF MINERAL AND SYNTHETIC LUBRICANTS IN A RUNNING ENGINE**

The performance of single grade and multigrade oils and synthetic oils, has been evaluated in terms of friction power loss using an engine running on the test bed according to a modified Morse procedure. The results obtained show a good correlation between the engine performance and the rheological

properties of the lubricants. The very low friction power loss experienced when using lubricants containing polymer can be explained by introducing the concept of anisotropic effective viscosity. Based on the good correlation between the measured and calculated friction generated in main bearings, a method has been devised for evaluating the temporary viscosity losses of multigrade oils by measuring the engine friction power loss and bearing temperatures.

Badiali, FL (Shamprogetti-Pet Prod Lab, Milan, Italy); Cassiani  
Ingoni, AA Pusateri, G  
Society of Automotive Engineers Special Pub 429, 1978, pp 85-95, 14 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

04 188360

**POWER SUPPLY TO RAILROAD COACHES BY MEANS OF  
STATIC CONVERTERS [Elektroenergieversorgung von Reisezugwagen  
mit Statischen Energiewandlern]**

The introduction of electrical heating makes it possible to satisfy other power needs from the train bus bar. This can be readily achieved by converters which bring the bus bar current and voltage values to those suitable for user. Technical solutions based on semiconductor power devices are described and evaluated. [German]

Knuth, W *Elektrie* Vol. 32 No. 1, Jan. 1978, pp 25-30, 12 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

05 180272

**BRAKING ON RAIL LINES ON A FALLING GRADIENT****[Eisenbahn-Bremsbetrieb auf Gefaellstrecken]**

On the basis of experience on mountain lines in the Andes (where UIC and AAR braking rules are combined), the authors study the braking conditions specific to slopes: first the case of keeping a train running at constant speeds, then for the case of keeping the train stationary. [German]

Heller, G Vajda, J *Glaser's Annalen ZEV* Vol. 102 No. 2, Feb. 1978, pp 45-52, 7 Tab., 7 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

05 180275

**50TH ANNIVERSARY OF BSI DISC BRAKES FOR RAIL VEHICLES [50 Jahre BSI-Scheibenbremsen fuer Schienenfahrzeuge]**

Development over the last 50 years of disc brakes produced by BSI and fitted on rail vehicles are described. The manufacturing processes, materials used to maintain a constant braking moment at nearly all speeds, high thermic capacity, short stopping distances and ways to restrict wear of wheels are all discussed. [German]

Sander, K Zeuner, H *Eisenbahntechnische Rundschau* Vol. 102 No. 3, Mar. 1978, pp 85-91, 11 Phot., 25 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

05 181921

**BRAKE SYSTEM DESIGN OPTIMIZATION. VOLUME I. A SURVEY AND ASSESSMENT**

Existing freight car braking systems, components, and subsystems are characterized both physically and functionally, and life-cycle costs are examined. Potential improvements to existing systems previously proposed or available are identified and described in functional and economic terms. Innovative braking systems which offer a potential benefit are identified, described, and assessed for functional and economic characteristics. Potential improvements are divided into two categories: those which could be implemented in the short term (10 years) and those which could be implemented in the long term (20 years). Areas which need additional study are identified.

Eshelman, LL Shelleman, CC Henderson, JP Kearney (AT) and Company, Incorporated, Transportation Systems Center Final Rpt. DOT-TSC-FRA-78-1.I, FRA/ORD-78/20.I, June 1978, 140 p.

Contract DOT-TSC-1040

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-284080/9ST

05 182584

**FRICTION MATERIALS; RECENT ADVANCES, 1978**

The detailed, descriptive information in this book is based on recent U. S. patents dealing with friction materials. Many of these patents are being utilized commercially. Whether used or not, they offer opportunities for technological transfer. Also, a major purpose of this book is to describe the number of technical possibilities available, which may open up profitable areas of research and development. The articles are grouped under following subheads: Organically bonded linings; Design of friction elements; Friction elements for railroads; Friction elements for aircraft; Slip resistant coatings for paper and plywood; and Tire tread friction treatments.

Newman, LB *Chemical Technology Review* No. 100, 1978, 358 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: Noyes Data Corporation, Noyes Building, Park Ridge, New Jersey, 07656

05 182858

**PROBLEMS IN THE IMPROVEMENT OF LINKLESS AUTOMATIC REGULATORS OF BRAKE RIGGING [Voprosy sovershenstvovaniya beskulisnykh avtoregulyatorov tormoznykh rychazhnykh peredach]**

Questions are addressed relating to interaction of automatic regulator components, taking into account established tolerances and characteristics

of springs. Calculations are given for the stability of the return spring and the stressed state of its supporting coils. An analysis is made of the geometrical dimensions of adjusting screws and a determination is made of the conditions that permit proper operation of the screw and the automatic controller's mechanism. [Russian]

See also RRIS 03 182853; Bulletin 7901.

Glushko, MI *Trudy TsNII* Proceeding No. 459, 1972, pp 78-91, 4 Tab.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

05 183583

**PERFORMANCE OF SINTERED IRON BASED METALLIC BRAKE SHOES FOR TREAD BRAKE. SOME INVESTIGATIONS BY FULL SIZE BRAKE TESTER**

A number of research projects have been carried out since 1958 using different materials (copper and iron) in the composition of railway vehicle brake shoes. This report gives the results of tests made with a full size brake tester on the friction performance of sintered iron-based brake shoes.

Idemura, K Sasaki, Y *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 45-46, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

05 183597

**METHODS FOR DETERMINING BRAKING BEHAVIOUR IN HIGH-SPEED PASSENGER TRAINS FITTED WITH P14 CAST IRON BRAKE BLOCKS [Mozliwosci okreslenia hamownosci pociagow pasazerskich przeznaczonych do wyzszych predkosci jazdy, hamowanych wstawkami hamulcowymi z zeliwa]**

The method used up to now by the UIC for determining braking behaviour in trains and individual vehicles is described in UIC Leaflet 544. This method is based on the idea of brake/weight and the percentage of this weight. This weight is calculated according to the average value of braking distance measured by means of the UIC method. The authors are proposing a modification to this method, consisting in changed values for the coefficients given. An example is given of braking distances in trains at 100 and 160 km/h, with the brake/weight percentage varying according to the method used. The two results obtained are discussed. [Polish]

Romaniszyn, Z Macokowski, A *Pojazdy Szynowe* No. 4, 1977, pp 21-25, 1 Tab., 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Pojazdy Szynowe, Warsaw, Poland

05 183897

**MECHANICAL SKID PREVENTER WITH NEW CONTROL METHODS--KNORR SYSTEM [Der mechanische Gleitschutz mit neuen Regelprinzipien System Knorr]**

A few years ago during a damp and foggy autumn with particularly heavy fall of foliage, the rail adhesion coefficient on gradient sections of the DB fell to about zero and in one case resulted in a fatal accident. The experience showed that there was room for improvement in the anti-skid equipment employed, and the DB's Central Office in Minden (Westf) was instructed to examine the matter in conjunction with Knorr-Bremse GmbH of Munich and provide a remedy. In the course of the subsequent investigations Knorr developed the mechanical skid preventer described here. According to the test results it can guarantee security in braking even under the most adverse weather conditions. [German]

Sonder, E Schmitt, T *Eisenbahntechnische Rundschau* Vol. 27 No. 9, Sept. 1978, 5 pp, 8 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

05 184162

**OPERATION ENVIRONMENT FOR NORTH AMERICAN FREIGHT TRAIN WHEELS DURING SPEED AND SLACK CONTROL BRAKING**

This paper reports investigation into the intensity, degree and duration of train brake applications used to control train speed and slack action of contemporary North American freight trains during grade and power braking operations. Normal braking is unlikely to produce tread temperatures exceeding 600 deg F on either undulating terrain or on long and heavy grades.

Supported in cooperation with the Association of American Railroads, Federal Railroad Administration and Railway Wheel Association. Sixth International Wheelset Congress, October 22-26, 1978, Colorado Springs, Colorado.

Blaine, DG Grejda, FJ Kahr, JC (Westinghouse Air Brake Company)

American Iron and Steel Institute Tech Paper Volume 1, Oct. 1978, 50 pp, 30 Fig., 7 Tab., 11 Ref.

ACKNOWLEDGMENT: American Iron and Steel Institute

ORDER FROM: American Iron and Steel Institute, 230 North Michigan Avenue, Chicago, Illinois, 60601

DOTL RP

05 184618

**PREVENTION OF SKIDDING ON SHINKANSEN VEHICLES BY IMPROVING FUNDAMENTAL ADHESION WITH SPECIAL COMPOSITE SLIDING BLOCKS ON WHEEL-TREADS**

Fundamental adhesion phenomena at speeds to 350 kph were investigated using a high-speed simulator to determine the relationship between slip ratio and traction coefficient. Fundamental adhesion coefficients decreased remarkably under water lubrications with increasing rolling speeds. To improve adhesion under wet conditions and decrease the shelling or flattening of wheel treads with wheel slide, a composition block was developed to clean the wheel tread. Universal adoption of this block on all Shinkansen cars resulted in a remarkable decrease in wheel-slide damage.

Ohyama, T Maruyama, H *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 3, Sept. 1978, pp 120-125, 15 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Japanese National Railways, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

05 185359

**REFERENCE BOOK ON BRAKES. THIRD EDITION [Spravochnik po tormozam]**

The reference book presents diagrams of locomotive braking equipment, multiple-unit (MU) rolling stock, and cars of the railroads of the U.S.S.R. Presented are the sizes of the basic components and parts of braking equipment subject to wear, repair tolerances established for these components and parts, diagrams of brake rigging norms for calculating the applied force of brake shoes, correlative curves for track braking distance versus

speed, the inclination and applied force of brake shoes, and lists and consumption norms for spare parts. This third edition of the reference book is supplemented with data on new brake apparatus accepted for manufacture, as well as on experimental apparatus in operation, diagrams of brake equipment on new rolling stock, comparative characteristics of foreign brake apparatus, technical requirements for redesigning brake apparatus, and technical conditions for brake apparatus. The sections on apparatus for high-speed trains, electro-pneumatic brakes, and materials used in brake manufacturing have been considerably expanded. The reference book is designed for engineers, inspectors, superintendents, and foremen involved in brake repair, as well as other engineering technical employees of railroad transportation connected with the operation of rolling stock brakes. It can be used in diploma and course planning. [Russian]

Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Krylov, VI

Transport Publishing House 1975, 448 p., 225 Tab.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

05 185360

**INSTRUCTIONS FOR OPERATION OF RAILROAD ROLLING STOCK BRAKES [Instruktsiya po ekspluatatsii tormozov podvzhnogo sostava zheleznykh dorog]**

These instructions establish the requirements and norms for the maintenance and servicing of braking equipment on rolling stock, as well as for controlling the brakes on trains. They constitute the basic guide for the operation of brakes on the railroads of the Union of Soviet Socialist Republics. The chapter headings are (1) The preparation of braking equipment, (2) The procedure of changing control cabs on locomotives and MU trains (3) Coupling of the locomotive to the consist and testing train brakes, (4) Supplying the train with brakes, (5) Procedure for placing and hooking up automatic brakes on trains (6) Care of automatic brakes on the road, (7) Brake control on trains, (8) General rules for the preparation of automatic brakes and control of them on freight trains weighing more than 6,000 tons, (9) Engineer actions during a required stop at a siding, (10) Engineer actions when delivering a train to a station after it has been broken up, (11) Brake control when a train is moving with dual or multiple traction, (12) Uncoupling of the locomotive from the consist, (13) Procedure for hooking up automatic brakes on inactive locomotives and cars of MU rolling stock transferred to trains in car groupings and brake control, (14) Operation of automatic brakes in winter conditions, and (15) Brake checks. [Russian]

Full translation available at Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

USSR Ministry of Railways 1974, 145 p., 6 Tab., 6 App.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

06 180257

**OPTICAL COMMUNICATION, TODAY AND TOMORROW**

Reviewing the inexorable growth in the electronic handling of information and optical-fibre communication systems, the author wonders just where these systems will make their impact in society.

Midwinter, JE *Electronics and Power* Vol. 24 No. 6, June 1978, pp 442-447, 9 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

06 180285

**ELECTRO-HYDRAULIC OPERATION OF BARRIERS IN THE RAILWAY SIGNALLING CONTEXT [Elektrohydraulischer Schrankenbetrieb in der Eisenbahnsignaltechnik]**

Absolute reliability is basic to the operation of crossing gates. The article describes the operating principle of such barriers and the installations insuring continuous regulation of opening and closing times, automatic closing in case of mechanical failure, the possibility of manual operation, the locking process, as well as the manner in which the hydraulic control system works. [German]

Kroeger, B *Siemens Review* Vol. 52 No. 1, 1978, pp 37-39, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

06 180312

**GROUND-TO-TRAIN TELECOMMUNICATION SYSTEM FOR A. C. ELECTRICAL TRACTION RAILWAYS**

The control and supervision of railroad traffic necessitates an efficient system of communication between running trains and fixed control centers. This problem has been solved in Italy in various ways. One approach calls for using the electric traction line of the railroad as the physical transmission bearer. A first theoretical study of the train-to-ground communication system was made to fix the basic transmission characteristics, and then an engineering plan was developed to allow for the system implementation in the railroads. The experience gathered from field work and from several systems installed have provided further information on the problems related to this type of transmission. This paper discusses some aspects of the problem and presents results of investigations on the subject.

EUROCON '77-Eur Conf on Electrotech, Conference Proceedings on Commun, Venezia, Italy, May 3-7, 1977. Volume 1, Papers 1, 4, and 3.

Morelli, P (Tellettra, Vimercate, Italy); Riva, GP  
Institute of Electrical and Electronics Engineers Proceeding n 77CH1257-5, 1977, 8 pp, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

06 180340

**EXPANSION OF SYSTEM SAFETY PROGRAM PLANNING TO THE RAILROAD INDUSTRY, SYSTEM SAFETY IN SIGNAL APPLICATIONS**

The special problems involved with safety analysis of railroad and rapid transit signaling installations are discussed.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington D.C.

McNenny, PJS (General Railway Signal Company)  
System Safety Society Proceeding 1977, pp 657-664, 1 App.

ACKNOWLEDGMENT: System Safety Society  
ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

06 180344

**OPERATIONAL SAFETY OF TRANSPORTATION SYSTEMS**

It is essential for public acceptance that the mass transit computer systems (i.e., software), electrical systems, and the systems they control be operationally safe and reliable. "Sneak Analysis" assures system operability by identifying all potential anomalies which can be caused by unplanned operational modes inherent in the system design. The correction or avoidance of these modes will then lead to a safer, more reliable system. Boeing Aerospace Company has found that "network trees" containing combinations of four basic topological patterns constitute all electrical systems and their analogs. Utilizing these topological trees, all latent signal

paths which can inadvertently initiate a function or inhibit a desired one-independent of component failure-are detected. Sneak Analysis has found latent operational capabilities in every system analyzed, including parts of the San Francisco Bay Area Rapid Transit and Morgantown Personal Rapid Transit systems. The technique also aids in locating areas of weak design. The resulting network trees can aid in shortening test and troubleshooting time. These also simplify the work required and accuracy of other analysis techniques which specifically examine component, environmental, and human related operational problems. The ability of the analysis technique to disclose unsafe operational modes after other techniques have certified reliability and even after years of normal operation indicates that Sneak Analysis is almost essential in critical areas of transportation systems.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Gieda, AC (Bay Area Rapid Transit District); Sidley, RF (Boeing Aerospace Company)  
System Safety Society Proceeding 1977, pp 715-730, 8 Fig., 9 Ref.

ACKNOWLEDGMENT: System Safety Society  
ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

06 180352

**IMPULSE TRACK CIRCUIT APPARATUS FOR GRADE CROSSING**

A high-voltage impulse track circuit has been developed and tested for grade crossing protection on Japanese National Railways. It was developed to detect lightweight rail vehicles even through oxide layers on rail heads. JNR had previously used the concept for car detection in classification yards. The high shunting sensitivity has been proven in service at several crossing installations.

Yasui, M *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 2, June 1978, pp 73-76, 9 Fig.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

06 180524

**RAIL CAR IDENTIFICATION APPARATUS**

The invention is a simulator of a rail car identification wayside system and includes a plurality of coded labels mounted at spaced apart locations on an endless conveyor. The conveyor produces horizontal movement of the labels sequentially through a zone viewed by an optical scanner. A control system monitors and controls operation of the endless conveyor and generates block signals responsive to the relative position thereof and wheel signals responsive to the entry of individual labels into the viewing zone. Processing and decoding of the information retained by the moving labels is accomplished by a data processor that receives the output of the scanner and the block and wheel signals from the control system. The effectiveness of the scanner and processor are determined by comparing their output to the data programmed into the control system and encoded on the moving labels.

This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS.

Long, LE Wiseman, RL  
Department of Transportation PAT-APPL-883 222, DOT/CASE-TSC-10117, No Date, 19 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279347/9ST

06 181809

**RAILROAD ACCIDENT REPORT, SIDE COLLISION OF SOUTHERN RAILWAY COMPANY TRAINS NOS. 1 AND 152, SPENCER, NORTH CAROLINA, OCTOBER 8, 1977**

About 2:53 a.m. on October 8, 1977, Southern Railway Company train No. 1, The Crescent, entered a crossover from the main track into the Spencer Yard at Spencer, North Carolina, and sideswiped freight cars which were being assembled as train No. 152 on an adjacent yard track. Four locomotive units and five cars of The Crescent and seven cars of train No. 152 were derailed. Twenty-six persons received minor injuries, and damage was estimated to be \$250,000. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the switch circuit controller to cause a red aspect to be displayed at the entrance to the signal block.

National Transportation Safety Board NTSB-RAR-78-3, May 1978, 24 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282426/6ST, DOTL NTIS, DOTL RP

06 182029

**VHF COMMUNICATIONS USAGE BY U.S. RAILROADS**

The document provides a comprehensive overview of radio communications and channel spectrum usage in the rail transportation industry. It reviews much of the data analyzed and methodologies/logic on which The Summary of Findings and Recommendations are based. Considerable focus is given to the growth of radio communication usage and associated safety and economic related achievements which resulted. Addressed are the impacts posed by a loss or reassignment of channel spectrum. The countermeasures available to preserve the achievements in safety and operating command control categories are also included in this research study effort. The need to document through research study the importance of radio communications usage so as to provide a more clear understanding throughout Federal/State governmental agencies, industry carriers, communications community and railroad labor organizations was a key motivation to pursue the effort. The critical concern of the FRA was to scope the safety and economic impacting value contribution.

Morrison, EL Grant, WB Espeland, RH Hemp, TH  
Office of Telecommunications, Federal Railroad Administration Final Rpt. FRA/RFA-78/02, 1977, 274 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-284816/6ST, DOTL NTIS

06 182564

**A GENERAL REVIEW OF DATA PROCESSING IN RAILWAY OPERATION** [Ueberblick ueber die Informatik im Eisenbahnverkehr]  
An account of major innovations made possible by progress in data processing techniques, and recently introduced in railway technology, such as the push-button route-setting unit, remote control of push-button units, safety installations at level crossings, continuous automatic train driving, radio links with trains and integral traffic control systems. [German]

Walther, H *Elektrische Bahnen* Vol. 49 No. 5, May 1978, pp 119-122, 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

06 182566

**INTERFERENCE IN TRANSMISSION CABLES FROM A 25 KV 60 HZ RAILWAY INSTALLATION WITH NEGATIVE BOOSTING TRANSFORMERS** [Beeinflussung von Nachrichtenkabeln durch eine 25-kV-60-Hz-Bahnanlage mit Saugtransformatoren]  
No Abstract. [German]

Roller, A *Elektrotechnische Zeitschrift, Ausgabe A* Vol. 99 No. 4, Apr. 1978, pp 192-195, 7 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

06 182572

**ON THE ANALYSIS OF RAIL SWITCH INTERLOCK** [Analiza konstrukcji zamkniecia nastawczego zwrotnicy]

Performance of a sliding interlock in the rail track switch is analyzed theoretically. The friction forces in the lock during switching are assessed. Imperfect lock is shown to appreciably increase the switching resistance. Reasons for this effect are outlined. The analysis can constitute a starting point to perform tests on both current and improved locks. [Polish]

Szfranski, W (Politech Warszawska, Poland) *Archiwum Inzynierii Ladowej* Vol. 24 No. 1, 1978, pp 17-33, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 182580

**AUTOMATED UNDERGROUND RAIL HAULAGE: HOW TO PLAN AN EFFICIENT SYSTEM**

Demands for increased productivity and better working conditions underground have in recent years accelerated the development of methods for automated underground rail haulage. Increased effectiveness can also be achieved with less-than-complete automation--for example, simple remote control of trains during loading and unloading. The author explains how to plan an efficient system for rail haulage automation. Maintenance and trouble-shooting for such a system are also covered, and it is shown how to choose between centralized and decentralized control when developing haulage system design.

Wallgard, G (Saab-Scania, Sweden) *Engineering and Mining Journal* Vol. 179 No. 4, Apr. 1978, pp 80-87

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 182581

**AUTOMATIC COAL HAULAGE SYSTEM IN THE STASZIC MINE, KATOWICE, POLAND**

The introduction and operation of an automatic horizontal haulage system for level 720 m in this Polish underground coal mine are described. The automation of level 720 m is designed to increase the haulage capacity, reduce the work force required, and improved safety. This automation system for coal haulage comprises: (1) Remote control of the loading; (2) Unloading of the trains; and (3) Automatic train control on the line between the loading stations and the unloading station.

Ferensztajn, B *Mining Engineer* Vol. 137 No. 201, Apr. 1978, pp 487-489

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 182595

**AUTOMATIC CONTROL OF TRACKBOUND VEHICLES**

Increased railway safety can be achieved by using modern electronic control techniques, such as the SELTRAC system for urban transport systems. Onboard equipment for this system has been undergoing trials in Berlin. The control center transmits data such as expected position, maximum permissible speed, and recommended speed to the vehicle and the onboard control system compares this with the measured values. Any discrepancies are corrected by forwarding control signals to the speed control or braking systems. The paper deals with the techniques and especially the safety factors involved.

Uebel, H *Electrical Communication* Vol. 52 No. 4, 1977, pp 279-282, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 182796

**CALCULATION AND MEASUREMENT OF ELECTROMAGNETIC INFLUENCE ON TELECOMMUNICATION CABLES IN SUBWAY SYSTEMS BY POWER ELECTRONIC CIRCUITS**

For the subway in Vienna/Austria electrical drives for air flow control are considered whose speed is controlled by power electronic circuits. The electric power line feeding the power electric circuits is mounted in parallel with the subway telecommunication cables over a length of close to six-hundred meters. The current pulses--caused by the power electronic control--in the electric power line lead to induced voltages in the telecommunication cables. This paper provides a derivation of equations to calculate the induced voltages. A Fourier analysis of the current in the electrical power lines is performed. The difficult problem of calculating the induced voltages in the telecommunication cables is solved by the conform mapping. The real geometric configuration concerning magnetic field calculation. In this configuration, by different mathematical operations, the induced voltages can be calculated. Good comparison is found between calculation and measurement of induced (EMI) voltages.

Second Electromagnetic Compatibility, Symposium and Technical Exhibit, Montreux, Switzerland, June 28-30, 1977.

Zach, FC (University of Technology, Austria); Demattio, R  
Institute of Electrical and Electronics Engineers Proceeding n 77CH1224-5EMC, 1977, pp 19-24, 1 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

06 182797

**INTERFERENCES IN TELEPHONE CIRCUITS DUE TO THYRISTOR CONTROLLED D.C. TRACTION**

For efficient control of motors in the case of d.c. traction, a thyristor chopper is used. Prior to introduction of thyristor chopper control in the metropolitan railway system extensive measurements were made in three cities of Fed. Rep. of Germany. After a brief review of chopper control this paper deals with the inductive interference on telephone cables. In general it can be established that the interference in telephone cables is mainly due to the current harmonics from the rectifier station. Furthermore, as far as the induced voltage is concerned it makes practically no difference which type of control is being used, as long as the d.c. traction power is the same.

Second Electromagnetic Compatibility, Symposium and Technical Exhib, Montreux, Switzerland, June 28-30, 1977.

Das, GP (Siemens, Research Laboratory, W Germany); Schulz, J  
Institute of Electrical and Electronics Engineers Proceeding n  
77CH1224-5EMC, 1977, pp 149-154, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

06 182798

**COMPUTERS REPLACING SAFETY RELAYS IN RAILWAY SIGNALLING**

For 40 years safety relays have been the predominant technology for railway signaling systems with fail-safe demands. During the last years computers have been introduced for vital functions. To fulfill fail-safe requirements different methods have been used to overcome the non-symmetric fail-function of electronic components and systems. This paper covers and evaluates some of these methods. As a result, an approach to achieve a fail-safe computer system is suggested. In a computer system for vital functions the information is processed twice by two independently designed and executed program versions in the same computer resulting in a safe and economic solution.

Digital Computer Appl to Process Control, Proceedings of the IFAC-/IFIP (Int Fed for Inf Process) 5th International Conference, The Hague, Netherlands, June 14-17, 1977.

Mathson, R (Telefonaktiebolaget LM Ericsson, Sweden)  
North Holland Publishing Company Proceeding 1977, pp 321-328, 6 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Elsevier North Holland Publishing Company, 52 Vanderbilt Avenue, New York, New York, 10017

06 182799

**ELECTROMAGNETIC ENVIRONMENT ON THE ROUTES OF ELECTRIC TRANSPORT AND THE PROBLEMS OF ITS IMPROVEMENT**

Urban land and railway electric transportation supplied from overhead d.c. and a.c. contact-conductor mains is a source of intensive quasi-impulsive interference in a broad frequency band. This report presents results of investigations made in the U.S.S.R. during a number of years directed at the improvement of electromagnetic environment along the routes of electric transport. The investigation aimed to improve broadcast and television reception as well as improving the conditions of service radio communication at the electric transport.

Second Electromagnetic Compatibility, Symposium and Technical Exhib, Montreux, Switzerland, June 28-30, 1977.

Abramson, YM (Leningrad Radio Research Institute, USSR);  
Kapitonov, VV  
Institute of Electrical and Electronics Engineers Proceeding n  
77CH1224-5EMC, 1977, pp 555-564, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

06 182814

**SICARID IDENTIFICATION SYSTEM FOR PROCESS AUTOMATION [Identifizierungssystem SICARID fuer die Prozessautomatisierung]**

The SICARID (Siemens Car Identification) System--a means of automating the flow of traffic or production processes. The microwaves emitted by a reader device are, in a coded form, reflected by a transponder counterpart, are checked and are relayed to the process control equipment. The

microwave principle of the system and the unit's physically robust design, its components and the space-economical equipment dimensions warrant a high read fidelity, superior dependability, adaptability and thus an economical and versatile application of the system. [German]

Engelmann, G *Siemens Review* Vol. 52 No. 4, Apr. 1978, pp 265-268, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

06 183312

**PRINCIPLES AND PRACTICES FOR INDUCTIVE CO-ORDINATION OF ELECTRIC SUPPLY AND RAILROAD COMMUNICATION/SIGNAL SYSTEMS**

Summarizes information on practical procedures concerning inductive co-ordination between the electric power and railroad industries. It also contains methods for calculating induced voltages. Includes bibliography.

Report of joint committee of AAR and Edison Electric Institute.

Association of American Railroads Technical Center Sept. 1977, 11 p., 6 App.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

06 183313

**PROGRAM MAGIND**

This is a listing and sample run of Magind. It calculates the voltage of the inductive interference in communication lines from power lines. The required inputs are the characteristics and geometry of the lines, soil resistivity and the currents in the power lines.

Driver, JB  
Association of American Railroads Technical Center Mar. 1975, n.p.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

06 183314

**PROGRAM MAGIND**

This computer program computes the inductive interference on railroad or communication facilities due to transmission lines. The self and mutual impedances are calculated by Carson's formulae with the frequency equal to 60 Hz.

Originally developed by Commonwealth Edison Company, Modified by AAR.

Driver, JB  
Association of American Railroads Technical Center No Date, n.p.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Association of American Railroads Technical Center, 3140 South Federal Street, Chicago, Illinois, 60616

06 183315

**ELECTROMAGNETIC INTERFERENCE DUE TO THYRISTOR CONTROL OF RAIL CARS**

Prototype chopper controlled car intended for use on Shinkansen line was tested for EMI. It was established that the harmonics in the line had no detrimental effect on the telecommunication circuits.

*Railway Technical Research Inst, Quarterly Reports* No. 2, 1976, pp 90-91

ACKNOWLEDGMENT: FRA  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

06 183589

**TEST OF NEW ATC USING LEAKAGE COAXIAL CABLE**

A three-rail line with mixed standard and narrow gauge is being built in the new submarine tunnel connecting Aomori with Hakodate. Conventional ATC cannot be used on this line since the JNR did not possess appropriate experience. The authors have researched a new ATC system using leakage coaxial cable as a transmission medium. This paper describes the experimental system and the results obtained.

Sasaki, T Uno, Z *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, pp 43-44, 1 Tab., 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji,  
Tokyo 110, Japan

06 183605

**USE OF COMPUTERS FOR FAIL-SAFE OPERATIONS IN  
RAILWAY SIGNALLING [Einsatz von Rechnern fuer  
Fail-safe-Aufgaben in der Eisenbahnsignaltechnik]**

To improve the safety of railway operations and relieve the staff of responsibility, electronic data processing can contribute to the development of computer systems with fail-safe procedures in railway signalling. In systems involving responsibility for safety, the software is the most important factor. [German]

Wobie, KH *Internationales Verkehrswesen* Vol. 30 No. 3, 1978, pp 188-192, 1 Phot., 16 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am  
Main, West Germany

06 183611

**OUTLOOK IN THE FIGHT AGAINST RADIO-ELECTRIC  
INTERFERENCE AT THE PKP [Perspektywy zwalczania zaklacen  
radioelektrycznych na terenie PKP]**

No Abstract.

Laskowski, M Markowski, R *Automatyka Kolejowa* Vol. 25 No. 1, 1978,  
pp 13-17, 4 Fig., 2 Tab., 1 Phot., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Automatyka Kolejowa, Warsaw, Poland

06 183903

**TRAFFIC DYNAMICS AND SAFETY PROTECTION OF  
LONGITUDINALLY CONTROLLED RAIL VEHICLES**

Besides the many practical problems in the further development of existing railway transport systems it is necessary now and then, to consider them theoretically also, in order to know what physical and technical principles determine the operation of the vehicles under the given limiting conditions. To that end in the first part of this article "synchronous" and "asynchronous" vehicle control and the various possibilities of automatic traffic- or vehicle control are described and assessed. In the second part some control procedures based on the interval control of rail vehicles are put forward and compared with one another. In this the chief imperative is to allow only safe vehicle movements. The system finally put forward for the traffic control of interval regulated rail vehicles shows the hierarchical set-up, in particular the minimum necessary, connection from the aspect of transmission technology between vehicles and line sections which is made possible by the optimum division of the orbits of the functions "safety" and "control" between vehicles and line section apparatuses.

Glimm, J (Technical University of Braunschweig, West Germany) *Rail  
International* No. 5, May 1978, pp 321-342, 23 Fig.

ACKNOWLEDGMENT: Rail International  
ORDER FROM: ESL

DOTL JC

06 184625

**CCTV CAR CHECKING ADVANCES**

With the demise of automatic car identification, interest has increased in closed circuit television for car checking. For a relatively low investment, a CCTV system using reliable equipment and standard fixtures will yield better than 90 percent accuracy at speeds of up to 60 mph. Early problems of extremely high light levels and blurring of numbers of passing cars have been overcome. Roads experimenting with the new generation equipment include Canadian Pacific, Union Pacific, Santa Fe and Chessie System.

*Progressive Railroading* Vol. 21 No. 11, Nov. 1978, 4 p., 8 Fig.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker  
Drive, Chicago, Illinois, 60606

DOTL JC

06 184626

**PLANNING FOR SIGNALLING SYSTEMS ON NEW RAILWAY  
ROUTES [Signaltechnische Planungen auf Neubaustrecken]**

Whereas the existing routes on the DB are secured by a system of fixed home and distant signals, the new routes are to have signals with simplified

indications. With this so-called Sk system, only a light point is actuated. Signalling of the permitted speed is by numbers on advance and main speed indicators. A speed once shown continues to apply until a change is signalled. The intermittent automatic train-running control system will continue to be used for train speeds of up to 160 km/h, while for higher speeds integrated linear train control in accordance with the recommendations of the ORE expert committee A 46 will be employed. If the latter system fails, the train will be automatically braked to 160 km/h, and the automatic train-running control system will take over. A signal cabin is necessary at each overtaking station. The diverting and junction points only have a local signal cabin when the distance from the signals and switches to the next signal cabin is more than 6.5 km. These signal cabins will be unmanned and will be remote-controlled from a centralized control point. [German]

Ernst, W *Eisenbahntechnische Rundschau* Vol. 27 No. 10, Oct. 1978, 6 p.,  
6 Fig., 9 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Ger-  
many

DOTL JC

06 184627

**THE LZB L 72 AUTOMATIC TRAIN CONTROL SYSTEM ON  
THE SBB [Das System der Linienzugbeeinflussung LZB L 72 bei den  
Schweizerischen Bundesbahnen (SBB)]**

Since June 1, 1975, the new LZB automatic train control system has been undergoing trials on the SBB. Vehicle and line equipment is continuously monitored and the data automatically recorded. Evaluation of the data provides an effective check of function and reliability, operating characteristics, as well as maintenance and servicing. The author describes the system, which is installed on the southern approach to the Gotthard, and discusses the testing of the programme (software). Also described is the actual operation of the system and the experience gained so far. [German]

Hayoz, H *Eisenbahntechnische Rundschau* Vol. 27 No. 10, Oct. 1978, 6  
p., 12 Fig., 1 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Ger-  
many

DOTL JC

06 184649

**LASER SECONDARY RADAR FOR AUTOMATIC COLLISION  
AVOIDANCE**

The use of radar to aid in collision avoidance in modern railroad systems is considered. Taking into account the security requirements and the fact that each train can be provided without problems with the required equipment, the advantages of a secondary radar are evident. One has further the choice between microwaves and laser frequencies. The use of the laser results in very sharp defined radiation patterns without unwanted sidelobes, even for small antenna dimensions. A compact laser secondary radar for automatic collision avoidance in underground railroads or similar railroad traffic systems is presented.

IEE Conf Publication n 155; Int Radar Conference, Radar '77, London,  
England, October 25-28, 1977.

Riegl, J (Technical University of Vienna, Austria); Aigner, P  
Institution of Electrical Engineers n 77CH1271-6 AES, 1977, pp 303-307,  
3 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Institution of Electrical Engineers, Savoy Place, London  
WC2R 0BL, England

DOTL JC

06 184651

**TRAINS--AN EXPERIMENTAL INTERACTIVE GRAPHICS  
MODEL**

A graphics-based simulation model of a large works rail system is described. Driven interactively with a light pen by an operator who performs all planning functions as the need arises, TRAINS is conceptually simple, flexible and highly visible in operation. The program was designed in SIMULA-like pseudocode from the top down to run in BASIC-Plus under RSTS/E on a PDP-11/40. This is linked to a GT40 graphics terminal running under the PICTUREBOOK software package. The BASIC imple-



mentation makes extensive use of virtual strings to emulated Simula objects and lists. Total development time for the project was four months.

Paper Presentations Proc Digital Equipment Computer Users Society, Volume 3 No. 5, Australia DECUS Symposium; James Cook University, Townsville, Queensland, August 29-September 2, 1977.

Brand, RA  
Digital Equipment Corporation Proceeding 1977, 7 p., 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Digital Equipment Corporation, Maynard, Massachusetts, 01754 ESL

**06 184656**  
**AUTOMATIC DRIVE AND BRAKE CONTROL. TRIAL RUNS OF AN ELECTRIC LOCOMOTIVE SERIES 111 [Automatische Fahr- und Bremssteuerung Erprobung auf einer Elektrischen Lokomotive der Baureihe 111]**

In order to relieve the engine driver of control moves, an automatic drive and brake control has been developed, making it possible to run tractive units with the affixed wagons and coaches by a predetermined rated speed value. A specially developed device is described to be used for operation with continuous train running control. [German]

Krueger, G Bohms, H *Elektrische Bahnen* Vol: 48 No. 11, Nov. 1977, pp 275-278

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**06 184675**  
**CONTROL IN TRANSPORTATION SYSTEMS. SESSION 3: RAIL/TRACKED SYSTEMS**

In session 3, the following papers were presented: Sensibility of optimized intercity passenger transportation systems to alteration in traffic demand, Pierick, K; transportation planning models and their success, Belshaw, PN; Higher availability-a result of influence of system maintenance, Fischer, K and Hultsch, K-H; Control algorithms for high speed DSS trains, Cosgriff, RL; Automatic classification yard, Stalder, O. For the covering abstract of the symposium, see IRRD abstract no. 234619.

Proceedings of the IFAC/IFIP/IFORS Third International Symposium, August 9-13, 1976, Columbus, Ohio. See also RRIS 06 156323; Bulletin 7801.

International Federation of Automatic Control, (87664-299-7) Proceeding 1976, pp 81-124, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234622)  
ORDER FROM: International Federation of Automatic Control, EKONO, P.O.B. 27, Helsinki 13, Finland

B7807629

**06 185229**  
**SOME METHODS OF INCREASING LINE CAPACITY OF SINGLE LINES**

Thirteen steps for increasing line capacity of African railways are discussed, including eight stages of centralized traffic control. When added signaling and extended passing sidings are no longer adequate, modified double tracking is the next stage with electrification as another possible method of increasing line capacity.

O'Mahoney, ME *Permanent Way Institution, Journal & Rpt of Proc* Vol. 96 Part 2, 1978, pp 128-132

ORDER FROM: ESL

DOTL JC

**06 185345**  
**OPTICAL FIBRES: A DEVELOPMENT TECHNOLOGY**

The first contract in the UK for a telephone link using optical fibres, awarded after competitive tender, has been placed by the London Transport Executive; the link will follow a 7 km route alongside the District Line.

Wells, A *Railway Engineer International* Vol. 3 No. 5, Sept. 1978, pp 35-36, 1 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

**06 186227**

**RAILROAD ELECTROMAGNETIC COMPATIBILITY. VOLUME II. ASSESSMENT FOR CLASSIFICATION YARDS AND ELECTRIFICATION**

The automated freight classification yard electromagnetic environment is composed of electrical and electronic devices that are each potential sources and/or victims of electrical interference. The electromagnetic radiation of the environment and selected railroad yard devices such as doppler radars and switch machines was measured at three railroad classification yards. The susceptibilities of selected yard devices were measured to determine operational sensitivity to the yard electromagnetic radiations. In addition to yards, since railroad electrification has important implications, radiations from an electrified railroad operating at 50 kilovolt 60 Hertz were also measured to formulate a measurement methodology and to determine the potential interference effects on railroad operations.

Prepared in cooperation with IIT Research Inst., Chicago, IL. See also Volume 1 dated March 78, PB-281705.

Speh, PE Griffin, S  
Electromagnetic Compatibility Analysis Center, IIT Research Institute, Federal Railroad Administration Final Rpt. FRA/ORD-77/77.II, ECAC-PR-78-038, Sept. 1978, 172 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287802/3ST, DOTL NTIS

**06 188089**

**TELECOMMUNICATION APPLICATIONS OF FIBER OPTICS**

The many advantages of fiber optics for telecommunications--including large bandwidth, long repeater spacing, small diameter cable, and absence of interference--have been widely discussed in the literature. However, in addition to these advantages, there are a number of ways in which lightwave systems differ from metallic systems--including lower efficiency transmitters, highly effective noise temperature receivers, wider bandwidth but with a more abrupt and less precisely controlled cutoff, and absence of DC transmission capability. The purpose of this paper is to indicate how these differences may affect the design and application of lightwave systems.

Proceedings of the National Telecommunications Conference NTC '77, Conference Record, Los Angeles, California, December 5-7, 1977. Volume 1, Paper 06.3.1-06.3.3.

Jacobs, I (Bell Telephone Laboratories Incorporated)  
Institute of Electrical and Electronics Engineers Conf Paper n 77CH1292-2 CSCB, 1977, n.p.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

**06 188093**

**COMING OF AGE OF OPTICAL-FIBER TRANSMISSION**

Optical-fiber transmission lines appear attractive for a variety of communication applications in which twisted copper pairs and coaxial cables are now used. These applications range from on-premises data links and equipment wiring to interoffice and intercity telecommunications trunks. Experiments to explore the technical feasibility of glass fibers in these areas are presently in progress. This paper summarizes the current state of research on optical fibers, fiberguide cables and splicing techniques, reviews and detectors, and discusses various systems considerations, experiments and applications.

Proceedings of the IEEE International Symposium on Circuits Systems, New York, New York, May 17-19, 1978.

Li, T (Bell Laboratories)  
Institute of Electrical and Electronics Engineers Conf Paper n 78CH1358-1 CAS, 1978, pp 17-19, 18 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

**06 188097**

**TOWARDS THE UNIVERSAL JOINTLESS TRACK CIRCUIT**

Stringent electronic checks are built into audiofrequency track circuits, recently installed by South African Railways on ac and dc electrified lines in an attempt to prevent maloperation by traction harmonics, even when thyristor or chopper control is used. Once techniques for protecting complex switches and crossings have been fully developed so that the need for block joints is eliminated altogether, neither the electric traction designer nor the permanent way engineer will be constrained by signalling requirements.

Moorey, E *Railway Gazette International* Vol. 134 No. 9, Sept. 1978, pp 654-657, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

06 188102

**A DEVICE TO MEASURE DI-ELECTRIC RESISTANCE OF INSULATION IN TRACK CIRCUITS [Ustrojstvo dlja izmerenija soprotivlenija izolacii v rel'sovyh cepjah]**

In 1970 plans were drawn up for a device to measure the effect of insulation in modernized track circuits. The article contains drawings and a description of the operating principles of this improved device. [Russian]

Zoh, VP *Avtomatika, Telemekhanika i Svyaz* No. 8, Aug. 1978, pp 18-21, 5 Fig., 1 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

06 188325

**TYNESIDE REPORT NO 7**

This report, the seventh in a series dealing with all aspects of the Tyne and Wear metro project, describes the progress of the scheme following on from the governmental decision in December, 1976 that the project could go ahead as planned within the constraint that the cost of the scheme would not exceed ,161 M at November 1975 prices (the 1972 estimate was ,65 M). The special factor that caused most of the cost overruns is described as the decision by British rail and the tyne and wear PTE not to share tracks except in special circumstances, the fundamental reasons being in the field of overhead clearances and signalling. Problems of incompatibility are discussed, by reference to trains, tracks, electrification (1500 volts DC from overhead wires), routes and signalling. A map provides information on the metro and adjacent br lines, with details of station and control centre locations and other relevant data. Methods to be employed for train identification and control including the use of train-borne transponders, trackside interrogators, and closed-circuit television systems are described. Techniques to be employed for automatic fare collection are detailed, bearing in mind that most metro stations ('metrostops') will be unstaffed, and that there will be no barriers at the station entrances.

Price, JH *Modern Tramway and Rapid Transit Review* Vol. 41 No. 486, June 1978, pp 186-193, 3 Fig., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 236059)  
ORDER FROM: Light Railway Transport League, 49 Axford Road, Handsworth Wood, Birmingham B20 1HG, England

06 188687

**OPTICAL AUTOMATIC CAR IDENTIFICATION (OACI) VOLUME I--ADVANCED SYSTEM SPECIFICATION**

A performance specification is provided in this report for an Optical Automatic Car Identification (OACI) scanner system which features 6% improved readability over existing industry scanner systems. It also includes the analysis and rationale which support this specification. This improved system is a result of design and test of selected modifications to existing equipment. It is projected that a cost reduction of fifty percent and a reliability improvement by a factor of three, along with a savings of seventeen hundred dollars per year due to maintainability considerations, could be realized using the new system. Sections of this report contain descriptions of test data showing the improvement in readability for degraded labels and difficult ambient conditions. Also included in this specification are guidelines for a compact, self calibrating scanner requiring no air conditioning. At the conclusion of the hardware and testing phase of the program, the modified scanner configuration was tested and demonstrated in the areas of optics, electronics, data processing, and packaging. Test results are included in this report.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. This is one of four volumes which provide the final reports for the FRA OACI Improvement Effort. The other final reports cover the subjects of: Systems Alternatives Evaluation Model 78/15, IV (May 1978); Readability and Scanner Performance 78/15.II (March 1978); Optical Properties of Labels 78/15.III (to be published).

Long, LE

Transportation Systems Center, (DTS-733) Final Rpt. FRA/ORD-78/15.I, DOT-TSC-FRA-78-22.I, Dec. 1978, 220 p., 45 Fig., 16 Tab., 4 App.

ACKNOWLEDGMENT: FRA  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

07 179348

**COMPARISON OF PASSENGER-COMFORT MODELS IN BUSES, TRAINS, AND AIRPLANES**

Recent controlled experiments concerning passenger ride comfort in intracity buses and intercity trains are reported and compared with past airplane ride-comfort studies. The primary method of analysis is linear regression of environmental and motion factors versus passengers' perceived ride comfort. The regression coefficients so obtained are compared among the three transportation modes for similarities. Transverse acceleration, vertical acceleration, and noise appear to be the dominant determinants of ride comfort in airplanes, roll is the major determinant of ride comfort in buses, and noise and roll are dominant in trains. Despite the differences in the dominant variables, the estimated regression coefficients for the different motions and noise are similar across all three modes. This suggests the possibility of a single general model incorporating all motions and environmental factors. /Author/

This article appeared in the Transportation Research Record N646, Transportation Ride Quality.

Jacobson, ID Barber, RW (Virginia University); Pepler, RD Vallerie, LL (Dunlap and Associates, Incorporated) *Transportation Research Record* No. 646, 1977, pp 1-6, 5 Fig., 8 Tab., 13 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

07 179351

**EFFECTS OF DECELERATION AND RATE OF DECELERATION ON LIVE SEATED HUMAN SUBJECTS**

This paper describes the testing of seated human subjects to determine the maximum deceleration and associated rate of change of deceleration (jerk) at which the majority of potential users of automated-guideway-transportation systems will remain securely in their seats. The subjects underwent various levels of deceleration and associated jerk in an instrument vehicle while seated normally (forward facing); sideways (turned 90 deg counterclockwise from the direction of travel); and normally, but tilted backward (facing forward, but with the entire seat tilted 5 deg backward). The subjects also underwent various levels of jerk (seated normally only). Two groups of subjects were chosen to represent the anthropometric extremes of potential passengers: males larger than 95 percent of the male population and females smaller than all but 5 percent of the female population. Estimates based on these tests of the maximum permissible emergency deceleration are 0.47 g for forward-facing, seated passengers and 0.41 g for side-facing, seated passengers. Tilting the entire seat assembly back 5 deg increased the estimated maximum permissible deceleration to 0.52 g.

This article appeared in Transportation Research Record No. 646, Transportation Ride Quality.

Abernethy, CN Plank, GR Sussman, ED Jacobs, HH (Dunlap and Associates, Incorporated) *Transportation Research Record* No. 646, DOT-TSC-UMTA-77-44, UMTA-MA-06-0048-77-3, 1977, pp 12-17, 2 Fig., 5 Ref.

ORDER FROM: TRB Publications Off, NTIS

PB-284653/3ST, DOTL JC

07 180320

**CONTROL SIMULATOR FOR THE FURTHER TRAINING OF THE PERSONNEL OF LOCOMOTIVES**

The working of the repetition system is based on the detection, by means of captors arranged in front of the first axle of the vehicle, of the field induced by the coded current of the automatic block circulating in each line of rails. This field induces in the coils surrounding the core of the captors a voltage of a frequency and pulsation equal to those of the coded current of the rail, and which, after amplification and suitable processing, is used in the apparatus on board in order to control the optical and acoustical arrangements of the repetition.

Tescola, G (Italian State Railway) *Rail International* Vol. 9 No. 2, Feb. 1978, pp 83-98

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

07 180804

**DEVELOPMENT OF TECHNIQUES AND DATA FOR EVALUATING RIDE QUALITY. VOLUME I. SUMMARY**

Ride-quality models for city buses and intercity trains are presented and discussed in terms of their ability to predict passenger comfort and ride acceptability. These models were developed using passenger response data gathered under actual field conditions. The report, first of three volumes, summarizes the results of the project.

See also Volume 3, PB-282327.

Pepler, RD Vallerie, LL Jacobson, ID Barber, RW Richards, LG Dunlap and Associates, Incorporated, Transportation Systems Center Final Rpt. ED-77-1(I), DOT-TSC-RSPD-77-1-I, Feb. 1978, 17 pp

Contract DOT-TSC-1090-1

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-282326/8ST, DOTL NTIS

07 180805

**DEVELOPMENT OF TECHNIQUES AND DATA FOR EVALUATING RIDE QUALITY. VOLUME III. GUIDELINES FOR DEVELOPMENT OF RIDE QUALITY MODELS AND THEIR APPLICATIONS**

Ride-quality models for city buses and intercity trains are presented and discussed in terms of their ability to predict passenger comfort and ride acceptability. The report, the last of three volumes, contains procedural guidelines to be employed by transportation specialists in developing ride-quality models and in using them to evaluate passenger comfort in existing or future systems. Specific guidelines are provided for: (1) collecting vehicle-motion and passenger-comfort data in the field; (2) generating ride-quality models based on these data; (3) validating models against data from passengers on scheduled services; (4) using models to evaluate or predict vehicle ride quality; and (5) specifying ride characteristics for new vehicles.

See also Volume 1, PB-282326.

Pepler, RD Vallerie, LL Jacobson, ID Barber, RW Richards, LG Dunlap and Associates, Incorporated, Transportation Systems Center Final Rpt., I ED-77-1(III), DOT-TSC-RSPD-77-1-II, Feb. 1978, 48 pp

Contract DOT-TSC-1090-3

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-282327/6ST, DOTL NTIS

07 181340

**IMPLICATIONS OF BART'S ENVIRONMENTAL IMPACTS FOR THE TRANSPORTATION DISADVANTAGED**

This is the first of four interim reports to be developed by the Implications for the Transportation Disadvantaged (ITD) Project of the BART Impact Program (BIP). This report focuses on the environmental impacts of BART's construction and operations on the transportation disadvantaged. The special population groups included in the analyses in this report are ethnic minorities (Black, Spanish heritage, Asians and others), the elderly, and the handicapped. Six issues related to possible environmental impacts of the construction or operation of the BART system for the transportation disadvantaged are examined. Information developed in the major project areas of the BIP is applied in the investigation of each issue. (Color illustrations reproduced in black and white)

Prepared by Urban Dynamics Associates, San Francisco, Calif.

Donnelly, RM Arguelles, JS Hinzdel, J Metropolitan Transportation Commission, Urban Dynamics Associates, Department of Transportation, Department of Housing and Urban Development Tech Memo DOT-BIP-TM-34-10-7, Jan. 1978, 90 pp

Contract HUD-CA-0042

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-283022/2ST, DOTL NTIS

07 182562

**SAFETY AND HUMAN ERRORS [Veiligheid en menselijke fouten]**

The concept of human error is dealt with and defined. A taxonomy of human error is given. It is pointed out that research on human error can be carried out at three different levels. The critical incident technique is described. Some illustrations of this technique are given. [Dutch]

Kragt, H *Veiligheid* Vol. 54 No. 4, 1978, pp 143-146

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Veiligheidsinstituut, Hobbemastraat 22, Amsterdam, Netherlands

07 182617

**INCREASED VIGILANCE WITH VERTICAL VIBRATION AT 5 HZ: AN ALERTING MECHANISM**

The human body resonates at a vertical frequency of 5 Hz. Yet in vigilance tasks when motivation is low, performance improved reliably with vertical vibration at 5 Hz.

Poulton, EC *Applied Ergonomics* Vol. 9 No. 2, June 1978, pp 73-76, 3 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

07 182619

**THE EFFECT OF THE POSITION OF THE AXIS OF ROTATION ON THE DISCOMFORT CAUSED BY WHOLE-BODY ROLL AND PITCH VIBRATIONS TO SEATED PERSONS**

No Abstract.

Parsons, KC Griffin, MJ *Journal of Sound and Vibration* Vol. 58 No. 1, May 1978, pp 127-141, 7 Tab., 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

07 182807

**DESIGN OF DRIVERS' CABS**

The paper examines the operational role of the driver and the environmental requirements if he is to fulfil this role successfully. It then looks at the state-of-the-art, with particular reference to Great Britain, in the fields of structure, visibility, environment, controls and instrumentation, and concludes by suggesting the basic characteristics of an optimum cab layout.

Powell, AJ (British Railways Board); Cartwright, A *Institution of Mechanical Engineers Proceedings* Vol. 191 No. 33, 1977, pp 194-205, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

07 182842

**GUIDE FOR THE EVALUATION OF HUMAN EXPOSURE TO WHOLE BODY VIBRATION [Guide pour l'estimation de l'exposition des individus a des vibrations globales du corps]**

This standard defines and gives numerical values to limits of exposure in the case of vibrations transmitted to the human body by solid surfaces in the 1 to 80 Hz frequency range. Within this frequency range it can be applied to periodic, random, or continuous-spectrum non-periodic vibrations. Provisionally, it can also apply to continuous excitations of the "shock" type as long as the energy transmitted is comprised between 1 and 80 Hz. These limits are given for applications corresponding to the 3 general criteria to adopt with a view to ensuring comfort, working capacity, safety and health. They are specified in vibration frequency, level of acceleration, exposure duration and direction of the vibration relating to the torso. It is only applicable to individuals in good health. No part of this standard can be extrapolated to frequencies outside the 1-80 Hz range.

ISO International Standard ISO 2631-1974, July 1974, n.p., 5 Fig., 3 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-106194), Central Laboratory of Bridges & Highways, France  
ORDER FROM: International Organization for Standardization, Case Postale 56, 1211 Geneva 20, Switzerland

07 183286

**ADJUSTMENT OF RAILWAY TRAVEL TO THE HANDICAPPED [Handikappanpassning av jaernvaegsresor]**

The aim of this study is to adjust the design of a railway coach to the needs of disabled persons. This report deals with solutions for entering and alighting together with adjustments of the interior of the coach. The problem of entering and alighting could be solved in the following ways; platform elevation, ramps or lifts. Of these alternatives the ramps are considered to be most inexpensive. Regarding the coach interior the seats and a cloakroom can be adjusted with a minimum of modifications. [Swedish]

Alemyr, M Bojling, B Nilsson, G

Chalmers University of Technology, Sweden Monograph 1978, 33 pp, 10 Fig., 5 Phot., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234405), National Swedish Road & Traffic Research Institute

ORDER FROM: Chalmers University of Technology, Sweden, Institution foer Transportteknik, S-402 20 Gothenburg, Sweden

78.0423

07 183594

**HEARING ACUITY OF RAILWAY STAFF [Hoervermoegen im Eisenbahndienst]**

Technological innovation in railway operations represents an increasing source of strain, particularly where the hearing of railway staff is concerned. For this reason, all new recruits destined for jobs as enginemen or traffic controllers are examined by means of an audiometric method. [German]

Auinger, A *Verkehrsannalen* Vol. 24 No. 5-6, 1977, pp 249-254, 3 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Verkehrsannalen, Gauer mann gasse 4, Vienna 100, Austria

07 183714

**FOREMEN'S TRAINING MANUAL**

This manual gives guidance in establishing and conducting training programs for trackmen, assistant foremen, foremen, track inspectors and other maintenance-of-way personnel. It indicates needs for training, types of training, ways in which training can be given, facilities required and recommendations for training aids and textbooks.

Roadmasters' & Maintenance of Way Assn of America No Date, 31 pp

ACKNOWLEDGMENT: Roadmasters' & Maintenance of Way Assn of America  
ORDER FROM: Roadmasters' & Maintenance of Way Assn of America, 18154 Harwood Avenue, Homewood, Illinois, 60430

07 183911

**PROCEEDINGS OF THE 1976 CONFERENCE "EMPLOYEE ASSISTANCE PROGRAMS, AN ALTERNATIVE TO TRAGEDY"**

No Abstract.

Sponsored by Federal Railroad Administration in cooperation with Employee Assistance Section-Railroad Personnel Association, Railroad Labor Organizations and Texas A&M University, November 10-12, 1976, College Station, Texas.

Federal Railroad Administration Proceeding 1976, 83 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: NTIS

07 184667

**RIDE QUALITY EVALUATION IN GROUND BASED VEHICLES: PASSENGER COMFORT MODELS FOR BUSES AND TRAINS**

Several experiments were conducted to determine the effect of a vehicle's environment on passenger comfort in intra-city buses and inter-city trains. Data were collected simultaneously on the physical characteristics of the environment and the passengers' comfort ratings in that environment. Roll rate was strongly related to judged comfort for buses, and noise and roll rate for trains. The results for ground based vehicles are compared to those from the air mode. /Author/TRRL/

Richards, LG Jacobson, ID Barber, RW (Virginia University);

Pepler, RC (Dunlap and Associates, Incorporated) *Ergonomics* Vol. 21 No. 6, June 1978, pp 463-472, 10 Tab., 4 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234894)

ORDER FROM: ESL

DOTL JC

07 184950

**HUMAN RESPONSE TO DYNAMIC MOTION OF STRUCTURES**

In this paper human reactions to the vibrations of fixed structures are discussed, and magnitudes of motion which should be acceptable to the majority of people, are suggested in tables and diagrams. The values suggested for acceptable horizontal motion magnitudes for bridges are higher than those for buildings since bridges are generally open structures on which there is an interaction between the users and environmental forces that causes the bridges to respond dynamically. Also, in contrast to occupied

buildings, bridges are generally used only for short periods at a time by those crossing, skilled work is usually suspended in storm conditions and people are generally not constantly engaged in either working or standing on bridges during storms. The suggested values of acceptable motion magnitudes for bridges does not account for transport functions, which could be interrupted before the limit of acceptability for humans is reached, or for the possibility of structural damage.

Irwin, AW (Heriot-Watt University, Scotland) *Structural Engineer* Vol. 56A No. 9, Sept. 1978, pp 237-244, 4 Fig., 3 Tab., 39 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-235558)  
ORDER FROM: ESL

DOTL JC

07 185353

**HOW SAFE IS THE DB'S TRAIN CONTROL SYSTEM? [Wie sicher ist die Zugsteuertechnik der DB?]**

The main theme is the development of signal box techniques, from the mechanically to the electronically controlled box, with special reference to technical reliability. Reports are also included of technical safety installations for locomotives and at level crossings, along with information concerning the limits of human reliability. The probability of human error determines incontrovertibly the degree of safety of the overall system in which man is combined with technology. The aim is to reduce the number of auxiliary operations depending on human reliability. [German]

Wehner, L *Zeitschrift fuer Verkehrssicherheit* Vol. 24 No. 2, 1978, pp 67-71

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Tetzlaff-Verlag GmbH, Havelstrasse 9, Postfach 4006, 6100 Darmstadt 1, West Germany

07 186200

**A SURVEY OF LONGITUDINAL ACCELERATION COMFORT STUDIES IN GROUND TRANSPORTATION VEHICLES**

Experimental studies of objective and subjective passenger response to various fore-and-aft, or longitudinal, vehicle acceleration transients are reviewed. It is found that the wide variability in type of study and form of results does not allow conclusive statements to be made regarding passenger acceptability of any specific acceleration-jerk profile in a given transportation system.

Hoferock, LL  
Texas University, Austin, Department of Transportation Res Rpt. RR-40, DOT/TST-76/110, July 1976, 51 p.

Contract DOT-OS-30093  
ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287404/8ST, DOTL NTIS

07 188073

**PROPOSED RESEARCH PLAN TO IMPROVE RAILROAD EMPLOYEE TRAINING**

The purpose of this study was to present an overall research plan for consideration by the Federal Railroad Administration which would aid the railroad industry in fulfilling its employee training needs. A sample of eight railroads, including both rail labor and management representatives were interviewed to determine the extent of existing training and to gain insights as to a possible role of the Federal Railroad Administration. The major recommendation was that FRA consider the development of a Basic Core Curriculum which would have universal applicability over the railroad system. This recommendation and the thirteen other research recommendations are now under review and consideration.

Stewart (DA) and Associates FRA-OPPD-78-14, Dec. 1977, 58 p., 2 Fig., 1 App.

Contract DOT-FR-75145

ACKNOWLEDGMENT: FRA  
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DOTL TF153.U68

07 188104

**THE DESIGN OF THE WORKING ENVIRONMENT OF A TRAIN DRIVER FROM THE MEDICAL POINT OF VIEW [Zur arbeitsmedizinischen Gestaltung der Lokfuhrer-Arbeitsplaetze]**  
No Abstract. [German]

Wittgens, H *Die Bundesbahn* Vol. 54 No. 8, Aug. 1978, pp 615-620, 2 Tab., 5 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

07 188320

**MODELS OF HUMAN REACTION TO VEHICLE ENVIRONMENTS**

Models for predicting human comfort responses to environmental variables are presented for diverse vehicles. Air mode studies reveal that comfort is a function of vertical and transverse accelerations, noise levels and seat factors, as well as manoeuvre conditions. Comfort models for ground-based vehicles involve roll rates and noise levels. /Author/TRRL/

Jacobson, ID Richards, LG Kuhlthau, AR (Virginia University) *Applied Ergonomics* Vol. 9 No. 3, Sept. 1978, pp 169-172, 3 Fig., 9 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-237080)  
ORDER FROM: ESL

07 188321

**VIBRATION AND PASSENGER COMFORT: CAN DATA FROM SUBJECTS BE USED TO PREDICT PASSENGER COMFORT?**

This paper presents a review of both field and laboratory studies of human reaction to vibration, to try to answer the question whether laboratory based studies may be used to predict comfort levels for passenger vehicles. The conclusion is reached that such studies may be used, provided their restrictions are understood. Finally, tentative suggestions are made for acceptable levels of vibration in passenger transport vehicles. /Author/TRRL/

Osborne, DJ (University College, Swansea) *Applied Ergonomics* Vol. 9 No. 3, Sept. 1978, pp 155-161, 4 Fig., 4 Tab., 30 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-237079)  
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07 188322

**PASSENGER COMFORT-AN OVERVIEW**

In transport it is axiomatic that passenger comfort is extremely important. This paper considers the concept of comfort and its relationship to the passenger's other travel experiences. The papers which follow in this special issue are then introduced and briefly discussed. The paper concludes with a section which considers factors in the transport environment likely to influence comfort but which have not been covered elsewhere in this issue. These factors include: temperature, ventilation, illumination, photic stimulation, pressure changes on the ear, journey length and task impairment. /Author/TRRL/

Osborne, DJ (University College, Swansea) *Applied Ergonomics* Vol. 9 No. 3, Sept. 1978, pp 131-136, 1 Fig., 1 Tab., 23 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-237076)  
ORDER FROM: ESL

08 180348

**RAILROAD CROSSINGS BLOCKAGES IN ELMWOOD PLACE**

This report delineates the problems in Elmwood Place resulting from trains blocking seven railroad/street crossings on the ConRail line, which traverses the entire length of the village. The report also presents recommendations for resolving the described problems and a funding strategy for implementing the optimal recommendation.

Buckner, SL  
Ohio-Kentucky-Indiana Regional Council of Govts Final Rpt. Feb. 1978, 80 pp, Figs., Tabs., 2 App.

Contract IT-09-0080

ACKNOWLEDGMENT: UMTA  
ORDER FROM: NTIS

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08 180362

**SYSTEM DESIGN FOR LIGHT RAIL TRANSIT IMPROVES INTERSECTION PERFORMANCE**

At-grade light rail transit crossings represent not only a safety hazard but a roadway capacity constraint as well. An analysis of the problem of traffic control at such locations was undertaken in Edmonton, Alberta. It led to the objectives which in turn resulted in the implementation of control measures. Significant improvements have been achieved through the application of Transportation Management principles.

Schnabegger, J Teply, S *ITE Journal* Vol. 48 No. 6, June 1978, pp 36-39, Refs.

ORDER FROM: Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

DOTL JC

08 180363

**IDENTIFICATION OF CRITICAL HIGHWAY-RAIL CROSSING AND WATERWAY CROSSING LOCATIONS**

A set of sketch planning techniques for analyzing intermodal conflicts on a regional basis is outlined in this paper. The techniques presented permit a cost effective examination of a large number of conflict locations. The analysis techniques were used in Southeastern Virginia.

Mierzejewski, EA Crosby, J Frank, W *ITE Journal* Vol. 48 No. 6, June 1978, pp 27-31

ORDER FROM: Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

DOTL JC

08 181201

**RAIL CROSSING SAFETY--AT WHAT PRICE**

The Federal Highway Administration has not decided how much warning or protection motorists should have at railroad crossings. As a result, States have widely divergent policies for improving crossing safety. Because Federal funds are earmarked for specific highway improvements, States have limited flexibility to select those projects that, in their judgment, provide the most safety in relation to cost. GAO recommends that: (1) The Highway Administration define the extent of safety needed at grade crossings and (2) The Congress authorize States additional flexibility, provided Federal funds are used to the best advantage.

General Accounting Office Cong Rpt. CED-78-83, Apr. 1978, 60 pp

ACKNOWLEDGMENT: NTIS  
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PB-280319/5ST

08 182847

**SAFETY AT AUSTRALIAN RAILWAY LEVEL CROSSINGS--AN EVALUATION OF THE LITERATURE**

This report has been prepared under contract to the Ministry of Transport, Victoria. Because of the continuing incidence of accidents at level crossings in Victoria, the Ministry of Transport initiated in November 1976 an investigation into railway level crossing safety, with emphasis placed upon the human factor aspects of the problem. This report is an evaluation of (mainly) Australian literature on level crossing safety, which has been prepared to assist the Ministry's investigation. The evaluation shows that a considerable amount of information is available in Australia and indicates that certain steps could be taken to improve safety at Victorian crossings.

The evaluation also shows that Victoria does not possess a detailed data collection on crossing parameters and crossing accidents, which would form a basis for future planning of improvements in level crossing safety.

Cowley, JE  
Ministry of Transport, Victoria Monograph Mar. 1976, 62 pp, Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234095)  
ORDER FROM: Ministry of Transport, Victoria, 570 Bourke Street, Melbourne, Victoria, Australia

08 183325

**HUMAN FACTORS IN ROAD-RAIL CROSSING ACCIDENTS**

This report has been prepared for the Victorian ministry of transport. Eighty percent of the fatalities at road-rail crossings in Victoria between 1969 and 1974 occurred either at crossings protected by flashing lights in major urban areas, or at "open" crossings (i.e. Protected only by signs and with no form of active device) in rural areas. The report is principally devoted to an examination of human factors thought to be associated with accidents at these two types of crossing. The report includes short-term and long-term recommendations and suggests that the effectiveness of the proposed measures be evaluated wherever practicable in field trials. It concludes with a tentative matrix of some human factors thought to govern road vehicle driver performance at rail-road crossings. This is offered as a basis for further development. /TRRL/

Wigglesworth, EC (Royal Australasian College Of Surgeons)  
Ministry of Transport, Victoria Monograph July 1976, 221 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234145), Australian Road Research Board

ORDER FROM: Ministry of Transport, Victoria, 570 Bourke Street, Melbourne, Victoria, Australia

08 183345

**CRASH SAFETY FOR RAILROAD PASSENGERS, TRAIN CREWS, AND GRADE CROSSING CRASH VICTIMS**

Several problems are cited as being in need of imminent solution if the crashworthiness of railroad rolling stock and vehicles involved in accidents with such rolling stock is to be improved. There is a need for locomotive grade crossing crash attenuators, for protection to railroad passengers from high speed collision with electric tower bases, for protection to passengers against hazardous materials derailment, for protection against injuries to standing passengers and to motormen and passengers at the ends of transit cars, and for protection to locomotive and caboose occupants against crash injury.

For Meeting held February 27-March 3, 1978.

Wakeland, HH (National Transportation Safety Board)  
Society of Automotive Engineers Preprint N 780022, 1978, 12 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

08 183573

**LEVEL CROSSING PROTECTION**

This working committee report aims at simplifying design and construction techniques for automatic grade crossing protection and at reducing installation, operating and maintenance costs in the light of current European experience. Types of gates and warning devices, intervals for warnings to be given, elimination of manual crossing protection and standards for road surfaces and profiles are all discussed. A 10-year program for eliminating 1,000 manned crossings and reduced regulatory constraints on this process are recommended.

A review of the report appeared in *Modern Railways*, Vol 35, No 361, October 1978.

Her Majesty's Stationery Office No Date, n.p.

ACKNOWLEDGMENT: Modern Railways  
ORDER FROM: Pendragon House, Incorporated, P.O. Box 255, Old Mystic, Connecticut, 06372

08 185228

**LEVEL CROSSINGS PAST, PRESENT AND FUTURE**

After examining the history of grade crossing protection in Britain, the author discusses the present role of manually operated crossing gates which still constitute a major manpower requirement for British Railways. A

program of installing automatic half barriers was interrupted following an accident in 1968 and has never been resumed. Most recent automation has involved remote control of gates supervised with closed circuit television. A railroad group is studying present day protection requirements to meet needs of road and rail traffic; it is concluded that modernized protection can make better use of resources and offer more safety than manual gated crossings.

Craig, TW (British Rail Headquarters) *Permanent Way Institution, Journal & Rpt of Proc* Vol. 96 Part 2, 1978, pp 122-127

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08 185343

## THE APPROACH

Safety at grade crossings enables both many human lives to be saved and considerable financial advantages to be gained by reducing the often very high costs resulting from accidents. Unfortunately the time elapsing between proposals for schemes to improve safety at crossings and their implementation is often very long. The article reviews the authorities involved.

Shaffer, FE *Modern Railways* Vol. 33 No. 89, Aug. 1978, pp 40-43, 1 Fig., 3 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

08 186108

## RAILROAD GRADE CROSSING PASSIVE SIGNING STUDY

The study examines the effectiveness of new passive signing configurations in warning drivers of the potential hazards at railroad grade crossings. Experiments were conducted in two phases over a two-year period. The first phase was begun in March 1975 and evaluated seven sign configurations at five test sites in Ohio and one site in Maine. The purpose of Phase I was to determine at a few crossings whether any of the new signs showed promise of being more effective than the existing sign configuration and to evaluate a variety of experimental variables. The results of Phase I were previously reported and indicated improved effectiveness for the new signs tested. The purpose of Phase II was to test and verify at a national level (18 sites in 14 states) the most effective signs as determined from Phase I and to concentrate on and refine, if necessary, the most important variables. In each phase, before-and-after data were collected at each site so that relative improvements provided by the new signs could be determined. The results of Phase II confirmed the findings of Phase I in that drivers showed more awareness (that is, an increased percentage of headmovements or looking for trains) with the new signs at the crossings tested.

See also Interim rept. dated Jan 77, PB-264749.

Koziol, JS Mengert, PH  
Transportation Systems Center, Federal Highway Administration Final Rpt. FHWA/RD-78- 34, DOT-TSC-FHWA-78-6, Aug. 1978, 68 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286528/5ST, DOTL NTIS

08 188135

## ELECTROHYDRAULIC BARRIER MACHINE FOR RAILWAY SIGNALLING SYSTEMS

High reliability and operational safety are central demands on a level-crossing barrier machine in railway signaling systems. A description is given of the structure of the barrier machine and devices for the stepless control of opening and closing times, automatic emergency closing and opening, holding, locking of the barrier arm, as well as the functional diagram of the hydraulic drive system.

Kroeger, B (Siemens, Railway Signal Div, Brunswick, W Germany)  
*Siemens Review* Vol. 45 No. 6, June 1978, pp 282-284

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

08 188314

## HUMAN FACTORS IN LEVEL CROSSING ACCIDENTS

Eighty percent of the fatalities at road-rail crossings in Victoria between 1969 and 1974 occurred either at crossings protected by flashing lights in major urban areas, or at "open" crossings (i.e. protected only by signs and with no form of active device) in rural areas. This paper is principally devoted to an examination of the (different) human factors thought to be associated with accidents at these two types of crossing. In the first category, the stimulus afforded by twin alternating flashing lights is deemed inadequate for many road vehicle drivers, already overloaded by the complexities of the major urban road traffic systems. In the second category, the absence of advance warning signs on one or more approach roads to the majority of crossings surveyed in a rural field study is thought significant. Moreover, at crossings where advance warning signs are provided, the one most frequently in use (the railway crossing warning assembly) is deemed inappropriate as it permits ambiguous interpretation and does not stimulate the desired response. /Author/TRRL/

Wigglesworth, EC *Accident Analysis and Prevention* Vol. 10 No. 3, Sept. 1978, pp 229-240, 4 Tab., 5 Phot., 12 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-236080)  
ORDER FROM: ESL

DOTL JC

09 053296

**FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES. GRAPHICAL AND ANALYTICAL EVALUATION OF FATIGUE STRENGTH DATA FOR WELDED CONNECTIONS**

Results of fatigue tests are evaluated on a uniform basis, using the normalised Wohler line for welded joints in structural steel. The graphical method hitherto used and a newly developed analytical method are applied, both methods being described. The investigations refer to bar-like specimens and specimens resembling structural members. Significant statements concern: the slope of the Wohler line, the scatter of stresses and endurances, the cut-off of the Wohler line. The results of both methods differ to some extent. A comparison with other results has been included.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways D 130/RP 9, Apr. 1978, 31 p., 19 Fig., 6 Tab.

ACKNOWLEDGMENT: UIC

ORDER FROM: UIC

DOTL RP

09 180258

**PERCUSSIVE IMPACT WEAR: A STUDY OF REPETITIVELY IMPACTING SOLID COMPONENTS IN ENGINEERING**

Repetitive impacting of solid components in many industries pose severe wear problems limiting service life. This paper describes the principal variables, testing methods, etc. and outlines a general engineering impact wear theory.

Engel, PA *Tribology International* Vol. 11 No. 3, June 1978, pp 169-176, 7 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

09 180270

**COMPRESSION STRESSES DUE TO HEAT TREATMENT ON RAILWAY WHEEL RIMS [Contraintes de compression induites par traitement thermique dans les jantes de roues de chemin de fer]**

The increasingly harsh conditions of use of railway stock are such that railway wheels need improved strength. A heat treatment process has been adapted to both increase wear resistance and create compression stresses in the rim to stop the damage from operating conditions getting worse. The ways of producing these constraints, measuring them, and the different methods used are described in turn.

Catot, B *Revue de Metallurgie* No. 4, Apr. 1978, pp 253-260, 1 Tab., 8 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

09 180315

**WEAR OF TITANIUM AND TITANIUM ALLOYS UNDER CONDITIONS OF ROLLING STRESS**

One of the most important conditions necessary for high-speed railway traffic is a clear reduction of the unsprung masses. The fact that even with light-weight wheelsets, the steel tires still constitute over 50 percent of the total weight, shows that it is here, by utilizing the lightweight materials, that the most promising possibility of weight reduction lies. For this reason, the frictional and wear behaviour of various titanium alloys was investigated and compared with that of normal steels. From the positive results, it would appear worthwhile carrying out further investigations under practical conditions as an adequate assessment cannot be obtained on the basis of the laboratory tests alone.

Krause, H (Technical University of Aachen, West Germany); Scholten, J *ASME Journal of Lubrication Technology, Trans* Vol. 100 No. 2, Apr. 1978, pp 199-207, 49 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

09 180616

**CONCRETE POLYMER MATERIALS, PRODUCTION METHODS AND APPLICATIONS**

Concrete polymer materials are being used world-wide in applications where high strength and durability are required. Methods for producing two

materials, polymer impregnated concrete and polymer concrete, are discussed and their structural and durability properties summarized. Existing and potential applications for these materials such as for chemical storage tanks, pilings, pipe, curbstones, and bridge decks are reviewed. (ERA citation 03:024742)

Symposium on Polymers in Concrete, Phoenix, AZ, USA, 13 January 1978.

Kukacka, LE

Brookhaven National Laboratory, Department of Energy CONF-780102-1, Oct. 1977, 10 pp

Contract EY-76-C-02-0016

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

BNL-23497

09 181214

**SHAKEDOWN LOADS ON ROLLING DISKS, CYLINDERS AND SPHERES**

The state of stress in a rolling disk subjected to various loads in the inelastic range is investigated numerically using the finite element method. Criteria for yielding and unloading during rolling are developed, and their use with the direct method and the quadratic programming technique is demonstrated. Besides the utilization of the constant strain triangular (CST) element in most of the analyses, a higher order elastic-plastic linear strain triangular (LST) element is proposed to take stress variation in a plastic element into account. In addition, a variable size finite element mesh scheme is developed for idealization of the disk. Further modifications and schemes, such as substructuring technique, are suggested. Only plane stress cases have so far been considered in this investigation. The future work should concentrate on the development of yielding and unloading criteria for plane strain and possibly for axisymmetric cases so that stress states near the points of contact in rolling cylinders and camshafts can be investigated.

Anand, SC

Clemson University, National Science Foundation Final Rpt. CUSC/DCE-76/1, Dec. 1976, 211 pp

Grant NSF-GK-37150

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-280157/9ST

09 181467

**CRACK TIP PLASTICITY IN DYNAMIC FRACTURE MECHANICS**

The objective of this work is to develop a procedure by which crack tip plasticity can be taken directly into account in rapid crack propagation. To set the stage, a background description of linear elastic dynamic fracture mechanics is first given. Existing solutions for dynamic crack propagation and for quasistatic crack growth accompanied by crack tip plasticity are reviewed. It is found that existing dynamic plastic fracture solutions are essentially confined to strip yield (Dugdale model) plastic zones that are collinear with the crack. The ultimate goal of the research reported in this paper is to provide the basis of a computational procedure for plastic dynamic crack propagation in structures of engineering interest. The prerequisite for such a development is knowledge of the nature of the crack tip singularity, which can be obtained via an asymptotic analysis in which attention is focused on the very near crack tip region. Here we have considered the specific case of crack propagation in antiplane strain (Mode III). The results suggest some interesting general conclusions, and the analysis has pointed the way to the solution of the Mode I problem.

Prepared in cooperation with Battelle Memorial Inst., Columbus, OH., Contract N00014-77-C-0576.

Achenbach, JD Kanninen, MF

Northwestern University, Evanston Intrm Rpt. NU-SML-TR-78-1, Apr. 1978, 25 p.

Contract N00014-76-C-0063

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A05159/8ST



09 181474

**THE PROBABILITY OF FAILURE OF A SYSTEM SUBJECTED TO THE JOINT EFFECT OF CYCLIC LOADING AND RANDOMLY DISTRIBUTED DISCRETE LOAD PEAKS**

If a specimen is subjected to some kind of cyclic loading with a maximum load level  $S$ , which is larger than the fatigue limit of the specimen, then the strength of the specimen will gradually decrease until its residual strength  $R$  reaches the value  $S$ , when static failure occurs. This deterioration process may, as indicated, be described graphically by an R-S-N-diagram or analytically by a set of parameter functions of  $S$  and  $N$ . If now a discrete load peak of known level  $L$  is imposed upon the specimen after  $N$  fatigue cycles, then the probability of failure may be directly read from the diagram or computed by use of the parameter functions. A generalization of the R-S-N-diagram is proposed in order to make it applicable to the case, when the discrete load peaks are replaced by sequences of different cyclic loadings. By use of this diagram it has been proved that Miner's measure of cumulative fatigue damage  $M = \sum_{i=1}^n n_i / N_i$  depends on the order in which the different sequences are applied, a defect which has been repeatedly verified by experiment. /Author/

Weibull, W

Weibull (Waloddi), (7351) Final Rpt. AFML-TR-77-169, Sept. 1977, 17 p.

Contract F44620-73-C-0066

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A055243/OST

09 181500

**GERIOMETRY: A CUMULATIVE STRESS/DAMAGE MEASUREMENT OF USEFUL LIFE OF MECHANICAL SYSTEMS**

It has long been understood in the equipment design and development shops of industry, that the useful life of mechanical systems is consumed by an accumulation of damage due to the broad range of stresses to which the system is subjected. Heretofore, measuring the cumulative damage as a means of assessing the remaining life has been impractical, particularly for mobile systems. The advent of microcomputers now makes it possible to keep a running measure of this damage and to use this measure to help optimize the system's continuing reliability. The name Geriometry has been coined to distinguish this process--the measurement of the system's continuing life expectancy. Used in conjunction with trend assessment of the system condition and performance capability, Geriometry provides the most powerful capability yet applied to manage (and minimize) maintenance resources while maximizing continuing system reliability.

Salter, R.G

Rand Corporation RAND/P-5952, Mar. 1978, 9 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A055556/5ST

09 181507

**PROBABILISTIC FACTORS IN RANDOM FATIGUE**

To predict random fatigue life, the popular cumulative damage criterion, which is based on constant amplitude sinusoidal fatigue tests, is known to be inaccurate. Therefore, actual random fatigue experiments are proposed to establish new and reliable damage criterion. In this report, all conceivable probabilistic factors which affect random fatigue life are explored and mathematically analyzed. Based on these factors the random fatigue experiments will be planned and conducted. (Author)

Huang, TC Shen, KS Nagpal, VK

Wisconsin University, Madison Tech Rpt. UW/RF-1, Oct. 1977, 20 p.

Contract N00014-76-C-0825

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A055626/6ST

09 181572

**WEAR RESISTANT ALLOYS FOR COAL HANDLING EQUIPMENT. PROGRESS REPORT, JANUARY 1--SEPTEMBER 30, 1977**

The in-service operating conditions of coal transport and fragmentation equipment involve various combinations of dry or liquid slurry abrasion,

impact loading, and temperatures that may vary from ambient to elevated (500 exp 0 F--1000 exp 0 F). Both 2-body and 3-body abrasive wear can be encountered. The published literature contains little information on testing materials under the various abrasive conditions that are of concern, especially 3-body wear. However, a number of tests were identified which may serve to provide wear data under different service conditions. A dry abrasive wear tester, to be used for screening alloys, was constructed. A review of the alloy steel literature was completed and was used to select low-alloy and secondary hardening steel compositions for screening. Initial screening criteria included the stipulation of a hardness of  $R_{c}/55$  with an impact toughness of around 15 ft lbs or a fracture toughness of 80 KSI  $\sqrt{in.}$ , depending on the application being considered. Several of the steels that were evaluated to date appeared to meet these criteria. A systematic development of secondary hardening steels has been evolved and it has been shown that good combinations of strength and toughness were achieved through proper composition and microstructural control. These higher alloyed steels appear to be suited for long-term, elevated-temperature service. The lower alloy Cr-Ni-Mo and Cr-Si-Mo steels investigated also exhibited good combinations of strength and toughness and may be suitable for ambient temperature use. (ERA citation 03:035573)

Bhat, MS Zackay, VF Parker, ER

California University, Berkeley, Department of Energy 1977, 130 p.

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

LBL-7381

09 181579

**FINITE ELEMENTS IN STRUCTURAL ANALYSIS. VOLUME 2. JULY, 1977-MAY, 1978 (A BIBLIOGRAPHY WITH ABSTRACTS)**

The bibliography cites Government-sponsored research reports concerning finite element analysis as applied to structural mechanics problems. Some computer programs are mentioned, but for a more complete listing of software developed for structural problems, see the Published Searches titled 'Structural Mechanics Software.' (This updated bibliography contains 77 abstracts, all of which are new entries to the previous edition.)

See also RRIS 166152.

Reimherr, GW

National Technical Information Service June 1978, 83 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0639/1ST

09 181583

**WOOD PRESERVATION (CITATIONS FROM THE NTIS DATA BASE)**

The bibliography is a compilation of general research on wood preservation. Wood preservatives for use against attack by marine borers, fungus, and moisture decay are described. Wood treatment methods are also cited with some studies comparing their effectiveness. (Contains 111 abstracts)

Brown, RJ

National Technical Information Service July 1978, 116 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0662/3ST

09 181584

**WOOD PRESERVATION (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)**

These abstracts of worldwide research contain information on wood preservation. Studies describing the different types of wood preservatives used, treatment methods, and durability of the preservatives are cited. (Contains 168 abstracts)

Brown, RJ

National Technical Information Service July 1978, 175 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0663/1ST

09 182818

**SOME OBSERVATIONS ON THE FALLING WEIGHT TEST FAILURES OF TYRES**

The wheels and tires are items of railway systems. Coarse grain size is mainly responsible for the failures in falling weight tests. The final grain size depends upon the finishing temperature. In direct spray quenching practice, the finishing temperatures are largely influenced by heating practice and rolling. Surface imperfections like inclusions, laps, cracks and deep tool marks act as stress raisers and can cause failures when the grain size is coarse.

Narasayya, KL Mukherjee, T *TISCO* Vol. 24 No. 4, Oct. 1977, pp161-165

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

09 182878

**COMPARATIVE EVALUATION OF THE PROPERTIES OF OXYGEN PROCESS AND OPEN HEARTH STEEL TYPE 09G2D DURING HARDNESS DROP TESTS ON FULL-SIZE SAMPLES AT LOW TEMPERATURES [Sravnitel'naya otsenka svoystv kislorodno-konvertornoy i martenovskoy stali marki 09G2D pri kopravnykh ispytaniyakh naturnykh obraztsov v usloviyakh nizkikh temperatur]**

The paper presents the results of impact tests of full-sized flat samples and beams with and without built-up faces from two melts of oxygen-process steel, sheet-rolled and Z-beam, and one melt of Z-beam-rolled open hearth steel. It is established that, according to the order of test indices, the service properties of oxygen-process steels somewhat exceed the properties of the open hearth steel while remaining within the limits of the requirements of GOST 5058-65. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Vershinskiy, SV Danilov, VN Boychevskiy, OG Vinogradov, Yu G *Trudy TsNII* Proceeding No. 548, 1976, pp 164-172, 4 Tab.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

09 183343

**INFLUENCE FUNCTION METHOD COMPUTER PROGRAM FOR ENGINEERING FRACTURE MECHANICS ANALYSES**

A computer program, BIGIF (an acronym for boundary-integral-equation-generated influence functions) has been developed. This program can, through use of influence function (IF) methods, model complicated, multiple transient, three-dimensional, elastic fracture mechanics problems accurately and efficiently, without resorting to expensive numerical stress analysis procedures which necessitate the explicit inclusion of the crack in the idealization of the structure. Application of the influence function (IF) method results in uniformly smaller errors as well as a more than one hundred times lower computer cost when compared to both direct and indirect applications of the finite element (FE) method for three-dimensional crack analyses. Therefore the IF method is recommended for analysis of cracked structures when uncracked stress solutions are available.

International Symposium on Innovative Numerical Analysis in Applied Eng Sci, Proceedings, Versailles, France, May 23-27, 1977.

Besuner, PM (Failure Analysis Association); Peters, DC  
Centre Technique des Industries Mecaniques Proceeding 1977, 7 pp, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Centre Technique des Industries Mecaniques, 52 Avenue Felix-Louat, 60300 Senlis, France

09 183595

**RESULTS OF THE TESTS CARRIED OUT WITH TYPE R 65 RAILS IN HARDENED STEEL [Ergebnisse der Erprobung von vergueteten Schienen der Form R 65]**

In 1973, the DR purchased type R 65 rails with hardened-steel rail flange surface, for experimenting in track before their large-scale introduction. Prior to laying and testing on a DR test track, these rails were studied from the standpoint of their mechanical properties. [German]

Herbst, B Euken, H *Signal und Schiene* Vol. 22 No. 3, 1978, pp 120-122, 11 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

09 184147

**RAYLEIGH WAVE DISPERSION IN THE COLD-WORKED LAYER OF USED RAILROAD RAIL**

The first shear mode (Sezawa mode) and the fundamental Rayleigh mode have been identified as they propagated through the work-hardened layer on the top surface of used, steel railroad rail. Longitudinal wave velocities and densities are very nearly equal for the work-hardened layer and the subadjacent layer. The ratio of shear wave velocity in the upper layer to that in the subadjacent layer is near to 0.95. Experimental data obtained at several frequencies (0.5-2.0 MHz) showed good agreement with expected velocities for a layer thickness ranging from 3 to 5 mm.

Bray, DE (Texas A&M University); Egle, DM (Oklahoma State University); Reiter, L (Nuclear Regulatory Commission) *Acoustical Society of America, Journal of* Vol. 64 No. 3, Sept. 1978, pp 845-851, 6 Fig., 4 Tab.

ACKNOWLEDGMENT: Acoustical Society of America, Journal of  
ORDER FROM: Acoustical Society of America, 335 East 45th Street, New York, New York, 10017

DOTL RP

09 184648

**PLASTIC FLOW AROUND A CRACK UNDER FRICTION AND COMBINED STRESS**

A boundary integral relaxation method was used to calculate the plasticity at the tip of a small horizontal crack buried in a rail head. The Hertz equations were used as boundary conditions, along with axial residual stress. A wheel passage gives initial sliding, followed by locking, squeezing the plastic zone, reversed sliding, locking, and finally unloading. Computing four cycles of this rail stress history cost \$51. At steady state (only three cycles), the plastic zone extended in the shear direction almost exactly as far as predicted from linear elastic fracture mechanics, in spite of the compression being 8 times the net shear tending to produce Mode II. The crack always remained closed. Reversed shearing on cross-slip planes was no more than 10% of that on the segment directly in front of the crack. Some speculations are given about a fracture criterion in terms of the displacements and the compressive stresses.

Fracture 1977 Advances in Research on the Strength and Fracture of Materials; 4th Int Conf on Fracture, University of Waterloo, Ontario, June 19-24, 1977.

McClintock, FA (Massachusetts Institute of Technology)  
Pergamon Press, Incorporated Proceeding Volume 4, 1978, pp 23-38, 18 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

09 184967

**SUSCEPTIBILITY TO PRIMARY GRAIN BOUNDARY FRACTURE DUE TO ALUMINUM NITRIDE FORMATION IN STEEL CASTINGS [Anfaelligkeit fuer primaerkorngrenzenbruch durch aluminumnitridbildung im stahlguss]**

The study deals with segregation mechanism of aluminum nitride on the primary grain boundaries of steel castings which results in susceptibility of the castings to fracture. It is shown that aluminum nitride is formed as an undesirable consequence of the conventional addition of aluminum as an efficient oxidizing agent into steelmaking electric arc furnaces. In such a case, the nitrogen content of the steel melt generally is not sufficient to exceed the gas solubility in the melt; on the other hand, however, under equilibrium conditions, it is always sufficient to cause the formation and precipitation of aluminum nitride. [German]

Forty-fourth International Foundry Congress, Congr Pap, Florence, Italy, September 11-14, 1977.

Hoener, KE (Berliner University, East Germany); Baliktay, S  
Associazione di Metallurgia 1977, pp 125-140, 32 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, Associazione di Metallurgia, Cent di Fonderia, Milan, Italy

09 185358

**PRODUCT DEVELOPMENT AND AUTHORIZATION FOR ITS MANUFACTURE. BASIC PROVISIONS [Razrabotka i postanovka produktov na proizvodstvo. Osnovnye polozheniya]**

The present standard serves as the basis from which Soviet ministries (departments) develop industrial branch and state standards. It establishes the general procedures for the development, coordination, and approval of technical assignments, the appraisal of draft technical documents, the testing of test versions (prototypes), and the conducting of inspection tests of the final products in series and mass production. Addendum 1 explains the procedure for structuring, elaborating, and drawing up technical assignments for the development and manufacture of products on the basis of documentation corresponding to the requirements set forth in standards of the Unified System of Design Documentation (YeSKD). Addendum 2 contains similar information for products developed and produced on the basis of technical documentation not containing design documents. Addendum 3 presents a list of key issues necessitating consideration in the development of standards, as well as in the conducting of inspection testing of series and mass-produced products; it is recommended that these issues also be taken into consideration in the preparation of industrial branch and state standards. Addendum 4 consists of the recommended requisition form for the development and assimilation of a product. Addendum 5 provides the form stating the expert's conclusion on the findings of the appraisal of draft technical documents. Addenda 6, 7, and 8 contain the recommended forms for the report on acceptance tests, the product acceptance documents, and the report of the industrial esthetics council. Addendum 9 provides the form for the report on periodic tests of products. [Russian]

Enacted by Decree No. 999, passed by the State Committee of Standards under the USSR Council of Ministers on April 23, 1973, to be in effect from January 7, 1974, to January 7, 1977. Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

USSR Council of Ministers Standard 15.001-73, No Date, 27 p.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

09 188069

**RAIL STEELS--DEVELOPMENTS, PROCESSING, AND USE**

This symposium at Denver, CO, in November 1976 involved four sessions. Introduction to Rail Steels included the following: A Review of the Manufacture, Processing and Use of Rail Steels in North America by Knupp et al; The Effect of Mechanical Properties Upon the Performance of Railroad Steels by Stone and Steele; Rail Wear Under Heavy Traffic Conditions by Kalousek and Bethune; The Assessment of Rail Steels by Morton et al; A metallurgical Examination of Control-Cooled, Carbon-Steel Rails with Service-Developed Defects by Sonon et al; Welding of Railroad Rails--A Literature and Industry Survey by Hauser. Effects of Alloy Additions and Special Processing on Rail Steels includes: Role of Alloying and Microstructure on the Strength and Toughness of Experimental Rail Steels by Bouse et al; Development of High-Strength Alloyed Rail Steels Suitable for Heavy Duty Applications by Marich and Curcio; Alloy Steels for High-Strength, As Rolled Rails by Smith and Fletcher; Some Features and Metallurgical Considerations of Surface Defects in Rail Due to Contact Fatigue by Masumoto et al; United Kingdom Development of Rails Rolled from Continuously Cast Blooms by Young. Strength and Fracture of Rail Steels includes Mechanism of Cleavage Fracture in Fully Pearlitic 1080 Rail Steel by Yong-Jin and Mernstein; Fracture Mechanics Analysis of Rails with Shell-Initiated Transverse Cracks by Bensuner; Stresses Around Transverse Fissure Flaws in Rails Due to Service Loads by Sampath et al; Prediction of Rail Steel Strength Requirements--A Reliability Approach by Mair and Groenhout. Fatigue in Rail Steels includes: The Effect of Grain Boundary Ferrite on Fatigue Crack Propagation in Pearlitic Rail Steels by Fowler and Tetelman; Fatigue and Fracture Behavior of Carbon-Steel Rails by Barsom and Imhof; Fatigue Crack Propagation Rail Steels by Feddersen and Broek; An Evaluation of the Fatigue Performance of Conventional British Rail Steels by Dabell et al; and Cyclic Inelastic Deformation and Fatigue Resistance Characteristics of a Rail Steel by Leis.

A Symposium sponsored by ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys, American Society for Testing and Materials, Denver, Colorado, November 17-18, 1976.

Stone, DH (Association of American Railroads Technical Center);

Knupp, GG (Bethlehem Steel Corporation)  
American Society for Testing and Materials ASTM Spec Pub 644, May 1978, 473 p.

ACKNOWLEDGMENT: American Society for Testing and Materials  
ORDER FROM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103

DOTL TA401.A615 N644

09 188110

**COMPUTER PROGRAMMES AND MEASURING INSTRUMENTS FOR THE STUDY OF THERMAL PROBLEMS [Rechnerprogramme und Messeinrichtungen fuer die Untersuchung thermischer Probleme]**

Various programmes for thermal evaluation, originally developed for use in aeronautical technology, can also be used for solving thermal problems on land. They can find practical application in the fields of electronics, energy technology, vehicle construction and cryogenics. These programmes ensure minimum computer time for an optimum overall picture. [German]

Doenecke, J Preuss, L *VDI-Z* Vol. 120 No. 14, 1978, pp 673-676, 1 Tab., 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: VDI-Verlag GmbH, Postfach 1139, Graf-Recke-Strasse 84, 4 Dusseldorf 1, West Germany

09 188112

**ATMOSPHERIC CORROSION OF GALVANIZED STEEL WIRE STRANDS FOR OVERHEAD GROUND WIRE**

Although galvanized steel wire strands have various uses, there are only a few reports in existence on their reduction in strength due to atmospheric corrosion. The author has studied atmospheric corrosion of cables in use for 8-36 years in order to estimate the strength of these galvanized steel wire strands in practical utilization conditions.

Watanabe, S *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 2, June 1978, pp 93-94, 1 Fig., 2 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

09 188132

**EVALUATION OF MOLYBDENUM DISULFIDE (MoS<sub>2</sub>) AS AN ADDITIVE FOR RAILROAD WHEEL MOUNTING COMPOUNDS--INTERIM REPORT**

The Association of American Railroads specifies the use of a white lead compound to press-fit railroad car wheels onto axles. It seeks assistance in the development of alternate lubricants because of recent restrictions on the use of toxic materials. This interim report reviews testing of MoS<sub>2</sub> sub 2 containing wheel mounting compounds in laboratory and field evaluations of wheel mounting and removal. The testing indicates that several of the candidate materials containing MoS<sub>2</sub> demonstrate that nontoxic, unleaded lubricants can be made available with characteristics similar to current approved products.

Kunz, EJ, Jr (MILCO Incorporated); Ridson, TJ *Lubrication Engineering* Vol. 34 No. 8, Aug. 1978, pp 444-447

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

09 188350

**RECENT DEVELOPMENTS IN LIQUID DIELECTRICS**

The polychlorinated biphenyls (PCBs) which are the basis of a wide range of dielectric fluids, are accumulative powerful ecological poisons and this article describes the testing and development of alternatives.

Waddington, FB Kallincos, A Goodman, DM *Railway Engineer International* Vol. 3 No. 5, Sept. 1978, pp 46-48, 5 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

10 053283

**RAILWAY NOISE**

This report contains representative measuring values obtained from some railway administrations and also from recent publications on the internal and external noise levels of motive power units and trains. So as to determine the characteristic features of the disturbing effects of railway noise, the question of appropriate exposure levels (dose) is discussed. Mention is made of the present legal regulations concerning noise in a number of European countries and provisional reference values are given for the permissible noise level in railway traffic.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways C 137/RP 4, Oct. 1977, 50 p., 4 Fig., 27 Tab., 7 App.

ACKNOWLEDGMENT: UIC  
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DOTL RP

10 053300

**RAILWAY NOISE. TESTS TO REDUCE THE NOISE DURING BRAKING AND RUNNING ROUND A SHARP CURVE: RESULTS OF TESTS AND CONCLUSIONS**

After the presentation of the general principles in report C 137/RP 2, this report describes all the test results and conclusions obtained from the measurements of screech and squeal caused by shoe and disc brakes on railway vehicles and also of the noise generated during the negotiation of a specially equipped track curve by a special test train. The conditions and mechanical laws making it possible to reduce these types of noise are determined.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways C 137/RP 7, Oct. 1977, 37 p., 74 Fig.

ACKNOWLEDGMENT: UIC  
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DOTL RP

10 177368

**HANDBOOK OF NOISE AND VIBRATION CONTROL. 3RD EDITION**

The third edition of the handbook, devoted to the control of industrial noise and vibration, contains information on the cause, effect, measurement, acceptable levels and methods of control of man-made noise. The information is presented in the following sections: (1) fundamentals and principles; (2a) measurement, analysis and recording; (2b) practical noise control; (2C) practical vibration control; (2D) noise in buildings; and (2e) environmental noise (including aircraft, road traffic and construction equipment noise levels). /TRRL/

Trade and Technical Press Limited, (0 85461 507X) Monograph 1977, 723 pp, Figs., Tabs., Photos.

ACKNOWLEDGMENT: TRRL (IRRD-231342)

ORDER FROM: Trade and Technical Press Limited, Crown House, Morden, Surrey, England

10 180263

**WAYS OF REDUCING INJURIOUS MATTER IN THE EXHAUSTS OF DIRECT-INJECTION DIESELS DURING IDLING [Möglichkeiten zur Verringerung der Schadstoffkonzentration in den Abgasen von Dieselmotoren mit Direkt-Einspritzung bei Leerlauf]**

During idling, diesel engines with direct injection have a higher concentration of injurious substances in the exhaust gases than do diesels with precombustion chamber, particularly in respect of hydrocarbons (CH) and to some extent carbon monoxide (CO). By shutting off some of the cylinders and, if necessary, by interposing a throttle in the exhaust line of the shut-off cylinders during idling, the output of the other cylinders can be increased. The combustion conditions in the latter are thus improved considerably. On two engines tested by the DB, such a procedure resulted in a reduction in the CH content to values similar to those for engines with precombustion chamber, while the CO content was less than with the latter engine type. Series switch-off and loading equipment for idling thus makes a useful contribution to reducing air pollution from engines with direct injection. [German]

Feulner, A *Eisenbahntechnische Rundschau* Vol. 27 No. 6, June 1978, pp 353-356, 4 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

10 180282

**STUDY INTO SOUND RADIATION FROM THE WHEELS OF RAIL VEHICLES AND TESTS ON WHEELS WITH SOUND DAMPING DEVICES FOR LONG AND SHORT DISTANCE TRAFFIC [Die Schallabstrahlung der Schienenraeder und Erprobung schallgedaempfter Raeder fuer Fern-und Nahverkehr]**  
No Abstract. [German]

Raquet, E Tacke, G *Eisenbahntechnische Rundschau* Vol. 27 No. 4, Apr. 1978, 5 pp, 19 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

10 180318

**NOISE AND RAILWAYS**

Work within the Research & Development Division of British Railways (BR) is carried out under the three main headings of staff hearing conservation, vehicle internal environment, and wayside noise. It is not the purpose of this article to discuss the first of these topics, but it will be clear that studies under the other two headings impinge on this field also. After all, vehicle internal design includes driving cabs and wayside noise affects permanent wayside staff with greater intensity than it affects lineside residents. Among the topics discussed are the large contribution (some 10 db A) to running-noise abatement which results from the use of disk brakes instead of shoe brakes. The spectral contribution of the noise (less high-frequency content) is also more acceptable. The reduction of noise in coaches is also discussed in some detail.

Stanforth, CG (British Railways Board) *Noise Control, Vibration and Insulation* Vol. 8 No. 9, Nov. 1977, pp 332-336, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 180353

**REDUCTION OF MICRO-PRESSURE WAVE RADIATED FROM TUNNEL EXIT BY HOOD AT TUNNEL ENTRANCE**

An explosive noise produced by high-speed trains emerging from long tunnels laid with concrete slab track has proved objectionable. Hoods were installed at the ends of one tunnel to reduce the micro-pressure wave preceding trains. A standardized hood, developed by model tests, is to be installed on existing and extended lines of the Shinkansen.

Ozawa, S Uchida, T Maeda, T *Railway Technical Research Inst. Quarterly Reports* Vol. 19 No. 2, June 1978, pp 77-83, 12 Fig., 3 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

10 180369

**COOPERATIVE STUDY OF HEAVY DUTY DIESEL EMISSION MEASUREMENT METHODS**

Among the objectives of this research were evaluation of a variety of designs in chemiluminescence analyzers used in heavy-duty testing; determination of the effects of sample line temperature and sample flow rates on emission values evaluation of an interference-free dual detector NDIR NOX analyzer system; comparison of emission results attained in parallel vs. series flow configuration, of five vs. ten-minute modes in test cycles and of emission results attained with Teflon vs. stainless steel sampling lines. Comparative findings involving instrument equivalency, composite cycles and modal differences were indeterminate. A major problem involving the NO/NOX crossover was uncovered. Until it is resolved there remains a question regarding the proper utilization of NO sub 2 to NO converters. The best performance in the study was demonstrated by the interference free NDIR system.

For meeting held February 27-March 3, 1978.

Perez, JM (Caterpillar Tractor Company); Clemmens, WC Broering, LC Johnson, JH  
Society of Automotive Engineers Preprint n 780112, 1978, 23 pp, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 10 180384

##### SOURCE ASSESSMENT: RAIL TANK CAR, TANK TRUCK, AND DRUM CLEANING, STATE OF THE ART

This document reviews the state of the art of air emissions and water pollutants from cleaning rail tank cars, tank trucks, and drums. Composition, quantity, and rate of emissions and pollutants are described. Rail tank cars, tank trucks, and drums are used to transport chemical commodities. Steaming, washing and/or flushing of such units result in air emissions and wastewater effluents. Air emissions are predominantly organic chemical vapors. Water pollutants common to these operations are primarily oil and grease, COD, BOD, suspended solids and many other organic and inorganic materials. Representative sources were defined in order to evaluate the hazard potential. Source severity was defined and evaluated for air emissions and for wastewater effluents. Control methods used to reduce emissions from rail tank car and tank trucks cleaning consist only of flaring flushed gases. By EPA estimates, two-thirds of the tank truck industry discharges into municipal systems with little or no pretreatment. This treatment has generally been limited to sedimentation, neutralization, evaporation ponds, and lagoons.

EPA Environmental Protection Technology Series.

Earley, DE Tackett, KM Blackwood, TR  
Environmental Protection Agency, Monsanto Research Corporation  
EPA-600/2-78-004g, MRC-DA-713, Apr. 1978, 69 pp, 22 Ref.

ACKNOWLEDGMENT: EI, NTIS  
ORDER FROM: ESL, NTIS

PB-280726/1ST

#### 10 180511

##### ANALYTICAL STUDIES FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY. VOLUME VIII. NOISE ABATEMENT: POLICY ALTERNATIVES FOR TRANSPORTATION

The report is a comprehensive discussion of the policy and legal issues involved in Noise Abatement Programs. It includes: information on the distribution of noise in the U.S., the trends in noise generation, the methods of noise measurement. It also provides an analysis of cost/benefit calculations with some illustrative examples.

Library of Congress Catalog Card no. 77-87121.

National Research Council, Environmental Protection Agency  
ISBN-0-309-02648-2, Oct. 1977, 203 pp

Contract EPA-68-01-2430

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279536/7ST

#### 10 180555

##### PROCEEDINGS OF THE WORKSHOP ON ACOUSTIC ATTENUATION MATERIALS SYSTEMS

The choice and use of materials for acoustical attenuation is an important technical problem as well as of great interest for improving comfort and working efficiency. Although the major effort in this field is at ambient conditions and in the audio frequency range, there are important applications that involve widely varying pressures, temperatures, and frequencies along with other requirements peculiar to the particular use. Among current problems in the control of acoustic energy are those associated with such diverse applications as ultrasonic devices, space vehicles, and deep-diving oceanographic vehicles. Each of these, of course, may also have other quite different requirements of the acoustical materials in such properties as density, pressure responses, and flammability.

National Materials Advisory Board Final Rpt. NMAB-339, 1978, 152 pp

Contract N00014-76-C-1110

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A053337/2ST

#### 10 180565

##### CHEMICAL TRANSFORMATIONS OF NITROGEN OXIDES WHILE SAMPLING COMBUSTION PRODUCTS

The present study reviews the sampling environments and chemical transformations of nitrogen oxides that may occur within probes and sample lines while sampling combustion products. Experimental data are presented for NOx transformations in silica and 316 stainless steel tubing when sampling simulated combustion products in the presence of oxygen, carbon monoxide, and hydrogen.

Availability: Pub. in APCA Jnl., v27 n7 p648-655 Jul 77.

Samuelson, GS Harman, JN, III  
California University, Irvine, (2308) Intrm Rpt. AFOSR-TR-78-0578, 1977, 10 pp

Grant AFOSR-74-2710

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A053140/OST

#### 10 180569

##### TRANSFORMATION OF OXIDES OF NITROGEN COMPOSITION WHILE SAMPLING COMBUSTION PRODUCTS

Combustion products are regularly sampled to determine the concentration of the major products of combustion as well as the concentration of the pollutant species. Nitrogen oxides are especially susceptible to changes in concentration that may occur during transport from the sampling point to an instrument for quantitative analysis. The present study reviews the range of conditions over which nitrogen oxides are sampled in practice, and the variety of chemical transformations that may occur within probes and sample lines. In addition, experimental data are presented for chemical transformations that occur for mixtures common to stationary source monitoring, namely combustion products mixtures containing oxygen at temperatures ranging from 25 C to 400 C.

Presented at Chemical Congress of the North American Continent (1st.) Held at Mexico City Dec 75.

Samuelson, GS Harman, JN, III  
California University, Irvine, (2308) Intrm Rpt. AFOSR-TR-78-0582, 1977, 40 pp

Grant AFOSR-74-2710

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A053096/4ST

#### 10 180618

##### NO SUB 2 LEVELS IN DIESEL EXHAUST

The safe operation of diesel-powered equipment in underground mines is predicated on there being sufficient ventilation to dilute the exhaust such that none of the toxicants in the dilute mixture exceed allowable levels. In order to determine the ventilation requirement for an engine, it is necessary to measure levels of the various toxicants in the exhaust. Measurements in the past typically either have excluded nitrogen dioxide or have not provided information on nitrogen dioxide specifically. Primarily this exclusion has resulted from lack of a fast, on-line analytical method. Development of the chemiluminescence analyzer appears now to provide the requisite capability; this instrument has been demonstrated to yield valid information for nitrogen dioxide levels and has been applied in a series of experiments conducted at the Department of Energy's Bartlesville (Okla.) Energy Research Center (BERC). Measurements of nitrogen dioxide in the exhaust from several diesel engines operated over wide ranges in speed and load were made as part of BERC's cooperative program with the U. S. Bureau of Mines. Results of these experiments indicate that nitrogen dioxide concentrations vary from less than 10% to approximately 30% of the total oxides of nitrogen. The nitrogen dioxide fraction was maximum at light load and decreased with increasing engine power. This trend was consistent for all five engines tested. (ERA citation 03:022090)

Marshall, WF  
Department of Energy Jan. 1978, 8 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

BERC/TPR-78/1

10 181109

**HEALTH AND SAFETY IMPLICATIONS OF DIESEL LOCOMOTIVE EMISSIONS**

A review of the published literature was made to determine whether there are health and/or safety effects of long-term exposure to low concentrations of diesel emissions within the ranges reported in actual railroad operations. No consistent evidence was found linking low concentrations of diesel emissions to long-term health effects or short-term respiratory function. Evidence was found linking emissions to eye irritation. Interviews with union officials and operating crews, letters from union members, union file material, and miscellaneous locomotive and caboose inspection reports pointed to the conclusion that diesel emissions are not a widespread or frequent problem in the railroad environment. There may be short-term, infrequent occurrences of burning eyes, headache, and nausea, but any safety consequences of such symptoms could not be determined. (Author)

Sanders, MS Peay, J

Navy Personnel Research and Development Center Final Rpt.  
NPRDC-TR-78-17, Apr. 1978, 64 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A053455/2ST

10 181619

**AIR POLLUTION ECONOMICS. VOLUME 3. 1977-JULY 1978 (A BIBLIOGRAPHY WITH ABSTRACTS)**

This bibliography contains studies on the economics of air pollution control and management but excludes cost studies unless they apply to an industry or entire region. The citations include the economics involved with industrial waste treatment, urban planning, government planning, and automobile and mass transportation. (This updated bibliography contains 231 abstracts, 155 of which are new entries to the previous edition.)

Cavagnaro, DM

National Technical Information Service Aug. 1978, 38 p.

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0798/5ST

10 182758

**A DIRECT READING INSTRUMENT FOR MEASUREMENT OF RESULTANT PARTICLE VELOCITY OF GROUND VIBRATION**

A new instrument is described for the measurement of ground vibrations caused by civil construction activities. The device gives a direct reading of the maximum resultant peak particle velocity of the vibration for frequencies in the range 15 Hz to 300 Hz. This is achieved by electronically processing the signals obtained from a velocity type tri-axial geophone. The result is displayed on an analog meter or digital display. Details of the system are given. It is expected that the comparatively low cost and ease of operation of the instrument will make more widespread monitoring of ground vibration in sensitive areas possible. The unit is particularly suited to the monitoring of blasting operations. /Author/TRRL/

Harris, RJ (Melbourne & Metropolitan Board of Works, Australia)  
*Australian Road Research* Vol. 8 No. 1, Mar. 1978, pp 17-24, 10 Fig., 2 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 234082), Australian Road Research Board

ORDER FROM: Australian Road Research Board, 500 Burwood Road, Vermont South, Victoria 3133, Australia

10 182811

**CONTRIBUTION TO THE CALCULATION OF NOX FORMATION IN THE DIESEL ENGINE [Beitrag zur Berechnung der Stickoxidbildung im Dieselmotor]**

On the basis of known models for the calculation of the nitric oxide formation in Otto engines a model for the nitric oxide formation in Diesel engines is deduced and developed, especially the formation of the combustion in several phases. A comparison of calculated and measured NOx-emissions and the possibility of theoretical predictions is demonstrated. [German]

Huber, E (Firma Daimler-Benz, W Germany); Schley, W Vogt, R  
*Motortechnische Zeitschrift* Vol. 39 No. 5, May 1978, pp 235-237, 9 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

10 182887

**NOISE CONTROL FOR FAN AND VENT SHAFTS IN SUBWAYS**

Subway fan and vent shafts can be prominent sources of noise impact to both the adjacent community and to patrons in the subway stations. Author discusses available methods for reduction of fan and train noise propagated out of vent shafts and fan noise propagated into stations. In addition, the results of fan noise measurements in station platforms and outside the fan shafts at existing rapid transit facilities are presented.

Lee, PYN *Noise Control Engineering* Vol. 10 No. 3, May 1978, pp 102-107, Refs.

ACKNOWLEDGMENT: DOT

ORDER FROM: ESL

DOTL JC

10 183327

**EGR LOWERS DIESEL NOX EMISSIONS**

The tendency of diesel engines to have high NOx emissions relative to future limitations is not fully compensated by their low HC and CO levels. Late fuel injection lowers fuel economy and water injection increases cost, though either can lower NOx. Use of exhaust gas recirculation, through requiring precise controls, has been found effective by Robert Bosch engineers employing a system which senses both air and fuel flow and limits exhaust gas recirculation (EGR) to provide clean combustion. If part of the intake air is replaced by exhaust gas, the cylinder's oxygen content is decreased, delaying the oxidation of the nitrogen in the intake air during combustion. The specific heat of exhaust gas is greater than that of air, also aiding in the reduction of combustion temperature and delaying nitrogen's oxidation. With increasing EGR, NOx emission decreases; HC and soot emission decreases; HC and soot emission is also lowered. A further increase in EGR results in an increase in soot, HC, and CO emission as well as fuel consumption, all as a result of the reduced oxygen content. With still greater EGR combustion misses occur.

*Automotive Engineering* Vol. 86 No. 7, July 1978, pp 46-51

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 183609

**NOISE ABATEMENT MEASURES IN MARSHALLING YARDS. REPORT FROM THE FEDERAL WORKING PARTY ON NOISE IN MARSHALLING YARDS [Laermenschutz an Rangierbahnhöfen. Bericht der Eidgenössischen Arbeitsgruppe "Laermbelastung durch Rangierbahnhöfe"]**

No Abstract. [German]

Eidgenössisches Amt fuer Umweltschutz Vol. 1-2 1978, 145 pp, 10 Tab., 64 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Eidgenössisches Amt fuer Umweltschutz, Eidgenössisches Amt fuer Verkehr, Berne, Switzerland

10 183612

**MAXIMUM CHARACTERISTICS OF THE HARMFUL ELEMENTS OF EXHAUST GAS FROM RAIL DIESEL ENGINES [Grenzwerte fuer Schadstoffe in den Abgasen von Bahndieselmotoren]**

Report taking stock of the guidelines applied by UIC Railways in connection with this major problem of limitation of diesel engine pollution. [German]

Feulner, A *Glaser's Annalen ZEV* Vol. 102 No. 6, June 1978, pp 175-179, 1 Tab., 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

10 184629

**NOISE EMISSIONS FROM THE STANDPOINT OF THE PLANNER [Schallimmissionen aus der Sicht des Planers]**

The problem of the great increase in road traffic noise in densely populated areas has also brought the subject of rail traffic into the discussion of noise levels. Sometimes arguments are resurrected which recall the early days of the railways, although with the development of the railways this mode of transport has become increasingly kind to the environment. One can in fact say that the railway is the transport mode which causes least damage to the

environment. The author also deals with the problems of different levels of noise nuisance and touches on the present legal position. Methods of reducing noise nuisance are described, and the principle illustrated by calculating a mean average level for a simple example. [German]

Glatzel, L *Eisenbahntechnische Rundschau* Vol. 27 No. 10, Oct. 1978, n.p., 7 Fig., 29 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**10 184631**  
**POSSIBILITIES OF REDUCING NOISE WITH SEGMENTAL BRAKE-BEAMS FOR RETARDERS [Moeglichkeiten der Laermbekaempfung mit Segmentbremsbalken bei Zulaufbremsen]**

The loud grinding noise which occurs during braking is largely attributable to the increased sliding friction coefficient in the lower speed range. This is represented with the existence of a "critical speed". A practical solution would be to get the "critical speed" below the usual working speed in the vicinity of the retarders, but during braking to a stop the noise could still occur. The most effective remedy could be segments made of materials which give almost constant dynamic and static friction coefficients when paired with steel. Using segments made of nodular cast iron, it was possible to determine the influence of the frictional coefficient under test conditions. [German]

Meuters, G *Eisenbahntechnische Rundschau* Vol. 27 No. 10, Oct. 1978, 3 p., 4 Fig., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**10 184639**  
**DIESEL ODOR SAMPLING AND ANALYSIS USING THE DIESEL ODOR ANALYSIS SYSTEM (DOAS)**

Diesel Odor sampling and analysis techniques and procedures using the Arthur D. Little, Inc. Diesel Odor Analysis System (DOAS) have been evaluated. Reproducibility of the or-0.1 TIA unit at the 2.0 TIA level and or-0.2 TIA unit at the 1.5 TIA level are achievable if a consistent, well defined sampling procedure is used. Significant odor sample trap breakthrough and sample volume effects have been isolated. The study indicates that care must be given to defining a standard odor sampling configuration and procedure.

For Meeting held February 27-March 3, 1978.

Cernansky, NP (Drexel University); Savery, CW Suffet, IH Cohen, RS  
Society of Automotive Engineers Preprint n 780223, 1978, 16 p., 15 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**10 184646**  
**DIESEL ENGINES AND THEIR PARTICLE SIGNATURES**

Smokemeters or opacity meters give a gross or optical indication of particle number density in diesel engine exhaust emissions; however, due to the small size of typical diesel exhaust particulates, it is difficult to collect size distributed samples except for the largest sizes. The inertial impactor used to obtain the data reported in this paper collected the majority of the particulates on a back-up filter with no inherent size differentiation. Because wear particles are larger in size, it is possible to obtain a visual idea of the particle size distribution from a ferrogram slide by means of optical microscope analysis. In all of the particle studies reported, it was necessary to work with the scanning electron microscope to obtain magnifications necessary to achieve physical characterization, and for even greater resolution, in the case of exhaust particulates, it was necessary to use the transmission electron microscope.

For Meeting held June 15, 1977.

Scotfield, GL  
Society of Automotive Engineers Preprint n 780426, 1977, 20 p., 12 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**10 184647**  
**ENVIRONMENTAL IMPACTS OF BART AND PEOPLE'S RESPONSES**

Results are intended for use in Federal transit policy making, in improvement of transit system design, and in simplification of the transit planning process. The study identified specific combinations of BART attributes and characteristics of its surroundings responsible for impacts. Adverse impacts included noise from trains on aerial trackways in quiet neighborhoods and the inconvenience and danger of large volumes of traffic and on-street parking by BART patrons in residential areas near some stations. Environmental benefits were largely visual, arising from the system's landscaping, linear parks under some of its aerial tracks, and encouragement of downtown street and pedestrian environments.

Graff, DL (Gruen Associates, Incorporated); Knight, RL *ASCE Journal of Transportation Engineering* Vol. 104 No. 5, Sept. 1978, pp 713-730, 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**10 184945**  
**NOISE-CON 77 PROCEEDINGS: NATIONAL CONFERENCE ON NOISE CONTROL ENGINEERING, 1977**

Thirty-six papers are presented. The first section of this Proceedings is devoted to reports from several organizations on the status of programs on the Federal, State and local levels. The second section deals with environmental impact and on the noise environment created by both air and surface transportation systems. The first group of papers deals with environmental impact, cost-effectiveness analysis and safety and economic considerations in tire noise control. The second group of papers deals primarily with noise environments created by rail transit systems and aircraft. The third section has been devoted to the prediction of noise levels, propagation effects and the effects of barriers and earth berms. Several papers are included on the state-of-the-art in rail transit noise, highway noise and aircraft noise. The proceedings also include papers devoted to standards and measurements of the noise generated by transportation systems.

Maling, GC, Jr (IBM Acoustics Laboratory)  
Noise Control Foundation

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, Noise Control Foundation, Box 1758, Poughkeepsie, New York, 12603

**10 184946**  
**EPA'S RULEMAKING PROGRAM AND STRATEGY FOR REDUCING SURFACE TRANSPORTATION NOISE**

The author presents, briefly, the history and strategy behind EPA's implementation of the Noise Control Act. The motorcycle and railroad noise programs will be highlighted and nine other Surface Transportation Regulatory Programs currently underway are covered.

For Meeting held February 27-March 3, 1978.

Roper, WE (Environmental Protection Agency)  
Society of Automotive Engineers Preprint SAE 780389, 1978, 12 p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**10 184966**  
**RELATION BETWEEN NITRIC OXIDE FORMATION AND COMBUSTION PROCESS IN DIESEL ENGINES**

A mathematical model was set forth to the relationships among NO emission, the combustion process and engine performances. And it was found possible to secure a lower NO emission in engines by controlling the combustion process without any increase of noise emission or sacrificing of thermal efficiency.

Twelfth International Congress on Combustion Engines, Tokyo, Japan, May 22-31, 1977.

Murayama, T (Hokkaido University, Japan); Miyamoto, N Sasaki, S Kojima, N  
International Council on Combustion Engines Vol. B No Date, 34 p., 15 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, Japanese Internal Combustion Engine Federation, Tokyo, Japan

10 185805

**THE PREDICTION OF AERODYNAMIC AND WHEEL/RAIL NOISE GENERATED BY HIGH-SPEED TRAINS**

Wheel/rail interactions and aerodynamic fluctuations are the important sources of wayside noise produced by high-speed railway trains. The dominance of one or the other of these sources depends entirely on the relative effectiveness of each in generating radiated noise. Equations are given for the calculation of both the wheel/rail and aerodynamic noise levels and their predictions are compared to peak noise levels measured during the passage of conventional fast trains, new high-speed trains, and magnetically levitated vehicles. For the quietest new trains built with state-of-the-art technology, the analysis presented indicates that aerodynamic fluctuations can become the dominant source of wayside noise at vehicle speeds between 250 and 300 km/h (155 and 187 mph).

King, WF, I

Deutsche Forschungs-u Versuchsanst f Luft-u Raumft DLR-IB-257-77/14, 1977, 34 p.

ACKNOWLEDGMENT: NTJS

ORDER FROM: NTJS

N78-29877/5ST

10 188061

**SOME STATIC AND DYNAMIC PROPERTIES OF RAILWAY WHEELS**

To improve the understanding of wheel/rail noise generation, experiments were conducted on four railway wheels to determine their static and dynamic behavior. The railway wheels used were the Bochum wheel, the Acoustaflex wheel, the S.A.B. wheel and a standard railway wheel. The properties measured were their frequencies, modal damping ratios, and mode shapes. Deflection properties are also given. Two prototype wheels also included in the tests were found to produce higher damping ratios than any of the four established railway wheels.

Contributed by the Rail Transportation Division of the American Society of Mechanical Engineers for presentation at the Winter Annual Meeting, San Francisco, California, December 10-15, 1978.

Strasberg, L Perfect, N Elliott, GL (Ontario Ministry of Transportation &amp; Communic, Can)

American Society of Mechanical Engineers Conf Paper 78/WA/RT-4, July 1978, 8 p., 15 Fig., 3 Tab., 9 Ref.

ACKNOWLEDGMENT: ASME

ORDER FROM: ESL

DOTL RP

✓ 10 188078

**FINAL ENVIRONMENTAL IMPACT STATEMENT. FINANCE DOCKET 28611--PETITION OF SOUTHERN PACIFIC TRANSPORTATION COMPANY FOR DISCONTINUANCE OF ALL PASSENGER TRAIN SERVICE BETWEEN SAN FRANCISCO AND SAN JOSE AND INTERMEDIATE POINTS**

Discontinuance of commuter service on the 47-mile Southern Pacific line between San Francisco and San Jose would displace about 7,500 riders daily, at least 61 percent of which are estimated to be diverted to automobiles. Adverse environmental and socioeconomic impacts are discussed in this report, a part of the ICC-prescribed service abandonment procedure.

Interstate Commerce Commission Oct. 1978, v.p., Figs., Tabs., Photos., Refs., 6 App.

ORDER FROM: Interstate Commerce Commission, Office of Proceedings, Section of Energy and Environment, Washington, D.C., 20423

DOTL RP

10 188105

**PROTECTION AGAINST NOISE ALONG RAILWAY LINES****[Zabezpieczenia przeciwhalaszowe linii kolejowej na szlaku]**

The article describes the sources of noise in rail transport, establishes the maximum noise levels in protected areas, gives an account of the results of studies carried out on Warsaw suburban lines as regards noise levels with trains and compares what has been done with measurements made on the SZD. To conclude, the author lists the various types of protection against noise and assesses their efficiency. [Polish]

Mizia, U Zimnoch, S *Problemy Kolejnictwa* Vol. N No. 9, 1978, pp 125-138, 10 Fig., 2 Tab., 20 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Problemy Kolejnictwa, Warsaw, Poland

10 188134

**REDUCED SCALE MODEL TEST ON FORCED VIBRATION OF GROUND AND BRIDGE SYSTEM**

Dynamic properties of railroad bridge members and near ground media were estimated through the reduced scale model test on forced vibration by an exciter, changing the bridge type, loading-mass, and supporting conditions. Two series of reinforced concrete bridges were tested.

Tamura, K Kawamata, J *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 2, June 1978, pp 88-89

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

10 188333

**THE ATMOSPHERE IN THE METRO [L'atmosphère du métro]**

The first chapter deals with the specific characteristics of the atmosphere in the metro: composition and physical parameters of the air, comfort as regards temperature, and includes a brief outline of the railway authorities objectives in this field. A table describes the air conditioning equipment, the urban metro and the regional metro. The means employed to improve the atmospheric conditions in the metro are presented in the third chapter: improvement in ventilation, reduction in heat dissipated in the tunnel, air conditioning of stations, metro lines, surge shafts, cleaning. Four appendices deal with: temperature control in the urban network, the technical construction of a ventilation plant, temperature curves for the railway lines, layout plans for the installation of ventilators and ventilation bays. [French]

Sutton, D Flahaut, J *RATP Bulletin de Documentation et D'information* Sept. 1976, pp 3-69, Figs., Tabs., Photos.

ACKNOWLEDGMENT: TRRL (IRRD 105213), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Regie Autonome des Transports Parisiens, 53 Ter. Quai des Grands Augustins, Paris, France

10 188334

**CHARACTERIZATION OF THE HYDROCARBON AND SULFATE FRACTIONS OF DIESEL PARTICULATE MATTER**

One of the most objectionable aspects of the use of diesel engines has been the emission of particulate matter. A literature review of combustion flames, theoretical calculations and dilution tunnel experiments has been performed to elucidate the chemical and physical processes involved in the formation of diesel particulate matter. A comparative dilution tunnel study of diluted and undiluted total particulate data provided evidence supporting calculations that indicate hydrocarbon condensation should occur in the tunnel at low exhaust temperatures. The sample collection system for the measurement of total particulate matter and soluble sulfate in particulate matter on the EPA 13 mode cycle is presented. A method to correct for hydrocarbon interferences in the EPA barium chloranilate method for the determination of sulfate in particulate matter is discussed.

For Meeting held February 27-March 3, 1978.

Khatri, NJ (Michigan Technological University); Johnson,

JH Leddy, DG

Society of Automotive Engineers Preprint N 780111, 1978, 24 p., 39 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

10 188337

**ENVIRONMENTAL TRADE-OFFS OF TUNNELS VS CUT-AND-COVER SUBWAYS**

Heavy construction projects in cities entail two kinds of cost-internal cost, which can be defined in terms of payments from one set of parties to another, and external cost, which is the cost borne by the community at large as the result of disutilities entailed in construction and operation. Environmental trade-offs involve external costs, which are commonly difficult to measure. Cut-and-cover subway construction probably entails higher external and internal cost than deep tunnel construction in many urban geological environments, but uncertainty concerning the costs and environmental trade-offs of tunneling leads to limited and timid use of tunneling by American designers. Thus uncertainty becomes a major trade-off which works against tunneling. The reverse is true in Sweden after nearly 30 years



of subway construction. Econometric methods for measuring external costs exist in principle, but are limited in application. Economic theory based on market pressure does not address the real problem of urban environmental trade-offs. Nevertheless, the problem of uncertainty can be addressed by comparative studies of estimated and as-built costs of cut-and-cover vs tunnel projects and a review of environmental issues associated with such construction. Such a study would benefit the underground construction industry and the design of transportation systems. It would also help solve an aspect of the urban problem.

Walton, M (Minnesota Geological Survey) *Underground Space* Vol. 3 No. 2, Sept. 1978, pp 62-67, 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 237150)

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

10 188361

## ENVIRONMENTAL IMPACTS OF COAL SLURRY PIPELINES AND UNIT TRAINS

SAI recently evaluated the environmental impacts of coal slurry pipelines

and coal unit trains for the U.S. Congress, Office of Technology Assessment. Both the general impacts of each technology and the impacts of hypothetical cases were evaluated. Results of this study are presented here with emphasis on the Utah-to-Southern California hypothetical case. It is shown that the coal slurry pipeline water requirement is so small in comparison with even the lowest flows in the Green River that no significant direct environmental impacts would be anticipated. Permanent removal of water from the Basin by a slurry pipeline would preclude some growth in alternative uses. The most likely re-use of recovered coal slurry pipeline water in the Barstow area would be as power plant cooling system makeup. Because the pipeline would largely bypass population centers, the major impact would be upon rural land use, which is primarily grazing land and open space.

Greater Los Angeles Area Energy Symposium, California, May 23, 1978.

Rogozen, MB Margler, LW

Western Periodicals Company Proc Series No. 4, 1978, pp 228-240, 33 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Western Periodicals Company, 13000 Raymer Street, North Hollywood, California, 91605

11 176279

**REVIEW OF DOWNTOWN PEOPLE MOVER PROPOSALS: PRELIMINARY MARKET IMPLICATIONS FOR DOWNTOWN APPLICATIONS OF AUTOMATED GUIDEWAY TRANSIT**

The Automated Guideway Transit (AGT) Socio-Economic Research Program, initiated by UMTA in 1975, is a comprehensive, multidisciplinary research effort addressing the social, economic, environmental, institutional, land use, and performance issues of AGT technology in the urban environment. A major objective of this program is to ascertain the potential market for AGT systems in the United States. The information was extracted from 38 proposals submitted by U.S. cities for consideration in UMTA's Downtown People Mover (DPM) Project in June 1976. These proposals address a range of socioeconomic considerations related to the installation of DPM systems in central business districts. The considerations include application site characteristics, system ridership, system economics, past project planning, local funding sources, related transportation planning activities, related central city redevelopment activities, and environmental impacts. This report presents a brief description of the status of AGT technology in the U.S., a summary of the project and site characteristics given in the DPM proposals, and individual summary sheets for each city. The 38 DPM proposals submitted indicate that there is a U.S. market for a people mover system.

Mabee, NB Zumwalt, BA  
Mitre Corporation, Urban Mass Transportation Administration, (UMTA-IT-06-0176) MTR-7691, UMTA-IT-06-0176-77-1, Dec. 1977, 144 pp

Contract UMTA-UT-50016

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281068/7ST

11 176305

**AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 2: WEATHER PROTECTION REVIEW**

This report is one of a series of reports associated with the AGT Guideway and Station Technology Project. The objective of the project is to develop guideway, station, and weather protection concepts which will reduce the cost and implementation time associated with AGT systems. Only the review portion of the weather protection area is addressed in this report. The concept development, analysis, and testing portions are the subject of a separate volume. This report presents a review of the experiences of AGT systems under severe winter weather conditions as well as a review of the experiences of non-AGT transportation modes (railroads, airports, and highways). The review material herein is a result of a literature search and interviews with personnel at operating AGT systems and manufacturers. This report focuses on bottom-supported, rubber-tired vehicle AGT systems (the only type of AGT system currently operating in a winter environment). Specifically, this means that the survey of existing AGT weather-related operating experiences focuses on the Ford Fairlane system, the Boeing Morgantown system, the Westinghouse test tracks, the Vought Airtrans system, and the Bendix Metropolitan Toronto Zoo system. Three areas of winter weather impact on AGT systems are presented: traction, power collection, and switching. Conclusions derived from this review and recommended areas for further investigation for AGT application are described.

Prepared in cooperation with ABAM Engineers, Inc., Tacoma, Wash.

Stevens, RD Nicarico, TJ McGean, TJ  
De Leuw, Cather and Company, ABAM Engineers, Incorporated, Urban Mass Transportation Administration Final Rpt. UMTA-IT-06-0152-79-1, Mar. 1978, 146 pp

Contract DOT-UT-70066

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281632/0ST

11 179350

**ASSESSMENT OF RIDE QUALITY OF AIRTRANS SYSTEM**

The acquisition and analysis of ride-vibration data for the AIRTRANS automated-guideway-transit system at the Dallas-Forth Worth Regional Airport are discussed. The ride vibrations are measured as translational components of the vehicle floorboard accelerations in the three principal directions. The total record for a complete loop around the network was subdivided into sections of straight, gently curved, and sharply curved zones,

and ensemble-averaged spectra for each type of zone were compared. The spectral-response characteristics between straight and gently curved zones are not very different, but the sharp turns increase the frequency, particularly in the 10 to 30-Hz range. The low-frequency behavior gives a multip peaked spectrum arising from the body and wheel modes as modified by kinematic resonances at frequencies corresponding to travel wavelengths that are multiples of the steering and main wheel bases. The ride quality was compared to a recent International Organization for Standardization standard, to a comfort criterion based on passenger satisfaction as found in small aircraft, and to ride ratings in a sedan automobile. All three predicted adequate ride satisfaction; the second method showed a 70 percent satisfaction level 94 percent of the time.

This article appeared in Transportation Research Record, No. 646, Transportation Ride Quality.

Healey, AJ (Texas University, Austin) *Transportation Research Record* No. 646, 1977, pp 7-12, 8 Fig., 9 Ref.

ORDER FROM: TRB Publications Off

DOTL JC

11 179869

**STUDY OF FLYWHEEL ENERGY STORAGE--VOLUME 1, EXECUTIVE SUMMARY; VOLUME 2, SYSTEMS ANALYSIS; VOLUME 3, SYSTEM MECHANIZATION; VOLUME 4, LIFE-CYCLE COSTS; VOLUME 5, VEHICLE TESTS**

In 1976, the Urban Mass Transportation Administration established the present program--Study of Flywheel Energy Storage--to determine the practicality and viability of flywheel propulsion systems for urban mass transit vehicles. The study began with a review of the U.S. transit properties requirements, which showed that the most suitable vehicle for deployment of flywheel propulsion is the full-size transit bus. Several propulsion concepts were hypothesized and subjected to comparative analysis with present diesel buses, trolley coaches, and battery buses in regard to performance and life-cycle economics. This screening resulted in the establishment of the following basic concepts that can provide various types of high quality transit service: Pure flywheel propelled bus; Flywheel/diesel engine hybrid bus; Flywheel-augmented trolley coach; and Flywheel/battery hybrid bus. The design studies that were conducted for the four propulsion configurations showed a high degree of commonality of components among the four concepts. Final life-cycle cost analyses showed all four concepts to be in a competitive range with present transit vehicles. Plans were made for a Phase II development program that will result in the design, fabrication, and testing of all four propulsion configurations in full-size buses within 36 months. Volume 1 presents the summary of the results of the Study of Flywheel Energy Storage. The study has shown the viability of flywheel-propelled buses, and a set of plans for successful deployment of these new vehicles has been prepared. The study recommends that the Phase II program leading to the development of prototype vehicles be promptly initiated. Volume 2 reviews, identifies, and defines the requirements for improved rubber-tired urban transit vehicles. It includes the quantification of three baseline vehicles: a 40-ft diesel bus, a trolley coach, and a battery bus. It discusses the requirement needs of 11 transit properties. Volume 3 describes the results of the system mechanization for the four flywheel propulsion configurations that scored highest in the screening: Pure flywheel drive; Flywheel/battery hybrid drive; Flywheel/diesel engine hybrid drive; and Flywheel-augmented trolley coach drive. Volume 4 describes the methodology developed to guide the life-cycle cost analysis of the flywheel propelled vehicles as compared with the three baseline vehicles. Volume 5 presents the major results of the tests performed on a 40-foot diesel bus and a trolley coach as related to the program methodology. It includes the test data from the 20-vehicle M.A.N. Electrobus demonstration program in Germany. Details of the tests, test data, and other test results are included in Appendixes A, B, and C of this report. /UMTA/

See also Vols. 2 through 5, NTIS PB-282653 through PB-282656 respectively, also available in set of 5 reports PC E14, PB-282651-SET.

Lawson, LJ Smith, AK Davis, GD  
AiResearch Manufacturing Company, (CA-06-0106) Final Rpt. UMTA-CA-06-0106-77-1, Sept. 1977, 725 pp

Contract DOT-UT-60097T

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-282652/7ST

11 179870

**A STUDY OF FLYWHEEL ENERGY STORAGE FOR URBAN TRANSIT VEHICLES, PHASE I**

This report documents the Phase I results of a program--Study of Flywheel Energy Storage--investigating the use of flywheel storage as applied to fixed-route, multistop, rubber-tired, urban transit vehicles. This program, established by the Urban Mass Transportation Administration in 1976, has an ultimate objective of hastening the changeover to electric propulsion from today's petroleum-powered transit vehicles. The objective of Phase I was to evaluate the application of flywheel energy storage to a broad spectrum of electrically powered urban transit vehicles and to identify the systems which could meet the established mission requirements. This document is the final report for Phase I of this flywheel storage program, and it summarizes the results of each of the six tasks of Phase I: Requirements Study; System Concept Study; Supporting Engineering Design and Analysis; Life-Cycle Cost; Development Plan for Phase II; and Technological Advancements. Charts, tables, major conclusions and recommendations are provided. The Appendixes (A-L) chart out such items as system requirements; flywheel/motor energy storage packages; life-cycle cost analysis, methodology, and worksheets; modularity in design; and a list of references. This report concludes that flywheel energy storage is a promising technique for reducing dependence upon petroleum fuels by urban transit buses as well as offering environmental improvement potentials to transit operators. The study recommends that a hardware development program be initiated for propulsions systems applicable to urban vehicles. /FHWA/

General Electric Corporate Research & Development, (NY-06-0062)  
Final Rpt. UMTA-NY-06-0062-77-1, Sept. 1977, 210 pp

Contract DOT-UT-60096T

ACKNOWLEDGMENT: UMTA  
ORDER FROM: NTIS

PB-282929

11 180279

**THE AIR-CORE SYNCHRONOUS LINEAR MOTOR USED FOR TRACTION PURPOSES WITH A NEW RAPID TRANSIT SYSTEM [Der eisenlose Synchronlinearmotor als Fahrzeugantrieb in einem neuartigen Schnellverkehrssystem]**

Description of the structure, characteristics, working and control of the air-core synchronous linear motor. Reminder of experiments done on two test benches. Tests are to continue with a full-size vehicle on the Erlangen circuit. [German]

Duell, HJ *Eisenbahn-technische Rundschau* Vol. 27 No. 3, Mar. 1978, pp 143-158, 4 Tab., 14 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

11 180286

**ANALYSIS AND ASSESSMENT OF THE FORESEEABLE EFFECTS OF A HIGH-SPEED GROUND TRANSPORT SYSTEM [Analyse und Bewertung der voraussichtlichen Auswirkungen einer künftigen Hochleistungs-Schnellverkehrs-Systems]**

Summary of a study carried out by the Battelle Institute (Frankfurt/Main) into the effects of the introduction of a transport system based on magnetic levitation between the main towns in West Germany. The study, based on a purpose-built vehicle model, involved assessing the 1990 demand against the background of ecological, economic and social considerations. [German]

Von Braun, CF Von Gizycki, R *Zeitschrift fuer Verkehrswissenschaft*  
Vol. 49 No. 1, 1978, pp 3-26, 3 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hellendoorn (A) Verlag, Stettiner Strasse 1, Postfach 78, 4442 Bentheim, West Germany

11 180296

**TECHNIQUE, MANAGEMENT AND STATE OF DEVELOPMENT OF THE H-BAHN SYSTEM [Technik, Betriebsfuehrung und Entwicklungsstand des H-Bahn-Systems]**

The H-Bahn is a short-distance transport system using suspended vehicles of various sizes. The smallest cabin with one compartment provides 17 seats, while the largest can take 220 passengers. Propulsion is provided by direct

current or linear motors. Driving techniques range from manual to fully automatic drive. Testing of the system on the 1.4 km experimental circuit at Erlangen, using 6 vehicles, is expected to be completed in 1979. [German]

Mueller, S *Siemens Review* Vol. 52 No. 2, 1978, pp 65-69, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

11 180314

**INVESTIGATION OF THE ELECTRODYNAMIC BRAKING CONDITIONS OF A LINEAR TRACTION ASYNCHRONOUS MOTOR [Issledovanie rezhima elektrodinamicheskogo tormozheniya tyagovogo lineinogo asinkhronnogo dvigatelya]**

A mathematical model of the electrodynamic braking conditions of a linear asynchronous motor is described. It is based on the method of integral equations. Calculated and experimental mechanical characteristics of a linear asynchronous motor are presented. An analysis of factors having an effect on the degree of braking efficacy is given. [Russian]

Fiskin, VZ *Izvestia Vysshikh Ucheb Zaved, Elektromekhanika* No. 12, Dec. 1977, 4 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

11 180327

**PEOPLE MOVERS ARE READY FOR THE BIG TIME**

A hypothetical regional transit system for major activity centers that are potential areas for people mover applications is illustrated. Relative evaluation of types of networks for people mover systems is given. Typical locational options available for the downtown people mover stations with respect to existing street facilities and adjacent buildings are shown.

Bondada, MV *Consulting Engineer* Vol. 50 No. 3, Mar. 1978, pp 78-81

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 180351

**THRUST AND LEVITATION FORCE OF LINEAR SYNCHRONOUS MOTORS FOR PROPULSION AND LEVITATION USE**

In recent years levitated railway systems have been studied in many countries. Most vehicles proposed would be driven by linear motors but levitated pneumatically or magnetically. Two types of linear motor--synchronous and induction--are available. They are in some cases only for propulsion and in other cases for propulsion and levitation. A basic model of linear synchronous motor for propulsion and levitation is suggested. An analysis of the thrust and levitation forces of such a motor is made.

Saijo, T *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 2, June 1978, pp 66-72, 11 Fig., 3 Tab., 4 Ref.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

11 180385

**DIRECTIONAL CONTROL AND STABILITY OF CVS PASSENGER VEHICLES**

The Computer-controlled Vehicle System (CVS) is a pure personal rapid transit system and is reported to make it possible to cope with present-day traffic conditions by providing good service quality and transit capacity of 15,000 passengers per hour for network transportation. This paper presents the results of experimental and theoretical analyses of the unique guide-mechanism by which the driverless operation of CVS vehicles has been made possible. It is shown from the results of the study that the designed vehicle has satisfactory ride comfort and stability at speeds lower than 60 km/h.

Iguchi, M (Tokyo University, Japan); Minami, T *High Speed Ground Transportation Journal* Vol. 12 No. 1, 1978, pp 23-40, 6 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 180386

**GERMAN RESEARCH AND TECHNOLOGY PROGRAM  
CONCERNING ADVANCED TRACKED  
GROUND-TRANSPORTATION SYSTEMS**

The author gives a review of the research and development of track-guided high-speed transportation systems in the Federal Republic of Germany, which are funded by the Federal Ministry of Research and Technology. He outlines the reasons and objectives for funding the new technology, and discusses the pros and cons of magnetic levitated systems.

Schulz, H *High Speed Ground Transportation Journal* Vol. 12 No. 1, 1978, pp 101-111, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

11 180682

**TASK REPORTS: SLURRY COAL PIPELINES. VOLUME II,  
PART 2**

This assessment analyzes the costs and potential economic, social, and environmental impacts of coal slurry pipelines. The report includes a discussion of the possible effects on society of coal slurry pipeline development, a comparison of pipeline and unit train costs, and an analysis of relevant legal and regulatory issues. Findings address conditions under which slurry pipelines may be attractive in terms of cost and the influence of transportation regulatory policy. Also evaluated are the potential impacts of slurry pipeline development on the rail industry, consequences of pipeline water use as contrasted with community impacts of increased coal train traffic, and implications of the power of eminent domain at the Federal, as opposed to the State, level.

Office of Technology Assessment OTA-E-60-PT-2, Jan. 1978, 804 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278677/0ST

11 180683

**TASK REPORTS: SLURRY COAL PIPELINES. VOLUME II,  
PART 1**

This assessment analyzes the costs and potential economic, social, and environmental impacts of coal slurry pipelines. The report includes a discussion of the possible effects of coal slurry pipeline development, a comparison of pipeline and unit train costs, and an analysis of relevant legal and regulatory issues. Findings address conditions under which slurry pipelines may be attractive in terms of cost and the influence of transportation regulatory policy. Also evaluated are the potential impacts of slurry pipeline development on the rail industry, consequences of pipeline water use as contrasted with community impacts of increased coal train traffic, and implications of the power of eminent domain at the Federal, as opposed to the State, level. Specific task reports contained in this volume deal with the market for coal transportation and other economic considerations. (Portions of this document are not fully legible)

Office of Technology Assessment OTA-E-60-PT-1, Jan. 1978, 528 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278676/2ST

11 180711

**GUIDEWAY TRANSPORTATION (A BIBLIOGRAPHY WITH  
ABSTRACTS)**

The bibliography cites research on automated guideway transportation (AGT), in which passengers or freight can be transported along tubes or rails under automatic control. The carriers, termed personal rapid transit vehicles or people movers, can accommodate individuals or small or larger groups. The reports cover many aspects of technology, such as demand actuated service, networks, elevated structures, monorail, light rail, computer aided control, vehicle merging, headway safety, shuttle loops, guideway designs, magnetic levitation, suspended vehicles, and dual mode. Discussions are made of steering control, ride quality, airport services to move people or baggage, gravity assistance in accelerating and braking, test vehicles, and maintenance. Other topics are cost comparisons of AGT with conventional transit, fares, and equipment failure. Air cushion vehicles are excluded. (This updated bibliography contains 157 abstracts, 25 of which are new entries to the previous edition.)

88

Kenton, E

National Technical Information Service May 1978, 162 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0402/4ST

11 180776

**ASSESSMENT OF THE SATELLITE TRANSIT SYSTEM (STS) AT  
THE SEATTLE-TACOMA INTERNATIONAL AIRPORT**

The report describes and assesses the Satellite Transit System (STS), an exclusively underground AGT system of the shuttle loop transit class used for passenger transport at Seattle-Tacoma International Airport. The information and data presented were collected through surveys of technical literature; formal site visits; interviews with operators, management, and engineering personnel; and a visit to the system manufacturer (Westinghouse). The report contains seven major sections and a comprehensive information checklist attached as an appendix: (1) Executive Summary; (2) Background Information; (3) Technical Description; (4) System Operational and Performance Assessment; (5) System Economics; (6) System Development Process; and (7) Concluding Remarks. The report concludes that the STS system has had no major problems in its four-year operating history, and it is in a position to further expand its final design capacity.

See also related reports, PB-261339, PB-278521, and PB-277184.

Yen, AM Henderson, C Sakasita, M Roddin, M Cronin, R  
SRI International, Urban Mass Transportation Administration, (UM-  
TA-IT-06-0135) Final Rpt. UMTA-IT-06-0135-77-1, Dec. 1977, 133 pp

Contract DOT-UT-70034

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-281820/1ST

11 180801

**AUTOMATED GUIDEWAY TRANSIT SERVICE AVAILABILITY  
WORKSHOP**

The workshop consisted of four panel sessions: Service Availability Definitions; Operator Experience in Operational Systems; Theoretical Aspects of AGT Service Availability; and User-Manufacturer Relationships. The workshop presented a wide spectrum of informed opinion on how to specify, predict, design, and measure the effectiveness of automated guideway transit systems. The document contains the papers and remarks presented at the four panel sessions, the comments made during the question and answer period that followed, and a list of attendees. The discussions illustrated the wide spectrum of meanings currently given to the term 'service availability.' The positions taken by representatives of the various portions of the transit industry--properties, designers, researchers, and manufacturers--showed the variety of ways in which system performance is specified and evaluated today, and the reasons for such a variety.

Watt, CW

Transportation Systems Center, Urban Mass Transportation Administration  
Final Rpt. DOT-TSC-UMTA-77-46, UMTA-MA-06-0048-77-4,  
Feb. 1978, 392 pp

Contract DOT-MA-06-0048

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282295/5ST, DOTL NTIS

11 180884

**STUDY OF FLYWHEEL ENERGY STORAGE**

No Abstract.

Set includes PB-282652 thru PB-282656.

AiResearch Manufacturing Company, Urban Mass Transportation Administration  
5 Volumes, Sept. 1977, 725 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282651-SET/ST

11 181026

**PARAMETERS AND REGIMES FOR THE HYDRAULIC  
TRANSPORTATION OF COAL BY PIPELINES**

The monograph deals with the results of experimental and theoretical study of the parameters and regimes of hydraulic transportation of coal through

pipelines. The author has discussed the data on the experimental studies of transporting the lump and run-of-mine coal in the water current, the effect of different parameters on the fragmentation of coal in the mains and on their hydroabrasive wear. The problems of theory and the calculation of different flow regimes along pipelines of thinly dispersed highly concentrated water-coal suspensions suitable for direct burning have also been discussed; the structural-mechanical properties of these suspensions and the conditions of transporting lump coal in them have been studied for the first time. Methods have been suggested for the calculation of parameters and regimes of transportation and the change in the sieve composition of coal in mains; recommendations have been made for the selection of effective parameters of transportation which ensure the least energy capacity of the process.

Trainis, VV  
Bureau of Mines, National Science Foundation TT-72 51038, 1977, 238 pp

Contract NSF-C466

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-280986-T/ST

#### 11 181168

##### A COMPARATIVE COST/BENEFIT ASSESSMENT OF MINITRAM AND OTHER URBAN TRANSPORT SYSTEMS

This report gives a summary account of a cost/benefit analysis of several hypothetical fixed track automatic passenger transport systems in an urban scenario based on the West Midlands. The assessment was carried out as part of the Minitram project study and is mainly concerned with a system using 20 place Minitrams, but other automatic systems studied for comparative purposes include a network cab system (Cabtrack) and Minitram systems using larger vehicles. Comparative work was also done on a rail rapid transit system, trams, and express buses running on ordinary roads. The report includes a brief description of the methodology used, with particular reference to the problems of estimating modal split to a new mode when two or more existing modes are present. The main conclusion reached from the study was that a suitable Minitram network is likely to produce enough cash revenue to cover its direct operating costs and to produce sufficient social benefit to give an internal rate of return of more than 10 per cent on its capital cost. However the capital cost of the infrastructure is too great for capital charges to be paid out of net revenue, and a substantial capital grant would be required as an initial subsidy. The report stresses the importance of selecting appropriate economic criteria for optimization before a valid economic comparison can be made with other systems. (Copyright (c) Crown Copyright 1977.)

Also pub. as ISSN 0305-1293.

Langdon, MG  
Transport and Road Research Laboratory Lab Rpt. TRRL-LR-747, 1977, 35 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-280865/7ST

#### 11 181322

##### FIRE DETECTION, EXTINGUISHMENT, AND MATERIAL TESTS FOR AN AUTOMATED GUIDEWAY TRANSIT VEHICLE

This report describes 27 fire tests performed in a mockup (modified school bus) of an automated guideway transit vehicle. There were a number of significant findings relative to fire safety in this type of vehicle. First, Halon 1301 was found to be effective in extinguishing typical seat fires, but generated extremely high noise levels during discharge; however, significant reductions in noise were achieved by modifying the discharge nozzle. Another important finding was that in all tests fires, the photoelectric detector responded more quickly than did the ionization detector. Finally, by studying various seat fire ignition sources, it was concluded that the underseat fire was the most severe condition. (Author)

Hill, RG Johnson, GR  
National Aviation Facilities Experimental Center Final Rpt.  
FAA-NA-76-52-REV, Nov. 1977, 30 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A056229/8ST

#### 11 181598

##### MATERIALS HANDLING BY SLURRY PIPELINES (CITATIONS FROM THE NTIS DATA BASE)

The bibliography contains citations on pipeline transportation of coal, oil, household wastes; sewage, mining, and dredging slurries. Studies on transport properties, fluid flow, hydraulic systems, pumps, and environmental impacts are included, as are economics and safety of slurry pipeline transportation. The majority of studies are energy related. (This updated bibliography contains 116 abstracts, 36 of which are new entries to the previous edition.)

Smith, MF  
National Technical Information Service July 1978, 122 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0720/9ST

#### 11 181599

##### MATERIALS HANDLING BY SLURRY PIPELINES (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)

Worldwide research on slurry pipelines containing coal, crude oil, minerals, sand, gravel, metallic ores, industrial wastes, and municipal wastes are cited. Studies on pumps, pipes, fluid flow, hydraulics, and design are included. Characteristics of transported materials are covered. Underwater pipelines and underground pipelines are also covered. (This updated bibliography contains 203 abstracts, 35 of which are new entries to the previous edition.)

Smith, MF  
National Technical Information Service July 1978, 211 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0721/7ST

#### 11 182002

##### VEHICLE LATERAL CONTROL AND SWITCHING TECHNOLOGY REVIEW STUDY PROGRESS REPORT

The Vehicle Lateral Control and Switching (VLACS) project has been established to investigate alternative steering and switching systems applicable to a wide variety of automated transit vehicle types. This project is part of the Automated Guideway Transit Technology (AGTT) development program derived from the Urban Mass Transportation Administration's experience with automated transportation systems. The objectives of the project are to: (1) reduce the cost, complexity and weight, and increase the life, reliability, maintainability, ride quality, and switching capability of VLACS systems; (2) develop specific performance requirements and guidelines for lateral control and switching systems for SLT, GRT, and PRT vehicles in trained and untrained configurations; (3) develop and evaluate baseline VLACS hardware designs reflecting project objectives; (4) provide experimental data to demonstrate capability of VLACS system and subsystem designs to meet performance requirements including line speed switching; (5) provide a comprehensive analytical evaluation of contact (mechanical) and non-contact (wire-follower) lateral guidance approaches; and (6) perform an assessment of the positive retention capabilities of automatic switching systems.

Haines, GA Fry, CM McHugh, T Greeson, JO  
Otis Elevator Company, Urban Mass Transportation Administration  
Final Rpt. OTIS/TTD/VLAC-020, OTIS/TTD/VLAC-023, Mar. 1978, 155 p.

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
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PB-284799/4ST

#### 11 182093

##### ASSESSMENT OF THE PASSENGER SHUTTLE SYSTEM (PSS) AT TAMPA INTERNATIONAL AIRPORT

The report is the second in a series of six to assess the systems at Seattle-Tacoma International Airport, Fairlane Town Center, Houston Intercontinental Airport, Tampa International Airport, Walt Disney World, and King's Dominion Amusement Park. In assessing systems at these sites, the overall objectives are to obtain engineering and operational data; obtain descriptive economic, system performance, and user perception data; and review the design, development, and implementation process. The purpose of the site reports is to provide a uniformly documented presentation of AGT

installations for UMTA's AGT program, and to establish the state of the art of AGT systems for ultimate use in planning, evaluating, producing, and deploying future systems. This report contains the findings of an assessment of the Tampa International Passenger Shuttle System (PSS), an elevated, automated AGT system that provides passenger transit service between a landside terminal and remotely located airside terminals at the airport. The PSS at Tampa has been in successful operation carrying passengers between airside and landside buildings since 1971.

See also related reports, PB-281820, PB-261339, and PB-278521.

Yen, AM  
SRI International, Urban Mass Transportation Administration, (UMTA-IT-06-0135) Final Rpt. UMTA-IT-06-0135-77-4, Dec. 1977, 110 p.  
Contract DOT-UT-70034

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-285597/1ST, DOTL NTIS

**11 182577**  
**CONTROL SYSTEM FOR AIR-CORED LINEAR SYNCHRONOUS MOTORS [Regeleinrichtung fuer den eisenlosen synchronlinearmotor]**

The article presents a control concept for air-cored linear synchronous motors for independent thrust and lift force control. The control concept comprises two main function groups, a vehicle position detector and a secondary current control system. The dynamic behavior of both measuring and control is analyzed by digital simulation. [German]

Gibson, JP Lingaya, S *Siemens Review* Vol. 52 No. 3, Mar. 1978, pp 113-117

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 182578**  
**ROSY, A ROTATING TEST STAND FOR AIR-CORED LINEAR SYNCHRONOUS MOTORS [Rosy, ein rotationspruefstand zum erproben des eisenlosen synchronlinearmotors]**

AEG, BBC and Siemens AG formed the Magnetic Levitation Project Group in order to develop and test components for high-speed, track bound magnetic levitation vehicles. Siemens are testing air-cored linear synchronous motors for the drive system. An account is given of their operating principle and properties and of the experiments in progress. [German]

Klocker, P Parsch, CP *Siemens Review* Vol. 52 No. 3, Mar. 1978, pp109-113

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 182795**  
**ANALYSIS OF LIFT AND DRAG FORCES IN ELECTROMAGNETIC LEVITATION SYSTEMS**

Much attention is being paid at present to the attractive electromagnetic levitation system in many countries as one of the most promising and less noisy railway systems. Vehicles are suspended and guided by the attractive force exerted on the ground iron rail by the attractive magnet on the vehicle. One of the technical problems of this system is that that a magnetic drag force is produced and the attractive force is decreased when the vehicle is running at high speed. This paper analyzes the high-speed levitation characteristics of two kinds of rails, one U-shaped and the other flat, by the finite element method.

Jizo, Y Yamada, T Iwamoto, M *Electrical Engineering in Japan* Vol. 97 No. 2, Mar. 1977, pp 94-100, 10 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 182815**  
**H-BAHN DEVELOPMENT--POINT OF DEPARTURE AND OBJECTIVE [Ausgangspunkt und Zielsetzungen der H-Bahn-Entwicklung]**

The construction of efficient rapid-transit systems is of special importance in view of the increasing congestion of city streets and parking areas. The objective of the H-Bahn development is to create a rapid-transit system running on a segregated guideway which is economic and quick to construct. Incorporating automatic control into the overall concept permits short headways, an efficient service and low personnel costs. [German]

Marten, F *Siemens Review* Vol. 52 No. 2, Feb. 1978, pp 60-63

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 183320**  
**ECONOMIC AND SERVICE COMPARISON OF CONVENTIONAL BUS AND AUTOMATED TRANSIT-A CASE STUDY**

The paper discusses the findings of an automated guideway transit (AGT)--bus comparative analysis carried out for the city of Trenton, NJ, for 1985. Four transit modes were originally assessed: demand-responsive bus, light rail, scheduled bus and automated guideway transit. Two of these, light rail and demand-responsive bus, were eliminated as relatively ineffective in the area concerned. The other two systems, conventional bus and AGT, were examined in detail as extreme alternatives. Area-wide AGT represents the ultimate in urban mobility while conventional line-haul buses offer easily introduced short-term improvements. The analysis showed that while AGT would offer a high level of mobility to compete with car travel and could enhance future development in Trenton, investment requirements were prohibitive. The analysis of the fixed-route bus system network showed that a significant increase in use could be achieved by increasing frequencies along certain corridors for a relatively modest investment. /TRRL/

Lutin, JM Kornhauser, AL Lion, PM (Princeton University) *Transportation Planning and Technology* Vol. 4 No. 3, May 1978, pp 139-151, 7 Fig., 9 Tab., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234543)  
ORDER FROM: ESL

**11 183602**  
**DEVELOPMENT OF NON CONTACT SPEEDOMETER**

Speed is normally measured by means of a speedometer, which is vulnerable to error in certain instances. In any case, this method cannot be used on a levitation railway. A non-contact speedometer has therefore been developed, and the results of experiments are described in this article.

Matsumoto, K Fujimori, S *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 1, Mar. 1978, 42 pp, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

**11 184614**  
**PROGRESS OF RESEARCH AND DEVELOPMENT ON REPULSIVE LEVITATION RAILWAY IN JNR**

The progress of research and development on repulsive levitation and linear synchronous motor propulsion with superconducting magnets is described. The progress from feasibility studies through actual testing is detailed.

Yamashita, H *Railway Technical Research Inst, Quarterly Reports* Vol. 19 No. 3, Sept. 1978, pp 99-105, 9 Fig.

ACKNOWLEDGMENT: Railway Technical Research Inst, Quarterly Reports  
ORDER FROM: Japanese National Railways, Kunitachi, Box 9, Tokyo, Japan

DOTL JC

**11 184637**  
**MATHEMATICAL MODEL OF MAGNETIC SUSPENSION SYSTEMS WITH PERMANENT MAGNETS IN REPULSION MODE OF OPERATION [Matematicheskaya model' sistem magnitnogo podvesa s postoyannymi magnitami. Rabotayushchimi na ottalkivanie]**

A mathematical model of magnetic suspension systems of a high-speed surface means of transportation is proposed. It is set up using methods of the theory of magnetic circuits. Derivation of the formulas for the forces of repulsion between the magnets of the vehicle and of the track is based on the consideration of the variation of their full magnetic energy following the variation of the working air gap. The variation of the full magnetic energy is related to the deformation of the flux tubes in the gap. Use of this mathematical model will permit derivations of optimal correlations between the dimensions of different variants of design of magnetic suspension systems with a comparatively small amount of computations. [Russian]

Galikyan, GS Krevchenko, Yu R Pekker, II Tkachenko, GI *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 2, Feb. 1978, pp 164-167

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 184644**  
**STATE OF THE ART OF THE DRIVING TECHNOLOGY FOR ELECTROMAGNETIC LEVITATION (MAGLEV) VEHICLES**  
[Stand der Antriebstechnik beim EMS-Fahrzeugen]

For high-speed traffic systems with electromagnetic levitation linear motors are especially suitable as drives. Possible variants are discussed with regard to design and their advantages and disadvantages. The asynchronous short stator two-cam motor and the iron clad synchronous long stator motor are qualified for the driving of MAGLEV vehicles. Advantages and disadvantages of these two variants are to be considered for each individual application. [German]

Lang, A. *Elektrische Bahnen* Vol. 48 No. 9, Sept. 1977, pp 232-239, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**11 184655**  
**CANADIAN HIGH SPEED MAGNETICALLY LEVITATED VEHICLE SYSTEM**

A technically feasible high speed (400-480 km/h) guided ground transportation system, based on the use of the vehicle-borne superconducting magnets for electrodynamic suspension and guidance and for linear synchronous motor propulsion, has been defined as a future modal option for Canadian application. Analysis and design proposals have been validated by large-scale tests on a rotating wheel facility and by modeling system components and their interactions. Propulsion and automatic system control is provided by the superconducting linear synchronous motor which operates at good efficiency (0.74) and high power factor (0.95). The vehicle is guided primarily by the interaction between the LSM field magnet array and flat null-flux loops overlying the stator windings in the guideway.

Atherton, DL (Queen's University, Canada); Belanger, PR Burke, PE Dawson, GE Eastham, AR Hayes, WF Ooi, BT Silvester, P Slemon, GR *Canadian Electrical Engineering Journal* Vol. 3 No. 2, Apr. 1978, pp 3-25, 33 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**11 184673**  
**DESIGNING SMALL VEHICLES AND STATIONS FOR AUTOMATIC URBAN TRANSIT SYSTEMS**

The work reported is part of a co-ordinated research programme into the financial, environmental and operational feasibility of the British minitram concept. The authors have examined the effect of passenger behaviour upon the design of vehicles, stations and system parameters.

Ashford, N Kirk, S (Loughborough University of Technology, England) *Ergonomics* Vol. 21 No. 6, June 1978, pp 473-482, 6 Fig., 2 Tab., 1 Phot., 7 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234893)  
ORDER FROM: ESL

DOTL JC

**11 184953**  
**DOUBLE HARMONIC ANALYSIS OF LINEAR INDUCTION MACHINES**

The paper presents an analysis of linear induction machines which accounts for both the longitudinal and transverse edge effects, through the use of a double harmonic approach. Theoretical results are compared with some experimental findings and the agreement can be seen to be acceptable.

IEEE Power Eng Soc, Summer Meeting, Los Angeles California, July 16-21, 1978.

Alwash, JHH Eastham, JF Freeman, EM  
Institute of Electrical and Electronics Engineers Preprint Paper A 78 612-4, 1978, 11 p., 19 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

**11 184954**  
**DEVELOPMENT OF A DC LINEAR MOTOR--2. RESEARCH FOR A GROUND COIL AND FIELD-MAGNET**

A test facility has been constructed for the linear motor car mainly to examine its propulsion characteristics. The 3.3 ton vehicle has a 2 ton propulsion force and can be accelerated to 165 Km/h in 200 m. The DC Linear Motor (DCLM) is made up of three main components: a ground coil, a field-magnet and a flip-flop type thyristor inverter. This paper deals with the development of the ground coil and the field-magnet. The ground coil is equivalent to the armature coil of the conventional rotary motor. The fundamental construction of the ground coil is of an air-core type so as to prevent the attractive force caused by the field-magnet. It is molded into a broad with FRP. Since the field-magnet is a part of the DCLM car and straddles the ground coil, the magnetic flux of the field-magnet passes through the ground coil. In order to have a light-weight field-magnet, the ground coil must be as thin as possible. The field magnet must be designed to minimize its weight and its exciting power, given a gap length, magnetic strength and region of magnetic flux. Ordinarily, the generated heat quantity of a magnet coil is very large, so the cooling of the magnet coil is necessary. The results of test with actual models are described.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Umemori, T (Japanese National Railways); Hosoda, Y Isasaki, M Toyoshima, M  
Institute of Electrical and Electronics Engineers Preprint Paper F 78 756-9, 1978, 9 p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

**11 184955**  
**DEVELOPMENT OF DC LINEAR MOTOR--FUNDAMENTAL CONSTRUCTION AND FEASIBILITY**

This paper reports on the results of study and experiments of a DC Linear Motor which was developed by the authors and proposes a transportation system in which the DCLM is used. The technical and economical feasibility of the system is also verified. Since the DCLM system uses a normal conductive electromagnet as field magnet, it requires fewer elements to be developed, as compared with a combined system of superconducting levitation and linear synchronous motor (LSM), so that it can be put to practical use with the technology presently available. This is an important feature of the DCLM. Another advantage is high reliability, as no control is required of levitation force and the single mechanism can provide propulsion and levitation forces simultaneously, when compared with a combined system of attractive force-levitation and linear induction motor (LIM). The DCLM car is a tire-suspension type experimental car designed to determine its actual propulsive performance. The vehicle, weighing 3,000 kilograms, ran 200 m (effective distance 180 m) in the test to give the speed of 165 km/h.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Umemori, T (Japanese National Railways); Kawashima, M Oda, M Ohsawa, S  
Institute of Electrical and Electronics Engineers Preprint Paper F 78 757-7, 1978, 9 p., 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

**11 184957**  
**CONTROL AND DYNAMIC SYSTEMS: ADVANCES IN THEORY AND APPLICATIONS, VOLUME 13, 1977**

Eight papers are contained in this volume dealing with such topics as: optimal operation of large scale power systems; high-speed tracked vehicle suspension synthesis; applications of optimization techniques to aerospace systems; optimal observers for continuous linear stochastic systems; and analysis of stochastic interconnected systems.

Leondes, CT (California University, Los Angeles)  
Academic Press Incorporated, Limited 1977, 365 p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, Academic Press Incorporated, Limited, 111 Fifth Avenue, New York, New York, 10003

11 184958

**NON-UNIFORM POWER DISTRIBUTION IN LINEAR INDUCTION MOTORS DUE TO END EFFECTS**

This paper presents experimental data showing the effects of electrical and magnetic discontinuities on linear induction motor (LIM) performance. The power distribution along the LIM, the effect of the machine length, and the validity of assuming a LIM model in which the iron extends beyond the bound of the winding were investigated. The test bed for the experiments was the linear induction motor research vehicle (LIMRV). The LIMRV, an aerodynamically shaped, 112 m/s (250-mph) steel wheel on steel rail vehicle, was powered by an onboard gas turbine-driven alternator. The thrust-producing element of the propulsion system is a 2500-hp LIM, rated at 1040 v line-to-line, at 173.3 Hz.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Bevan, RJA (AiResearch Manufacturing Company); Kalman, GP  
Institute of Electrical and Electronics Engineers Preprint Paper F 78  
754-4, 1978, 5 p., 15 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

11 184959

**FORCE TRANSIENTS AT GUIDEWAY BUTT JOINTS IN REPULSIVE MAGNETIC LEVITATION SYSTEM**

To provide for thermal expansion, the guideway for the repulsive levitation of high-speed ground transport would be jointed. The presence of these joints (ohmic discontinuities) interrupts the stationary pattern of the eddy-current in the guideway as the superconducting magnet traverses across them. This change in eddy current distribution causes a time transient in the Lorentz force acting on the magnet. The nature of this joint force is of engineering interest especially if it incurs a loss of lift or if its pulsations affect the ride quality. The objective of this paper is to examine the nature of this transient force. The butt joint is considered here, because it represents the worst case. The effect of butt joints on the force components is analyzed by the dynamic circuit theory. Predicted results show very good agreement with measurements.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Ooi, BT (McGill University, Canada); Jain, OP  
Institute of Electrical and Electronics Engineers Preprint Paper F 78  
733-8, 1978, 8 p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

11 184960

**THEORETICAL ANALYSIS OF LINEAR INDUCTION MOTORS**

This paper describes a quasi-three-dimensional mathematical model developed for the design of linear induction motors operating with either controlled current or controlled voltage supplies. The model is notable in its simultaneous treatment of (1) electromagnetic boundary phenomena, including longitudinal end-effect and transverse edge-effect; and (2) other refinements, such as the effects of staggered double-layered windings, and a secondary resistance corresponding to the actual current pattern. The mutual interaction of these characteristics is encompassed in the model.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Lee, CH (AiResearch Manufacturing Company); Chin, CY  
Institute of Electrical and Electronics Engineers Preprint Paper F 78  
724-7, 1978, 9 p., 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

11 186106

**ASSESSMENT OF THE UMI TYPE II TOURISTER AGT SYSTEM AT KING'S DOMINION**

The information and data presented were collected through surveys of technical literature; site visits; interviews with pertinent personnel; and a visit to the system manufacturer. The purpose is to provide a uniformly documented presentation of AGT installations for UMTA's AGT Socio-Economic Program, and to gain an in-depth understanding of the performance, capabilities, and limitations of existing systems. The overall objectives are to obtain factual engineering and operational data; obtain

descriptive economic, system performance, and user perception data; and review the design, development, and implementation process. The findings are to be used in planning, evaluation, producing, and deploying future AGT systems. This report addresses the background of the project; the engineering system description and assessment; operation, maintenance and reliability and passenger-oriented system performance; systems economics; and the development history. The system at King's Dominion has a relatively low technological level, but an overall design that fulfills the site requirements in a reliable and economical manner. It is an unscheduled, loop-type system that can accommodate small wheelchairs designed for children. The system is in a mature state of development, but is less completely automated than some of the other AGT systems.

Yen, AM Henderson, C Sakasita, M Roddin, M Siddiquee, W  
SRI International, Urban Mass Transportation Administration Final  
Rpt. UMTA-IT-06-0135-77-6, Dec. 1977, 65 p.

Contract DOT-UT-70034

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286513/7ST, DOTL NTIS

11 186107

**ASSESSMENT OF THE AUTOMATICALLY CONTROLLED TRANSPORTATION (ACT) SYSTEM AT FAIRLANE TOWN CENTER**

This report contains the interim findings of an assessment of the Automatically Controlled Transportation (ACT) System for passenger transport in the Fairlane Town Center at Dearborn, Michigan. SRI International conducted the assessment as part of a program sponsored by UMTA, and is under contract to assess the systems at Sea-Tac International Airport, Fairlane Town Center, Tampa International Airport, Houston Intercontinental Airport, Walt Disney World, and King's Dominion Amusement Park. The purpose of the site reports is to provide a uniformly documented presentation of AGT installations for UMTA's AGT Socio-Economic Research Program, and to gain an in-depth understanding of existing domestic and foreign AGT systems. The overall objectives are to: (1) obtain factual engineering and operational data; (2) obtain descriptive economic, system performance, and user perception data; and (3) review the design, development, and implementation process. The findings are intended to establish the state of the art of AGT systems for ultimate use in planning, evaluating, producing, and deploying. This report addresses the approach used in the Fairlane assessment; the engineering systems description; operation, maintenance and reliability, and passenger-oriented system performance; systems economics; and the development history.

Yen, AM Henderson, C Sakasita, M Roddin, M Cronin, R  
SRI International, Urban Mass Transportation Administration,  
(SRI-5949) Final Rpt. UMTA-IT-06-0135-77-2, Dec. 1977, 120 p.

Contract DOT-UT-70034

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286524/4ST, DOTL NTIS

11 186111

**VEHICLE LATERAL CONTROL AND SWITCHING TECHNOLOGY EVALUATION MODELS STUDY PROGRESS REPORT. COST AND WEIGHT MODEL**

The Vehicle Lateral Control and Switching (VLACS) project has been established to investigate alternative steering and switching systems applicable to a variety of automated transit vehicles. The VLACS project tests include a review of existing lateral control and switching technology, detailed mathematical modeling analysis and simulation, detailed hardware studies, experimentation with alternative designs, and development of guideline specifications for VLACS systems. A usable life-cycle cost and weight model is available for immediate application to automated guideway transit (AGT) nominal designs and control alternatives from these designs. The model incorporates the design goals delineated herein; a test case has been successfully run. This document contains a description of the cost and weight model for VLACS systems. The model is a life-cycle cost and weight model which focuses on system components which vary with lateral control option. This model is to be used to evaluate the cost and weight of VLACS design for four classes of AGT vehicles: Shuttle Loop Transit (PRT), Group Rapid Transit (GRT) large and small, and Personal Rapid Transit (PRT). Numerous illustrations and tables related to the model, its programs and



subroutines, as well as a list of references are contained herein. This report concludes that the model has been structured to allow for evolution to keep the model current and usable. Relative inflation rates will be added to this model in the immediate future, and a test case using data for the SLT nominal design will be run at General Research Corporation. The model will then be converted to Otis equipment and an updated version of this report will be prepared.

See also report dated Mar 78, PB-284799.

Graver, CA Fry, CM  
Otis Elevator Company, Urban Mass Transportation Administration  
Final Rpt. OTIS/TTD-VLACS-025, UMTA-IT-06-0156-78-4, Apr. 1978, 142 p.

Contract DOT-UT-70088

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286551/7ST, DOTL NTIS

#### 11 186214

##### AGT GUIDEWAY AND STATION TECHNOLOGY. VOLUME 3: GUIDEWAY AND STATION REVIEW

This report is one of eight volumes associated with the AGT Guideway and Station Technology Project. The project objective is to develop guideway, station, and weather-protection concepts which will reduce the cost and implementation time associated with AGT systems and improve performance. The outputs are intended to aid planners, designers, administrators, and others interested in AGT systems and their application to specific transportation needs in urban areas. Automated Guideway Transit (AGT) systems in the United States comprise more than 64 km (40 mi) of guideway, over 70 passenger stations, and nearly 700 vehicles. This report reviews the guideways and stations found at 30 AGT systems and purports to establish the existing state-of-the-art. Related conventional rail transit stations are briefly reviewed to supplement the AGT station material. Information presented was derived from a literature search, personal contact with system manufacturers, operators, and personal experience. This review summarizes the considerations in the design of AGT guideways and includes discussions of vehicle interface, power distribution, weather-related effects, structural alternatives, site-related effects, and ride comfort. For stations, the design considerations include station description, site relationships, and station elements. This coverage of design considerations for both guideways and stations gives an overview of the issues and illustrates them by examples from specific AGT installations. The review also includes a discussion of the codes used in the design of the structures, the construction techniques, and the contracting methods employed for the design and construction of existing AGT guideways and stations.

See also Volume 2, PB-281632. Prepared in cooperation with ABAM Engineers, Inc. Tacoma, WA.

Stevens, RD  
De Leuw, Cather and Company, ABAM Engineers, Incorporated, Urban Mass Transportation Administration Final Rpt. UMTA-IT-06-0152-79-2, Sept. 1978, 301 p.

Grant DOT-UT-70066

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287522/7ST, DOTL NTIS

#### 11 188055

##### LINEAR PROPULSION

Linear propulsion, a novel type of electric drive, involves a motor split into two parts of which one is carried by the vehicle and the other lies along the track. The force of interaction is utilized directly as tractive effort without the need for intermediate transmission or gear. Linear induction motors and linear synchronous motors are described and design criteria are given. Low-speed and high-speed applications in ground transport are discussed.

This article appeared in the Standard Handbook for Electrical Engineers, Eleventh Edition.

Levi, E  
McGraw-Hill Book Company, Incorporated 1978, p23.104-23.120, Figs., Tabs., 67 Ref.

ORDER FROM: McGraw-Hill Book Company, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

#### 11 188343

##### PNEUMATIC CAPSULE PIPELINES

This is a brief description of a project being carried out by TRRL and others, to develop pneumatic capsule pipelines for transporting large volumes of bulk materials between fixed end-points. Features of the system are listed, and details of various installations are tabulated. The calculation of steady state capsule motion is explained. The experimental pipeline loop at Milton Keynes, Bucks, is described; this includes demonstrating the feasibility of the booster and pneumatic capsule pipeline system, and calibrating the pipeline instrumentation. An outline is given of the progress of the experimental work.

*Construction (UK)* No. 26, June 1978, pp 31-33, 2 Tab., 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 236640)

ORDER FROM: Her Majesty's Stationery Office, 13 A Castle Street, Edinburgh EH2 3AR, Scotland

#### 11 188348

##### SCALE-MODEL LINEAR INDUCTION MOTORS WITH SOLID IRON SECONDARIES

The performance of large linear induction machines with nonlinear secondaries is predicted utilising the principle of electromagnetic similitude and small-scale models.

Bland, TG Freeman, EM *Institution of Electrical Engineers, Proceedings* Vol. 125 No. 11, Nov. 1978, 4 p., 6 Fig.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

#### 11 188368

##### SYSTEM DECISION IN MAGNETIC LEVITATION

###### [Systementscheidung bei der Magnetschwebetechnik]

Over the last two years, readers of the ETR have been kept informed on developments in magnetic levitation techniques. It is therefore particularly to be welcomed that a decision has been taken on the further procedure in rail-guided magnetic levitation. On December 8, 1977, the Federal Ministry of Research and Technology (BMFT) made known its decision to concentrate its future assistance measures on only one line of development. This "system decision" was preceded by an exhaustive comparison of various rival concepts. [German]

Rogg, D Schulz, H *Eisenbahntechnische Rundschau* Vol. 27 No. 11, Nov. 1978, 6 p., 4 Fig., 2 Tab., 12 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

12 090576

**CLASSIFICATION OF OXIDIZERS AND FLAMMABLE SOLIDS.  
PHASE III**

Existing bench-scale test methods for oxidizers and flammable solids were critically evaluated for reproducibility and ease of duplication by the Naval Ordnance Station, Indian Head, Md. Detailed drawings for the burning rate test and time-to-ignition test have been submitted to permit the construction of standard test devices for uniform application. Variables which can affect measured test results have been identified and recommendations have been made to preclude obtaining a wide range of test values when measured by different laboratories.

Dale, CB

Naval Ordnance Station, Department of Transportation Final Rpt. Mar. 1975, 37 pp

Contract DOT-AS-30042

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-240878/9ST

12 176291

**FIRE HAZARD EVALUATION OF BART VEHICLES**

A fire hazard evaluation of the subway cars used on the San Francisco Bay Area Rapid Transit District was performed. After analyzing the cars' interior and exterior design, five recommendations were made that, if implemented, would improve passenger safety by decreasing the probability of developing a hazardous fire situation. Among these recommendations were the upgrading of current upholstered urethane seat assemblies and the need for the development of a fire detection system appropriate for rapid rail transit vehicles. Those system improvements would not only provide passengers a safer traveling environment but would also provide a modest level of protection for the heavy investment in rail vehicles.

Braun, E

National Bureau of Standards, Urban Mass Transportation Administration Final Rpt. NBSIR-78-1421, Mar. 1978, 24 pp

Contract DOT-AT-70007

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281383/OST

12 180338

**METROPOLITAN ATLANTA RAPID TRANSIT AUTHORITY  
SYSTEMS SAFETY, FIRE PROTECTION, AND CODE  
DOCUMENTATION FOR STATIONS**

The intent of this phase of MARTA systems safety is to (1) prevent fires; (2) protect the general public, employees and fire department personnel from injury due to fire, smoke, explosion or panic; and (3) protect structures and equipment from damage due to fire. This has necessitated trade-offs between subsystems, and required consideration of state and local codes within jurisdictions in which MARTA operates.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Gooden, WE (Parsons, Brinckerhoff, Quade and Douglas, Inc); Troy, JJ (Gage-Babcock and Associates, Incorporated)  
System Safety Society Proceeding 1977, pp 517-527

ACKNOWLEDGMENT: System Safety Society

ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

12 180339

**SYSTEMS ASSURANCE PROGRAM NORTHEAST CORRIDOR  
IMPROVEMENT PROJECT**

The systems assurance program provides means for verifying that quality control, reliability, maintainability, system safety and system security are maintained in all phases of the Northeast Corridor Improvement Project. This extends through the design, procurement and construction phases.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Petrella, AD (De Leuw, Cather-Parsons and Associates)  
System Safety Society Proceeding 1977, pp 643-655

ACKNOWLEDGMENT: System Safety Society

ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

12 180341

**STRUCTURED SYSTEM SAFETY PROGRAM PLAN FOR THE  
RAILROAD INDUSTRY**

This paper discusses how one railroad has structured its organization and a system safety approach to the cost-effective control of hazards in both new and existing activities. Examples are cited of system safety applications to such railroad risks as rail-highway grade crossings, train derailments and employee injuries. Emphasis is also given to the need for evaluating the cost-effectiveness of casualty prevention programs.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Howes, WF, Jr (Chessie System)

System Safety Society Proceeding 1977, pp 665-670

ACKNOWLEDGMENT: System Safety Society

ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

12 180342

**SAFETY AND SYSTEM ASSURANCE RESOURCES APPLIED TO  
THE DESIGN AND DEVELOPMENT OF A RAIL RAPID  
TRANSIT SYSTEM**

MARTA management is committed to a formalized research, review and systematic approach to implementation of a safety and system assurance program. The procedures and manpower involved are described.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Gooden, WE (Parsons, Brinckerhoff, Quade and Douglas, Inc); Lock, AM (Metropolitan Atlanta Rapid Transit Authority)  
System Safety Society Proceeding 1977, pp 687-698, 5 Fig.

ACKNOWLEDGMENT: System Safety Society

ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

12 180343

**THE SAFETY PROGRAM FOR THE BALTIMORE REGION  
RAPID TRANSIT SYSTEM**

This paper describes the overall safety program in the Baltimore Rapid Transit System. The emphasis is on the safety aspects in facility design which is essentially complete, whereas the specifications for the vehicle and train control have not progressed as far.

Third International, System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Hunt, H (Daniel, Mann, Johnson and Mendenhall)

System Safety Society Proceeding 1977, pp 699-714

ACKNOWLEDGMENT: System Safety Society

ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

12 180345

**MARTA SYSTEMS SAFETY VERIFICATION. A RAIL RAPID  
TRANSIT APPLICATION OF SYSTEMS SAFETY TECHNOLOGY**

This program assures that system safety goals and criteria are established and implemented; that safety hazards are identified and assessed as early as possible during design; that actions will be taken to eliminate or control identified critical/catastrophic hazards; and that the system will be verified to be safe for revenue service prior to opening.

Third International System Safety Conference, October 17-21, 1977, Stouffer's National Center Inn, Washington, D.C.

Lock, AM (Metropolitan Atlanta Rapid Transit Authority); Gooden, WE Jacob, RH (Parsons, Brinckerhoff, Quade and Douglas, Inc)  
System Safety Society Proceeding 1977, pp 731-741, 4 Fig.

ACKNOWLEDGMENT: System Safety Society

ORDER FROM: System Safety Society, P.O. Box 165, Washington, D.C., 20044

12 180372

**RAILROAD ACCIDENT REPORTS-BRIEF FORMAT, ISSUE NUMBER 3--1976**

This publication contains briefs of 63 selected railroad accidents, occurring in U.S. railroad operations during calendar year 1976. The brief format presents basic facts, conditions, circumstances, and probable cause(s) in each instance. Additional statistical information is tabulated by types of accident, and casualties related to types of accidents, carriers involved, and causal factors. Numbers: R-76-168 through R-76-171; R-76-173 through R-76-190; R-76-193 through R-76-194; R-76-196 through R-76-221; R-76-223; R-76-225 through R-76-231; R-76-233 through R-76-237.

National Transportation Safety Board NTSB-RAB-78-1, June 1978, 72 pp, 3 Tab.

ACKNOWLEDGMENT: National Transportation Safety Board  
ORDER FROM: NTIS

PB-283430/7ST, DOTL RP, DOTL NTIS

12 180459

**CRASH TESTING OF NUCLEAR FUEL SHIPPING CONTAINERS**

In an attempt to understand the dynamics of extra severe transportation accidents and to evaluate state-of-the-art computational techniques for predicting the dynamic response of shipping casks involved in vehicular system crashes, the Environmental Control Technology Division of ERDA undertook a program with Sandia to investigate these areas. The program encompasses the following distinct major efforts. The first of these utilizes computational methods for predicting the effects of the accident environment and, subsequently, to calculate the damage incurred by a container as the result of such an accident. The second phase involves testing of one-eighth scale models of transportation systems. Through the use of instrumentation and high-speed motion photography the accident environments and physical damage mechanisms are studied in detail. After correlating the results of these first two phases, a full scale event involving representative hardware is conducted. To date two of the three selected test scenarios have been completed. Results of the program to this point indicate that both computational techniques and scale modeling are viable engineering approaches to studying accident environments and physical damage to shipping casks. (ERA citation 03:024840)

National Academy of Sciences, Washington, D.C., USA, January 1978, Portions of document are illegible.

Jefferson, RM Yoshimura, HR  
Sandia Laboratories, Department of Energy CONF-780107-1, Aug. 1977, 60 pp

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

SAND-77-1462C

12 180609

**SHIPMENTS OF NUCLEAR FUEL AND WASTE: ARE THEY REALLY SAFE**

The safety aspects of shipping nuclear fuels and radioactive wastes are discussed by considering: US regulations on the shipment of hazardous and radioactive materials, types of radioactive wastes; packaging methods, materials, and specifications; design of shipping containers; evaluation of the risk potential under normal shipping conditions and in accident situations. It is concluded that: the risk of public catastrophe has been eliminated by strict standards, engineering design safety, and operational care; the long-term public burden of not transporting nuclear materials is likely to be higher than the risks of carefully controlled transportation, considering the various options available; and the likelihood of death, injury, or serious property damage from the nuclear aspects of nuclear transportation is thousands of times less than the likelihood of death, injury, or serious property damage from more common hazards, such as automobile accidents, boating accidents, accidental poisoning, gunshot wounds, fires, or even falls. (ERA citation 03:021162)

Department of Energy Oct. 1977, 13 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

DOE/EV-0004

12 181240

**HAZARDOUS MATERIALS TRANSPORTATION, PART 1. GENERAL STUDIES (CITATIONS FROM THE ENGINEERING INDEX DATA BASE)**

Worldwide journal research is cited on transportation of hazardous chemicals, gases, and explosives. The majority of studies concern liquified natural gas transportation. Tanker ships, containers, and pipelines for these materials are discussed. Descriptions of accidents, spills, handling, loading, and equipment design are covered. Mathematical models and simulations are included.

Smith, MF  
National Technical Information Service Final Rpt. June 1978, 212 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0555/9ST

12 181241

**HAZARDOUS MATERIALS TRANSPORTATION, PART 2. RADIOACTIVE MATERIALS AND WASTES (CITATIONS FROM THE NTIS DATA BASE)**

The bibliography cites studies on the hazards, risks, and uncertainty of transporting radioactive wastes and materials. The design of shipping containers and special labels for identification purposes for transporting fuels and wastes are also cited. Studies are included on legislation dealing with the safety and health of the population and the environmental problems associated with transporting radioactive materials.

Reimherr, GW  
National Technical Information Service Final Rpt. June 1978, 146 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0554/2ST

12 181242

**HAZARDOUS MATERIALS TRANSPORTATION, PART 1. GENERAL STUDIES (CITATIONS FROM THE NTIS DATA BASE)**

The transportation of explosives, rocket propellants, pesticides, chemical warfare agents, industrial chemicals, liquified natural gas, chlorine, and other hazardous materials are covered. All means of transportation are described. Accidents, injuries, explosions, and spills involving these materials are covered. Material testing and safety equipment are discussed. Economics and statistics of hazardous material transportation are included. Radioactive wastes and materials are excluded.

Smith, MF  
National Technical Information Service Final Rpt. June 1978, 304 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0553/4ST

12 181380

**TRANSPORTATION SAFETY INFORMATION REPORT. JANUARY, FEBRUARY, AND MARCH 1978 QUARTERLY HIGHLIGHTS**

The "Transportation Safety Information Report," published quarterly, is a compendium of selected national-level transportation safety statistics for all modes of transportation. Each quarterly report presents and compares transportation fatalities, accidents, and injuries on a monthly and quarterly basis for the current and preceding years. In addition, it provides an overview of modal safety hazards, safety programs, and related accident prevention information. Featured in this quarterly report is a discussion on Recreational Boating Safety and an Intermodal Safety article on Rail-Highway Grade Crossing Safety.

Paper copy also available on subscription, North American Continent price \$30.00/year; all others write for quote.

Transportation Systems Center Final Rpt. DOT-TSC-P24-78-1, June 1978, 78 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTISUB/D/224-001

12 181543

**EVALUATION OF SAFETY IN THE TRANSPORTATION OF NATURAL URANIUM HEXAFLUORIDE**

A general model developed for the safety of transporting radioactive materials is applied to UF sub 6. Results given concern only the container contents during an accident; harmful consequences to the environment are not considered. It is shown that railroad transport is safer than road transport, particularly with regard to fire. (ERA citation 03:030436)

Translation of French report (No. 4, May 1977).

Maitre, P Meslin, T Pages, P  
Centre d'Etudes Nucleaire de Fontenay-aux-Roses, Department of Energy  
Sept. 1977, 78 pp, 13 Fig., 12 Tab.

Contract EY-76-C-06-0830

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

BNWL-tr-269

12 181840

**WORKING PAPERS-AN EVALUATION OF RAILROAD SAFETY. (AN ANALYSIS OF FEDERAL RAILROAD SAFETY LAWS ADMINISTERED BY THE DEPARTMENT OF TRANSPORTATION AND RELATED LAWS.)**

The Federal railroad safety laws are analyzed and the discussions include section-by-section summaries, relevant references to Congressional hearings, reports, and floor debate, and other valuable elements of the public record. Some of the major laws discussed are: the Federal Railroad Safety Act of 1970, the Federal Railroad Safety Authorization Act of 1976, the Transportation Safety Act of 1974, the Rail Service Passenger Act of 1970, and the Noise Control Act of 1972. (Portions of this document are not fully legible)

Office of Technology Assessment OTA-T-64, May 1978, 142 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-283209/5ST

12 181854

**PREDICTED OCCURRENCE RATE OF SEVERE TRANSPORTATION ACCIDENTS INVOLVING LARGE CASKS**

A summary of the results of an investigation of the severities of highway and railroad accidents as they relate to the shipment of large radioactive materials casks is discussed. The accident environments considered are fire, impact, crash, immersion, and puncture. For each of these environments, the accident severities and their predicted frequencies of occurrence are presented. These accident environments are presented in tabular and graphic form to allow the reader to evaluate the probabilities of occurrence of the accident parameter severities he selects. (ERA citation 03:030389) (Portions of this document not fully legible).

Symposium on packaging and transportation of radioactive materials, Las Vegas, NV, USA, 7 May 1978.

Dennis, AW  
Sandia Laboratories CONF-780506-2, 1978, 8 pp

Contract W-7405-ENG-48

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

SAND-78-0061C

12 182563

**A CLOSER INSPECTION OF THE SAFETY OF TRANSPORT SYSTEMS [Veiligheid van vervoerssystemen nader beschouwd]**

After a large number of figures on transport safety, the author deals with the nature of the unreliability of the various transport systems, their chance of failure as a starting point for transport techniques, the human factor in transport safety, the costs of reducing unreliability and the particular aspects of road transport. [Dutch]

Blom, JHD *Ingenieur, Netherlands* Vol. 90 No. 22, June 1978, pp 440-447, 3 Fig., 11 Tab., 1 Phot., 9 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: NVA Oosthoek's Uitg-Mij, Domstrat 11-13, Utrecht, Netherlands

12 182677

**WHITE PAPER ON TRANSPORTATION SAFETY 1977 EDITION**

This white paper is in two parts: Book -1, entitled "Traffic Accident Situation", analyzes the trends in vehicle traffic and road traffic accidents in 1976 in Japan. It also gives data on railway traffic and accidents, marine transport and disasters at sea, aviation traffic and accidents. Book 2, "Traffic Safety Measures" gives details of the budget allocated to road traffic safety and outlines measures for improving road traffic safety (improvement of the environment, traffic safety publicity campaigns, driver education, vehicle safety and inspection, enforcement of traffic control systems, improvement of first aid series, accident compensation, and research and development in the field of traffic safety), railway traffic safety including safety measures for railway crossings, and measures related to marine and air traffic safety. /TRRL/

Japan Office of the Prime Minister Monograph 1977, 242 pp, Figs., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD 233406)  
ORDER FROM: International Assoc of Traffic & Safety Sciences, No. 5, 5-Chome, Yaesu, Chou-Ku, Tokyo, 104, Japan

12 182794

**INVESTIGATION OF DERAILMENTS**

The concept, history, and operation of the Derailment Investigation Service maintained by the Research and Development Division of the British Railways Board is discussed, together with the nature and sources of the body of technical and numerical data which has been established. The mechanisms and causes of derailment are also described and the relevance of vehicle condition, track geometry, operating circumstances, and vehicle dynamics are discussed.

Duncan, IG (British Railways Board); McCann, JB Brown, A *Institution of Mechanical Engineers Proceedings* Vol. 191 No. 37, 1977, pp 323-332, 12 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

12 182821

**NATIONAL TRANSPORTATION SAFETY BOARD. SAFETY RECOMMENDATIONS-R-78-42**

In a study of data from 269 accident investigations involving 280 fatalities over a 20-month period, NTSB has developed a profile of the average pedestrian killed by a train. Characteristics of the accident site, time of day and day of week, and of the victims, including use of alcohol, were determined. The recommendation to Federal Railroad Administration was for development of criteria for railroad fencing in built-up areas.

National Transportation Safety Board July 1978, 9 pp, 1 App.

ACKNOWLEDGMENT: National Transportation Safety Board  
ORDER FROM: National Transportation Safety Board, 800 Independence Avenue, SW, Federal Office Building 10A, Washington, D.C., 20594  
DOTL RP

12 182822

**HAZARDOUS MATERIALS: AN SP PRIORITY**

To assure safe movement of the 100,000 carloads of dangerous materials it handles annually Southern Pacific has a system for regular track inspection of routes used by this traffic, procedures for handling the cars in trains and information on placement of such cars which is available to train crews and wayside emergency forces. A Hazardous Materials Control Section has highway equipment at strategic points along the road and training equipment which is used for employee training and for instruction of firemen in wayside communities.

*Progressive Railroading* July 1978, pp 46-47, 4 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

12 182891

**RAILROAD EMPLOYEE FATALITIES INVESTIGATED IN 1975**

No Abstract.

Federal Railroad Administration 1977, 143 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: FRA

12 183305

**RAILROAD ACCIDENT REPORT--DERAILMENT OF AUTO-TRAIN NO. 4 ON SEABOARD COAST LINE RAILROAD, FLORENCE, SOUTH CAROLINA, FEBRUARY 24, 1978**

About 2:10 a.m., on February 24, 1978, 19 cars and a locomotive unit of Auto-Train No. 4 derailed on Seaboard Coast Line Railroad trackage at Florence, South Carolina. Twenty-four of the 503 passengers were injured. The total accident damage was estimated to be \$774,029. The National Transportation Safety Board determines that the probable cause of the accident was a locomotive unit axle fracture that originated in an undetected void that developed during the manufacture of the axle. Contributing to the cause of the accident was the lack of a system for detecting an axle failure independent of crewmembers' inspection.

National Transportation Safety Board Sept. 1978, 22 pp, 1 Fig., 3 Tab., 4 Phot., 3 App.

ACKNOWLEDGMENT: National Transportation Safety Board  
ORDER FROM: NTIS

DOTL RP, DOTL NTIS

12 183561

**PRICE OF SAFETY**

The author shows how railway safety has developed, usually in response to public opinion, to the high standard of today. The author traces the significant improvements in safety that have been achieved during the past 15 years and discusses the extent to which further improvements might be justified. The lecture also raises the possibility that, for certain lines, some relaxation of the current safety requirements, with consequent cost savings, might be made without a significant lowering of safety standards.

McNaughton, IKA (Department of Transportation, London, England)  
*Institution of Mechanical Engineers Proceedings* Proceeding Vol. 191 No. 1, 1977, pp 1-9

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

12 183885

**RAILROAD ACCIDENT REPORTS--BRIEF FORMAT ISSUE NUMBER 1-1977**

This publication contains 142 briefs of selected railroad accidents, occurring in U.S. railroad operations during fiscal year 1977. The brief format presents basic facts, conditions, circumstances, and probable cause(s) in each instance. Additional statistical information is tabulated by types of accident, and casualties related to types of accidents, carriers involved, and causal factors.

National Transportation Safety Board NTSB-RAB-78-2, Aug. 1978, 157 pp, Tabs.

ACKNOWLEDGMENT: National Transportation Safety Board  
ORDER FROM: NTIS

DOTL RP, DOTL NTIS

12 183901

**KEEPING HAZARDOUS MATERIALS ON THE RIGHT TRACK**

The Task Force on Rail Transportation of Hazardous Materials is a joint effort of the Manufacturing Chemists Association and the Association of American Railroads. It was formed to reduce the number and severity of transportation accidents--especially those involving hazardous materials.

The article first appeared in DuPont Context, No. 2, 1978.

Ichniowski, T *National Safety News* Vol. 118 No. 4, Oct. 1978, pp 51-53

ORDER FROM: ESL

12 184669

**SWEDISH RAILWAYS' SAFETY SERVICE 1977--RAILWAY ACCIDENT STATISTICS [Saekerhetstjaensten 1977]**

These Swedish railway accident statistics deal among other things with level crossing accidents during 1977. [Swedish]

Statens Jaernvaegar Monograph 1978, 20 p., 8 Fig., 13 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-234690), National Swedish Road & Traffic Research Institute  
ORDER FROM: Statens Jaernvaegar, Centralfoervaltningen, Stockholm, Sweden

78.0464

12 184735

**RISK ASSESSMENT FOR SOLVING TRANSPORTATION PROBLEMS**

Battelle, Pacific Northwest Laboratories, is currently conducting a research program sponsored by the Energy Research and Development Administration to assess the risk of transporting energy materials. The risk assessment model, although originally developed for use in analyzing shipments of radioactive materials, can be used to evaluate the risk of shipping any hazardous material. This paper briefly reviews the risk assessment method and describes how it can be used to solve hazardous materials shipping problems. /Author/

This paper appeared in Transportation Research Record No. 647, Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials.

Johnson, JF Hall, RJ (Battelle Memorial Institute/Pacific Northwest Labs) *Transportation Research Record* No. 647, 1977, pp 59-63, 9 Fig., 4 Ref.

ORDER FROM: TRB Publications Off

12 184736

**TRANSPORT OF HAZARDOUS MATERIALS AND DOCKET HM-112 (ABRIDGMENT)**

HM-112 is a serial docket number pertaining to the U.S. Department of Transportation regulation on the safe transport of hazardous materials. This action is significant because it brings all the Department's regulations together into a single volume. It also improves the safety regulations pertaining to the safe transport of hazardous materials by making them as intermodally compatible as possible. The consolidation under HM-112 is beneficial because now only one volume is needed when classifying a material, determining its required packaging, marking, labeling, and preparing shipping documents. Consolidation has also eliminated 700 pages of federal regulations and thereby the need to go through three different volumes to find the applicable requirements on transport of hazardous materials. The labeling and placarding system can now be considered consistent with the international standards and provisions required by some international regulatory bodies. The history of HM-112, from notice in the Federal Register to rule making procedures, is described. Carriers reactions to HM-112 are mixed. Motor carriers must convert to the new placarding format. Rail carriers are required to follow revised car placement. Train crews must carry documents indicating the locations of all placarded cars in their trains. Overall, the standardized documentation and placarding requirements will improve the ability of carriers to carry out their responsibilities.

This paper appeared in Transportation Research Record No. 647, Evaluating Bridge Structures, Pavement Maintenance, Roadside Management, Deicing Salts, Transport of Hazardous Materials.

Roberts, AI (Department of Transportation) *Transportation Research Record* No. 647, 1977, pp 63-65

ORDER FROM: TRB Publications Off

12 185619

**REALISTIC ASSESSMENT OF A NUCLEAR CASK DURING A HYPOTHETICAL RAILROAD ACCIDENT**

The study results indicate that blindly selecting the "worst-possible-case assumptions", and then postulating a radioactive material (RAM) release without identifiable mechanisms compounds unrealism and adds confusion. In order for a RAM release to occur, an unlikely series of events must first occur which breach the multiple containment barriers surrounding the fuel. The overall safety margin provided by the packaging equipment increases geometrically beyond the already adequate margin provided by each containment barrier. A case evaluation of the NL 10/24 packaging system illustrates this contention by showing that: (1) the accident events which must occur before a release of RAM, other than gases, is possible are in themselves incredible; and (2) the biological effects of a release of fission gases will in all likelihood be nil. (ERA citation 03:043414)

Symposium on packaging and transportation of radioactive materials, Las Vegas, NV, USA, 7 May 1978.

Anderson, RT  
Allied-General Nuclear Services, Department of Energy CONF-780506-25, May 1978, 22 p.

Contract ET-78-C-09-1040

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AGNS-1040-14

12 185630

**SAFETY AND ECONOMIC STUDY OF SPECIAL TRAINS FOR SHIPMENT OF SPENT FUEL**

Spent fuel from nuclear reactors has been transported in routine commerce in the U.S. for over 25 y. During this period, no accident has occurred that resulted in the release of radioactive material from a spent fuel cask. By 1986, the annual rate of spent fuel shipments by rail is expected to be nearly 20 percent of the total shipments during the last 25 y. Because of this increased shipping rate, the railroad industry contends that the transportation environment for spent fuel shipments must be controlled to maintain this excellent safety record. To provide this control over the transportation environment, the Association of American Railroads (AAR) has proposed that all spent fuel be handled in special train service. A set of operating practices for spent fuel special trains has been proposed that includes a 35 mph maximum speed restriction, a passing restriction and a no-other-freight restriction. The purpose of this study was to evaluate the potential effects of these restrictions on the safety and cost of shipping spent fuel by train. The analysis is based on estimated quantities of spent fuel transported in 1986. (ERA citation 03:041269)

Loscutoff, WV Murphy, ES Clark, LL McKee, RW Hall, RJ  
Battelle Memorial Institute/Pacific Northwest Labs Dec. 1977, 108 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

BNWL-2263

12 185951

**RAILROAD ACCIDENT REPORT--LOUISVILLE AND NASHVILLE RAILROAD COMPANY FREIGHT TRAIN DERAILMENT AND PUNCTURE OF ANHYDROUS AMMONIA TANK CARS AT PENSACOLA, FLORIDA, NOVEMBER 9, 1977**

About 6:06 p.m., on November 9, 1977, 2 SD-45 locomotive units and 35 cars of Louisville & Nashville freight train No. 407 derailed when entering 6 deg 04 min curve at Pensacola, Florida. The adjacent tank heads of the 18th and 19th cars were punctured during the derailment by a loose wheel and axle assembly; this released anhydrous ammonia into the atmosphere. Two persons died and 46 were injured as a result of the derailment, release of anhydrous ammonia, and evacuation of about 1,000 persons. Property damage was estimated to be \$724,000. The National Transportation Safety Board determines that the probable cause of this accident was the overturning of the high rail in the 6 deg 04 min curve which caused track gage to widen. The high rail tipped because it was not able to withstand the lateral forces generated by the 6-axle locomotive units because of the tight gage of the track, and the forces generated because of the placement of a lightly loaded long car and an empty short car directly behind the locomotive with large trailing tonnage. The cause of the fatalities and injuries was the release of anhydrous ammonia through punctures in the tank cars; head shields would have prevented such punctures.

National Transportation Safety Board NTSB-RAR-78-4, July 1978, 47 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-284335/7ST, DOTL NTIS

12 185990

**ANALYSIS OF PROCEEDINGS OF THE NATIONAL TRANSPORTATION SAFETY BOARD INTO DERAILMENTS AND HAZARDOUS MATERIALS, APRIL 4-6, 1978. RAILROAD PUBLIC HEARING REPORT**

The public hearing held April 4-6, 1978 focused on derailments and the carriage of hazardous materials. Forty-nine witnesses testified during the hearing and provided expert testimony on derailments and the carriage of hazardous materials. The Safety Board examined safeguard installations for DOT 112A and 114A tank cars, emergency notification and response procedures, the derailment problem, hazardous materials track routing, track standards, the Federal/State Participation Program, and other areas of Safety Board concern. Immediate urgent recommendations were issued by the Safety Board to the Department of Transportation for acceleration of installation of shelf couplers and head shields for all DOT 112A and 114A tank cars. The Safety Board further determined that the severity of derailments with subsequent release of hazardous materials and assessing the

threats to public safety, the lack of accelerated action and leadership by Federal regulatory agencies in reversing derailment trends and minimizing the risk to the public of hazardous materials releases, the lack of timely notification of accidents, and the need to research and review current Federal regulations for improvement and application.

National Transportation Safety Board NTSB-SEE-78-2, June 1978, 55 p., 3 Fig., 2 App.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-284665/7ST, DOTL NTIS, DOTL RP

12 188079

**SAFETY MEASURES FOR TRANSPORTATION OF HAZARDOUS MATERIALS**

Transportation of hazardous materials by Japanese National Railways is discussed, along with details of design of tank cars.

Hirota, Y (Japanese National Railways) *Japanese Railway Engineering* Vol. 18 No. 2, 1978, pp 20-21, 1 Phot.

ORDER FROM: ESL

DOTL JC

12 188352

**RISK ASSESSMENT OF THE RAIL TRANSPORTATION OF LIQUID CHLORINE**

An assessment has been performed on the toxication risk of the population due to bulk transportation of liquid chlorine by rail in Finland. Fourteen rail accident types were selected and the leakage probability was estimated for each type separately. The study resulted in some important conclusions on how to reduce transport risks effectively. The main conclusion is that if a chlorine tanker is not placed at either end of a train among the four first or last wagons, tank damage probability is noticeably reduced. By reconstruction of the valves and the manhole neck, the likelihood of leakages as well as impact damages in accidents could be reduced.

Proceedings of the Second Int Symp on Loss Prevention and Safety Promotion in the Processing Industry, Heidelberg, West Germany, September 6-9, 1977.

Lautkaski, R Mankamo, T  
Deutsche Gesellschaft fuer Chem Apparatewesen Proceeding Publ Series No. 1, 1978, 7 p., 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Deutsche Gesellschaft fuer Chem Apparatewesen, Frankfurt am Main, West Germany

12 188638

**ANALYSIS OF THE RADIOLOGICAL RISKS OF TRANSPORTING SPENT FUEL AND RADIOACTIVE WASTES BY TRUCK AND BY ORDINARY AND SPECIAL TRAINS**

The radiological impacts associated with the transportation of nuclear fuel cycle materials by ordinary and dedicated trains are compared. For a population of 100 light-water reactors, no significant radiological differences between ordinary and special train service were determined.

Smith, DR Taylor, JM  
Sandia Laboratories SAND-77-1257, June 1978, 35 p.

Contract EY-76-C-04-0789

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

PC-A03/MF A01

12 188640

**EMERGENCY RESPONSE TO TRANSPORTATION ACCIDENTS: AN OVERVIEW**

Measures taken to ameliorate the consequences of accidents in transport of radioactive materials are examined: packaging, labeling, regulations, and emergency plans. The last measure is reviewed in more detail: development and implementation of emergency plans, rapid response by organizations, public relations, and revised regulations vs improving emergency response.

From 5th Symposium on packaging and transportation of radioactive materials; Las Vegas, Nevada, May 1978. CONF-780506-32.

Darr, DG  
Allied-General Nuclear Services AGNS-1040-17, 1978, 8 p.

Contract ET-78-C-09-1040

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: NTIS

PC A02/MF A01

12 188700

**RAILROAD ACCIDENT REPORT--DERAILMENT OF ATLANTA & SAINT ANDREWS BAY RAILWAY COMPANY FREIGHT TRAIN, YOUNGSTOWN, FLORIDA, FEBRUARY 26, 1978**

About 1:55 a.m., c.s.t., on February 26, 1978, an Atlanta & Saint Andrews Bay Railway freight train derailed at milepost 22.3 near Youngstown, Florida. As a result, chlorine gas, released from a tank car, killed 8 persons and injured 138. Property damage was estimated at \$1,089,000. The National Transportation Safety Board determines that the probable cause of the derailment was the intentional displacement of a rail end into the guideway reserved for the wheel flange. The rail end was restrained in this abnormal position until the train derailed. A tank car of liquid chlorine was punctured in the derailment when struck by the corner of another car, and its contents were released. All of the injuries and deaths were the results of chlorine inhalation.

National Transportation Safety Board NTSB-RAR-78-7, Nov. 1978, 19 p., 6 Fig.

ACKNOWLEDGMENT: National Transportation Safety Board  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

12 188701

**RAILROAD ACCIDENT REPORT--COLLISION OF PORT**

**AUTHORITY OF ALLEGHENY COUNTY TROLLEY CAR NO. 1790 AND BUS NO. 2413, PITTSBURGH, PENNSYLVANIA, FEBRUARY 10, 1978**

About 8:03 a.m., on February 10, 1978, a trolley car and a bus owned by the Port Authority of Allegheny County collided in Pittsburgh, Pennsylvania, when the trolley car suddenly turned into the path of the oncoming bus. Four persons were killed, 37 persons were injured, and damage was estimated to be \$48,000. The National Transportation Safety Board determines that the probable cause of this accident was the operator's inadvertent and untimely operation of an unprotected track switch, which caused the trolley car to be routed into the path of the approaching bus. Contributing to the accident was the operator's operation of the car at a speed too great to permit stopping when he detected the turning movement of the car, and the lack of protective devices to control the switch operation. Two recommendations were made to the Port Authority of Allegheny County, Pennsylvania, about the means by which the track switch can be operated from the trolley car and about providing protection against the switch operating when another vehicle is in a danger zone. A recommendation was also made to the Governor of the Commonwealth of Pennsylvania, urging the State to encourage communities that have emergency response facilities to establish emergency procedures for disasters.

National Transportation Safety Board NTSB-RAR-78-5, Aug. 1978, 26 p., 4 Fig., 2 App.

ACKNOWLEDGMENT: National Transportation Safety Board  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

13 053297

**HIGH POWER TRACTION CURRENT COLLECTION AT HIGH SPEED. HIGH CURRENT COLLECTION AT THE CONTACT AREA BETWEEN CONTACT WIRE AND CURRENT COLLECTOR AT HIGH SPEED**

This report relates to studies at high speed of the influence of the various parameters on the active current transfer area between contact wire and pantograph, localised heating, the current distribution at the contact area, permissible current collection limit.

Restrictions on the use of this document are contained in the explanatory material.

International Union of Railways A 129/RP 9, Apr. 1978, 22 p., 21 Fig., 5 Tab.

ACKNOWLEDGMENT: UIC  
ORDER FROM: UIC

DOTL RP

13 180293

**COMPUTER SIMULATION OF CATENARY-BASED ELECTRIFICATION SYSTEMS [Simulacion mediante ordenador de los sistemas de electrificacion por catenaria]**

The article describes a scaled-down model developed for laboratory simulation, as well as the computer programs which replaced the model subsequently. These programs provide for a wide range of catenary--suspension equipment designs, and make it possible to study a large number of features and innovations. [Spanish]

Rothman, M *AIT-Revista* No. 21, Apr. 1978, pp 9-13, 7 Fig., 1 Tab., 1 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

13 180294

**CALCULATION METHOD FOR THE NEW CATENARY SUPPORT [Metodo de calculo de nuevo poste de catenaria]**

The AIT has developed a calculation method based on simulation of the structural behaviour of the new catenary support when subjected to actual stresses. [Spanish]

Jimenez Otero, J Pallardo Comas, E *AIT-Revista* No. 20, Feb. 1978, pp 26-32, 5 Fig., 5 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Asociacion de Investigacion del Transporte, Alberto Alcocer 38, Madrid, Spain

13 180311

**REMOTE CONTROL OF THE R.A.T.P. ELECTRICAL ENERGY DISTRIBUTION SYSTEM**

Structure of the electric power supply network for the subway system (Metro) in Paris, France, is described. The power is supplied by the Electricite de France nationally connected system directly at 63 kv from 8 supply points and at 225 kv from one supply point. Later two further 225 kv points will be added in 1977, and two additional points in 1979, all spread throughout Paris in order to diversify the supply sources. Operational and functional details are discussed, along with data processing and control facilities.

EUROCON '77-Eur Conf on Electrotech, Conference Proceedings on Commun, Venezia, Italy, May 3-7, 1977. Volume 1 Papers 1,2, and 5.

Guittard, J Trotin, G  
Institute of Electrical and Electronics Engineers Proceeding n 77CH1257-5 Reg 8, 1977, 7 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

13 180319

**SOLID-STATE WRONG-PHASE-COUPPLING RELAY FOR THE PROTECTION OF 25 KV A. C. TRACTION SYSTEM**

The paper describes a solid-state wrong-phase-coupling relay developed for the protection of 25-kV 50-Hz single-phase traction system of the Indian Railways. A restricted-directional characteristic has been selected in place of the presently used admittance characteristic of the electromechanical relay. A dual phase-comparator based on block-spike coincidence has been

employed. In addition to the comparator details, several practical design aspects, covering dc supplies, replica impedance, surge protection of circuits, etc. are discussed in the paper. Results of the performance tests conducted in the laboratory to determine the steady state and dynamic characteristics, behavior on low voltage and current signals, operating time and effect of frequency variation have been found very satisfactory, and are reported and analyzed.

Verma, HK (Roorkee University, India); Rao, TS  
Institute of Electrical and Electronics Engineers Preprint Pap A 78314-7, 1977, 9 pp, 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: IEEE

13 180354

**CONTACT STRIPS FOR COLD DISTRICTS**

Presence of ice on contact wires makes necessary the use of contact strips on pantographs which resist the erosion caused by constant arcing. The development of an alloy more resistant than copper and which does not accelerate the wear of the contact wire is reported.

Teraoka, T *Railway Technical Research Inst. Quarterly Reports* Vol. 19 No. 2, June 1978, pp 95-96, 3 Fig., 3 Tab.

ORDER FROM: Ken-yusha, Incorporated, Hikaricho 1-45-6, Kokubunji, Tokyo, Japan

DOTL JC

13 180355

**AERODYNAMIC PROBLEMS WITH OVERHEAD LINE EQUIPMENT**

Aerodynamics can cause pantograph contact force to vary on high speed trains so that current collection can be adversely affected. Field or wind tunnel tests may be necessary in finalizing design. Wind forces may induce oscillations in contact wire or could simply overload the overhead structure causing failure. Factors necessary to counter adverse wind effects are discussed.

Gawthorpe, RG (British Railways Board) *Railway Engineer International* Vol. 3 No. 4, July 1978, pp 38-40, 3 Fig., 9 Ref.

ORDER FROM: ESL

DOTL JC

13 180379

**EFFECT OF ALTERNATING CURRENT ON THE UNDERGROUND CORROSION OF STEELS**

Results of tests involving imposition of 60 Hz AC at various densities in an oxygen concentration corrosion cell on DC between 2 electrodes are reported. AC imposed on DC increases the corrosion rate of steel in soil with high initial and then steady state attack following after a time interval. High densities increased attack rate and if sufficiently high, pitting. Corrosion products from AC-DC were friable. Temperature increases in the soil had negligible effect on corrosion rate. It is postulated that AC acts as a depolarizer and that reversible potential characteristics may be significant.

Pookote, SR (Clarkson College of Technology); Chin, D *Materials Performance* Vol. 17 No. 3, Mar. 1978, pp 9-15, 37 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

13 182558

**NEW CONCEPT IN REMOTE CONTROL OF POWER SUPPLY INSTALLATIONS ON ELECTRIFIED RAILWAYS [Neue Konzeption fuer die Fernsteuerung von Energieversorgungsanlagen elektrischer Bahnen]**

Taking as a basis the work of the central Karlsruhe sub-station, a description is given of the procedure whereby several thousand switches and the corresponding distribution installations in the DB catenary network could be remotely controlled and surveyed from a control center. The necessary ancillary automation equipment is also described. [German]

Seiffert, K *Elektrische Bahnen* Vol. 49 No. 5, May 1978, pp 111-118, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC



13 182592

**PROBLEMS ASSOCIATED WITH THE PHASE-ANGLE CONTROL OF LOCOMOTIVES IN CONTACT WIRE NETWORKS**  
With specific configurations and operating conditions overvoltages may occur in single-phase railway networks, served by thyristor locomotives with phase-angle control. The author explains the causes of these overvoltages and shows how they can be reduced.

Graf, R *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 761-769, 3 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

13 182593

**SUBSTATIONS FOR FEEDING THE 60 HZ CONTACT WIRE OF THE KOREAN STATE RAILWAYS**

The railway line linking the capital Seoul to the east coast of South Korea was electrified between 1973 and 1975. The line is used chiefly for the transport of coal and cement. The article describes the substations for feeding the contact lines, in which only well-proven equipment requiring little maintenance is installed. Protection of the contact line requires special attention. A simple protective device is used which measures the harmonic content of the current as a criterion for distinction between operating and fault current.

Granel, R *Brown Boveri Review* Vol. 64 No. 12, Dec. 1977, pp 755-760

ACKNOWLEDGMENT: EI  
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13 182599

**RAILROAD ELECTRIFICATION AND ENERGY CONSERVATION**

History of U.S. Railroad Electrification; reasons for decline in electrification; potentials for operating economics; effect of advances in technology; growth of railroad electrification overseas; progress in cost reduction; factors improving feasibility of electrification; impact of national energy policy; potentials for energy savings in freight movements; obstacles facing electrification; potential competition from coal slurry pipelines; capital investment requirements; outlook for government assistance on electrification; provisions of 1976 4-R Act; development of prototype systems; candidate systems for early electrification.

Middleton, WD *Traffic Quarterly* Vol. 32 No. 3, July 1978, pp 383-397

ACKNOWLEDGMENT: Traffic Quarterly  
ORDER FROM: ESL

13 182616

**DUAL FREQUENCY E1200 LOCOMOTIVES WITH THREE-PHASE CURRENT TRACTION [Zweifrequenzlokomotiven E 1200 mit BBC-Drehstromantriebstechnik]**

Following the amalgamation of several minor railway companies in the Ruhr, it was necessary for two traction systems, one 15 kV 16 2/3 Hz, the other 15 kV 50 Hz to be combined on the new mine and port railway. The article describes the problems encountered and the solutions adopted for the locomotives. [German]

Teich, W *Eisenbahntechnische Rundschau* Vol. 27 No. 4, Apr. 1978, pp 185-192, 14 Phot., 18 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

13 182620

**COMPARISONS ON THE ECONOMIC USE OF AUTO-TRANSFORMER CONNECTIONS AND THE ARRANGEMENT OF DB OVERHEAD CONTACT LINES**

[Vergleichende Betrachtung ueber den wirtschaftlichen Einsatz der autotransformer-Schaltung gegenueber der Fahrleitungsanordnung mit Verstaerkungsleitung bei der DB]

Parallel connections are placed on heavily-used overhead contact lines to increase their capacity. When this is not sufficient, additional sub-stations or line feeders must be installed. The auto-transformer connections used by the JNR since 1972 can also be used. Investigation into the economic repercussions of using this system on a DB line and comparison with other power supply connections. [German]

*Elektrische Bahnen* Vol. 49 No. 4, Apr. 1978, pp 95-99, 7 Phot., 6 Ref.  
ACKNOWLEDGMENT: International Union of Railways, BD  
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DOTL JC

13 182621

**SIMULATION MODEL TO INVESTIGATE THE PROPAGATION AND SUPERPOSITION OF HARMONIC VIBRATIONS IN THE RAILWAY NETWORK [Laboratoriummodell zur Untersuchung der Ausbreitung und Superposition von Oberschwingungen im Bahnnetz]**  
When tractive units with rectifier control are put into service, the results of harmonic vibrations which occur in the network should be taken into account. A description is given of a laboratory model which simulates and evaluates the superposition of harmonic vibrations when several tractive units are introduced into a specific network configuration. Comparisons made with action taken on the CFF network confirm the usefulness of the model. [German]

Burtscher, H Lekkas, G *Elektrische Bahnen* Vol. 49 No. 3, Mar. 1978, pp 65-72, 14 Phot., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
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DOTL JC

13 182800

**CAPACITY AND CHARACTERISTIC VALUES OF ELECTRIC TRACTION [Leistungsfaehigkeit und Kennwerte des Elektrischen Zugbetriebes]**

The different components for the estimation of the capacity of electric traction are discussed. Absolute and specific characteristic values are described and the importance of the net structure is pointed out. As an important specific characteristic value of stationary plants, reference is made to the transport performance in relation to the length of the railroad line which imparts, at the same time, information about the extent of utilization. Additional characteristic values for stationary plants and tractive units are defined. The most important absolute and specific characteristic values are integrated in four nomograms. Values for three stages of the development of electric traction of the West German railroad system are shown graphically. [German]

Bauermeister, K *Elektrische Bahnen* Vol. 48 No. 8, Aug. 1978, pp 190-195

ACKNOWLEDGMENT: EI  
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DOTL JC

13 182801

**USE OF NEUTRON-DOPED SILICON DIODES IN RECTIFIERS OF RAILROAD SUBSTATIONS [Einsatz von Neutronendotierten Siliciumdioden in Gleichrichtern von Bahnunterwerken]**

By means of a particular doping technique it is possible to produce high-power diodes for reverse voltages up to 4,800 v. It is shown how these have made it possible to design rectifiers for railroad substations also for high operational voltages without connecting the diodes in series. By means of a favorable shape of the cooling body, a compact structure and a particular arrangement of the busbars a high loading rate is obtained even with non-forced air cooling. [German]

Lehmann, G Rausch, D Zellerhoff, HG *Elektrische Bahnen* Vol. 48 No. 8, Aug. 1978, pp 195-197, 2 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

13 182802

**POWER SUPPLY INSTALLATIONS OF THE SUBWAY IN MUNICH, WEST GERMANY [Energieversorgungsanlagen der Muenchner U-Bahn]**

The energy supply system for traction and lighting and electric power is outlined. A description is given of the particularities of the electric protective system against corrosion and dangerous contact voltages of the dc operated subway which is linked up with the ac operated municipal railroad line at certain points. The experience gained on the existing lines which has been considered at the planning and construction of the new line is dealt with. [German]

Schemmel, H *Elektrische Bahnen* Vol. 48 No. 8, Aug. 1978, pp 198-205, 4 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

**13 182804**  
**TRACTION OVERHEAD LINE SYSTEM OF AUSTRIAN FEDERAL RAILWAYS [Die Fahrleitung der Oesterreichischen Bundesbahnen]**

The standardization traction overhead line system evolved by the Austrian Railways in cooperation with the corresponding Austrian production companies is outlined; its design, installation methods together with the relative pole configurations and the pole footing are shown by a wide selection of illustrations. [German]

Hermmann, O *Elin-Zeitschrift* Vol. 30 No. 1, 1978, pp 27-34

ACKNOWLEDGMENT: EI  
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**13 182809**  
**MINUTES OF MEETING--PENNSYLVANIA ELECTRIC ASSOCIATION, SYSTEM PLANNING COMMITTEE, MAY 3-4 1977**

This conference contains 9 papers dealing with plans and problems associated with the development and growth of electric power supply systems. Topics are: electric railroads; northeast corridor development; long range financial planning; the question of capital shortage; capital conservation through distribution station planning; a multicell fluidized boiler plant (Rivesville Station); the application of coal gasification alternatives to power plants; and solvent-refined coal for power generation. Selected papers are indexed separately.

Minutes of Meeting, Pennsylvania Electric Association Engineering Section, System Planning Commission, Hershey, Pennsylvania, May 3-4, 1977.

Pennsylvania Electric Association Conf Paper 1977, v.p.

ACKNOWLEDGMENT: EI  
ORDER FROM: Pennsylvania Electric Association, Engineering Section, Harrisburg, Pennsylvania

**13 182810**  
**RAILROAD ELECTRIFICATION FROM A UTILITY VIEWPOINT**  
Railroad electrification has become of increasing interest to railroads, utilities, manufacturers and government agencies in recent years. This paper summarizes the reasons for and against electrification, as well as the technical considerations of importance to the utility application engineer, including substation design, load factor, power factor, harmonics, unbalance, and analog studies.

Minutes of Meeting, Pennsylvania Electric Association Engineering Section, System Planning Commission, Hershey, Pennsylvania, May 3-4, 1977.

Burke, JJ (General Electric Company)  
Pennsylvania Electric Association

ACKNOWLEDGMENT: EI  
ORDER FROM: Pennsylvania Electric Association, Engineering Section, Harrisburg, Pennsylvania

**13 182848**  
**STRAY CURRENT CORROSION DUE TO THE PROPOSED NORTH-EAST TRAMWAY**

This report which was prepared for the South Australian Department of Transport concerns conditions affecting currents along proposed N-E tram-line. Their effects on stray current are estimated by comparison with the Glenelg tram-line. This is done using two different variables: (I) relative energy required to move the traffic, and (II) relative currents at the peak traffic demand. The ratios are then applied to the cost (to the utilities) of stray current corrosion due to the Glenelg tram-line determined in a previous study.

Wenk, GJ  
Australian Mineral Development Laboratories Monograph AMDEL Rpt No. 1205, Feb. 1978, n.p., 3 Fig.

ACKNOWLEDGMENT: TRRL (IRRD-234101)  
ORDER FROM: Australian Mineral Development Laboratories, Flemington Street, Fremville, South Australia, Australia

**13 182885**  
**CONSTANT TENSION CATENARY SUSPENSION [Ravnoelastichnaya kontaktnaya podveska]**

Following exhaustive research, the All-Union Order of the Red Banner of Labor Scientific Research Institute of Railroad Transport (TsNII) has developed a solution to the problem of deficiencies in the static and dynamic characteristics of pantographs and catenary suspension; these deficiencies cause sections of the contact wire to wear out and thereby necessitate replacement of the wire. The solution proposed is a catenary system of absolutely constant tension. This system makes use of the torsional action of the messenger wire produced by a level suspension unit. Procedures for mounting the levered catenary in compensated, semicompensated, and rhombic arrangements are provided, as well as data obtained from a broad experimental research base. Also given are special mounting procedures for traffic speeds over 160 km/hr and the levered catenary's advantages over sprung catenary. [Russian]

Belyaev, IA *Elektricheskaya i Teplovoznaya Tiaga* No. 2, 1977, 2 pp, 1 Tab., 1 Ref.

ACKNOWLEDGMENT: FRA  
ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

DOTL RP

**13 182886**  
**SUMMARIZATION OF THE EXPERIENCE IN OPERATING CATENARY NETWORK AND DEVELOPMENT OF TECHNICAL REQUIREMENTS FOR THE CATENARY NETWORK FOR TRAIN TRAFFIC CONDITIONS ON EXISTING RAILROAD LINES WITH SPEEDS UP TO 200 KM/HR [Obobshchenie opyta ekspluatatsii kontaktnoi seti i razrabotka tekhnicheskikh trebovaniy k ney dlya uslovii dvizheniya poezdov na suschestvuiuschikh zheleznodorozhnykh liniyakh so skorostyami do 100 km/ch]**

The improvement of pantographs has been the principal means of achieving alternating current electric rolling stock traffic running at speeds up to 200 km/hr on the Soviet railroads. Characteristics of catenary suspensions utilized on the Moscow-Leningrad line are given, as well as those of the levered catenary mounted on several anchor sections for operational testing. The paper also includes the following: results of tests on two TS-6M pantographs with automatic control of the ChS 200 electric locomotive operating at a maximum speed of 210 km/hr, and the operational experience of running the multiple-unit ER-200 train on the Moscow-Leningrad line. Also listed are the technical requirements for the catenary network on alternating current suitable for running trains at speeds up to 200 km/hr. [Russian]

All-Union Labor Red Banner Railway Research Inst 1977, 14 pp, 5 Ref.

ACKNOWLEDGMENT: FRA  
ORDER FROM: All-Union Labor Red Banner Railway Research Inst, USSR Ministry of Railways, Moscow B-174, USSR

DOTL RP

**13 183311**  
**RAILWAY ELECTRIFICATION: CHOICE OF POWER SYSTEM AND VOLTAGE LEVEL**

Article outlines the criteria for deciding what system to select as the type and form of power supplied from the catenary.

Steiner, B  
Brown Boveri and Company, Limited Tech Memo TN 74/08, Oct. 1974, n.p.

ACKNOWLEDGMENT: FRA  
ORDER FROM: Brown Boveri and Company, Limited, Kallstadter Strasse 1, Postfach 351, 6800 Mannheim, West Germany

**13 183603**  
**THE DEVELOPMENT OF PANTOGRAPHS ON DB TRACTIVE VEHICLES [Entwicklung der Stromabnehmer der Triebfahrzeuge der DB]**

The author explains the pantograph mechanism and defines several of the basic concepts involved; he then describes the workings of the pantograph-catenary system and the development from the stage of current collector pantographs with a fixed axis to modern types of pantograph. [German]

Zoeller, H *Elektrische Bahnen* Vol. 49 No. 7, July 1978, pp 168-175, 1 Tab., 11 Phot., 6 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

13 183604

**A DOUBLE COMPUTER SYSTEM CONTROLS THE ELECTRICITY SUPPLY TO COPENHAGEN'S SUBURBAN NETWORK [Doppelrechnersystem steuert die Energieversorgung der S-Bahn Kopenhagen]**

The lessons learned from the remote-control equipment with double computer in service since 1973 for signalling on the Danish State Railways have been decisive for the construction of corresponding installations for traction current supply. The modernization of the remote-control equipment for Copenhagen's suburban network includes a remote-control system for data transmission and the central control station with the service equipment, data processing computers and modulation of the control panel. [German]

Thyge Hansen, J Brodowski, E *Elektrische Bahnen* Vol. 49 No. 6, 1978, pp 144-149, 6 Phot., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

13 183607

**LONG-TERM ELECTRIFICATION PLAN AROUSES GOVERNMENT INTEREST**

No Abstract.

*Railway Gazette International* Vol. 134 No. 7, July 1978, pp 484-486, 3 Fig., 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
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DOTL JC

13 183610

**ELECTRIFICATION. BRITISH RAIL STATES ITS CASE**

A joint BR/Department of Transport working party is about to start the review of the general case for further main-line electrification promised in the Government White Paper Last year. This article reviews the case as put forward in a BR discussion paper which is also the policy document forming the basis of the joint study.

*Modern Railways* Vol. 35 No. 359, Aug. 1978, pp 349-351, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

DOTL JC

13 184619

**SHOULD THE THIRD RAIL ELECTRIFY THE WORLD'S TRAINS?**

The case for third-rail direct-current electrification of even high-speed lines is presented. Efficiency, environmental protection and the compact population possible are cited as reasons for choosing this system over the popular high-voltage alternating current system with catenary distribution.

Ogilvie, J (British Rail) *New Scientist* Vol. 80 No. 1126, Oct. 1978, p 273

ORDER FROM: IPC Magazines Limited, King's Reach Tower, Stamford Street, London SE1 9LS, England

DOTL JC

13 184633

**ELECTRIFICATION OF RAILROADS--PROBLEMS--POTENTIALS-- ECONOMIC IMPACTS**

This paper provides a historical background of Railroad Electrification within the U. S. It also provides data related to percent electrification of railroad route miles within the major developed countries around the world. An attempt is made to provide quantification of the benefits accrued due to electrification. The economic and technical characteristics between the diesel/electric and electric trains are compared. The paper is primarily concerned with the following aspects of electrification: electric locomotives have 2/3 lower maintenance cost, twice economic life, and 1/2 the out of

service time. Also listed are the components of cost for electrification and data are provided on the rate of return estimated under several scenarios.

Proceedings of the 4th National Conference on the Effects on Energy Constraints on a Transport Syst, August 1-5, 1977, held at Union College, Schenectady, New York. Prepared for DOE, Div of Transportation Energy Conservation. For proceedings see also RRIS 16 174442, Bulletin 7802.

Meeker, MD (General Electric Company)  
Union College Conf Paper CONF-770878, 1977, pp 417-438, 13 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: NTIS

13 184956

**INCREASING THE POWER SYSTEM CAPACITY OF THE 50 KV BLACK MESA AND LAKE POWELL RAILROAD THROUGH HARMONIC FILTERING AND SERIES COMPENSATION**

A 50 kV electrified railroad must be uprated to double its hauling capacity without additional substations or transmission line. Careful analysis of the power supply requirements for rectifier drives produces a filtered, compensated system having more than twice the former capability. A transient network analyzer is used to evaluate the overall system and to model the train performance. Field measurements confirm the design expectations.

IEEE Power Eng Soc, Summer Meeting, Los Angeles, California, July 16-21, 1978.

Burke, JJ (General Electric Company); Engel, AP Gilligan, SR Mincer, NA  
Institute of Electrical and Electronics Engineers Preprint Paper A 78 532-3, 1978, 7 p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL, IEEE

13 185221

**AN EXAMINATION OF SOME ECONOMIC OBSTACLES TO ELECTRIFICATION**

Although viewing eventual electrification of heavy-traffic mainlines as inevitable, the author cites environmental, operational and technical obsolescence problems which need to be examined and overcome before U.S. railroads will electrify. The challenge of further mergers and computer controlled operations must be met, as well as the building of coal slurry pipelines.

Lamphier, TJ (Burlington Northern, Incorporated) *Transportation Research Board Special Report* No. 180, 1977, pp 10-12, 2 Ref.

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13 185222

**IMPLEMENTING AN ELECTRIFICATION PROGRAM: THE NORTHEAST CORRIDOR IMPROVEMENT PROJECT**

The NECIP involves the first major U.S. electrification in almost two generations. It involves two entirely separate segments--planning, design and construction of an entirely new system between New Haven and Boston, and conversion and rehabilitation of the existing system between Washington and New Haven. It was recommended that the entire system be designed and constructed to facilitate 25-kV 60-Hz operation. Discussed are the technical and economic issues, design and construction costs, and environmental impact.

Howell, RP (De Leuw, Cather and Company); Olson, PE (ASEA Incorporated) *Transportation Research Board Special Report* No. 180, 1977, pp 20-23

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13 185223

**SUMMARY TO RAILROAD ELECTIFICATION: THE ISSUES**

Since the end of World War II, U.S. railroads have not considered the price of electrification worth paying. Meanwhile, electrification has proceeded rapidly elsewhere. The main difference is that U.S. railways are privately owned, while others are state owned. Major benefits of electrification accrue over many years after an initial negative impact on cash flow. Financing remains a major deterrent despite demonstrated operating advantages.

Alston, LL (International Bank for Reconstruction & Development) *Transportation Research Board Special Report* No. 180, 1977, pp 72-73, 2 Ref.

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13 185224

**A RAILROAD VIEW OF ELECTRIFICATION**

Some general advantages and disadvantages of electrification are discussed, along with specific problems associated with Southern's study of the electrification of its main line between Cincinnati and Atlanta.

Simpson, WW (Southern Railway System) *Transportation Research Board Special Report* No. 180, 1977, pp 74-76

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13 185225

**AN ECONOMIC VIEW OF RAILROAD ELECTRIFICATION**

Despite certain operating advantages, railroads regard electrification as a marginal investment. Economic and energy benefits are not now large enough to merit extensive private investment. Failure to electrify is not a failure to adopt the best possible technology but is really a reflection of conditions in an industry that is already highly capital intensive. Major electrification has to await basic changes in the industry's financial condition. Government-sponsored demonstrations may reduce uncertainty; resolution of basic uncertainties surrounding national transportation and energy policies is also required.

Harvey, SB (Association of American Railroads) *Transportation Research Board Special Report* No. 180, 1977, pp 76-79, 10 Ref.

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13 185226

**A FINANCIAL VIEW OF ELECTRIFICATION**

The high capital requirements and long pay-back cycles for investments in railway electrification are major deterrents in the U.S. Some methods for overcoming these problems are discussed.

Livingston, HH (Kidder, Peabody and Company, Incorporated) *Transportation Research Board Special Report* No. 180, 1977, pp 79-83

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13 185227

**A GOVERNMENT VIEW OF ELECTRIFICATION**

Title V of the 4R Act makes provision for government assistance for railroad electrification. Reasons that no applications have been made for such assistance are discussed. Direct funding of electrification or government ownership of electrification facilities with leases that allow costs to be operational rather than capital are a possibility ultimately. Railroad industry support for assistance on electrification would be necessary; it is unlikely that Congress would force such steps on a reluctant industry.

Allison, TG (United States Senate) *Transportation Research Board Special Report* No. 180, 1977, pp 83-85, 3 Ref.

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13 185344

**MODERN PROTECTIVE TECHNIQUES ON THE DB [Moderne Schutztechnik bei der DB]**

The increase in power of electric locomotives over the last 20 years has led to the need for more stringent safety measures for protection of the overhead line. The article describes in detail the measures taken for this purpose and points out how conventional protection has had to be replaced by electronic methods. This decision, originally motivated by technical and financial considerations, is also proving advantageous from the point of view of occupational medicine. [German]

Seiffert, K *Elektrische Bahnen* Vol. 49 No. 8, Aug. 1978, pp 192-197, 1 Tab., 6 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

13 188056

**ELECTRICAL APPLICATIONS IN RAILROADS**

Technology and economics of railway electrification, signaling and automatic train operation are covered briefly. Railway electrification, whether achieved with electric locomotives relying on central-station power supply or with diesel-electric locomotives carrying their own generating equipment, is explained. Uses of alternating and direct current on both types of motive power is considered. Details are given for catenary and third-rail power delivery, locomotive rectifiers, controls, and traction motors.

104

This article appeared in the Standard Handbook for Electrical Engineers, Eleventh Edition.

Houser, FN

McGraw-Hill Book Company, Incorporated 1978, p.23.64-23.104, Figs.

ORDER FROM: McGraw-Hill Book Company, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

13 188057

**TAPERED ROLLER BEARINGS IMPROVE ELECTRIC RAILWAY PERFORMANCE**

In the second-generation catenary design of British Rail, "supertensioning" was introduced to assure successful current collection at high speeds and during high winds. The higher forces caused malfunction of pulleys in the weight system used for tensioning and the problem was solved by introducing roller bearings in place of the original sintered plain bearings.

*Modern Railways* Vol. 35 No. 363, Dec. 1978, pp 570-571, 4 Phot.

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

DOTL JC

13 188090

**REMOTE CONTROL EQUIPMENT FOR THE ELECTRIC POWER SUPPLY OF THE URBAN RAPID TRANSIT SYSTEM IN HAMBURG, WEST GERMANY [Neue Fernwirkanlage fuer die Energieversorgung der Hamburger S-Bahn]**

For more than 35 years the electric power supply installations have been monitored and operated by a remote action installation. After many years in service the first installation no longer satisfied modern requirements. Therefore, October 1977, a new installation has been put into operation. A report is given on the remote action system with selective dialing technique and the main network control center. [German]

Gladigau, R Haupt, R *Elektrische Bahnen* Vol. 49 No. 1, Jan. 1978, pp 16-22, 3 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

13 188094

**EFFECTS OF THE AERODYNAMIC CHARACTERISTICS OF PANTOGRAPHS ON CURRENT COLLECTION AT HIGH SPEEDS [Vlijanje aerodinamiceskoj karakteristiki tokopriemnika na kacestvo tokos"ema pri vysokih skorostjah dvizenija]**  
No Abstract. [Russian]

Beljaev, IA *Vestnik VNIIZT* No. 5, 1978, pp 4-6, 2 Fig., 2 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Vestnik VNIIZT, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

13 188096

**NEW RAILCAR FOR SERVICE USE ON THE DB FOR OVERHEAD LINE MAINTENANCE [Neuer Bahndiensttriebwagen der DB fuer die Fahrleitungsunterhaltung]**

Description of the new railcar with a mobile platform used on the DB for overhead line maintenance on main and new lines. This 52 t railcar can run at 140 km/h, and is equipped with 2,287 kW Diesel engines. This stock has been fitted with improved standard equipment and adapted to modern working methods. [German]

Huber, M Kottenhahn, V *Elektrische Bahnen* Vol. 49 No. 8, Aug. 1978, pp 203-209, 1 Tab., 10 Phot., 5 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

13 188131

**COMMUTATION PROCESSES IN CONVERTERS OF MINE CONTACT-TYPE ELECTRIC LOCOMOTIVES**

Computational relationships are derived for determination of the shape of the traction-current curve of an alternating-current contact network during operation of electric locomotives with thyristor converters.

Shulin, NI Guzov, ES Sinchuk, ON *Soviet Electrical Engineering* Vol. 48 No. 3, 1977, pp 37-40

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

13 188326

## 'SPARKS EFFECT' KEEPS RAILWAYS ROLLING

The 'sparks effect' is the railway man's term for the success of modern suburban electrical systems in the UK where demand has increased by 30 per cent during the first year of operation. The author examines the possibilities of this effect leading to main-line electrification. The advantages of electrification are studied. Fuel costs are less for electric systems and will probably not increase so rapidly as those for diesel trains. Maintenance costs are also lower for electric systems. However, electrification of primary routes cannot be justified by the usual test discount rate and would need a higher level of railway investment. A major problem would be for traction equipment and its associated items, but this could be overcome if there was sufficient demand. Several reasons for the need for an early decision on electrification are put forward. It is suggested that an all-electric version of the HST would be successful, and the apt could be reserved for routes with unsmoothed permanent way curves.

Moss, J *Electrical Review* Vol. 203 No. 12, Sept. 1978, pp 16-17, 3 Fig., 1 Tab., 2 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 236325)

ORDER FROM: IPC Electrical-Electronic Press Limited, Dorset House, Stamford Street, London SE1 9LU, England

13 188690

## FIXED INSTALLATIONS ON THE FRENCH 200 MPH

## RAILROAD. TRANSLATIONS

A new milestone in railroad transportation technology will have been achieved with the completion in 1981 of the new high speed rail line between Paris and Lyon, France, when high speed passenger trains will be traversing the 409 kilometers (255 miles) between Paris and Lyon at cruising speeds of about 260 kmph (160 mph). The French Railroad Administration (SNCF) has the responsibility for implementation of the project as well as for the development of the equipment and infrastructure. A great number of articles and pamphlets have been published in French on the subject. Four of these articles for the purpose of acquainting the American railroad community with the newer technology from abroad and to illustrate the potential benefits which might be derived by utilizing this particular technology in the North American operations were selected for translation at JPL, e.g.: Scope and implementation of tests on the high speed traction head Z7001, Senac, G.; The power supply of the French alternating current railways, Niekamp, K.; Supply of electrical energy to the new line, Laurenceau, J-N., and Fixed installations of electric traction and the collection of current, Boissonnade, P. and Dupont, R.

Macie, TW

Jet Propulsion Laboratory FRA/ORD-77/69, Aug. 1978, 79 p., Figs., Tabs.

Contract DOT-FRA AR-30006

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

DOTL NTIS, DOTL RP

15 180306

**EFFECTS OF RAILROAD ABANDONMENT ON THE MODAL DISTRIBUTION OF TRAFFIC AND RELATED COSTS**

Legislation easing abandonment of unprofitable branch lines or permitting subsidies for continued operation can have effects on the rest of the transportation industry, on users of affected lines and on the economies of the primarily rural areas served by these lines. This paper summarizes the results of a study which had the objective of determining the extent of some of these effects. Included are the transport costs of affected rail users, the resulting public-sector and private-sector investment requirements and energy consumption.

Weinblatt, H (Faucett (Jack) Associates); Matzzie, DE (CONRAD Research Corporation); Harman, J (Department of Transportation) *Transportation Journal* Vol. 17 No. 4, 1978, pp 86-96, 8 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

15 180364

**THE IMPACT OF A NEW RAPID TRANSIT SYSTEM ON TRAFFIC ON PARALLEL HIGHWAY FACILITIES**

Study analyzes data of traffic crossing San Francisco Bay and passing through the Berkeley Hills via Caldecott Tunnel to determine the effect of the opening in 1974 of the Bay Area Rapid Transit System (BART) transbay line.

Homburger, WS *Transportation Planning and Technology* Vol. 4 No. 3, May 1978, pp 187-201, Refs.

ORDER FROM: ESL

DOTL JC

15 180373

**THE SUCCESSFUL TRANSPORTATION SYSTEM AND THE REGIONAL PLANNING PROBLEM: AN EVALUATION OF THE MUNICH RAPID TRANSIT SYSTEM IN THE CONTEXT OF URBAN AND REGIONAL PLANNING POLICY**

The development of the Munich Rapid Transit System, coupled with the growth of the Munich region, has had a major effect on the spatial structure of the region. The radial form of the rapid transit system has led to an outward movement of higher income families and a strengthening of the service function of the city centre, to the cost of local centres. Lower income families are tending to settle in the city centre fringe areas, although their primary employment opportunities, in manufacturing industry, are increasingly moving to the urban fringe. There is, thus, a growing spatial separation between homes and workplaces and although the rapid transit system has reduced traffic congestion in Munich, it has encouraged the development of an urban structure which is not compatible with the objectives of either the state or the region.

Also available from ESL.

Kreibich, V (Dortmund University, W Germany) *Transportation (Netherlands)* Vol. 7 No. 2, June 1978, pp 137-145, 4 Fig., 22 Ref.

ACKNOWLEDGMENT: Transportation (Netherlands)

ORDER FROM: Elsevier Scientific Publishing Company, P.O. Box 211, Amsterdam, Netherlands

15 180377

**INTERACTION BETWEEN PUBLIC TRANSPORTATION AND OTHER SOCIAL ACTIVITIES: A SYSTEMS APPROACH**

This paper describes a quantitative method of evaluating public transportation systems in areas in which the frequencies of transportation services are low. The starting point of the evaluation is an overall view of the interaction between public transportation, private transportation, and the area with its physical and socio-economic variables. The problem concerning the evaluation of the public transportation system is treated.

Jensen, OH (Royal Technical University of Denmark) *Transportation Research* Vol. 12 No. 2, Apr. 1978, pp 83-89, 9 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

15 180901

**ECONOMIC IMPACTS OF BART CAPITAL AND OPERATING EXPENDITURES**

The 71-mile Bay Area Rapid Transit (BART) system is the first regional scale rapid transit system to open in the United States in over 50 years. This technical memorandum assesses the economic impacts of BART's \$1.5 billion capital expenditures and \$60 million annual operating expenditures on the Bay Area's regional economy. The report documents the changes in regional output and employment in the nine-county San Francisco Bay Area, in each of 50 sectors, as a result of BART's expenditures. Two input-output models were developed of the San Francisco Bay Area, one for 1967 and one for 1974, to test these impacts. The models and the methodology for formulating them are described. BART's impact on employment opportunities during construction and its permanent staff is evaluated. The impact of BART's construction expenditures on construction wage rates within the region is also analyzed. (Color illustrations reproduced in black and white)

Prepared by McDonald and Grefe, Inc., San Francisco, Calif. Sponsored in part by Department of Housing and Urban Development, Washington, D.C.

Grege, R McDonald, A McLeod, D

Metropolitan Transportation Commission, McDonald and Grefe, Incorporated, Department of Transportation, Department of Housing and Urban Development Tech Memo DOT-BIP-TM-29-7-77, Oct. 1977, 190p

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-283061/0ST, DOTL NTIS

15 181337

**STATION AREA LAND USE. BART IMPACT PROGRAM. LAND USE AND URBAN DEVELOPMENT PROJECT**

The report summarizes time series data on BART stations compiled for the Land Use and Urban Development Project. Data collection and classification methods are described, and data sources are documented. Station area land use changes during the period 1965-77 also are summarized. (Color illustrations reproduced in black and white)

Prepared by Blayney (John) Associates, San Francisco, Calif. and Dornbusch (David M.) and Co., Inc., San Francisco, Calif. Sponsored in part by Department of Housing and Urban Development, Washington, D.C.

Dyett, MV

Metropolitan Transportation Commission, Blayney (John) Associates, Dornbusch (David M) and Company, Incorporated, Department of Housing and Urban Development, Department of Transportation DOT-BIP-WP-39-5-77, Nov. 1977, 37 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-282996/8ST, DOTL NTIS

15 182000

**THE SIGNIFICANCE OF TELECOMMUNICATIONS AS A PARTIAL SUBSTITUTE FOR TRANSPORTATION**

The major objective of the research is to determine the feasibility of using existing communications technology to prevent the need for many of the Central Business District (CBD), inter-office business trips made in the Pittsburgh, Pennsylvania area. The effect these technologies may exercise on future urban form and travel patterns is also examined, as various types of communication systems, their use, cost-effectiveness, advantages/disadvantages, and short and long-term forecasting as to present and future changes are discussed. The work trip offers the greatest potential for relieving congestion and associated costs, and since two out of five trips within the urban area (world-wide) are home to work and work to home, the possibilities of reducing peak hour congestion, delays, accidents, and pollution are immense. There are indications that in the future offices may provide suburban branches for the convenience of employees who can work together effectively with picture phones and time-sharing computers. The report addresses the Contact Record Surveys which were developed to present existing trip-making based on a sample of Pittsburgh CBD centers. Results of the questionnaires are analyzed.

Wells, M Tolle, JE

Carnegie-Mellon University, Urban Mass Transportation Administration, (UMTA-PA-11-0013) Final Rpt. UMTA-PA-11-0013-78-1, Sept. 1976, 132 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-284718/4ST, DOTL NTIS

**15 182110**  
**STUDY OF WORKERS' LOCATION DECISIONS. LAND USE AND URBAN DEVELOPMENT PROJECT. BART IMPACT PROGRAM**

BART's effects on workers' location decisions in San Francisco and Oakland are investigated. BART's effect on residential location decisions, as influenced by job location decisions, also are examined. The principal means of investigation is computer analysis of the results of a survey of downtown workers recently changing jobs and a survey of employees working in the BART corridors. The paper concludes with an assessment of the policy implications of this research.

Prepared in cooperation with Blayney (John) Associates, David M. Dornbusch and Co., Inc., San Francisco, CA. Sponsored in part by Department of Housing and Urban Development, Washington, D.C. Revision of report dated Nov 77.

Dyett, MV Castle, GH, III  
Metropolitan Transportation Commission, Blayney (John) Associates, Dornbusch (David M) and Company, Incorporated, Department of Transportation, Department of Housing and Urban Development  
DOT-BIP-WP-38-5-77, Mar. 1978, 84 p.

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
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PB-285969/2ST, DOTL NTIS

**15 182559**  
**POSSIBILITIES OF EVALUATING THE REPERCUSSIONS OF TRANSPORT INVESTMENTS AT REGIONAL ECONOMIC LEVEL, AS DEMONSTRATED BY THE EXAMPLE OF THE NEW DB HANOVER-GEMUENDEN LINE [Moeglichkeiten zur regionalwirtschaftlichen Bewertung von Verkehrsinvestitionen dargestellt am Beispiel alternativer Trassenfuehrungen der Bundesbahnneubaustrecke Hannover-Gemuenden]**  
No Abstract. [German]

Jansen, GD Platz, H  
Vandenhoeck und Ruprecht DB: Dok 4761, 1978, 140 pp, 59 Tab., 18 Phot., 59 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Vandenhoeck und Ruprecht, Theaterstrasse 13, Postfach 77, 3400 Goettingen, West Germany

**15 182827**  
**RATIONALIZATION OF RAIL LINE ABANDONMENT POLICY IN THE MIDWEST UNDER THE RAILROAD REVITALIZATION AND REGULATORY REFORM ACT OF 1976**

Since ICC got jurisdiction in 1920, more than 70,000 miles of rail line have been abandoned, 15,000 miles of this since 1970. With the rate accelerating, the Midwestern lines are indicating the highest expectation for additional abandonments. The research reported attempts to examine the correlation between loss of rail service and adverse impacts on community viability, using rural Minnesota as a case study. Comparative data for 40 grain elevators that lost rail service and 64 located on existing rail lines were analyzed. Evidence indicates most elevators losing rail service have not been adversely affected in competition with nearby rail elevators. Implications for grain shipping are discussed.

Spraggins, HB (Minnesota University, Minneapolis) *Transportation Journal* Vol. 18 No. 1, 1978, pp 5-18, 1 Fig., 5 Tab., 1 App.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

**15 182839**  
**EVIDENCE OF LAND USE IMPACTS OF RAPID TRANSIT SYSTEMS**

This paper draws from the findings of published empirical studies and observations of the impacts of rapid transit systems on urban development. Analysis is based on comparisons of impact findings by different researchers and for different cities. An initial set of key issues is proposed, against which available information is arrayed and compared. It is concluded that rapid transit can have substantial growth-focusing impacts, but only if other supporting factors are present.

Knight, RL Trygg, LL (De Leuw, Cather and Company) *Transportation (Netherlands)* Vol. 6 No. 3, Sept. 1977, pp 231-247, 28 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233293)

ORDER FROM: Elsevier Scientific Publishing Company, P.O. Box 211, Amsterdam, Netherlands

**15 182845**  
**COST RECOVERY IN AUSTRALIAN TRANSPORT, 1974-75**

"Cost recovery" is a term used to describe the levels to which various undertakings are able to recoup the costs of providing their services. Clearly, such a concept can cover a wide range of possibilities. In performing this study of cost recovery in Australian transport, the BTE took the view that results of the study should be based as closely as possible on actual financial transfers. However, the BTE also recognises that many transport services have both positive and negative spinoffs which cannot be accounted for in a direct financial sense. Some of the positive spinoffs are improved mobility, enhancement of trade and increased employment opportunities, while pollution and accidents are examples of negative spinoffs. Within these limited boundaries, the BTE developed a formal framework for analysing cost recovery in Australian transport in the year 1974-75. Each major mode of transport is included, and the analysis is comprehensive in the sense that different areas and classes of transport operations within each mode are analysed wherever applicable or practicable.

Australian Government Publishing Service Monograph Sept. 1977, 324 pp, Figs., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-234076)

ORDER FROM: Australian Government Publishing Service, Bureau of Transport Economics, 109 Canberra Avenue, Griffith, A.C.T., Australia

**15 183613**  
**RAILWAYS IN THE URBAN CONTEXT [Le chemin de fer et la ville]**

Railway implantation in cities generally dates from the 19th century, and the locations chosen at that time do not always correspond to present-day requirements. The process of adapting to urban environment is hampered by numerous obstacles and the SNCF, after the many large-scale streamlining operations carried out in the past, has now drawn up property-policy guidelines for the future. [French]

LeGrand, M *Transports* No. 233, June 1978, pp 274-280, 9 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Editions Techniques et Economiques, 3 rue Soufflot, 75005 Paris, France

**15 183712**  
**TRANSPORTATION PLANNING TRENDS IN THE FEDERAL REPUBLIC OF GERMANY**

In spite of a population decline, other socioeconomic changes in the Federal Republic of Germany will lead to greater reliance on private automobiles and a decline in use of rail passenger transportation. Transportation planning must be more effective, responding to need for preserving environmental values while accommodating a high level of mobility expected with socioeconomic changes under way.

Retzko, HG (Technical University of Darmstadt, West Germany) *Traffic Quarterly* Vol. 32 No. 4, Oct. 1978, pp 583-597

ORDER FROM: ESL

**15 184663**  
**TRAFFIC POLICY--COST RESPONSIBILITY AND FARES [Trafikpolitik-kostnadsansvar och avgifter]**

The commission presents a report on marginal costs of social economics concerning road maintenance, traffic surveillance, congestion, accident costs

and environmental costs. The commission points out that for the efficiency of social economics, fares adjusted to the costs of social economics for each mode of transport are essential. The commission looks upon motor traffic as a central element in the Swedish social pattern, but suggests that private transport should be restricted in urban areas. However, in rural areas with few transport alternatives private transport should be supported. The taxes for bus transport are considered too low. The reason why the commission proposes increased bus taxes depends on the inter-regional bus transport, which is a competitor to rail transport. It is proposed to subsidize bus transport by means other than tax relief. In order to control urban traffic the commission has discussed special fares. However, the commission leaves it to the local authorities to suggest and design fare systems. The economy of the Swedish state railways is also discussed. Finally, the commission rejects a formal joint responsibility, considering transport modes, for the costs within the field of overland transport. /TRRL/ [Swedish]

Kommunikationsdepartementet Monograph N SOU 1978:31, 1978, 191 p., 11 Fig., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-235371), National Swedish Road & Traffic Research Institute

ORDER FROM: Kommunikationsdepartementet, Fack, Stockholm, Sweden

#### 15 184676

##### MOBILITY COSTS AND METROPOLITAN DECENTRALISATION IN SYDNEY

The research described in this paper was undertaken to quantify the value of supportive land use and transport planning policies, and thus to quantify the extent to which a traditional transport problem (the provision of upgraded railway connections and additional capacity between developing fringe areas and the centre of the city) can be solved by a non-transport action--the creation of employment concentrations in the fringe areas. The "transport solution" and the "land use" solution were both tested and the benefits of both solutions are compared. The second purpose of the study was to examine the work journey mobility costs of the future residents of a growth centre on the fringe of a metropolitan area to justify the decentralisation of a balancing and significant amount of employment in addition to significant improvements in the transport services to the fringe. (a) the number of the covering abstract of the conference is IRRD No. 234299.

Smyth, RB (NSW Planning & Environment Commission, Australia);

Johnston, DK (Voorhees (Alan M) and Partners Pty Ltd, Australia)  
Institution of Engineers, Australia, (0 85825 0861) Conf Paper 1977, pp 1-6, 1 Fig., 5 Tab., 1 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234301), Australian Road Research Board

ORDER FROM: Institution of Engineers, Australia, 11 National Circuit, Barton, A.C.T., Australia

#### 15 184952

##### EFFECTS OF SUBWAYS ON URBAN FORM AND STRUCTURE

A general equilibrium model was built which shows how the locations of employment and residences are related to alternative transportation systems. The model was applied to different size cities. The analysis suggests that the construction of a subway system will not necessarily result in the revitalization of the central business district (CBD) or in the reversing of the trend toward suburbanization. Although land rent is generally higher in the city without subway systems than in the city with subway systems, the steeper rent gradient at the peripheries of the former, along with other findings, suggest that the rate of suburbanization of the city without subway systems is not significantly higher than of the city with subway systems.

Kim, TJ *Transportation Research* Vol. 12 No. 4, Aug. 1978, pp 231-239, 7 Fig., 5 Tab., 5 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 235533)

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DOTL JC

#### 15 185632

##### APPLICATIONS OF THE NEW ALTERNATIVE FUTURES PLANNING CONCEPT

Instead of using a point estimate of the future where all parameters have unique values, the method of alternative futures planning suggests that plans be developed based on several plausible futures. This paper discusses the concept, mentions some national level applications, and describes three

varied local and regional applications. The first application description is of the long-range transportation system plan being done in Northeastern Illinois. Three futures for the region instead of one are being studied. These multiparameter futures are systematically defined. The second description is of a rail-network optimization study. Here future capital budgets and mode choices are being combined to define nine alternative futures. The last application described is an evaluation of the proposed discontinuation of service on a rapid-transit branch line. The branch is located in an area of urban decline which does, however, have the potential for massive redevelopment. The discontinuation was evaluated under various population futures for the area. After detailing these applications, the paper stresses the commonalities in the applications of the concept. The concept is not only viable but essential to decision making under an uncertain future. (ERA citation 03:040508)

Bernard, MJ, III

Argonne National Laboratories, Department of Energy 1978, 23 p., 16 Ref.

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

CONF-780138-1

#### 15 186105

##### SOCIAL IMPACTS OF BART ON BAY AREA FAMILIES AND LIFE STYLES

The report describes the impacts of BART upon the families and life styles of Bay Area BART users. It evaluates the impacts of BART upon nine dimensions of family and life style routines. It also reports BART impacts on the experience of the region and riders' perceptions of safety and well being in the public space. Policy implications of the research findings are also included. (Color illustrations reproduced in black and white)

Report on BART Impact Program. (Bay Area Rapid Transit). Prepared in cooperation with Jefferson Associates, Inc., San Francisco, CA. Sponsored in part by Department of Housing and Urban Development, Washington, DC.

Minkus, D Polk, K

Metropolitan Transportation Commission, Jefferson Associates, Incorporated, Department of Transportation, Department of Housing and Urban Development Tech Memo DOT/BIP/TM-21-6-77, Nov. 1977, 146 p.

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS

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PB-286509/5ST, DOTL NTIS

#### 15 186187

##### LAND USE IMPACTS OF RAPID TRANSIT: IMPLICATIONS OF RECENT EXPERIENCE

The report seeks to display available evidence on the extent to which recent (post-World War II) major rapid transit improvements in the United States and Canada have influenced urban land use. From this compilation are derived several types of conclusions. The factors governing the size and nature of land use impacts of transit are determined; implications for appropriate Federal policy are drawn; and specific needs for related future research are identified. The report's intended use is as a resource for those involved in the planning and evaluation of possible improvements in urban transit systems.

Knight, RL Trygg, LL

De Leuw, Cather and Company, Department of Transportation Final Rpt. DOT/TPI/10-77/29, Aug. 1977, 266 p.

Contract DOT-OS-60181

ACKNOWLEDGMENT: NTIS

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PB-287190/3ST, DOTL NTIS

#### 15 186188

##### LAND USE IMPACTS OF RAPID TRANSIT: IMPLICATIONS OF RECENT EXPERIENCE. EXECUTIVE SUMMARY

The report reviews evidence of land use impacts of recent major rapid transit improvements and draws conclusions concerning the extent and nature of such impacts and the conditions under which they have occurred. Transit



improvements studied are primarily post-World War II in origin. American and Canadian examples are stressed, although European experience is treated briefly. Virtually all major modern American and Canadian rapid transit improvements are included, covering conventional rapid rail, commuter rail, light rail and bus/busway. In addition to conclusions on general patterns of land use impact causes, research recommendations and Federal policy implications are drawn.

Knight, RL Trygg, LL  
De Leuw, Cather and Company, Department of Transportation DOT/-  
TPI/10-77/31, Dec. 1977, 19 p.

Contract DOT-OS-60181

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287191/1ST, DOTL NTIS

#### 15 186225

#### STUDY OF BART'S CONSUMPTION OF LAND AND PROPERTY. LAND USE AND URBAN DEVELOPMENT PROJECT

The paper documents BART's consumption of land and property in terms of the characteristics of business and people displaced, describes the relocation process, and examines development on surplus land BART acquired and subsequently sold. Study methods included statistical analysis of parcel data obtained from the BART Real Estate Department and the California Department of Transportation, a small survey of households and firms receiving relocation payments from BART, and key informant interviews with persons knowledgeable about BART's real estate activities. The paper closes with assessment of policy implications. (Color illustrations reproduced in black and white)

See also report dated November 77 PB-282996. Sponsored in part by Department of Housing and Urban Development, Washington, DC.

Dyett, MV Castle, GH, III  
Blayney (John) Associates, Dornbusch (David M) and Company,  
Incorporated, Department of Transportation, Department of Housing  
and Urban Development Work Paper DOT-BIP-WP-55-5-78, May  
1978, 51 p.

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
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PB-287797/5ST, DOTL NTIS

#### 15 186226

#### STUDY OF HOUSEHOLDS' LOCATION DECISIONS

The paper examines BART's effects on households' location decisions in San Francisco's Mission District, suburban Walnut Creek, and East Oakland. In each study area, randomly selected households that had moved in the 1975-76 period were interviewed by telephone to determine factors affecting moving and location decisions, the relative importance of BART in neighborhood choice, current and prior commuting patterns, workplace location, and socio-economic characteristics of respondents. Reasons for moving from one neighborhood to another are summarized, and BART's role in the decision-making process is described, with particular attention to the issue of who is influenced by BART. A multiple regression model explaining the importance of BART in residence choice in terms of workplace location, current and prior BART use, work trip length, occupation, age, income, ethnicity, and household composition also is presented. The paper closes with assessment of policy implications. (Color illustrations reproduced in black and white)

Report on BART Impact Program, Land Use and Urban Development Project. Prepared by Blayney (John) Associates/David M. Dornbusch and Co., Inc., San Francisco, CA.

Dyett, MV Fajans, MH Falcke, C  
Metropolitan Transportation Commission, Blayney (John) Associates,  
Dornbusch (David M) and Company, Incorporated, Department of  
Transportation, Department of Housing and Urban Development Work  
Paper DOT/BIP-WP-47-5-78, Feb. 1978, 94 p.

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
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PB-287798/3ST, DOTL NTIS

16 178743

**ENERGY EFFICIENT RAIL TRANSIT OPERATION**

The paper investigates the energy consumption characteristics of modern rail rapid transit. The paper shows the variation in energy consumption caused by different operating policies and design characteristics of the rail transit mode, and points out the energy economies of improved design and operation. Five variables are analyzed using a rail transit performance computer model that simulates the performance of a rail transit train whose operating characteristics are specified by the program user. The simulated train runs over a track segment established by the user and a performance log of train speed and acceleration along the track segment plus the rate of energy consumption and cumulative energy used are output by the train performance program. The analysis indicates that of the variables studied, the most promising ways of reducing rail transit energy consumption are to include a coasting phase with reduced maximum speeds in the trains' performance cycle and to adjust the track vertical profile. /Author/

This article appeared in the Transportation Research Record No. 662, Planning and Design of Rapid Transit Facilities.

Eash, RW (Chicago Area Transportation Study); Phelps, DR (General Electric Company) *Transportation Research Record* No. 662, 1978, pp 1-6, 6 Fig., 4 Tab., 9 Ref., Apps.

ORDER FROM: TRB Publications Off

16 180378

**CASE STUDIES OF TRANSIT ENERGY AND AIR POLLUTION IMPACTS**

This report summarizes an analysis of the energy consumption and air pollution impacts of eight case studies of new or improved transit services. The case studies include (a) areawide bus service improvement programs involving route extensions, increased frequencies, new lines, demand responsive service, and fare reductions; (b) new corridor exclusive busway service on the Shirley Highway and San Bernardino Freeway; and (c) new rail transit service in the Philadelphia-Lindenwold corridor. Probabilistic models were developed for each of these three service improvement scenarios to account for key travel demand and transportation system factors affecting energy consumption and air pollution impact levels. Results showed that low patronage response to areawide bus improvements as well as diversion from prior bus service, carpools, etc. and extensive auto access (park-and-ride, kiss-and-ride) to corridor systems reduce expected energy and air pollution gains and may, under certain conditions found in four case studies, result in possible energy use increases. Additionally, it was found that auto use for corridor system access may worsen air quality conditions in suburban areas in the vicinity of corridor transit terminal locations.

EPA Socioeconomic Environmental Studies Series.

Curry, JP (De Leuw, Cather and Company)  
Environmental Protection Agency n 60015-76-003, May 1976, 198 pp, 49 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

16 180538

**ENERGY CONSERVATION: TRANSPORTATION (A BIBLIOGRAPHY WITH ABSTRACTS)**

The potential to achieve fuel conservation through technology, management, and planning is discussed. Transportation as covered include urban mass transit, aviation, marine transportation, automobiles, trucks, and railroads. A few abstracts discuss public attitudes concerning conservation measures. (This updated bibliography contains 273 abstracts, 70 of which are new entries to the previous edition.)

Hundemann, AS  
National Technical Information Service May 1978, 279 pp

ACKNOWLEDGMENT: NTIS

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NTIS/PS-78/0501/3ST

16 180590

**MODE SHIFT STRATEGIES TO EFFECT ENERGY SAVINGS IN INTERCITY TRANSPORTATION. FINAL REPORT**

Increased fuel costs and growing concern over energy consumption and energy conservation have not, to date, changed the demand for U.S. transportation modes. Thus, short of changing life styles or developing an expanded willingness to use our communications systems as an alternative

to travel, it will not be easy to alter the growth of travel demand, its distribution among the modes, or the consumption of energy by the transportation system. The FEA did, however, examine the potential for lessening the amount of energy devoted to transportation. The major goals in this study are to determine the extent to which intercity travelers could be induced to shift from high energy-consumption to more-energy-efficient travel modes, and to identify means of inducing such mode shifts which could save significant amounts of energy. The analysis was restricted to short-haul transport of intercity travelers in two high-density areas—the Northeast and California corridors. A major concern was the reaction of the traveling public to qualitative transportation system changes. The following fuel-conservation strategies were studied: air-fare adjustments; rail-fare reductions; rail-and bus-fare reductions; auto-cost increases; rail-block-time reductions; rail and bus block-time reductions; car availability; air frequency reductions; and combinations of the above. The study concludes with an examination of issues that could constrain or hamper implementation of the most attractive strategies found. (ERA citation 03-018586)

Aerospace Corporation, Department of Energy Apr. 1977, 296 pp

ACKNOWLEDGMENT: NTIS

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TID-28045

16 180795

**THE IMPACTS OF URBAN TRANSPORTATION AND LAND USE POLICIES ON TRANSPORTATION ENERGY CONSUMPTION. VOLUME 1**

This report explores relationships between energy consumption in urban passenger travel, land use, transportation system characteristics, and travel behavior. Findings are based on 112 experiments conducted with an integrated, equilibrium transportation-land use simulation model. This model simulates urban growth, is sensitive to a broad range of transportation and land use actions, accounts for congestion, accommodates auto and transit modes, and responds to the generalized costs of travel. Three city shapes, concentric ring, one-sided, and polynucleated, were tested.

Peskin, RL Schofer, JL  
Northwestern University, Evanston, Department of Transportation Final Rpt. DOT/TST-77/85, Apr. 1977, 209 pp

Contract DOT-OS-50118

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-282241/9ST, DOTL NTIS

16 180980

**HYDROGEN USE AS A FUEL (A BIBLIOGRAPHY WITH ABSTRACTS)**

Federally-funded research studies pertaining to the technical feasibility of using hydrogen as a fuel for vehicular transportation, electric power generation, and both subsonic and supersonic aircraft are discussed. Excluded are studies on hydrogen production and storage. These topics are covered in other bibliographies.

Hundemann, AS  
National Technical Information Service June 1978, 167 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0635/9ST

16 181084

**WASTE OIL FACT SHEET**

Waste oil is generated from automotive and industrial sources at the rate of approximately 1,100,000,000 gallons each year. Although this amounts to somewhat less than 1 percent of the Nation's annual petroleum consumption, it does equate, nevertheless, to more than 70,000 barrels of oil per day, or 7 percent of the President's energy conservation goal for 1975. Although dirty and contaminated, waste oil has high energy value and is composed almost entirely of "lube oil fractions," a small but valuable portion of a barrel of crude oil. It can be re-refined into good lubricating oil or used as a feedstock in the manufacture of other petroleum products. In industrial applications it can be reclaimed to nearly original quality by off-the-shelf equipment. It can be reprocessed to clean fuel oil and, under special conditions, can be burned safely untreated. Yet today, as much as 50 percent of all waste oil generated in this country is lost from a resource recovery point of view. Although this loss is primarily related to the adverse

economics of various collection and recovery systems, especially in rural areas, the Federal Energy Administration (FEA) believes that better waste oil recovery is possible without Federal subsidization, and regards this objective as an important opportunity for energy conservation. FEA has developed and begun to implement a waste oil recovery program. This program has been designed to encourage greater waste oil collection and re-use, through state and local action, and public and industrial education programs. This Fact Sheet summarizes the issues, presents the results of federal research, states FEA's position on these issues, and outlines the elements of the waste oil conservation program.

Federal Energy Administration, Department of Energy June 1976, 16 pp

ACKNOWLEDGMENT: NTIS  
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TID-28212

#### 16 181139

##### EXPERIMENTS WITH NOVEL FUELS FOR DIESEL ENGINES

Engine tests were conducted with two fuels that would be considered as novel for use in diesel engines. The fuels, methanol and a water/diesel fuel emulsion, were used in this study because of their potential for reductions in exhaust emissions. The test results showed that these fuels yield no advantages over standard diesel fuel with respect to emissions of unburned hydrocarbons and oxides of nitrogen. Although smoke and carbon monoxide emissions were reduced with the use of the water/fuel emulsion, the same effect could also have been achieved via engine adjustment.

Marshall, WF  
Department of Energy Feb. 1978, 7 pp

ACKNOWLEDGMENT: NTIS  
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BERC/TPR-77/8

#### 16 181297

##### ENERGETICS AND SYSTEMS MODELING: A FRAMEWORK STUDY FOR ENERGY EVALUATION OF ALTERNATIVE TRANSPORTATION MODES

Report compares economic and energetic approaches for evaluating transportation systems. Discusses general energy theory, methods for calculating the energy value of goods and services, energy flows associated with natural systems, and energy benefit/cost analysis as applied to alternative modes for transportation of bulk commodities. Direct and indirect energy costs of transporting coal, or its energy equivalent, are evaluated, with energy costs per ton-mile and energy yield ratios (i.e., units of energy transported per unit of energy cost) compared for barge, slurry pipeline, railroad and electric transmission line systems. (Author)

Bailey, S Zucchetto, J Shapiro, L Mau, D Nessel, J  
Florida University, Gainesville Final Rpt. IWR-CR-77-10, Dec. 1977, 88 pp

Contract DACW17-75-C-0075

ACKNOWLEDGMENT: NTIS  
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AD-A053690/4ST

#### 16 181332

##### ENERGY IN TRANSPORTATION

This report discusses near-term transportation energy demand, vehicle design considerations, and transportation energy conservation opportunities. It deals with the current and projected energy demand in the transportation modes, and describes their relative energy efficiencies. Various vehicle and propulsion systems are described, along with several examples of potentially more efficient propulsion technologies that are in development. The estimated effectiveness of various energy conservation opportunities are summarized.

Husted, RA  
Department of Transportation Staff Rpt. DOT/RSPA/DPB-20/7813, May 1978, 44 pp

ACKNOWLEDGMENT: NTIS  
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PB-282928/1ST, DOTL NTIS

#### 16 181545

##### EFFECTS OF ENERGY CONSTRAINTS ON TRANSPORTATION SYSTEMS

Twenty-six papers are presented on a variety of topics including: energy and transportation facts and figures; long-range planning under energy constraints; technology assessment of alternative fuels; energy efficiency of intercity passenger and freight movement; energy efficiency of intracity passenger movement; federal role; electrification of railroads; energy impact of the electric car in an urban environment; research needs and projects in progress--federal viewpoint; research needs in transportation energy conservation--data needs; and energy intensity of various transportation modes--an overview. A separate abstract was prepared for each of the papers for inclusion in Energy Research Abstracts (ERA) and in Energy Abstracts for Policy Analysis. (ERA citation 03:031235)

National conference on the effects of energy constraint on transportation systems, Schenectady, NY, USA, 1 Aug 1977.

Mittal, RK  
Union College, Department of Energy Dec. 1977, 560 p.

Contract EC-77-G-01-6067

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

CONF-770878-

#### 16 182013

##### THE EMISSIONS AND FUEL ECONOMY OF A DETROIT DIESEL 6-71 ENGINE BURNING A 10-PERCENT WATER-IN-FUEL EMULSION

Initial efforts with water/fuel emulsions in diesel engines were directed toward the control of NOx. More recent studies emphasized the use of emulsions to improve fuel economy. It is believed that in a diesel engine combustion process, emulsified fuel droplets would undergo micro-explosions that would decrease the heterogeneity of the injector spray pattern and thus increase the efficiency and fuel economy. Although all data in the literature indicate that emulsions do lower the levels of NOx and smoke, carbon monoxide (CO) and hydrocarbons (HC) generally increase, depending on the amount of water in the emulsion, and the engine type, speed, and load. Reported fuel economy either decreases or increases, again, dependent on the water content, engine type and design, and engine speed and load. Other possible effects, such as increased fuel injector corrosion, water dilution of the lubricating oil, and the possibility of increased combustion chamber deposits have not been studied. The task reported here is a preliminary investigation of water/fuel emulsions in a GM6-71 engine. Surface active agents (surfactants), were used to produce the emulsions for this task. The purposes of this preliminary effort were to resolve the conflicting results in the literature, assess potential problem areas, and aid in formulating future efforts.

Walter, RA  
Transportation Systems Center Final Rpt. TSC-USCG-78-1, USCG-D-10-78, July 1978, 81 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A058550/5ST, DOTL NTIS

#### 16 182624

##### RATIONALISATION OF THE DRIVING OF TRAINS

From the economic point of view, the reduction in energy costs for railway traction is a problem of considerable importance. In achieving this reduction in energy consumption, any application of an adequate technology for the driving of trains must be assessed on its true merits. This article establishes a scientific technology for the driving of trains, application of which makes it possible to achieve considerable fuel economies, to which the driver contributes directly without the need for special equipment.

Popoviciu, G *Rail International* Vol. 9 No. 6, June 1978, pp 427-431, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

#### 16 182808

##### ENERGY CONSERVATION IN SUBWAY SYSTEMS BY CONTROLLED ACCELERATION AND DECELERATION

The 1975 electric bill for propulsion in the New York City subway system was close to 90 million dollars. This paper addresses the question of how a

subway motorman should run his train in order to minimize this energy consumption. It is shown that using maximum acceleration followed at the appropriate time by coasting, and then braking at the maximum acceptable rate, gives a particularly low energy consumption for typical subway trains (although slightly different velocity profiles can be better under appropriate circumstances). This velocity profile is relatively easy to implement, and has now been proven effective in experimental tests. As a result of recommendations reported here, the New York City Transit Authority ran idealized tests of the profile, followed by recently completed tests in revenue service which demonstrated an 18.4 percent decrease in energy consumption using a daily weighted increase of 4.25 per cent in trip time. This paper also evaluates the energy saved using an alternative method involving equipment modification for field shunting in the series mode.

Viswanathan, CN (Columbia University, New York); Longman, RW Domoto, GA *International Journal of Energy Research* Vol. 2 No. 2, Apr. 1978, pp 133-151, 5 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 16 183321 THE ENERGY COST OF ROAD AND RAIL TRANSPORT IN TASMANIA

The purpose of this study was to undertake a detailed investigation into the energy used by the road and rail sectors of the Tasmanian transport system for the year 1974. In section a, the energy used by road transport is examined in terms of the direct energy cost of fuels and also the indirect energy costs associated with motor vehicles and their support systems. Section b is concerned with the government railways and analyses the energy cost of fuel, rolling stock and railway lines. In each of these sections the relative efficiencies with which sub-modes perform their transport task are considered. The final section, section c, compares the energy utilization of the Tasmanian transport system with the national average and that of other countries and considers some policies directed towards energy economies. /Author/TRRL/

Perry, NRF Volframs, A  
Tasmania University, (0313-5780) Monograph No. 6, 1977, 48 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234143)  
ORDER FROM: Tasmania University, Board of Environmental Studies, P.O. Box 252C, Hobart, Tasmania, Australia NTIS

PB-283952/OST

#### 16 183322 AN ENERGY OVERVIEW OF AUSTRALIAN TRANSPORT

The paper reviews the development of transport vehicles and systems in Australia as a function of several parameters, a major one being a ready supply of suitable energy. The Australian transport task is assessed in terms of the energy required by each of its components. Several transport modes are reviewed in detail to determine trends in their energy intensiveness. The paper concludes with a comparative analysis of the typical energy intensiveness of various transport modes. /Author/TRRL/

Electric Transport Conference 1977, Papers and Proceedings.

Lawlor, LC (Australian Bureau of Transport Economics)  
Australian Government Publishing Service Book 1978, pp 38-92, 4 Fig., 27 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234169), Australian Road Research Board  
ORDER FROM: Australian Government Publishing Service, P.O. Box 84, Canberra, A.C.T., Australia

#### 16 183323 ENERGY SAVINGS IN THE TRANSPORT SECTOR

This report deals with energy savings at two levels for private cars, lorries, domestic aviation and other transport modes in Sweden. Level 1 comprises measures which are judged to be feasible up to 1990 without negative effects on people's transport situation (stimulants, information, campaigns). At level 2 fairly strict control measures may be considered, but these measures must not affect employment and necessary travel or include fuel rationing. An assessment of these two alternatives indicates that total energy savings in the transport sector will amount to 3% (level 1) and 14% (level 2). An energy-saving program set at the level of 7% is proposed. The measures discussed in this program are directed to reducing the energy consumption

by private motoring and to some extent by lorry transport. The measures considered in the program are the following: (1) information to motorists; (2) training at driving schools; (3) improved compliance with speed regulations; (4) extension of public transport in combination with reorganization of traffic environment and restrictions on use of cars, especially in larger towns; (5) increased car pooling; (6) standards for maximum permissible specific fuel consumption; (7) strictly differentiated motor vehicle tax; (8) voluntary savings program for lorry transport and (9) reinforcement of competitiveness of Swedish railways. /TRRL/

Kommunikationsdepartementet Monograph 1978, 37 pp, 6 Fig., 7 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-234412), National Swedish Road & Traffic Research Institute

ORDER FROM: Kommunikationsdepartementet, Fack, Stockholm, Sweden 78.0424

#### 16 183326 LONGTERM ENERGY DEMAND FORECASTING. A NEW APPROACH

This paper describes a method of energy demand forecasting based on system analysis of the energy demand of a socioeconomic system and scenario description of its development. An application carried out for the French economy is briefly outlined to illustrate the feasibility and practicality of the method. Some general features of the method are reviewed to show how it might be adapted for other countries. /Author/TRRL/

Chateau, B Lapillonne, B *Energy Policy* Vol. 6 No. 2, 1978, pp 140-157, 5 Fig., 8 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-233748)

ORDER FROM: ESL

DOTL JC

#### 16 183340 STANDARDIZATION OF TECHNICAL REQUIREMENTS REGARDING LUBRICATING OILS FOR MARINE, LOCOMOTIVE, AND STATIONARY DIESEL ENGINES [O standartizatsii tekhnicheskikh trebovaniy k smazochnym maslam dlya sudovyykh, teplovoznyykh i statsionarnyykh dizel'nykh dvigateley]

Out of 10 most widely used in the USSR lubricating oils for diesel engines, nine are made by enterprises of the Ministry of Petrochemical Industry according to the ministry's specifications and not according to State standards. These specifications do not indicate the principal engine properties of the oils on the basis of tests. It is urged that State standards be worked out for these lubricating oils. [Russian]

Davydov, PI Mikutenok, YA Sibarova, II *Energomashinostroenie* No. 1, 1978, pp 23-24

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

#### 16 183512 RAIL RAPID TRANSIT AND ENERGY: THE ADVERSE EFFECTS (WITH CLOSURE)

Because it is generally believed that transportation energy can be saved by diverting people from automobiles to rail transit, the United States is now building or planning a number of multi-billion-dollar rail systems. These new-generation rail systems were examined and found to be a net user of energy. The two main points prompting this conclusion are that (a) the energy invested in building a rail system is enormous and thus difficult to repay and (b) the possible savings in operating energy are small, or even negative, because most rail passengers are diverted from buses and buses are more energy efficient than modern rail systems. The analysis was done for San Francisco's Bay Area Rapid Transit (BART) system, but evidence is cited to show that the results are typical for other modern rail systems as well. To the extent that BART is atypical, it appears to be atypically efficient. The analysis takes into account the reduced demand for automobiles and buses because their passengers are diverted to rail and then calculates the energy saved because these conventional vehicles are not built or driven and the roads on which they would travel are not constructed. It is concluded that even radical improvements in automobile diversion, rail patronage, and load factors would not significantly alter the results. /Author/

This article appeared in Transportation Research Record No 648, Environmental and Conservation Concerns in Transportation: Energy, Noise, and Air Quality.

Lave, CA (California University, Irvine); Tennyson, EL (Pennsylvania Department of Transportation); Holden, WHT (Daniel, Mann, Johnson and Mendenhall); List, GF (Pennsylvania University, Philadelphia); Usowicz, TW Hawley, MM (San Francisco Bay Area Rapid Transit District) *Transportation Research Record* No. 648, 1977, pp 14-30, 1 Fig., 8 Tab., 39 Ref.

ORDER FROM: TRB Publications Off

16 183563

**IN SEARCH OF PERPETUAL MOTION**

This paper acknowledges the debt railway engineers owe to mathematicians and physicists of the past and describes the operation of the London Underground in the context of environment, energy, money and manpower.

Maxwell, WW (London Transport Executive) *Institution of Mechanical Engineers Proceedings* Proceeding Vol. 191 No. 24, 1977, pp 147-152, 7 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

16 183567

**CHEMOTOLOGY OF FUELS AND LUBRICANTS**

One of the effective methods for improving the protective properties of fuels is the use of corrosion inhibitors suitable for this particular purpose. In the reported experiments, the following additives were investigated: BMF corrosion inhibitor, MSDA-11 preservative additive, and a batch of mixed additive consisting of KhT-3, KINK-1, and KINK-5, which are respectively the dimethylolurea ester of alkylbenzenesulfonic acids, an ionic complex of distilled naphthenic acids with ethylenediamine, and a similar complex with triethylenetetramine. The mechanism of additive protective action includes two stages: Displacement of water or aggressive electrolyte (such as seawater) from the metal surface, and the formation of adsorbed or chemisorbed protective films on the water free metal. Both stages of corrosion protection by inhibitors were investigated. Test data are presented which show that relative polarization resistance (RPR) of KINK-1 and KINK-5 is high and that the retardation of electrochemical corrosion processes by these additives is effected primarily through the activation component of the protective action, in connection with the high energy of their absorption and with the probable formation of chemisorbed protective films.

Gureev, AA Konstantinov, EA Shekhter, Yu N Churshukov, ES *Chemistry and Technology of Fuels and Oils* Vol. 13 No. 9-10, Sept. 1977, pp 727-729

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

16 183596

**ENERGY SAVING FACTORS IN THE OPERATION OF TRACTIVE UNITS [Faktoren der Energieökonomie im Triebfahrzeugeinsatz]**

This article explains the importance of the engineman's role to achieve the maximum energy savings in running trains. [German]

Schnabel, H *Eisenbahnpraxis* Vol. 22 No. 3, 1978, 4 pp, 5 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Transpress VEB Verlag fuer Verkehrswesen, Franzoesische Strasse 13-14, 108 Berlin, East Germany

16 183615

**THE RAILWAY: THE MOST ENERGY-SAVING TRANSPORT MODE [Die Eisenbahn: das energiesparsamste Verkehrsmittel]**

The author considers critically the energy consumption of road, rail and inland waterway transport. Among the conclusions reached is the fact that the specific consumption of primary energy for passenger and freight transport by road is six times higher than for the same traffic by rail. [German]

Bauermeister, K *Elektrizitaetswirtschaft* Vol. 77 No. 9, 1978, pp 327-329, 6 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

16 184948

**HOW TO ECONOMISE IN TRANSPORT, INTERMINISTERIAL STUDY OF THE RATIONALIZATION OF BUDGETARY CHOICE [Comment economiser dans les transports, etude interministerielle de rationalisation des choix budgetaires]**

This report, prepared at the request of the Chancellor of the Exchequer and of the Secretary of State for Transport, is the first work of an interministerial review group. It analyses the current French situation as regards energy in the transport section in relation to the development of international exchanges. It envisages the energy economies possible in each transport technology (cars, road freight, rail freight, transport by ship and by air) and the measures which should be taken in the organisation of passenger and freight transport. It also examines the results to be expected. [French]

Merlin, P

Ministere de l'Economie et des Finances Monograph Nov. 1976, 260 p., 10 Fig., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-105180), Central Laboratory of Bridges & Highways, France, Institute of Transport Research

ORDER FROM: Ministere de l'Economie et des Finances, Palais du Louvre, rue de Rivoli 93, Paris, France

NEV33

16 185355

**DAMAGE CAUSED BY BACTERIA TO DIESEL ENGINE LUBRICANTS [La degradation par les bacteries des huiles de graissage de moteurs Diesel]**

Short article on a problem into which very little research has been done in France: major damage to diesel engines has been proved to be the result of degeneration in the lubricants caused by bacteria; until recently it was thought that such damage was due to electrochemical corrosion. [French]

Kerneur, J *Bulletin technique du Bureau Veritas* No. 7-8, July 1978, pp 188-190, 3 Phot., 8 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Bureau Veritas, 58 bis, rue Paul Vaillant-Couturier, Levallois-Perret, France 92300

16 185364

**FUEL, LUBRICATION, AND WATER [Topливо, smazka, voda]**

This book is divided into three sections. The first reviews the classification, composition, and basic properties of various types of fuels, and ways to economize fuel and normalize its consumption on diesel locomotives. The second section presents the basic characteristics, methods of obtaining, and uses for lubricating oils. The third section describes the composition and properties of natural waters, reasons for the formation of deposits and corrosion of metals, methods for the preliminary treatment of water, and methods of preparing water for cooling diesel locomotive engines and feeding steam locomotive boilers. The book has been approved by the main department of educational institutions as a textbook for use in instructing technical students and as a teaching aid for students in technical schools of railroad transportation. [Russian]

Full translation available at the Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Gonchazov, VM Murzin, LG

Transport Publishing House 1973, 200 p., 63 Tab., 18 Ref.

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP

16 188095

**OPTIMUM ENERGY-SAVING METHOD FOR TRAIN CONTROL AND TIMETABLE ALTERATION [Zur energie-optimalem Zugsteuerung und Fahrplanmodifikation]**

Presentation of the results of theoretical and experimental research aimed at energy-saving in urban and suburban rail traffic. According to these studies, energy consumption may be reduced by 15 to 20 percent by using a microcalculator on board the motive power unit and modifying running plans. [German]

Horn, P Winkler, A *DET Eisenbahntechnik* Vol. 26 No. 8, Aug. 1978, pp 324-328, 5 Fig., 3 Tab., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: VEB Verlag Technik, Oranienburgerstrasse 13-14, 102 Berlin, East Germany

**16 188317**  
**TRANSPORTATION IN ENERGY CRISIS [Transporter vid energikris]**

Several studies presented recently have come to the conclusion that the world's oil production will probably start slowing down in the near future, and there are many signs indicating that there will be a drastic shortage of energy in the coming decades. This means that an improved management of energy resources in the form of more efficient utilization of available energy is necessary. The main question dealt with in this report is how energy consumption for inter-regional transport in Sweden can be reduced by relatively short term organizational changes. The analyses presented in the study are based on the assumption that the level of activity in the community will be largely maintained in spite of reductions in energy supplies. Consequently, energy will have to be saved by more effective use of available transportation and by a more rational regional study of production and consumption. In regard to inter-regional passenger transportation, the study concludes that the greatest energy saving potential lies in the transition of travel to low energy models of transportation, bus, railway etc. And in the case of inter-regional goods transportation, the reorganization that would save the most energy would be the transition of road haulage goods to the railways. /TRRL/ [Swedish]

Engstroem, MG Sahlberg, R Waermark, A  
 Nordplan Monograph Rapport 1978:1, 1978, 268 p., 9 Fig., Tabs., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-235935), National Swedish Road & Traffic Research Institute

ORDER FROM: Nordplan, Skeppsholmen, Stockholm, Sweden

P6012

**16 188637**  
**ENERGY DEMAND AND ENVIRONMENTAL PROTECTION IN GERMAN TRANSPORT**

After describing the development of primary energy demand, the conversion to final energy, and the covering of remaining requirements by imports in the period between 1973 and 1974, the article deals with developments in energy consumption in the four modes of transport, and the different technical conditions of road and rail transport. Special consideration is given to the results of the changes in the DB's motive power services, including the reduction in pollution by the elimination of harmful emissions and the substantial drop in energy demand with simultaneous increase in transport performance. [German]

Froboess, U *Eisenbahntechnische Rundschau* Vol. 26 No. 7-8, July 1977, pp 509-516

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

**16 188639**  
**SECTORAL MACRO-AND MICRO-ANALYSIS OF ENERGY APPLICATION IN TRANSPORT**

An analysis of the development in the various transport sectors during the period 1950 to 1975 makes it clear that the increase in final energy consumption in transport was brought about by land transport. Structure,

development trends, and possibilities to use energy in the transportation sector more efficiently were investigated. [German]

From Meeting on the application of energy at the final consumption stage-analysis, planning, techniques; Schliersee, Germany, FR, May 17-18 1977.

Prechtel, H *VDI-Berichte* No. 282, 1977, pp 41-45

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: ESL

**16 188641**  
**CANADIAN RAILWAY ENERGY CONSERVATION AND ALTERNATIVE FUELS**

Possibilities for energy conservation and energy substitution within the rail mode are investigated. Estimates are made of potential energy conservation from operational changes, technological changes and infrastructure changes. The status of alternative hydrocarbon fuels in railway applications is assessed and alternative energy systems are evaluated. Recommendations are made for railway implementation of some points and further investigation of others.

English, GW Lake, RW Roney, MD Taggart, J  
 Canadian Institute of Guided Ground Transport Final Rpt. CIGGT-Rpt 78-13, Aug. 1978, 98 p., Figs., Tabs., 2 App.

Contract 7538

ACKNOWLEDGMENT: CIGGT

ORDER FROM: CIGGT

DOTL RP

**16 188693**  
**RAILROADS AND THE ENVIRONMENT: ESTIMATION OF FUEL CONSUMPTION IN RAIL TRANSPORTATION VOLUME III. COMPARISON OF COMPUTER SIMULATIONS WITH FIELD MEASUREMENTS**

This report documents comparisons between extensive rail freight service measurements (previously presented in Volume II) and simulations of the same operations using a sophisticated train performance calculator computer program. The comparisons cover a variety of lengthy freight movements over a differing terrain, for TOFC, boxcar, and branchline operations. The simulation shows excellent agreement (within 2%) for aggregated data, although some specific runs or run segments show substantial deviations. Uncertainty is typically plus or minus 10% to 15%, a range equivalent to the scatter generally found within sets of measured data. The report also includes a full description of the simulation program and a general analysis of the major factors which bear upon the validity and accuracy of train performance calculations. Proposed modifications to conventional train resistance equations are suggested.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. Volume I, Analytical Model, has 90 pp. Volume II, Freight Surface Measurements, has 46 pp.

Hopkins, J Hazel, M McGrath, T  
 Transportation Systems Center Final Rpt. FRA/ORD-75-74.III, DOT-TSC-FRA-78-16III, Sept. 1978, 102 p., 8 Fig., 11 Tab., 10 Ref.

ACKNOWLEDGMENT: FRA

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PB-288866/AS, DOTL NTIS, DOTL RP

17 176256

**INTERMODAL MANAGEMENT INFORMATION SYSTEM-PHASE II. STATE-OF-THE-ART SURVEY**

Survey objectives were to determine the state of existing and planned systems which support any or all aspects of intermodal activity, and to identify unmet needs. A sample of eight railroads was surveyed. In addition, one common carrier, two trucking subsidiaries, and one international water carrier were included to further diversify the investigation of intermodal activities. Findings of the survey were verified by a search of pertinent literature and related research. All railroads, other than the smallest, presently have some type of automated systems supporting intermodal management and control. These vary widely in sophistication, in the degree to which mechanized processing is employed, and in the extent to which intermodal processing is embedded in existing rail systems. The use of data processing techniques for the intermodal carrier has been, in large part, an outgrowth of automated systems developed for carload traffic and does not take into consideration the unique nature of intermodal traffic (e.g., the need to keep an inventory of two pieces of equipment rather than one). Survey participants indicated that increased capabilities are needed in the following areas: an intermodal equipment control system; a repetitive waybilling and rating system; and a profit analysis system.

Prepared in cooperation with Ford, Bacon and Davis, Inc., Washington, D.C. and Norfolk and Western Railway Co., Va.

Peternick, J Fredrickson, V Pflugrad, A Rynders, B Wiersema, R PRC Systems Sciences Company, Ford, Bacon and Davis, Incorporated, Norfolk and Western Railway, Federal Railroad Administration Final Rpt. FRA/OPPD-78/8, Mar. 1978, 171 pp

Contract DOT-FR-741-5157

ACKNOWLEDGMENT: NTIS  
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PB-281016/6ST

17 180266

**COMPUTERIZED LOCOMOTIVE DISTRIBUTION [L'affectation des locomotives aux trains par ordinateur]**

The first article gives a detailed description and analysis of the Automatic Locomotive Distribution System (SYAAL) which can determine the successive allocations of a fleet of locomotives, while at the same time ensuring that the service is covered by a minimum number of motive power units. Article 2 describes COSAL, a computer program for optimizing train/locomotive allocation that evolved to a new mathematical model, which is better adapted to traffic fluctuations in real time and compatible with SYAAL. [French]

Carenco, G Genete, M *Revue Generale des Chemins de Fer* Mar. 1978, pp 184-208, 5 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

DOTL JC

17 180277

**APPROACH METHOD FOR EMPTY WAGON DISTRIBUTION [Naeherungsverfahren fuer die Leerwagenverteilung]**

When automating empty car distribution, it is necessary to adapt the rate of commands to that of movements. Computer calculations must, therefore, be completed at a given time. The author studies several mathematical models that could be used in this context. [German]

Hein, O *Eisenbahntechnische Rundschau* Vol. 27 No. 1-2, Jan. 1978, pp 73-78, 8 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

17 180324

**COMPUTERIZED PROJECT-MANAGEMENT SYSTEM SERVES B&M'S SPECIAL NEEDS**

Cost control center with terminals meets requirements for timely reports on extensive amounts of railroad-financed projects and jobs.

Davis, T *Railway Track and Structures* Vol. 74 No. 7, July 1978, 3 pp, 2 Phot.

ORDER FROM: ESL

DOTL JC

17 180376

**SENSITIVITY ANALYSIS OF MULTICOMMODITY NETWORK FLOWS**

Given the multicommodity flow solution for a current transportation or communication network the authors analyze some kind of heuristic measure of the effectiveness of new links which might potentially be added to the network. This paper suggests the use of the dual variables associated with the new arcs. The paper also develops an efficient method for determining these dual variables from the current solution.

Jarvis, JJ (Georgia Institute of Technology); Martinez, OM *Transportation Science* Vol. 11 No. 4, Nov. 1977, pp 299-306, 4 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

17 181708

**A DIRECTORY OF COMPUTER SOFTWARE APPLICATIONS-TRANSPORTATION, 1970-APRIL, 1978**

Transportation reports that list computer programs and/or their documentation are cited. These software applications pertain to topics, such as motor vehicle safety, aviation safety, air traffic control, rail freight handling, motor vehicle traffic control, marine transportation scheduling, global navigation systems, and noise exposure. The directory contains complete bibliographic data for each report as well as a subject and a corporate author index.

National Technical Information Service NTIS/SA-78/07, Apr. 1978, 94 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-279570/6ST

17 182067

**FREIGHT CAR DEMAND INFORMATION AND FORECASTING RESEARCH PROJECT. INDUSTRY REPORT**

A rail freight car demand forecasting study was initiated to investigate the nature of short-range shipper demand and the requirements for a forecasting system (Phase I, Final Report, March 1975) and to develop a forecasting system based on those requirements to predict that demand (Phase II, Final Report, November 1977). This report is an implementation guide for the railroad industry of the demand forecasting system (D4) developed in Phase II. The report briefly reviews the work in the previous phases of research, relates the relevant issues as to the use of a demand forecasting system, covers the method and procedures needed to set up D4, and serves as a 'user's manual' to D4. By using D4 as described in this report as the basis of a demand forecasting system, a railroad can quickly and inexpensively computerize an important component of its car distribution system.

See also Phase I, PB-261473.

Minger, WK Hargrove, MB  
Association of American Railroads Technical Center, Federal Railroad Administration FRA/OPPD-78/13, May 1978, 95 p.

Contract DOT-FR-30058

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-285417/2ST, DOTL NTIS

17 182070

**RAILROAD OPERATIONS MODULAR PROCESSING SYSTEM: SYSTEM DESIGN SUMMARY**

The Railroad Operations Modular Processing System (ROMPS) is intended to provide a comprehensive package of hardware and software components for a mini-computer based data processing system for smaller railroads which will assist them in automating many clerical railroad functions presently undertaken manually. This report describes the capabilities of the various ROMPS hardware and software and was prepared principally for the information and review of short line railroads which might be interested in participating in the system. (Portions of this document are not fully legible)

Ocean Data Systems, Incorporated, Federal Railroad Administration FRA/OPPD-78/15, Apr. 1978, 170 p.

Contract DOT-FR-65146

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-285442/0ST, DOTL NTIS

17 182071

**MASSTRAM**

No Abstract.

Set includes PB-285449 thru PB-285451, RRIS 17 182072 thru 182074 respectively; Bulletin 7901.

Boston University, Urban Mass Transportation Administration 3 Volumes, 1977, 339 p.

ACKNOWLEDGMENT: NTIS

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PB-285448-SET/ST, DOTL NTIS

17 182072

**MASSTRAM: THE DEVELOPMENT OF A COMPUTER SYSTEM FOR THE COST-EFFECTIVE MAINTENANCE OF RAIL EQUIPMENT IN URBAN MASS TRANSIT SYSTEMS**

This document is intended as a management oriented guide to the rail vehicle maintenance scheduling problem and to the new model (MASSTRAM) developed for evaluating such schedules. This final report outlines and discusses a three phase project for the development of a conversational computer system for the cost-effective maintenance of heavy equipment in urban mass transit systems. Phases I and II consisted of operations analysis of maintenance activities at selected properties, namely, on maintenance procedures at the Massachusetts Bay Transportation Authority (MBTA). Phase III consisted of the development of a model called MASSTRAM (Maintenance Analysis and Scheduling System for Transit Management). A new model, MASSTRAM, has been designed to be compatible with whatever information system a transit property uses for collecting and storing information on vehicle maintenance and repair activities. MASSTRAM has the ability to evaluate the cost and service loss implications of any specified maintenance strategy, given the prevailing maintenance/break-down relationships. In addition, the model can be used to generate an 'optimal' preventive maintenance schedule. A 'User's Manual' has been written for MASSTRAM containing detailed explanations of all options available. MASSTRAM is now operational. MBTA plans to incorporate MASSTRAM in their Computerized Maintenance Records System when their system is completed. The value of MASSTRAM rests with the use to which it is put by transit management and staff, and with the ability of information systems to provide the model with up-to-date accurate information in the required formats.

See also PB-285450. Also available in set of 3 reports PC E06, PB-285 448-SET. RRIS 17 182071; Bulletin 7901.

Herniter, JD Rosenthal, SR Welam, UP

Boston University, Urban Mass Transportation Administration Final Rpt. UMTA-MA-06-0073-78-1, June 1977, 199 p.

Contract DOT-MA-06-0073

ACKNOWLEDGMENT: NTIS

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PB-285449/5ST, DOTL NTIS

17 182073

**MASSTRAM: USER'S MANUAL FOR MASSTRAM**

The final report (UMTA-MA-06-0073-78-1) of this project is intended as a management oriented guide to the rail vehicle maintenance scheduling problem and to the new model (MASSTRAM) developed for evaluating such schedules. It outlines a three phase project for the development of a conversational computer system for the cost-effective maintenance of heavy equipment in urban mass transit systems. Phases I and II consisted of operations analysis of maintenance activities at selected properties, namely, on maintenance procedures at the Massachusetts Bay Transportation Authority (MBTA). Phase III consisted of the development of a model called MASSTRAM (Maintenance Analysis and Scheduling System for Transit Management).

See also PB-285449, and PB-285451. Also available in set of 3 reports PC E06, PB-285 448-SET. RRIS 17 182071; Bulletin 7901.

Herniter, JD Rosenthal, SR Welam, UP

Boston University, Urban Mass Transportation Administration UMTA-MA-06-0073-78-2, June 1977, 71 p.

Contract DOT-MA-06-0073

ACKNOWLEDGMENT: NTIS

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PB-285450/3ST, DOTL NTIS

17 182074

**MASSTRAM: SOURCE LISTING**

The final report (UMTA-MA-06-0073-78-1) of this project is intended as a management oriented guide to the rail vehicle maintenance scheduling problem and to the new model (MASSTRAM) developed for evaluating such schedules. It outlines a three phase project for the development of a conversational computer system for the cost-effective maintenance of heavy equipment in urban mass transit systems. Phases I and II consisted of operations analysis of maintenance activities at selected properties, namely, on maintenance procedures at the Massachusetts Bay Transportation Authority (MBTA). Phase III consisted of the development of a model called MASSTRAM (Maintenance Analysis and Scheduling System for Transit Management).

See also PB-285448. Also available in set of 3 reports PC E06, PB-285 448-SET. RRIS 17 182071; Bulletin 7901.

Herniter, JD Rosenthal, SR Welam, UP

Boston University, Urban Mass Transportation Administration UMTA-MA-06-0073-78-3, June 1977, 69 p.

Contract DOT-MA-06-0073

ACKNOWLEDGMENT: NTIS

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PB-285451/1ST, DOTL NTIS

17 182789

**SYSTEM REQUIREMENTS AND BENEFITS OF A TERMINAL INFORMATION SYSTEM FOR THE KANSAS CITY RAILROADS**  
No Abstract.

Reymond, RD Troup, KF

Transportation Systems Center Final Rpt. FRA/OPPD-76-6, Aug. 1976, 144 pp, Refs.

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: NTIS

17 182803

**GRAPHIC DATA PROCESSING FOR THE WEST GERMAN RAILROAD SYSTEM [Graphische Datenverarbeitung bei der Deutschen Bundesbahn]**

The West German Railroad system has been gaining experience in automatic drawing for about ten years now. After a test period, four drawing machines were installed. Regarding the efficiency of this type of equipment, hardware development is of considerable importance. The basic software, as well as the operations systems, play a fundamental role for the further development of application software. Graphic data processing includes (because of digital/analog conversion) both automatic drawing and digitalization. [German]

Pauletzki, G (German Federal Railway); Hupfeld, W *Elektronische Rechenanlagen mit Computer Praxis* Vol. 19 No. 5, Oct. 1977, pp 239-249

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

17 182872

**SYSTEM FOR FULLY AUTOMATING THE PROCESSING OF DATA FROM DYNAMIC TESTS OF ROLLING STOCK [Sistema polnoy avtomatizatsii obrabotki dannykh dinamicheskikh ispytaniy podvizhnogo sostava]**

The paper examines the problems of developing a system for fully automating the processing of data from dynamic tests of rolling stock on the basis of the "Dispersiometr" computer, the procedure for recording information on magnetic tape, and the operation of the entire system as a whole. [Russian]

See also RRIS 02 182865; Bulletin 7901.

Cherkashin, Yu M Godnev, VK *Trudy TsNII* Proceeding No. 548, 1976, pp 87-93

ACKNOWLEDGMENT: FRA

ORDER FROM: Transport Publishing House, Basmannyi Tupik, 6a, Moscow B-174, USSR

DOTL RP



17 183309

**UP: ESCAPING THE PAPERWORK JUNGLE**

Outbound Waybilling (OWB), subsystem of Union Pacific's Agency Accounting System, is utilizing a central computer, 7 remote computers and satellite input/output terminals to give network access for 231 freight agencies which produce 650,000 waybills and 250,000 freight bills each year. The benefits include more accurate bills and more current financial reporting along with reduced clerical effort.

*Railway Age* Vol. 179 No. 15, Aug. 1978, pp 40-42, 1 Phot.

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17 183593

**QUESTION 1: ESTABLISHMENT OF DUTY ROSTERS AND ROTATION OF TRAIN CREWS (DRIVERS AND GUARDS) AND OR LOCOMOTIVES AND MULTIPLE UNITS BY MEANS OF COMPUTERS**

As part of the intersession activities of the IRCA in 1977 and 1978, a report has been drawn up by the authors, Mr. Maffei for French and German-speaking Railways and Mr. Holt for English-speaking Railways on the Establishment of duty rosters and rotation of train crews (drivers and guards) and of locomotives and multiple units by means of computers. The article quotes the conclusions reached jointly by the two rapporteurs and gives the two reports which were drawn up on the basis of the replies to a questionnaire sent to all IRCA members.

Maffei, G Holt, J *Rail International* Vol. 9 No. 7-8, July 1978, pp 455-511, 6 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

17 183601

**CENTRALISED TRAFFIC CONTROL SIMULATION ON THE GERMAN FEDERAL RAILWAY [Eine Grosssimulation fuer die Integrierte Transportsteuerung der Deutschen Bundesbahn]**

The data pyramid concept developed by Schmitz in the mid sixties for the DB's centralized traffic control (ITS) was based on simulation. The necessary system analysis produced 58 different types of information that would have to be processed on a network with more than 100 computers and some 10,000 data centres. Judging from the simulation results, ITS is feasible. It will be introduced by stages. [German]

Hein, O *Internationales Verkehrswesen* Vol. 30 No. 3, 1978, pp 192-196, 1 Tab., 5 Phot., 21 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Dr Arthur Tetzlaff-Verlag, Niddastrasse 64, Frankfurt am Main, West Germany

17 184643

**ELECTRONIC DATA PROCESSING AT THE WEST GERMAN RAILROAD SYSTEM. CLAIMS AND REALITY [Elektronische Datenverarbeitung bei der Deutschen Bundesbahn, Anspruch und realitaet]**

The introduction and application of electronic data processing at the West German railroad is reported, along with data processing and arithmetic techniques realized at present in various areas of application. Data collection and data transmission and both the hardware and the software are discussed. Areas of application to be integrated into the data processing system of the future are considered, including the use of microprocessors. [German]

Gottfried, G *Elektrische Bahnen* Vol. 48 No. 9, Sept. 1977, pp 226-231

ACKNOWLEDGMENT: EI

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DOTL JC

17 184645

**CONTINUOUS POWER SUPPLY SYSTEMS FOR ELECTRONIC DATA PROCESSING INSTALLATIONS AND THEIR APPLICATION AT THE WEST GERMAN RAILROAD SYSTEM [Unterbrechungsfreie Energieversorgung fuer EDV-Anlagen und ihre Anwendung bei der Deutschen Bundesbahn]**

EDP installations must meet the requirements concerning availability and safety, especially when operational processes have to be controlled.

Installations securing a continuous power supply eliminate damaging interruptions of the power supply network and contribute to a higher availability. The construction of such installations is considered, and a comparison is made of the operating characteristics. [German]

Topic also covered in Volume 48 No. 10, October 1977, pages 210-219.

Middendorf, E (Bundesbahn, Groebenzell, W Germany) *Elektrische Bahnen* Vol. 48 No. 9, Sept. 1977, pp 261-263, 5 Ref.

ACKNOWLEDGMENT: EI

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DOTL JC

17 184652

**MONITORING RAILWAY SYSTEM SAFETY AND OPERATION WITH ON-LINE COMPUTER**

An on-line, real-time computing facility, based on a PDP 11/70 and designed to monitor the safety and operation of a railway system is described. The basic components of the facility include memory management, 2K byte parity bipolar cash memory, 128K byte parity core memory expansion, 1600 BPI 9 track magnetic tape drive and control at 75 inch per second, 20M byte disk drive and control, 64 Ch 600 LPM printer and two 512 channel pulse height analyzers. The system will have an RSX-11M operating system and a Fortran IV license.

Paper Presentations Proc Digital Equipment Computer Users Society, Volume 3 No. 5, Australia DECUS Symposium; James Cook University, Townsville, Queensland, August 29-September 2, 1977.

Kemeny, LG (New South Wales University, Australia)

Digital Equipment Corporation Proceeding 1977, 7 p., 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: Digital Equipment Corporation, Maynard, Massachusetts, 01754 ESL

17 184670

**FREIGHT DISTRIBUTION MODEL PREDICTIONS COMPARED: A TEST OF HYPOTHESES**

The transportation problem and a doubly constrained gravity model with a power deterrence function are used to find predictions of a number of 134 x 134 freight matrices detailing tonnages moved in Great Britain in 1972. The matrices detail movements by thirty commodity groups, and predictions are obtained for movements by road for all but one of the commodities and for the principal items carried by rail. These predicted matrices are used to examine a number of questions. The relationships between some alternative goodness-of-fit statistics are examined to establish which commodities are best modelled by each technique and to point out empirically which statistics give unreliable rankings. Various summary measures of the actual matrices are examined to see if it is possible to predict which matrices will be best modelled by each technique. The modelling techniques are compared to indicate which provides the best predictions for each matrix, and some conclusions are offered on the absolute efficiency of the best models.

Pitfield, DE *Environment and Planning A* Vol. 10 No. 7, July 1978, pp 813-836, 1 Fig., 10 Tab., 40 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-235405)

ORDER FROM: Pion Limited, 207 Brondesbury Park, London NW2 5JN, England

17 188053

**STRUCTURING FOR PROFIT MANAGEMENT**

To improve the organization for railroad profit management, the controllable and uncontrollable dimensions of profit at various management levels must be identified and management information necessary for decentralized profit management must be more clearly delineated. Product line management, equipment management and the interface between them are discussed. Along with adequate profit measurement of existing traffic, there must be analytic capacity to assess the profit implications of pending decisions.

Lang, AS (Association of American Railroads); Burd, SA (Southern Pacific Transportation Company) *Railway Age* Vol. 179 No. 24, Dec. 1978, pp 41-43, 3 Fig.

ORDER FROM: ESL

DOTL JC

18 157207

**RAIL TRANSIT SYSTEM COST STUDY**

The cost of constructing, operating and maintaining three kinds of urban rail systems: light rail, rapid rail and commuter rail, were assessed. Cost data from several North American and European transit authorities were collected and analyzed. These data, together with recent experience of the Consultant in several transit construction projects, served as the basis of the cost projections. Factors influencing appreciable cost variations in construction and operations were reviewed and included as criteria for cost projects.

/Author/

Sponsored by DOT, Urban Mass Transportation Administration.

Dyer, TK Hale, WK Ingalls, FA Whelan, RB Dyer (Thomas K), Incorporated, (DOT-TSC-UMTA-75-22) Final Rpt. UMTA-MA-06-0025076-3, Mar. 1977, 114 pp, 1 Fig., 13 Tab., 2 App.

Contract DOT-TSC-808

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18 180251

**THE IMPACT OF STRUCTURAL AND COMPOSITIONAL CHANGES ON THE CANADIAN RAILWAY INDUSTRY: 1958-1973**

The purpose of the article is to quantify the influence of changes in the structure and nature of gross national expenditure on the main economic variables within the railway industry in Canada between 1958 and 1973. The author has recorded that such changes have led to drops of 3 and 6 percent respectively in the growth rate for railway tonnage and ton/miles. On the other hand, they have caused increases of 5 percent in the real level of receipts.

Someshwar Rao, P *Transportation Research* Vol. 12 No. 2, Apr. 1978, pp 79-82, 3 Tab., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

18 180252

**ESTIMATING COST FUNCTIONS FOR RAIL RAPID TRANSIT PROPERTIES**

Estimating the relations existing for transport modes between costs and productivity is an important factor when establishing price and investment policy for urban and suburban transport. The article discusses the use of an econometric method to establish the cost factors for urban/suburban transport companies.

Pozdena, RJ Merewitz, L *Transportation Research* Vol. 12 No. 2, Apr. 1978, pp 73-78, 4 Tab., Refs.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

18 180359

**EARLY WARNING REPORT--FINANCIAL CONDITION AND PROSPECTS OF CONRAIL**

The staff study uses a number of productivity and efficiency measurements to assess ConRail's performance, and the results are largely negative. Much of this information is not new, however. It was previously included in a report made public by the United States Railway Association. ConRail has subsequently made some changes in top management and has developed, as the ICC report says, an "innovative and unique approach" to railroad marketing. While important changes have occurred, one must continue to be concerned about ConRail's poor performance.

Interstate Commerce Commission Aug. 1978, 51 pp

ORDER FROM: Interstate Commerce Commission, 1112 ICC Building, Washington, D.C., 20423

DOTL RP

18 180521

**CONRAIL'S PROFITABILITY: FRAMEWORK FOR ANALYSIS**

Conrail has expressed a need for \$1.3 billion in addition to the \$2.0 billion appropriated in 1976. Financial projections made by the United States Railway Association in 1976, when Conrail began operating, assumed that \$2.0 billion would be all of the Federal assistance that the railroad would need to become self-supporting. Because of this probable change in Conrail's

financial outlook, the Congress should reassess the information which it needs to fulfill its oversight responsibilities. This study shows that to be able to make its own assessments of the prospects for Conrail's profitability, the Congress will need information and analysis explaining how Conrail's experience matches key assumptions underlying the financial projections.

General Accounting Office PAD-78-52, Apr. 1978, 27 pp

ACKNOWLEDGMENT: NTIS

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PB-279426/1ST

18 181072

**SURVEY OF COST OF RAIL VERSUS NEW TECHNOLOGY FOR LONG DISTANCE COAL TRANSPORTATION. FINAL REPORT**

Coal slurry pipelines were determined to be potentially more economical and environmentally acceptable; more suitable than rail in rugged terrain, relatively inflation resistant (capital intensive), large consumers of water, low in environmental pollution (electric power, underground system), and with a proven technology (Black Mesa Pipeline) although not fully developed. Pneumatic pipelines were determined to be not technically proven for long distance, effective for short distance coal haulage (about 10 miles), i. e. potentially effective for transporting coal to central locations for shipment by other means. Rail transport of coal was determined to be most economical in areas where system exists, dependent on petroleum now, able to convert to electric power, susceptible to inflation (labor intensive), polluting (diesel exhaust, noise, dust), more hazardous to the general public (rail-roadway crossings), and able to increase efficiency through available technology (lightweight coal cars, more efficient locomotives, advanced design roadbed). Both rail and slurry pipelines will require large capital investments to increase capacity equal to future coal production. The relative merit of each system changes in relation to terrain and existing systems. To fully meet projected coal transportation needs, both systems will be needed. By 1985 coal slurry pipelines could carry 10% of western coal. Introduction of pipeline coal transport will not pose a threat to the survival of the western railroads. (ERA citation 03:027773)

Davis (JJ) Associates, Department of Energy 1976, 69 pp

ACKNOWLEDGMENT: NTIS

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HCP/I3461-01

18 181986

**MONETIZATION OF TRANSPORTATION IMPACTS: POLICY EVALUATION METHODOLOGY**

The impacts of transportation investments are often measured in units that make comparisons difficult. Converting the units of an impact into equivalent dollar values (called monetization) will allow the combination of diverse effects measured in different inherent units. The result of this monetization process should provide additional objective and useful information in the decision-making process, and thus improve the analysis of investment alternatives. This report concentrates on those impacts that are relatively easy to monetize (travel time, energy use) and those impacts that are relatively difficult to monetize (pollution, accidents). Monetization for current values only is considered. The report consists of nine parts: an introduction and summary of the findings plus eight appendixes detailing the monetization process for a number of transportation impacts. The appendixes discuss the following: pollution, crime, accident costs, comfort, residential and business relocation, travel time and energy use.

Rock, SM

Illinois University, Chicago, Urban Mass Transportation Administration  
Final Rpt. UMTA-IL-11-0008-78-1, Apr. 1978, 138 p.

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-284585/7ST

18 182113

**SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEMS. PHASE I. EXPLORATORY PLANNING. VOLUME IV. TASK RESULTS**

Volume IV documents analysis of current intermodal system and equipment characteristics; identification of institutional, regulatory, and operational constraints to intermodal freight service; discussion of problems and opportunities; and identification of appropriate goals and objectives for an improved intermodal system; development of an evaluation methodology to

compare alternative systems: selection of appropriate evaluation factors and criteria, and recommendation of relative weights to be assigned to each evaluation factor and criteria; identification of improved and innovative technological components for intermodal freight movement, technological assessment of each component, synthesis of components into subsystems (pick-up and delivery, terminal, and line-haul), analysis at the subsystem level, and development of technologically compatible systems; and, final evaluation of alternative technological systems with respect to economics, service, operational impact, technological considerations, and social implications.

Prepared in cooperation with Battelle Columbus Labs., OH., Banks (R. L.) and Associates, Inc., Washington, DC. and Boeing Computer Services, Inc., Arlington, VA. See also PB-282370 and PB-286036.

Hill, D Leilich, R Elliff, A Morice, W Edsforth, J Peat, Marwick, Mitchell and Company, Battelle Columbus Laboratories, Banks (RL) and Associates, Incorporated, Boeing Computer Services Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-78/24.IV, 289-53177-VOL-4, July 1978, 468 p.

Contract DOT-FR-749-4273

ACKNOWLEDGMENT: NTIS  
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PB-286035/1ST, DOTL NTIS

**18 182114**  
**SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEMS. PHASE I. EXPLORATORY PLANNING. VOLUME V. TASK RESULTS: APPENDICES**

Appendix A documents the Intermodal Cost Calculator, which is the model used to perform the economic evaluation. Appendix B documents the technological assessment of component alternatives analyzed by the study team. Appendix C lists the parameters describing each technological alternative in terms of cost, performance, and other factors. Appendix D documents the formulae used in the life cycle cost model developed by the study team to calculate cost of ownership and terminal tie/untie costs. Appendix E presents the input data values and detailed results of the economic evaluation.

Prepared in cooperation with Boeing Computer Services, Arlington, VA. Battelle Columbus Labs., OH. and Banks (R. L.) and Associates, Inc., Washington, DC. See also PB-286035.

Hill, D Leilich, R Elliff, A Morice, W Edsforth, J Peat, Marwick, Mitchell and Company, Boeing Computer Services Incorporated, Battelle Columbus Laboratories, Banks (RL) and Associates, Incorporated, Federal Railroad Administration Final Rpt. FRA/ORD-78/24.V, 289-53177-VOL-5, July 1978, 272 p.

Contract DOT-FR-749-4273

ACKNOWLEDGMENT: NTIS  
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PB-286036/9ST, DOTL NTIS

**18 182598**  
**YOUR OWN RAIL CARS: BENEFITS, MAINTENANCE CONCERNS**

Leasing or owning offers distinct advantages. But there are important maintenance considerations to keep in mind.

Quinn, FJ *Traffic Management* Vol. 17 No. 7, July 1978, 6 pp

ACKNOWLEDGMENT: Traffic Management  
ORDER FROM: Cahnners Publishing Company, Incorporated, 205 East 42nd Street, New York, New York, 10017

**18 182609**  
**UCOST: A MICRO APPROACH TO A TRANSPORTATION PLANNING PROBLEM**

UCOST is a software system that has been developed for use by planners in estimating the cost of proposed mass transportation systems. The models in UCOST represent an unusual micro approach to a planning problem. To derive its cost estimates, UCOST finds feasible vehicle schedules and an accurate estimate of crew requirements over the day for the proposed multi-modal transit system. The procedures in UCOST differ from the usual macro approach of costing transit systems which are based on simple characteristics of the proposed transit system such as vehicle in-service hours. Through the development of fast computational procedures such a

micro approach is possible. UCOST is being implemented within the Urban Transportation Planning System, a computer package for transportation planners developed by the Urban Mass Transportation Administration. A description of the procedures in UCOST and its implementation is presented.

Bodin, L (Maryland University, College Park); Rosenfield, D Kydes, A *Journal of Urban Analysis* Vol. 5 No. 1, 1978, pp 47-69, 11 Ref.

ACKNOWLEDGMENT: EI  
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**18 182788**  
**THE FEDERAL RAILROAD ADMINISTRATION COST RESEARCH PROGRAM**  
No Abstract.

A presentation to the Association of American Railroads Cost Analysis Organization, San Francisco, California, April 6-7, 1977.

Federal Railroad Administration Status Rpt 1977, 94 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO  
ORDER FROM: FRA

**18 182829**  
**THE ECONOMICS OF COAL SLURRY PIPELINING: TRANSPORTATION AND NON-TRANSPORTATION FACTORS**

The factors pertinent to the controversy over slurry pipelining are analyzed. Capital and operating costs are analyzed for railroads and pipelines in competitive situations. Non-transportation factors such as environmental effects, water supply, export of resources and existing institutional arrangements are also discussed.

Farris, MT Shrock, DL (Arizona State University, Tempe) *Transportation Journal* Vol. 18 No. 1, 1978, pp 45-57, 3 Fig., 3 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

**18 182892**  
**COAL TRANSPORTATION STUDY. FINAL REPORT**

The Coal Transportation involved a literature search of all relevant documents written in 1970 or later. The purpose of this search was to identify factors which could serve as indicators of the energy/cost efficiency of coal transportation. The various modes of transportation considered were barge, mixed rail, pipeline, and unit train. Over 170 reports, articles, hearings, and other studies were gathered and reviewed. The majority of the documents dealt with coal transportation efficiency in a very general way disregarding specific route factors such as circuitry, grade, return trip, etc. The information was evaluated and summarized in a computer file. A detailed review of the computer output identified a wide range of values for many of the mode, volume, and distance combinations. Examination of the bibliography revealed little first-hand information from coal transporters. It was concluded that: (1) The data base constituted by those reports written since 1970 and currently in the public domain does not contain sufficient specific data to allow meaningful comparisons of coal transportation modes. (2) BTU/Tnmi and cents/Tn-mi were the only factors specifically identified. Other specific route factors were generally not defined. Specific route factors which are essential to any inter-modal comparisons include: Circuitry, grades, climatic effects, return of empties, unique terminal requirements, water availability, limitation of usage of transportation elements, and environmental impacts. (3) The impact of the specific route factors on the energy and cost requirements is significant. This precludes the use of the present data bank for any inter-modal comparisons of coal transportation.

Hood, R White, TG  
General Motors Corporation, Department of Energy Sept. 1977, 349 pp  
Contract EY-76-C-02-2970

ACKNOWLEDGMENT: Energy Research Abstracts, NTIS  
ORDER FROM: General Motors Corporation, Transportation Systems Division, Warren, Michigan, 48090 NTIS

COO-2970-1

**18 182893**  
**RAILS CAN DO THE JOB**

If railroads are offered steady high tonnage volume traffic and in the time frame it takes to open new mines and build or expand consuming plants,

railroads can make the necessary changes and secure the cars and motive power if: (1) Coal sources and points of consumption are well identified in advance; (2) tonnages and contract terms between producers and consumers are large and long enough to amortize the additional investment; and (3) agreement can be reached in a price for transportation that will provide an adequate return on investment and a profit for the services rendered.

From Coal Production, Use and Financing Conference; Section 3, Paper 2, Washington, D.C., January 25, 1977.

Morris, RN  
Executive Enterprises, Incorporated CONF-770136, 1977, 6 p.

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Executive Enterprises, Incorporated, 10 Columbus Circle, New York, New York, 10019

### 18 183906 THE BANKRUPTCY DECISION

This paper investigates the circumstances under which a firm will be forced into bankruptcy. The model developed can be viewed as part of a larger framework which would be necessary to address the question of optimal financial policy in a world of taxation, bankruptcy costs, investment and depreciation, uncertainty, etc. The model focuses on the conflicts of interest among various claimants to the assets and income flows of the firm (the stockholders, bond-holders, and bank lenders). We derive conditions under which the necessary funds for continuation will not be forthcoming and illustrate the importance of the liquidity of the assets and the maturity structure of the debt in staving off bankruptcy. Several examples highlight the major conclusions of the paper. The conditions for bankruptcy, which have some intuitive appeal, are more complex than those appearing in the previous literature. The latter part of the paper considers merger with a healthy company as an alternative to bankruptcy. We show that the tax system has an important effect on the choice between merger and bankruptcy.

Bulow, JI (Massachusetts Institute of Technology); Shoven, JB (Stanford University) *Bell Journal of Economics* Vol. 9 No. 2, 1978, pp 437-456, 4 Fig., Refs.

ACKNOWLEDGMENT: Bell Journal of Economics  
ORDER FROM: ESL

### 18 184622 DETERMINING RAILROAD RATES OF RETURN

A method is described for determining rate of investment return which fully compensates investors in regulated industry for the level of risk incurred. In examining rolling stock per diem, a distortion was found when financing cash flow is intertwined with investment flow. The resulting rate lacks a clear-cut standard by which to gauge the project's attractiveness as an investment. A similar conclusion was drawn after analyzing the rail service continuation subsidy programs of the 3R and 4R Acts. If investments involve lesser or greater risk than general investments in railroad assets, then a lower or higher cost of capital should be used in project investment analysis. A Capital Asset Planning Model is suggested for such appraisal.

Hirschey, MJ Kroncke, CO (Wisconsin University, Madison) *ICC Practitioners' Journal* Vol. 46 No. 1, Nov. 1978, pp 64-76, 1 Fig., 1 Tab.

ORDER FROM: Association Interstate Commerce Comm Practitioner, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

### 18 184739 A NEW WAY TO MEASURE PERFORMANCE-AND WHAT IT SHOWS

A rate of return analysis is utilized for comparing railroad credit, earnings growth and the relative investment qualities of securities of different railroads. The method of analysis is claimed to isolate operational factors and financial factors which affect the final result. Operational factors are the asset turnover rate and profit margin; financial factors are effective tax rate and financial leverage. Analyses and comparisons are made of 10 major U.S. railroads and holding companies.

Benham, IH (Printon, Kane Research, Incorporated) *Railway Age* Vol. 179 No. 22, Nov. 1978, 4 p., 4 Tab.

ORDER FROM: ESL

DOTL JC

### 18 188308

#### PRODUCTIVITY IN CANADIAN RAILROADS, 1956-1975

This study provides a comprehensive profile of the Canadian railroad industry from 1956 to 1975 in terms of real outputs, real inputs and productivity. Productivity has grown approximately 3 percent per year for both Canadian National and Canadian Pacific, a rapid rate by any reasonable standard and about twice the rate achieved by U.S. railroads. There are two complete sets of results--the first treating all freight ton miles as equivalent and the second considering 22 different categories of ton miles as distinct outputs. When results for the two railroads are compared, there is no evidence that either had markedly higher productivity than the other.

Caves, DW Christensen, LR (Wisconsin University, Madison)  
Canadian Transport Commission Report 10-78-16, Aug. 1978, 61 p., 30 Tab., Refs.

ORDER FROM: Canadian Transport Commission, 275 Slater Street, Ottawa, Ontario K1A 0N9, Canada

DOTL HE 2808.C29

### 18 188318 STATISTICAL COST ANALYSIS: AN ENGINEERING APPROACH

The author considers that accurate estimates of transportation costs are needed by both policy makers and the managers of transportation enterprises. It is suggested that the public policy maker generally has used a macro approach to cost estimations, involving the approach of statistical cost analysis focused on the relationship between transportation unit costs and the number of ton-miles of transportation services. The transportation executive generally has used a micro approach, whereby the cost analysis concentrates on attempting to determine how the cost of performing specific operating functions is related to shipment characteristics such as shipment weight, density and volume. It is suggested that both the macro and micro cost approaches have deficiencies which limit the usefulness of results generated through their use. The cost estimates obtained from the macro approach are felt to suffer since they provide aggregate data which is useful only in gauging broadly-based situations. The cost estimates obtained from the micro approach suffer because of a difficulty of extending the results to more general situations. This paper discusses an engineering approach to statistical cost analysis which, it is suggested, combines the methodological rigour and the generalization characteristics of the macro approach with the micro approach's ability to determine costs applicable to narrowly-defined sets of conditions. The concepts which form the basis of the engineering approach are described first. This is followed by a description of the methodology and a demonstration of its application in costing motor carrier transportation services. The methodology is evaluated, and conclusions are drawn as to its potential for extension to other transportation modes. /TRRL/

Schuster, AD (Texas University, Austin) *Logistics and Transportation Review* Vol. 14 No. 2, 1978, pp 151-164, 3 Fig., 27 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-237145)  
ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

### 18 188345 REPORT ON CAPITAL REQUIREMENTS FOR TRANSPORTATION OF ENERGY MATERIALS

The study obtains and organizes sufficient data so that costs of expanding capacity in transportation of energy materials can be determined in a way designed to meet the needs and requirements of the Project Independence Evaluation System (PIES) model. Requirements for capital expenditures are computed for three modes of transport in five computer-based algorithms: oil pipeline investment; gas pipeline investment; rail car and locomotive investment; coal barge and collier investment; and oil barge and tanker investment. Necessary data and assumptions are organized within the context of each algorithm either as a separate data base or written into the program as suits the nature of the mode and the output information obtainable from PIES. The only exception to this concerns track and railbed improvements, the need for which cannot be predicted on the basis of information derived from PIES outputs. The approach in the algorithm logic differs considerably between the modes. Each chapter is dedicated to a different mode, Chapter II to Pipeline Transportation, Chapter III to Water Transportation, and Chapter IV to Railroad Transportation. Each chapter opens with an introduction on the salient characteristics of the mode

followed by a discussion of the logic of the algorithm, and data sources and assumptions. A brief overview of the methods employed in the modal analyses and their relationships to PIES are given.

Transportation & Economics Research Associates Inc June 1978, 263 p.

ORDER FROM: NTIS

**18 188696**

**RAIL SYSTEM INVESTMENT ANALYSIS: LITERATURE SEARCH**

This document reviews the recent literature dealing with the analysis of railroad capital investments for freight transportation. The primary emphasis is on project evaluation from the corporate, rather than the public, perspective. The document includes an annotated bibliography with 81 entries, summaries of some of the most useful sources found, and general observations.

Prepared in cooperation with R.L. Banks & Associates, Inc., Washington, D.C.

Ernst and Ernst DOT-TPI-10-78-32, Feb. 1978, 64 p.

Contract DOT-OS-60097

ACKNOWLEDGMENT: OST  
ORDER FROM: NTIS

DOTL HE18.5.A323

**18 188697**

**RAIL SYSTEM INVESTMENT ANALYSIS: DESCRIPTION OF THE RAILROAD INVESTMENT PROCESS**

This report contains a description of the investment decision process in the railroad industry. It focuses on techniques for project evaluation and the environment in which investment decisions take place. Some problems associated with the procedures in general use are noted, but the report is designed to describe current practices rather than to evaluate these practices or to contribute to the current state of the art. A sample of 96 investment projects are used to illustrate various approaches to project evaluation and problems associated with capital investment decision making. The information reported here is based on the practices of 13 railroads. It has been collected to serve as the basis for a larger study concerned with Federal assistance to the railroad industry to be completed for the U.S. Department of Transportation. The report may also be of interest to government officials who want to know more about the industry and to railroad-executives interested in comparing the procedures of their company with those of other carriers.

Prepared in cooperation with R.L. Banks & Associates, Inc., Washington, D.C.

Ernst and Ernst DOT-TPI-10-78-33, Feb. 1978, 129 p.

Contract DOT-OS-60097

ACKNOWLEDGMENT: OST  
ORDER FROM: NTIS

DOTL HE18.5.A323

**18 188698**

**RAIL SYSTEM INVESTMENT ANALYSIS: FINANCIAL ANALYSIS OF INVESTMENT PROJECTS FROM THE INDIVIDUAL CORPORATE PERSPECTIVE**

This document reports the results of financial analyses of 63 investment opportunities based on information supplied by 13 railroads. The report discusses financial analysis methodology, the composition of railroad capital budgets, the relative attractiveness of different kinds of railroad investments, the sensitivity of the financial analyses to changes in key assumptions, and institutional factors affecting the attractiveness of railroad investments.

Prepared in cooperation with R.L. Banks & Associates, Inc., Washington, D.C.

Ernst and Ernst, (OST/P-14) DOT-TPI-10-78-34, May 1978, 321 p.

Contract DOT-OS-60097

ACKNOWLEDGMENT: OST  
ORDER FROM: NTIS

DOTL HE18.5.A323

**18 188699**

**RAIL SYSTEM INVESTMENT ANALYSIS: ANALYSIS OF INVESTMENT PROJECTS FROM THE RAILROAD INDUSTRY PERSPECTIVE**

This study deals with the impact of railroad investments on the profits of all the affected companies in the railroad industry, not just the railroad making the investment. It draws upon interviews with executives at 13 railroads, data on 96 investment projects undertaken or proposed by these railroads, and numerous published sources. The study demonstrates that the investments made by individual railroad companies are sometimes not the best investments from the industry point-of-view, and occasionally do more harm than good. This disparity stems from three factors: the railroads' indifference to the impacts which their investments have on other railroads; the limitations on the size of investments caused by the fragmentation of the industry's capital resources; and the administrative barriers to the undertaking of joint projects within the industry. The study describes each of these factors and discusses their implications for railroads and governments.

Prepared in cooperation with R.L. Banks & Associates, Inc., Washington, D.C.

Ernst and Ernst, (OST/P-14) Final Rpt. DOT-TPI-10-78-35, May 1978, 68 p.

Contract DOT-OS-60097

ACKNOWLEDGMENT: OST  
ORDER FROM: NTIS

DOTL HE18.5.A323

20 179649

**ECONOMIC IMPACT OF THE U.S. PORT INDUSTRY: AN INPUT-OUTPUT ANALYSIS OF WATERBORNE TRANSPORTATION. VOLUME I. ANALYSIS**

The objective of this study is to provide Government policy makers and business executives with a new tool by which the impact of alternative policies relating to the U.S. port industry can be analyzed and assessed.

See also Economic Impact of the U.S. Port Industry: An Input-Output Analysis of Waterborne Transportation. Volume II. I-O Computer Print-outs. Apr 78, 200p MA-GEN-970-78044, PB 278-913/9GA.

Port Authority of New York and New Jersey, Maritime Administration  
MA-GEN-970-78043, Apr. 1978, 107 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278912/1GA

20 179716

**IMPROVING INTERMODAL TRANSPORTATION IN NEW ENGLAND--VOLUME I, NEW ENGLAND FREIGHT TRAFFIC FLOWS; VOLUME II, THE STATUS OF INTERMODAL FREIGHT TRANSPORT IN NEW ENGLAND; VOLUME III, THE COMPETITION FOR NEW ENGLAND FREIGHT TRAFFIC; VOLUME IV, THE SELKIRK HURDLE**

These reports present an overview of the intermodal movement of freight within New England and between New England and the rest of the United States and overseas. The purpose of the study is to make recommendations to the Commission and to the New England states regarding specific activities which they might perform to improve intermodal transportation. Volume I, New England Freight Traffic Flows, presents the recommendations that grew out of the study. A data base describing the present state of goods movement by rail and truck is also included. Volume II, The Status of Intermodal Freight Transport in New England, describes intermodal operations of the various types and modes in New England. It develops a picture of the operations, their market and institutional characteristics, and describes the evolution the services under went to arrive at this present status. Volume III, The Competition for New England Freight Traffic, concentrates on the analysis of the top land modes, highway and rail, in many operating configurations of equipment, services, and routings. Volume IV, The Selkirk Hurdle, discusses improvements in the rail car load modes and quantifies the service and cost levels of the land-based modes. An examination of the Selkirk Hurdle, its evolution, impacts, and alternatives are also presented.

New England Regional Commission Tech Rpt. June 1976, v.p., 92 Fig., 3 App.

ORDER FROM: New England Regional Commission, 55 Court, Boston, Massachusetts, 02108

20 180303

**PROJECTS TO EXPAND ENERGY SOURCES IN THE WESTERN STATES--AN UPDATE OF INFORMATION CIRCULAR 8719. SURVEY OF PLANNED OR PROPOSED COAL MINES; ELECTRIC GENERATING, COAL CONVERSION, AND WASTE-TO-FUEL PLANTS; OIL SHALE AND TAR SANDS PROJECTS; GEOTHERMAL FACILITIES; URANIUM MINES, MILLS, AND ENRICHMENT FACILITIES; NATURAL GAS PROCESSING AND STORAGE FACILITIES; OIL REFINERIES AND TERMINAL FACILITIES; RAILROADS; AND COAL SLURRY, PETROLEUM, AND NATURAL GAS PIPELINES, IN STATES WEST OF THE MISSISSIPPI RIVER (AS OF AUGUST 1977)**

This Bureau of Mines report is an expansion and update of Information Circular 8719 and comprises maps and tables listing the name, location, and other pertinent data concerning certain fuel-related projects. The maps show the locations of the planned or proposed facilities. The tables include information on projects involving the proposed or planned development of fuel resources, as well as the development of storage, transportation, and conversion facilities. The report covers the 24 States west of the Mississippi River including Alaska and Hawaii. Of the 808 projects for which information is provided, 219 concern coal mines, 246 concern electric generating plants, and 115 concern uranium mines; Energy Supply and Environmental Coordination Act coal conversion notices are also included. Because of the dynamic nature of the energy industry, many uncertainties

exist and some of the listed projects may never become realities. Also, no attempt has been made to determine the degree of certainty or viability of each project.

Rich, CH, Jr *Bureau of Mines Information Circular* 1978, 199 pp, 24 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: GPO, NTIS

PB-283706/OST

20 180304

**ADDITIONAL INSIGHTS CONCERNING RAIL-TRUCK FREIGHT COMPETITION**

This study attempts to synthesize previous research in order to arrive at a simple way of identifying the factors important to rail-truck modal choice and to determine their critical values. Factors are considered which are not included in the theoretical approaches and which are lost in the aggregate data of the Census of Transportation. Two such are availability of rail service at origin and destination and a commodity's susceptibility to damage. Efforts have been made to eliminate the need to collect specific data regarding actual rates, transit times and reliability with distance being used as a surrogate for these values. Shipment size is taken as given but is not considered until a late stage of the analysis.

Stenger, AJ (Pennsylvania State University, University Park);  
Cunningham, WHJ (University of South Florida) *Transportation Journal*  
Vol. 17 No. 4, 1978, pp 14-24, 2 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

20 180310

**MINERAL TRANSPORTATION**

Many of the Canadian mineral transportation issues in 1977 arose either through partial implementation of the transport policy principles announced by the Minister of Transport in 1975, or the need for additional rail and port capacity to serve growing bulk traffic to west coast ports. Rising rail freight rates continued to be of concern to mineral shippers.

Brown, DD (Department of Energy, Mines and Resources, Canada)  
*Canadian Mining Journal* Vol. 99 No. 2, Feb. 1978, 3 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

20 180367

**WORLD-WIDE AVAILABILITY OF IRON ORES AND GROWTH IN THEIR USES [Disponibilites en mineraux de fer dans le monde et evolution de leurs utilisations]**

This report is divided in two parts: the first part attempts to pinpoint the growth in use of iron ores by the iron and steel metallurgical industry, taking into consideration the changes in metallurgical processes; the second part reviews the world's major mining projects in the face of these quantitative and qualitative changes. A breakdown of the world's major iron ore reserves by single countries is also given. [French]

Astier, J *Revue de Metallurgie* Vol. 75 No. 2, Feb. 1978, pp 75-95, 7 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

20 180467

**DYNAMIC MODELS OF THE INDUSTRIAL DEMAND FOR ENERGY**

Econometric approaches to modeling the demand for electricity, petroleum, coal, and natural gas by the manufacturing sector of the U.S. economy are investigated. Important aspects of the research are incorporation of dynamic effects as well as an introduction of the impact of technological change on energy usage. The first model analyzed is the ad hoc partial adjustment model applied to a system of equations. Extending the work of Rosen and Nadiri (A.E.R. 1969) and Berndt and Savin (Econometrica, Sept./Nov. 1975), the authors show that ad hoc models applied to flexible functional forms such as the translog or generalized Leontief have a number of undesirable features: (1) short-run own-price elasticities may exceed long-run elasticities, thus violating the Le Chatelier principle; and (2) for the translog, if the adjustment matrix is diagonal, all rates of adjustment must be equal; specification of a general adjustment matrix leads to underidentification of the adjustment parameters. The above two problems and others

are illustrated using data drawn from U.S. aggregate manufacturing 1948 to 1971. A second model is developed from the cost-of-adjustment literature associated with R. Lucas and A. Treadway. It is shown that the Lucas and Treadway models can be implemented empirically to overcome the theoretical objections to the ad hoc partial adjustment models. In particular, the econometric model cannot violate the Le Chatelier principle and contains a generalized endogenous (non ad hoc) partial adjustment mechanism. An analysis of the effects of an investment tax credit on both the long-run demand for energy and the adjustment path to the new long-run equilibrium demand is made. Several models are considered that can be utilized in an analysis of endogenous technical change. The most promising model for future research is one which incorporates knowledge as a quasi-fixed factor within the cost of adjustment framework. (ERA citation 03:024210)

Berndt, ER Fuss, MA Waverman, L  
Economics Research Group Limited Nov. 1977, 147 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

EPRI-EA-580

**20 180585**  
**CAPABILITIES OF U.S. DOMESTIC TRANSPORTATION SYSTEMS FOR THE SHIPMENT OF RADIOACTIVE WASTES**

This document is a compilation of data and reports that provide an overview of the capabilities of U.S. domestic transportation systems for the shipment of materials that are or may be classified as radioactive wastes. (ERA citation 03:016878)

Best, RE Allen, JH Aucoin, PA Ball, GD Hoffman, CC  
Nuclear Assurance Corporation, Department of Energy NAC-C-7715,  
Sept. 1977, 348 pp

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

Y/OWI/SUB-77/22330

**20 180673**  
**ECONOMIC IMPACT OF THE U.S. PORT INDUSTRY: AN INPUT-OUTPUT ANALYSIS OF WATERBORNE TRANSPORTATION. VOLUME II. I-O COMPUTER PRINTOUTS**

The objective of this study is to provide Government policy makers and business executives with a new tool by which the impact of alternative policies relating to the U.S. port industry can be analyzed and assessed.

Port Authority of New York and New Jersey, Maritime Administration  
MA-GEN-970-78044, Apr. 1978, 200 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278913/9ST

**20 181055**  
**NATIONAL COAL UTILIZATION ASSESSMENT: THE PRICE AND AVAILABILITY OF LOW SULFUR COAL IN EASTERN MARKETS**

This study examines the regional market patterns for low sulfur coal through 1985. Regional coal demands and price-quantity relationships for coal supply are estimated. Demand and supply are integrated within a formal model of interregional coal markets. Minemouth and delivered prices of low sulfur coal are computed, as well as the market boundary between Western and Eastern coal supply regions. Finally, potential transportation, mining equipment, and labor constraints on expanded low sulfur coal production are examined. (ERA citation 03:025719)

Krohm, GC Dux, CD  
Argonne National Laboratories, Department of Energy July 1977, 54 pp

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

ANL/AA-12

**20 181057**  
**RESERVE BASE OF BITUMINOUS COAL AND ANTHRACITE FOR UNDERGROUND MINING IN THE EASTERN UNITED STATES**

The coal reserve base is defined for coalbeds having sufficient thickness for underground mining within a depth range compatible with economic

recovery. The reserve data are compiled by the Federal Bureau of Mines by updating and reevaluating previous estimates of the U.S. Geological Survey, State geological surveys, and others. Through the application of computer techniques, the tonnages are compiled by State, county, coalbed, and rank. Coal reserves base is allotted to sulfur categories by a statistical apportionment of data from available Bureau of Mines reports and records. The coal reserve base in those States east of the Mississippi River, minable by underground methods, is estimated to be 169 billion tons in coalbeds greater than 28 inches in thickness to a maximum depth of 1,000 feet. Excluding those coals in reliability categories other than measured and indicated, the underground reserve base includes 162 billion tons of bituminous coal and 7 billion tons of anthracite. Of the total, 27 billion tons contains 1.0 percent or less sulfur. Most of this low-sulfur coal is in the southern Appalachian area. Approximately 16 percent of the underground reserve base is without available analyses. A glossary of terms applicable to a classification system for coal resources and reserves is included to provide a common yardstick for determining coal resources and reserves. (ERA citation 03:030154)

Bureau of Mines, Department of Energy 1974, 432 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

BM-IC-8655

**20 181071**  
**COAL AND GAS PIPELINE FEASIBILITY STUDY. FIRST MONTHLY REPORT, 6 SEPTEMBER 1977-30 SEPTEMBER 1977**

The objective of this study is to determine the technical and economic feasibility of using a coal and gas pipeline system to bring northern Appalachian coals of medium and high sulfur content to the United States east coast utility markets. Coals, whose sulfur and mineral matter content rendered them unacceptable for current or projected steam coal markets, are to be beneficiated to yield a low sulfur, low ash fraction. The lower grade product is to be gasified to produce a fuel gas of intermediate heating value. The fuel gas is cleaned and subsequently used to transport the clean coal pneumatically to east coast markets, such as, the Philadelphia, PA area. (ERA citation 03:030037)

Rebello, WJ  
Systems Consultants, Incorporated, Department of Energy Nov. 1977, 4 pp

Contract EF-77-C-01-2707

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

FE-2707-1

**20 181540**  
**ENVIRONMENTAL CONTROL IMPLICATIONS OF GENERATING ELECTRIC POWER FROM COAL. TECHNOLOGY STATUS REPORT. VOLUME II**

This is the first in a series of reports evaluating environmental control technologies applicable to the coal-to-electricity process. The technologies are described and evaluated from an engineering and cost perspective based upon the best available information obtained from utility experience and development work in progress. Environmental control regulations and the health effects of pollutants are also reviewed. Emphasis is placed primarily upon technologies that are now in use. For SO sub 2 control, these include the use of low sulfur coal, cleaned coal, or flue-gas desulfurization systems. Electrostatic precipitators and fabric filters used for the control of particulate matter are analyzed, and combustion modifications for NO/sub x/ control are described. In each area, advanced technologies still in the development stage are described briefly and evaluated on the basis of current knowledge. Fluidized-bed combustion (FBC) is a near-term technology that is discussed extensively in the report. The potential for control of SO sub 2 and NO/sub x/ emissions by use of FBC is analyzed, as are the resulting solid waste disposal problems, cost estimates, and its potential applicability to electric utility systems. Volume II presents the detailed technology analyses complete with reference citations. This same material is given in condensed form in Volume I without references. A brief executive summary is also given in Volume I. (ERA citation 03:032977)

Argonne National Laboratories, Department of Energy Dec. 1976, 435 p.

Contract W-31-109-ENG-38

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

ANL/ECT-1(V.2)

20 181723

**MARKET POTENTIAL FOR COALS OF THE ILLINOIS BASIN**

The markets presently being served by the coals from the Illinois Basin are examined, and changes in the distribution patterns for the past decade are discussed. Also, the projected increase in demand for coal through 1985 is examined in detail, and the market potentials this increase in demand is likely to create for Illinois Basin coals are evaluated.

Malhotra, R  
Illinois State Geological Survey IL-MINERALS NOTE-67, Aug. 1977,  
63 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-281323/6ST

20 182612

**ALUMINUM**

Aluminum is the most abundant structural metal element in the Earth's crust. It is important in virtually all segments of the world economy, but principal uses have been developed in six major industries: Transportation, construction, electrical, containers and packaging consumer durables and mechanical equipment. For many years demand has grown at a faster rate than the growth rate of other major metals, and measured either in quantity or value, the use of aluminum now exceeds that of any other metal except iron. Smaller but important industrial uses also have been developed for nonmetal forms of aluminum. This Bureau of Mines report presents comprehensive data for the commodity including industry structure, uses, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, strategic considerations, economic factors operating factors and problems, and outlook to the year 2000.

Stamper, JW Kurtz, HF  
Bureau of Mines 1978, 29 pp, 3 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800  
Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 182613

**IRON AND STEEL**

Iron and steel are the major metallic materials in use in the world today. The materials included in this general classification include rolled steel products, steel forgings, iron and steel castings, and smaller quantities of powder-metallurgical products. Iron and steel are used in virtually every phase of modern life, but the major uses are in transportation, construction, and machinery. This Bureau of Mines report presents comprehensive data for the commodity including industry structure, uses, technology, supply-demand relationships, economic factors and problems, operating and processing factors, environment and pollution control, occupational factors and problems, and outlook to 2000.

Desy, DH  
Bureau of Mines 1978, 29 pp, 9 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800  
Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 182614

**ENERGY USE PATTERNS FOR METAL RECYCLING**

A study was conducted for the Bureau of Mines, U.S. Department of the Interior, to provide information which will lead to an increase in the recycling of mineral materials, in order to help conserve the Nation's mineral resources. Data were collected on energy requirements to recycle prompt industrial and obsolete scrap for nine metal commodities: Iron and steel, aluminum, copper, zinc, lead, stainless steel, titanium, tin, and nickel and nickel alloys. Major process routes for recycling were considered. Starting from the first collection point through scrap preparation, transportation, smelting and/or refining to the molten metal, ingot, or other semi-finished form approximately equivalent to a primary metal of a similar composition. Available data for 1976 were collected on the amounts of each metal commodity recycled by major scrap categories. In addition, energy requirements were estimated for separating municipal solid wastes into four major categories: Refuse-derived fuel, magnetic, aluminum, and glass cullet fractions. Finally, areas of research were identified to enhance recycling and/or increase the efficiency of energy use.

Kusik, CL Kenahan, CB  
Bureau of Mines 1978, 182 pp, 4 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: GPO

20 182793

**COVERED HOPPER ORDERS ZOOM**

Transporting the carryover from the 1976-1977 season first in severe weather and then on top of an export boom for 1978 crops has confronted railroads with a record demand for grain transportation which has been handled satisfactorily. The demand has produced a sharp upturn in orders for new covered hopper cars. Statistics include grain in storage, port unloadings, covered hopper orders/deliveries and crop production over past five years with 1978 projections.

Association of American Railroads No Date, n.p.

ORDER FROM: AAR

DOTL RP

20 183562

**ARIMA MODELS OF IRON ORE FLOWS-BY PORT OF ENTRY AND GRADE OF ORE**

The problem of modeling iron ore flows by port of entry is considered. A family of seasonal autoregressive integrated moving average (ARIMA) models is used, and the interpretation of results is discussed. The relative performance of various possible models is discussed, and chosen models are used to forecast the trend of imported iron ore in the United Kingdom. Difficulties in interpretation of the forecast from a model based on a transformed data set are also considered.

Model Simul Proceedings of the Annual Pittsburgh Conference, for 8th meeting, University of Pittsburgh, Pennsylvania, April 21-22, 1977.

Lalwani, CS (Wales University); Lee, PR  
Instrument Society of America Proceeding Volume 8 Part 1, 1977, pp  
107-111, 4 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Instrument Society of America, 400 Stanwix Street, Pitts-  
burgh, Pennsylvania, 15222

20 183912

**VERMICULITE**

Vermiculite is a mica-like mineral with the unique property of exfoliating to a low-density bulky material when heated. Vermiculite concrete is used for roof decks and floor fill where lightweight, thermal insulation, and acoustical properties are of particular importance. Vermiculite plasters and cement are employed mainly for fireproofing purposes. They are also valuable by reason of light-weight, good resilience, and good bonding properties. Loosefill vermiculite is used to insulate walls and ceilings. The use of vermiculite as a thermal insulator has gained increasing importance in light of the current desire to save energy through higher levels of home insulation. The material also has utility in agriculture, primarily due to its high absorptive capacity. This Bureau of Mines report presents comprehensive data on vermiculite including industry structure, uses, reserves-resources, technology supply demand relationships, economic factors and problems, operating factors and problems, and outlook to the year 2000.

Haines, SK  
Bureau of Mines 1978, 10 pp, 1 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800  
Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 183913

**TITANIUM**

The mineral sources of titanium products are rutile and ilmenite. Concentrations of these minerals are made at a relatively small number of operations throughout the world. Texturally, the deposits may be sand or rock. Sand deposits are placer concentrations, almost always at or near the coast, in which rutile and ilmenite commonly, but not invariably, occur together. In rock deposits, ilmenite is the mineral of consequence and rutile is rarely found. This Bureau of Mines report presents comprehensive data for titanium including industry structure, uses, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, strategic considerations, economic factors and problems, operating factors and problems, and outlook to the year 2000.



Lynd, LE  
Bureau of Mines 1978, 19 pp, 2 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 183914

#### STONE

Stone is an inclusive term that relates to products and materials ranging from highly finished exotic marbles through other finished varieties to crushed and broken stone, and the stone industry is the largest nonfuel, nonmetallic mineral industry in the United States. This Bureau of Mines report presents comprehensive data on stone, dimension stone, and crushed stone including definitions, uses, reserves-resources, byproducts, economic factors, operating problems, industry structure, technology, supply-demand relationships, and outlook to the year 2000.

Reed, AH  
Bureau of Mines 1978, 19 pp, 2 Fig.

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

20 184658

#### COMPETITION IN NATIONAL AND APPALACHIAN COAL MARKETS

Paper examines concentration ratios for Appalachian coal production and the output behavior of coal-oil merged firms in Appalachia.

Proceedings of the 4th Annual UMR-DNR (University of Mo-Rolla/Mo Dept of Natural Resources) Conference on Energy, University of Mo-Rolla, October 11-13, 1977.

Page, WP (West Virginia University)  
Missouri University, Rolla 1978, pp 115-122, 11 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: Missouri University, Rolla, Extension Division, Rolla, Missouri, 65401

20 184659

#### WESTERN COAL IN THE U.S. ENERGY PICTURE

The present and future role of Western coal in the U.S.'s energy production and supply is analyzed. After a difficult period, coal production--particularly from the West--is making large gains. U.S. production in 1976 was 665 million tons, up 2.6 percent. Meanwhile, Western production was 132 million tons, up 19 percent. Contributing reasons include the shortages and high costs of alternate fuels at powerplant, air quality laws that are inducing a shift to low-sulfur coal, and the availability in the West of thick seams of coal that can be mined by low-cost surface methods. The West's ascendancy is expected to continue because this area contains 93% of the U.S.'s surface-minable, low-sulfur coal.

Paper presented at the National West Mining Conference and Exhibition, 80th Anniversary, Denver, Colorado, February 2-4, 1977.

Lowrie, RL (Bureau of Mines) *Mining Yearbook* 1977, pp 114-131

ACKNOWLEDGMENT: EI  
ORDER FROM: Colorado Mining Association, 1515 Cleveland Place, Denver, Colorado, 80202

20 184671

#### THE RAILWAY FREIGHT SYSTEM

This article outlines the history of the railways in Britain as freight carriers, in particular during the present century, and gives reason for the decline of rail freight traffic both absolutely and as a proportion of total freight traffic; the position in London is described. Stress is laid on the need to integrate the development of London's freight traffic with national trends and policies and eleven areas of likely future growth and change are identified. The longer term development of rail freight in London is considered in relation to economic and planning needs.

*Greater London Intelligence Journal* No. 40, June 1978, pp 31-38, 1 Fig., 3 Tab., 3 Phot.

ACKNOWLEDGMENT: TRRL (IRRD-235400)  
ORDER FROM: Greater London Council, County Hall, London SE1 7PB, England

20 184690

#### INTERMODAL FREIGHT TRANSPORT (ABRIDGMENT)

There are two elements characteristics of intermodal transport. The first is the through movement from region to destination with no intermediate storage. The second element is an interchange or transfer between two or more modes. It is the ease with which these transfers occur that brings them under the intermodal umbrella. The most important advantage to intermodal operations is the superior cost and service trade-off it offers compared with the use of a single form of carriage or with two modes employed but not in an integrated fashion. It is noted that although trucking is a major partner in the intermodal movement, it is frequently the dominant partner. In marine containerization, intermodal has been a major success. In terms of consistent growth and in percentage of total cargo carried, intermodal operations now transport a major portion of this business. With rail transportation, rail-truck intermodal has grown only modestly. As a proportion of freight revenue, piggyback runs as high as 9 percent. The possibility of maximizing efficiency of freight markets is still far from being realized. The barriers and problems that have prevented intermodal operations from achieving their potential must be overcome.

This paper appeared in *Transportation Research Record* No 656, Rail Planning.

Ainsworth, DP (Reebie (Robert) and Associates, Incorporated) *Transportation Research Record* No. 656, 1977, pp 62-64, 2 Fig., 1 Ref.

ORDER FROM: TRB Publications Off

20 184692

#### INTERMODAL REALITIES

The current decline in market share of U.S. railways for merchandise traffic has led the Federal Railroad Administration to initiate a major study of the shortcomings and potential of rail piggyback and intermodal operations. The study examines merchandise movements, transport services' modal and economic capabilities, and shipper needs and practices. A model of rail intermodal services over a hypothetical 52,000 km (32,500-mile) route structure serving 120 cities was developed. Results indicate that the current piggyback market share of total containerizable freight in the U.S. is about 4 percent and that the principal impediments to the shipper of rail intermodal services were costs and service. The study recommends cost reductions in rail operations and service improvements. The rail network modeled could handle three times the current trailer-on-flatcar volume by 1980, and transport cost might be reduced by an estimated \$200 million a year. The Federal Railroad Administration and cooperating railroads have begun a series of demonstrations to test the practicability of the study results and rail intermodalism. /Author/

This paper appeared in *Transportation Research Record* No. 656, Rail Planning.

De Boer, DJ (Interstate Commerce Commission) *Transportation Research Record* No. 656, 1977, pp 67-68, 2 Ref.

ORDER FROM: TRB Publications Off

20 184694

#### INTERMODAL TRANSPORT AND CONTAINERIZATION

Shippers' associations began the development of intermodal operations about 10 years ago. Growth has been steady since that time because of improved transit times that make intermodal more competitive with truck and boxcar service. Containers also cost relatively little compared with boxcars. These capital considerations must be weighed by carrier management in future investing strategies. Many shippers are hopeful that intermodal will grow by using the flexibility of motor carrier deliveries with the economics of long-haul rail transportation. Private business must assist in the development of new concepts in intermodal transportation by cooperating with carriers, government, and shipper communities. /Author/

This paper appeared in *Transportation Research Record* No. 656, Rail Planning.

Jones, HW (General Foods Corporation) *Transportation Research Record* No. 656, 1977, pp 71-72

ORDER FROM: TRB Publications Off

20 184737

#### RAIL FREIGHT SYSTEMS

This report of a conference on rail freight systems examines the technical, economic and institutional problems facing railroads, indicating areas where change and improvement have the potential for holding or regaining

markets. Participants presented 15 papers in four sessions dealing with the following: (1) Inherent service characteristics and emerging markets for rail freight service; (2) Externally imposed constraints that affect the emerging role of railroads; (3) Constraints internal to the rail industry that affect the emerging role of railroads; (4) Major opportunities for effective development and improvement of rail freight service.

Proceedings of the Carnegie-Mellon Conference on Rail Freight Systems, May 22-23, 1978.

Carnegie-Mellon University Proceeding FRA/ORD-78/80, 1978, 174 p., Figs., Tabs.

ORDER FROM: Carnegie-Mellon University, Transportation Research Institute, Pittsburgh, Pennsylvania, 15213

#### 20 184820

##### BAUXITE/ALUMINA--BULKS IN TRANSITION

In the second of a series of articles analyzing bulk trade developments and the implications for terminals and associated cargo-handling techniques, this article looks at the potential of aluminum raw materials seaborne trade in the next decade, concluding that the provision of higher capacity bauxite/alumina loading and discharging facilities, necessitated by trade growth and changes in vessel sizes, is likely to prove increasingly problematic.

*Cargo Systems International* Vol. 5 No. 5, May 1978, 3 p.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

#### 20 188086

##### SAND AND GRAVEL

Sand and gravel has been, and will continue to be among the most important construction and industrial materials in the United States. It is the only mineral commodity produced in all 50 States. It is the principal ingredient in many houses, office buildings, highways, dams, airport runways, bridges, canals, and in glass for bottles and house and automobile windows. Also, it has one of the lowest average per ton values of all mineral commodities. To keep the price of sand and gravel low, the general trend is toward larger, more efficient plants, working larger deposits, and keeping the transportation costs to deliver a ton of aggregate at a minimum. The Bureau of Mines report presents comprehensive data on sand and gravel including industry structure, reserves-resources, technology, supply-demand relationships, byproducts and coproducts, economic factors and problems, operating factors and problems, and outlook to 2000.

Evans, JR

Bureau of Mines 1978, 22 p., 4 Fig.

ACKNOWLEDGMENT: Bureau of Mines

ORDER FROM: Bureau of Mines Publications Distribution Branch, 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213

#### 20 188087

##### RESERVES AND RESOURCES OF SURFACE-MINABLE COAL IN ILLINOIS

Surface mining accounts for nearly 50% of recent coal production in Illinois. In previous publications, the Illinois State Geological Survey reported that over 20 billion tons of coal in Illinois were potentially strippable. A current estimate, which takes into consideration the present economic and environmental factors, shows that Illinois has 6 billion tons of surface-minable coal in the ground. The amounts of strippable reserves are large in western Illinois and especially in southwestern and southern Illinois, which are more attractive for surface mining because land costs are lower, the heating value of the coal is higher, and the tonnage recoverable per acre is greater. The southwestern and southern Illinois deposits are and will continue to be the major sources of surface-mined coal in the state.

Treworgy, CG Bengal, LE Dingwell, AG *Illinois State Geological Survey Circular* No. 504, 1978, 44 p., 24 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

#### 20 188168

##### THE MINNESOTA COAL STUDY AN INTERIM REPORT TO THE LEGISLATURE

This report provides an overview of Minnesota's present and projected coal use, including preliminary findings on demand trends and projections, transportation routes, impacts of increased rail transport on communities,

and potential industrial conversion to coal. The impacts of increased coal consumption on air quality and water use are also briefly discussed.

Minnesota Energy Agency Jan. 1978, 77 p., 6 Fig., 6 Tab.

ACKNOWLEDGMENT: Minnesota Department of Transportation

ORDER FROM: Minnesota Energy Agency, American Center Bldg, 150 East Kellogg Boulevard, St Paul, Minnesota, 55101

#### 20 188331

##### THE OUTLOOK FOR DOMESTIC FREIGHT TRANSPORT IN AUSTRALIA

One of the major obstacles encountered by the surface transport sector is that there is no national transport policy. The outlook for the future depends on the attitude of governments. The virtual monopoly by rail of the land transport freight task has been rapidly eroded by competition from the road transport industry. The result is that the roles of road and rail are to some extent reversed from what they should be according to economic criteria. The problem is to identify and re-direct rail operations to the areas to which they are best suited. Air cargo will show an expanding market, with airfares showing a reduction, or be contained. Regulatory reform is recommended, with vehicle standards and safety being a national matter. The number of the covering abstract of the conference is IRRD no. 235123.

Transport Outlook Conference, Canberra, 1978.

Marks, LE (Brambles Holdings Limited, England)

Australian Government Publishing Service Conf Paper 1978, 30 p., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 235127), Australian Road Research Board

ORDER FROM: Australian Government Publishing Service, 109 Canberra Avenue, Griffith, A.C.T., Australia

#### 20 188351

##### MATHEMATICAL MODELLING OF RAW MATERIALS AND ENERGY NEEDS OF THE IRON AND STEEL INDUSTRY IN THE U.S.A.--PHASE III AND IV: THE EFFECTS OF TECHNOLOGICAL AND POLICY VARIABLES ON CAPACITY, RAW MATERIAL AND ENERGY REQUIREMENTS OF THE U.S. STEEL INDUSTRY

The report summarizes a portion of the results of a continuing study of the future raw material needs of the U.S. steel industry. The purpose of the work reported here is to explore the effects of changes in technological and policy variables on capacity, raw material, and energy requirements of the domestic iron steel industry. It is not the purpose of this work to make judgments about the efficacy of maintaining an industry capable of producing to meet demand during peak periods--only to state what the requirements of the industry will be under certain assumptions. All steps in the manufacture of steel from the mining of raw ore to the production of finished steel are considered. The requirements of the iron and steel industry of the United States for raw materials, scrap, productive capacity, and fuels, including the extent and form of the fuels and energy consumed, are determined as a function of the following variables: (1) Level of steel demand, (2) impact of changing technology, (3) changing process mix in steelmaking, (4) level of steel imports, and (5) level of exports of scrap.

Elliot, JF Clark, JP

Massachusetts Institute of Technology Oct. 1977, 70 p., 27 Fig.

Contract S0122079

ACKNOWLEDGMENT: Bureau of Mines

ORDER FROM: NTIS

PB-279969/AS

#### 20 188353

##### SHORT-TERM COAL DEMAND MODELLING

Historically, coal demand has been differentiated into four major components: coal demand by utilities; industrial and other retail coal demand; metallurgical coal demand; and export demand for coal. Due to the marked differences in these four sectors, the factors upon which expected consumption depends, and the quantity and quality of available data, each sector was modeled separately. The model described is based upon econometric principles and methodologies. The model is used to forecast the consumption of coal over the next three years. The results indicate an aggregate 4.9 annual growth in demand over 1976 levels.

Cohen, BN (Department of Energy); Uri, ND Maybee, JS *Energy Communications* Vol. 4 No. 5, 1978, pp 405-431

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**20 188354**  
**COAL DEMAND THROUGH 1985**

The author attempts to make a market forecast through 1985 by major producing segments of the United States' coal industry. The demand for coal for the years 1976, 1981 and 1985 is given in tabular form with the following breakdown of coal usage electric utility, coking, and industrial and retail. The coal producing areas are divided into four major segments; the Appalachian Area, the Mid-Western Area, the Mid-Continent Area, and the West. A great shift in coal demand toward the West is noted.

Third Pap Symp on Coal Management Technology; NCA/BCR (Nat'l Coal Assoc/Bitum Coal Res Inc) Coal Conf and Expo 4, Louisville, Kentucky, October 18-20, 1977.

Johnston, VM (Island Creek Coal Company)  
National Coal Association Conf Paper 1978, pp 18-27

ACKNOWLEDGMENT: EI  
ORDER FROM: National Coal Association, Coal Building, 1130 17th St, NW, Washington, D.C., 20036

**20 188642**  
**A CROSS-SECTIONAL STUDY OF DEMAND FOR FREIGHT TRANSPORTATION IN CANADA: AN APPLICATION OF THE TRANSLOG COST FUNCTION**

A rail-truck freight transport demand model is derived, consistent with the economic theory of mode choice in the price-speed-reliability space. The model is estimated from the cross-sectional data of Canadian inter-regional freight flows, separately for each of eight selected commodity groups. Parameter estimates are used to measure price and quality elasticities of demand and elasticity of rail-truck substitution. An attempt is also made to identify the range of distance over which effective inter-modal competition exists.

Oum, TH  
Canadian Institute of Guided Ground Transport Res Paper CIGGT Rpt 78-14, Oct. 1978, 32 p., 1 Fig., 8 Tab., Refs.

ACKNOWLEDGMENT: CIGGT  
ORDER FROM: CIGGT

DOTL RP

**20 188695**  
**RAIL TRANSPORTATION REQUIREMENTS FOR COAL MOVEMENT IN 1985**

This study of transportation requirements for coal movements through 1985 is one of the series conducted for the U.S. Department of Transportation to identify and quantify future transportation requirements for energy materials. This report presents the results of the study. The primary objectives of the study were to develop a scenario for 1985 coal production and consumption and to project rail coal traffic volumes and equipment and facilities requirements consistent with the scenario. A second objective was to identify the planning processes used by the railroads to identify and prepare for future traffic. The third objective of the study was to identify potential constraints to the institutional issues impacting increases in rail coal traffic and the ability of the railroads to handle it profitably.

Prepared for U.S. DOT, Office of the Secretary, Asst Secretary for Policy and International Affairs, Office of Intermodal Transportation, Washington, D.C.

Witten, JM Desai, SA  
Input Output Computer Services, Incorporated Final Rpt.  
DOT-TSC-OST-78-20, Dec. 1978, 166 p., 4 Fig., Refs., 1 App.

Contract DOT-TSC-1282

ACKNOWLEDGMENT: OST  
ORDER FROM: NTIS

DOTL NTIS, DOTL RP

21 052240

**REPORT ON RAIL AND MARINE INTERFACE AT THE PORT OF HAMPTON ROADS**

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.

Maritime Administration MA-GEN-711-74026, 1973, 29 pp

ACKNOWLEDGMENT: NTIS (COM-73-50977/0)

ORDER FROM: NTIS, GPO

COM-73-50977/0, C39.202:R13.7

21 176253

**TRANSPORTATION NETWORK ANALYSIS AND DECOMPOSITION METHODS**

The report outlines research in transportation network analysis using decomposition techniques as a basis for problem solutions. Two transportation network problems were considered in detail: a freight network flow problem and a scheduling problem for a transportation system with multiple vehicle fleets. Several different approaches for decomposing the overall problems into smaller subproblems were examined. A third problem, dealing with the routing of vehicles over a series of demand points, was also examined using a different solution approach. The report presents detailed mathematical formulations of the different problems, discusses the solution approaches examined and presents computational results of the research.

Magnanti, TL Simpson, RW

Massachusetts Institute of Technology, Transportation Systems Center  
Final Rpt. DOT-TSC-RSPD-78-6, Mar. 1978, 205 pp

Contract DOT-TSC-1058

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-280991/1ST

21 176255

**FREIGHT CAR CLEARINGHOUSE EXPERIMENT: EVALUATION OF THE EXPANDED CLEARINGHOUSE**

The Freight Car Clearinghouse Experiment, which started in September 1974 as a cooperative undertaking of three railroads to improve freight car utilization, was expanded in the summer and fall of 1976 to include ten railroads. With some changes in membership the Clearinghouse is still in operation today. The report examines the benefits accruing to the member railroads as a result of the expansion. The report estimates that: (1) empty interchange received cars decreased by nearly a quarter; (2) loaded car-miles increased; and (3) the monetary savings amounted to over 30 million dollars per year spread over all the member railroads.

See also report dated February 77, PB-265 206.

Dingle, AD

Association of American Railroads, Federal Railroad Administration  
Final Rpt. FRA/OPPD-78-11, AAR-R-293, Jan. 1978, 114 pp

Contract DOT-FR-65146

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281015/8ST

21 176292

**NETWORK AGGREGATION IN TRANSPORTATION PLANNING. VOLUME I: SUMMARY AND SURVEY**

Volume 1 summarizes research on network aggregation in transportation models. It includes a survey of network aggregation practices, definition of an extraction aggregation model, computational results on a heuristic implementation of the model, and related mathematical results.

See also Volume 2, PB-281 385.

Hearn, DW

Mathtech, Incorporated, Transportation Systems Center Final Rpt.  
DOT-TSC-RSPD-78-8.1, Apr. 1978, 100 pp

Contract DOT-TSC-1232

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-281384/8ST

21 176293

**NETWORK AGGREGATION IN TRANSPORTATION PLANNING. VOLUME II: A FIXED POINT METHOD FOR TREATING TRAFFIC EQUILIBRIA**

Volume 2 defines a new algorithm for the network equilibrium model that works in the space of path flows and is based on the theory of fixed point method. The goals of the study were broadly defined as the identification of aggregation practices and the development of a framework for studying these practices. These goals have been accomplished by, (a) conducting a survey of aggregation practices, (b) formulating an aggregation model, (c) conducting a computational study, (d) deriving mathematical programming formulations aimed at making steps of the model precise, and (e) programming and testing a particular algorithm.

See also Volume 1, PB-281 384.

Kuhn, HW

Mathtech, Incorporated, Transportation Systems Center Final Rpt.  
DOT-TSC-RSPD-78-8.2, Apr. 1978, 75 pp

Contract DOT-TSC-1232

ACKNOWLEDGMENT: NTIS

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PB-281385/5ST

21 178795

**LIVESTOCK TRUCKING INFORMATION CLEARINGHOUSE: A CASE STUDY OF TRANS-FAX**

This report analyzes and evaluates the economic costs and benefits of establishing and operating a regional clearinghouse system, which provides information regarding availability of truck transport capacity in relationship to cattle and general livestock transport needs.

Knox, PL Crawford, RH

Trans-Fax, Incorporated Final Rpt. FHWA-RD-78- 79, May 1976, 43 pp

SPONSORING AGENCY:

RESPONSIBLE INDIVIDUAL: Abbott, P (HRS-41)

Contract DOT-FH-11-8747

ACKNOWLEDGMENT: Federal Highway Administration

ORDER FROM: NTIS

PB-281590/AS

21 180259

**COMPARISON OF VARIOUS SOLUTIONS PROPOSED TO INCREASE LINE CAPACITY WHEN THERE IS A CHANGE IN THE TRAFFIC GROWTH RATE [Sravnienie varianlov usilenija transportnyh ob'ektov pri izmenenii tempov rosta ih zagruzki]**  
No Abstract. [Russian]

Cernomordik, GI Pozamantir, EI *Vestnik VNIIZT* No. 3, 1978, pp 7-9, 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: All-Union Scientific Res Inst of Railroad Transp, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

21 180278

**ANALYSIS OF JUNCTIONS AND DETERMINATION OF LOADING LIMITS [Untersuchung von Fahrstrassenknoten und Ermittlung einer Belastungsgrenze]**

Description of a simulation method for defining maximum throughput capacity at a rail junction. When this capacity is exceeded, delays increase and the quality of the service deteriorates. The authors apply their method to two types of rail junctions and they compare the results with those obtained using two analytical methods. [German]

Voelz, WD Kretschmer, W *Eisenbahntechnische Rundschau* Vol. 27 No. 1-2, Jan. 1978, pp 45-48, 4 Phot., 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

DOTL JC

21 180307

**THE ROADRAILER: RETURN OF AN IDEA**

Revival of a semi-trailer concept with both highway and railroad wheels, developed by Chesapeake & Ohio over 20 years ago, is the basis for a new intermodal organization. Details of the new vehicle design, operating concepts, savings in line-haul and terminal operations, and market potential are examined. RoadRailer system is being promoted by Bi-Modal Corp.

*Traffic World* Vol. 174 No. 12, June 1978, pp 22-27

ORDER FROM: Traffic Service Corporation, 815 Washington Building, Washington, D.C., 20005

DOTL JC

21 180316

**COMPUTER SIMULATION OF RAILWAY LOCOMOTIVES AND TRAINS**

An outline of the computer simulation technique is presented, along with a description of the representation of the railway locomotive/train system. This is followed by a survey of locomotive/train simulation, based mainly on work carried out at the Railway Technical Center, Derby. First, the simulation of train movement and its application to models of the working railway is described. Second, the simulation of train control systems within a train simulation is dealt with. Finally, an introduction is given to the computer simulation used in locomotive and train simulators. The paper concludes with some views on the reasons for computer simulation, and mentions the problems and success of the technique.

Ashworth, EO (Railway Technical Center, England) *Measurement and Control* Vol. 11 No. 1, Jan. 1978, pp 25-28, 8 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

21 180322

**MASS TRANSPORT FOR BULK COMMODITIES: DOING WHAT RAILS DO BEST**

This report on the status of unit trains in the U.S. and Canada includes, along with operational and marketing discussions, tables detailing the actual trains which are operating along with details such as their numbers of cars, length of run, terminal points and other information.

Welty, G *Railway Age* Vol. 179 No. 14, July 1978, pp 22-24

ACKNOWLEDGMENT: Railway Age

ORDER FROM: ESL

DOTL JC

21 180360

**TEAMING SWITCHERS AND MAINLINERS FOR ECONOMIC UNIT TRAIN HAULAGE**

Railroads are economically transporting coal through the use of modern and efficient high capacity cars, high-horsepower mainline electric & diesel electric locomotives, and modern heavy-duty, diesel electric switchers. Each has a specific function to perform: the electric locomotive is on an automated railroad totally dedicated to loading, hauling and dumping unit trains; the mainline diesel locomotive is used in similar service but manually controlled; and the switcher locomotive's task is to load the cars while the mainline diesel is hauling the loads to the generating plant and returning again with empties. Investment in these efficient equipments and machines has proven to be the economical answer to low coal haulage cost today and promises to be the right answer for many years in the future. It remains for the coal companies, utilities, railroads, and equipment suppliers working together to optimize this transportation opportunity. Proper selection of the system and the equipment will make the system operate efficiently and at lowest cost. But, it must be kept in mind that the right answer for one mine/utility/railroad combination may not be the best answer for another. Each must analyze its own set of needs and conditions to achieve its right answer. The payoff for the analysis can be savings in the hundreds of thousands of dollars per year for all participants.

From Coal Convention of the American Mining Congress, Pittsburgh, Pennsylvania, May 1, 1977, Paper 22, Set No. 4.

Jacobs, GW (General Electric Company)

American Mining Congress CONF-7705111, 1977, 10 pp

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: American Mining Congress, Ring Building, 1200 18th Street, NW, Washington, D.C., 20036

21 180361

**RAIL OPERATION AT THE FORTUNA OPENCAST MINE AND ITS TECHNICAL DEVELOPMENT**

Provided is an overview of the construction of the rail system at the Fortuna opencast mine with its technical equipment. High-capacity cars for overburden and coal, electric locomotives and the pertinent train safety systems are described, including the most modern central signal box. Underlined in particular are the technical innovations and improvements made in all sectors. In conclusion, the development of the rail system is described and shown in perspective with the new connections to the Berghem and Hambach opencast mines. [German]

Fries, D Meyer, W *Braunkohle* No. 9, Sept. 1977, pp 356-363

ACKNOWLEDGMENT: Energy Research Abstracts

ORDER FROM: Droste-Verlag GmbH, Presshaus am Martin-Luther Platz, Postfach 1122, 4000 Dusseldorf 1, West Germany

21 180518

**INFORMATION ON QUESTIONS ABOUT CONRAIL'S SERVICE IN THE SCRANTON, PENNSYLVANIA, AREA**

Conrail submitted estimated 1976 traffic volumes to the Department of Transportation for determining the classification and designation of its rail lines. GAO found that Conrail's data accurately portrayed the then-current level of traffic on the Scranton-Stroudsburg line. The Interstate Commerce Commission's hearings on Conrail's request to close its Scranton piggyback terminal were held in Washington, D.C. The Commission said that such hearings are usually held in Washington and that the hearing was publicized in the usual manner. Conrail acquired four major routes between northern New Jersey and western New York State. It is evaluating each of these to determine which should be mainline routes for through traffic. GAO found that Conrail's analyses were comprehensive and adequately considered the technical and economic aspects of each route.

General Accounting Office CED-78-82, Apr. 1978, 19 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-279478/2ST

21 182057

**FREIGHT CAR UTILIZATION AND RAILROAD RELIABILITY: AN ASSIGNED FLEET MODEL. STUDIES IN RAILROAD OPERATIONS AND ECONOMICS, VOLUME 24**

This report presents a simulation model that can be used to evaluate the relative impacts of various shipper and railroad actions to improve the performance of assigned fleets. Shipper behavior is modeled as his ability to load goods, relative to his production rate and empty car availability. If empty cars are not available, the goods are stored in a warehouse. Railroad origin-to-destination performance is described by a trip time distribution, reflecting mean transit time and unreliability. At the receiver, cars are detained until demand for them arises, or they are unloaded into a warehouse. Service is measured in terms of the backlog of goods warehoused at the shipper, the number of stockouts at the receiver, and the characteristics of the queue at either end. Results of the model show that railroad operating improvements can effectively increase the capacity of the fleet. By improving mean times or reliability, railroads can improve the level of service to shippers without adding cars to the fleet. Shipper actions, such as increasing warehouse capacity, may also improve service and utilization of the fleet. The model was tested in a case study involving the Milwaukee Road and the Miller Brewing Company.

Also pub. as Massachusetts Inst. of Tech., Cambridge. Center for Transportation Studies, Rept. no. MIT-CTS-78-1. See also PB-275433 and PB-279642.

Assarabowski, RJ

Association of American Railroads, Massachusetts Institute of Technology, Federal Railroad Administration Final Rpt. AAR-R-286, FRA/OPPD-78/18, Apr. 1978, 177 p.

Contract DOT-FR-65146

ACKNOWLEDGMENT: NTIS

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PB-285242/4ST, DOTL NTIS

21 182082

**FREIGHT CAR UTILIZATION AND RAILROAD RELIABILITY: THE APPLICATION OF AN INVENTORY MODEL TO THE RAILROAD EMPTY CAR DISTRIBUTION PROCESS. STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 25**

This report applies inventory control concepts to the problem of sizing empty car inventories at points on railroad networks. Existing car distribution techniques typically flow empty cars from surplus to deficit areas, without considering the inherent variability in both the supply and the demand for empty cars. This report presents a discrete event simulation model of a single terminal area that can estimate optimal inventory levels as a function of supply and demand variability and the cost of holding empty cars for distribution relative to the cost of falling to provide empty cars when required by shippers. The model shows how inventory requirements drop with improvements in trip time reliability, with reductions in variability of supply or demand, and with reductions in the cost of unfilled orders relative to the holding cost. In a preliminary analysis, the model indicated that an excessive inventory was maintained in one surplus area. The report concludes with recommendations for using the model to size empty car inventories on a railroad.

Also pub. as Massachusetts Inst. of Tech., Cambridge. Center for Transportation Studies, Rept. no. MIT-CTS-78-2. See also PB-285242.

Philip, CE

Association of American Railroads, Massachusetts Institute of Technology, Federal Railroad Administration Final Rpt. AAR-R-287, FRA/OPPD-78/19, Apr. 1978, 143 p.

Contract DOT-FR-65146

ACKNOWLEDGMENT: NTIS  
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PB-285243/2ST, DOTL NTIS

21 182570

**AUTOMATIC CONTROL FOR LARGE CONTAINER TRAFFIC TRAVELLING ON THE TRANS-SIBERIAN AS PART OF SERVICES BETWEEN EUROPE AND JAPAN [Avtomatizacija kontrolja za proizvodnjom krupnotonnaznyh tranzitnyh kontejnerov]**  
No Abstract. [Russian]Kozlov, J *Zheleznodorozhnyi Transport* No. 4, 1978, pp 27-29

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: USSR Ministry of Railways, Novo-Basmanaya Ulitsa 2, Moscow B-174, USSR

21 182813

**RAIL HAULAGE OF WASTE ROCK AND CRUDE ORE**

This presentation of rail haulage practices in open pit mining describes car types, sizes, car construction practices and air braking data, as well as a variety of loading and unloading methods for the several types of cars. The paper includes a review of basic transportation formulas with an eye toward job matching the locomotive with the best fuel economy to a given application.

For meeting held April 10-12, 1978.

Ward, RJ (DIFCO, Incorporated)  
Society of Automotive Engineers Preprint n 780469, 1978, 17 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

21 183287

**SIMULATION EXPERIMENTS WITH AN EMPTY RAILWAY WAGON DISTRIBUTION MODEL**

The paper describes an empty railway wagon distribution model and some simulation experiments performed with it. The model gives a fairly detailed description of the flow of empty and loaded wagons between different regions, the generation of demand for wagons and the costs connected with transportation and shortage. The purpose of the model is to make experiments possible, mainly to compare different redistribution strategies for the available "empties", but also to test the effect of changes in the "environment", e.g. Changes in the demand pattern. Great care has been used in programming the model so as to get low variance estimates in comparisons of different strategies of environments. This is done by an elaborate "synchronization" of the generated (pseudo) random numbers. (using among other devices an inverted random number generator, generat-

ing the random numbers in the reverse order). This synchronization proved quite successful, reducing variances by a factor of at least 5. Antithetic sampling has also been used with success to reduce variances in single runs cutting simulation time by a factor of about 2. The simulations are started near steady state, in that the runs start from an analytically computed average state. Another feature worth mentioning is that other values than the "true" ones for the parameters are tried in the redistribution strategies.

Lindberg, PO Svanberg, K  
Royal Institute of Technology, Sweden Monograph TRITA-MAT-1976-15, 1976, 12 pp, 7 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-234396), National Swedish Road & Traffic Research Institute  
ORDER FROM: Royal Institute of Technology, Sweden, Fack S-100 44, Stockholm 70, Sweden

78.0436

21 183579

**IMPROVEMENT WORK ON MAIN LINES IN RELATION TO TRAIN OPERATION AND LATE RUNNING [Ausbau von Fernstrecken in Abhängigkeit vom Betriebsprogramm und Verspätungsniveau]**

One of the central problems of railway operating sciences is the presentation of the theoretical relationships between system size, train-running schedule and the standard of timekeeping. In the present article a simulation model for main lines with high-speed traffic is put forward which can be used to determine qualitative line carrying capacity. Examples of its application show methods of formulating decision aids for track work and train operation. The starting point in each case is an uncontrolled operating condition in which, with respect to traffic hinderance, a natural equilibrium comes about between the train-running schedule and the state of route work, by way of which the compatibility of speed groups, mix ratios and traffic density can be made apparent. From this information it is possible to derive favourable intervals between passing places and also the number of passing tracks at each of them. Then the effects were tested of control algorithms which--starting from the natural equilibrium of uncontrolled operation--allow the operating quality with fast trains to be improved step by step until a hinderance-free condition is attained. With this simulation model, which exactly calculates a train's time-distance and speed-distance lines, the train-running schedule and the state of the route can be studied not only in normal working; also under extreme conditions the reaction of the latent forces in an operating system can be made evident. [German]

Richey, A *Eisenbahntechnische Rundschau* Vol. 27 No. 7-8, July 1978, 7 pp, 7 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzfofallee 33, 61 Darmstadt, West Germany

DOTL JC

21 184688

**COMPUTER METHODS IN BLOCKING AND TRAIN OPERATIONS STRATEGIES**

This paper presents a set of computer-aided methods for developing blocking and train operations strategies for railroad networks. These methods are iterative processes in which complex, judgmental decisions are made by experienced railroad operators and extensive, repetitive calculations are performed by a computer. By using these methods, railroad operators can compare the consequences of various blocking and train operations strategies in terms of such measures as car switching, yard loading, blocksize, car-kilometers, ton kilometers, train-kilometers, and the like, which are calculated by the computer; operators can then develop efficient blocking and train operations strategies.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Siddiquee, W D'Esopo, DA (Stanford Research Institute) *Transportation Research Record* No. 656, 1977, pp 45-52, 9 Fig., 3 Ref.

ORDER FROM: TRB Publications Off

21 184689

**INVENTORY MODEL OF THE RAILROAD EMPTY-CAR DISTRIBUTION PROCESS**

Techniques to improve freight-car fleet use are of considerable interest to the railroad industry. One potentially high improvement area is the disposition

of empty cars within the network. This paper reports the first results of inventory control applied to one aspect of the process, namely the sizing of empty-car inventories at points in the network. First we evaluate existing techniques for distributing empty cars on a rail network. These techniques deal primarily with optimizing empty-car movements from areas of surplus to areas of deficit. To account for variations in supply and demand, we designed a discrete event simulation model that can determine optimum inventory level, for a single terminal area, as a function of (a) daily supply variations, (b) daily demand variations, and (c) cost of holding a car in a terminal awaiting loading compared to cost of having no car available to satisfy shipper demand. A first attempt to use the model to evaluate the performance of an actual railroad terminal area indicates that excessive inventories are maintained in surplus terminal areas. The applicability of the model to a real railroad operating situation is also demonstrated.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Philip, CE (Association of American Railroads); Sussman, JM (Massachusetts Institute of Technology) *Transportation Research Record* No. 656, 1977, pp 52-60, 8 Fig., 2 Tab., 8 Ref.

ORDER FROM: TRB Publications Off

21 184693

#### PENNSYLVANIA COMMONWEALTH PIGGYBACK DEMONSTRATION

In the belief that a prototype intermodal service is crucial to the development of a national intermodal network, the Bureau of Science and Technology of the Pennsylvania Department of Commerce has been planning the Transcommonwealth Piggyback Demonstration Project. This has been developed to the point where it can be brought to operating status relatively quickly with a modest investment and will be of substantial value to federal rail planners. This paper presents the need for such a project, plans for providing a reasonable approximation of network-type service, potential value in terms of operating data obtained and momentum created for the development of a national network, and costs of carrying out the demonstration. /Author/

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Gellman, AJ (Gellman Research Associates, Incorporated) *Transportation Research Record* No. 656, 1977, pp 69-71

ORDER FROM: TRB Publications Off

21 185351

#### SOLVING THE PROBLEM OF BULK FREIGHT MOVEMENTS

"We are regularly working trains of 6,000 tonnes on 1.5 percent gradients. Trains of 12,000 tonnes have already been tested successfully on the coal line to Richards Bay" the General Manager of South African Railways stated in an interview. The SAR, in implementing its modernisation and expansion program, ranks as one of the world's most progressive Railway organisations.

*International Railway Journal* Aug. 1978, 6 p, 5 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Simmons-Boardman Publishing Corporation, 508 Birch Street, Bristol, Connecticut, 06010

DOTL JC

21 185354

#### A POWERED VEHICLE WITH INTERCHANGEABLE AXLES FILLS A GAP IN CONTAINER TRANSPORT ON THE DB [Selbstfahrendes Umsetzfahrzeug schliesst eine Lücke im Containertransport der Bundesbahn]

At the present time 2 percent of part-load traffic is containerised, which bears little relation to investments. Following experiments, a new item of equipment has been invented, which even with a live catenary can transfer two containers from one wagon to another or on to a lorry in the space of 2 minutes. It is fitted on a transporting wagon which has two driving axles and can haul two more loaded wagons. It is not connected to terminals and can be incorporated in trains, which enables it to be used in networks with secondary terminals. Propulsion: 100 kW diesel hydraulic. [German]

*Foerdern und Heben* Vol. 28 No. 8, 1978, pp 534-535, 3 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: ESL

21 188106

#### CHOICE OF OPTIMUM SOLUTIONS WHEN OPERATING FREIGHT TRAINS DURING PERIODS WHEN THERE IS

#### MAJOR TRACK OVERHAUL [Vybor optimal'nyh variantov propuska gruzovyh poezdov pri kapital'nom remonte puti]

Way of choosing optimum solutions so that loaded and empty freight trains can run over long and short distances when there are traffic stoppages for major track repairs. Description of the effects of rational organisation of transport on reducing delays to trains. [Russian]

Teterskij, GI *Zheleznodorozhnyi Transport* No. 7, 1978, pp 24-29, 6 Fig., 1 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: USSR Ministry of Railways, Novo-Basmannaya Ulitsa 2, Moscow B-174, USSR

21 188347

#### SELF-LIFTING PALLETS: INTER-MODAL BREAKTHROUGH

In conjunction with the Transport & Road Research Laboratory (TRRL), at Crowthorne, Berks, and the South Western Industrial Research laboratory (SWIRL), at Bath University, SCIDS Ltd (Small Container Intermodal Distribution Systems), in which Freightliners has an interest, has developed a special steel pallet capable of lifting standard ISO containers carrying loads of up to 20 tons on its own telescopic legs. The pallet is a simple rectangular box measuring 20ft by 8ft and 6in deep, and it uses the power of an ordinary 24V vehicle battery to transfer containers from road to rail and vice versa without the need for cranes or other heavy lifting equipment.

*Modern Railways* Vol. 35 No. 361, Oct. 1978, pp 467-468, 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

DOTL JC

22 178209

**COAL--THE FASTEST GROWING BULK TRADE?**

In the first of a series of articles analysing bulk trade development and the implications for terminals and associated cargo-handling techniques, CARGO SYSTEMS' research division looks at the potential of seaborne coal trade worldwide in the next decade, and concludes that as trade expands significantly beyond 1980, higher discharging rates will be necessary to cope with increasing vessel size, potentially stimulating the introduction of technologically innovative handling methods.

*Cargo Systems International* Vol. 5 No. 4, Apr. 1978, pp 81-83

ACKNOWLEDGMENT: Cargo Systems International  
ORDER FROM: ESL

22 180295

**COMPUTER-AIDED STUDY INTO THE EFFICIENCY OF VIBRATION SYSTEMS FOR COMPACT-LOADING BULK GOODS IN COVERED AND HOPPER WAGONS [Primenenie imitacionnogo modelirovaniya pri issledovanii vibracionnyh sistem]**  
No Abstract. [Russian]

Dubrovin, BS *Vestnik VNIIZT* No. 2, 1978, pp 57-60, 2 Fig., 3 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: All-Union Scientific Res Inst of Railroad Transp, 3-aya Mytishchinskaya Ulitsa 10, Moscow I-164, USSR

22 180302

**WORKING WITH THE RAILROAD**

The planning required and information needed for the rail transport of sewage sludges is discussed with emphasis on the needs of the railroad manager.

Proceedings of the Third National Conference on Sludge Management, Disposal, and Utilization, Miami, Florida, December 14, 1976. See CONF-761211.

Heller, N (Southern Railway System)  
Information Transfer, Incorporated Proceeding 1977, pp 50-51

ACKNOWLEDGMENT: Bureau of Mines  
ORDER FROM: Information Transfer, Incorporated, 1160 Rockville Pike, Rockville, Maryland, 20852

22 180365

**MCKINLEY NEARS 5-MILLION TPY GOAL**

Pittsburg & Midway Coal Mining Co.'s McKinley mine near Gallup, N.M., is being expanded to increase annual production to 5 million by 1980. When completed the mine will produce from four seams of coal using four Bucyrus-Erie 55-cu-yd draglines. Previously, mining was limited to one seam worked by a 33-cu-yd shovel. Other features include a 75,000-ton stockpile and blending facility and a 3,000-tph unit-train loadout. Drilling, blending and pre-weighing as well as reclamation operations are discussed.

Jackson, D *Coal Age* Vol. 83 No. 4, Apr. 1978, pp 106-110

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

22 180383

**ANALYSIS OF A TRANSSHIPMENT PROBLEM WITH MULTIPLE CONFLICTING OBJECTIVES**

This paper presents the formulation of a goal programming model for analysis of the transshipment problem, where multiple conflicting objectives must be considered. Included are the general goal programming model for the transshipment problem, and a representative application of goal programming to such a problem. Analysis and interpretation of the G.P. solution to the problem is presented.

Moore, LJ (Virginia Polytechnic Institute & State University); Taylor, BW, III Lee, SM *Computers and Operations Research* Vol. 5 No. 1, 1978, pp 39-46, 10 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

22 181705

**RADIOACTIVE WASTE TRANSPORTATION SYSTEMS ANALYSIS AND PROGRAM PLAN**

The objective of the Transportation/Logistics Study is to ensure the availability of a viable system for transporting the wastes to a federal

repository in 1985. In order to accomplish this objective, a systems analysis of waste transportation has been directed by ORNL to determine the problems that must be solved and to develop a program plan that identifies which problems must first be pursued. To facilitate this overall approach and to provide for short- and long-range waste management, logistics models have been developed to determine the transportation fleet requirements and costs. Results of the study are described in this report. (ERA citation 03:030387)

Shappert, LB Joy, DS Heiskell, MM  
Oak Ridge National Laboratory, Department of Energy Mar. 1978, 46 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

ORNL-5362

22 181706

**LOGISTICS MODELS FOR THE TRANSPORTATION OF RADIOACTIVE WASTE AND SPENT FUEL**

Mathematical modeling of the logistics of waste shipment is an effective way to provide input to program planning and long-range waste management. Several logistics models have been developed for use in parametric studies, contingency planning, and management of transportation networks. These models allow the determination of shipping schedules, optimal routes, probable transportation modes, minimal costs, minimal personnel exposure, minimal transportation equipment, etc. Such information will permit OWI to specify waste-receiving rates at various repositories in order to balance work loads, evaluate surge capacity requirements, and estimate projected shipping cask fleets. The programs are tailored to utilize information on the types of wastes being received, location of repositories and waste-generating facilities, shipping distances, time required for a given shipment, availability of equipment, above-ground storage capabilities and locations, projected waste throughput rates, etc. Two basic models have been developed. The Low-Level Waste Model evaluates the optimal transportation policy for shipping waste directly from the source to a final destination without any intermediate stops. The Spent Fuel Logistics Model evaluates the optimal transportation policy for shipping unprocessed spent fuel from nuclear power plants (1) indirectly, that is, to an Away-From-Reactor (AFR) storage facility, with subsequent transshipment to a repository, or (2) directly to a repository. (ERA citation 03:034617)

Joy, DS Holcomb, BD  
Oak Ridge National Laboratory, Department of Energy Mar. 1978, 54 p.

Contract W-7405-ENG-26

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

ORNL/TM-6192

22 182825

**ECONOMIC IMPACT OF RAIL-BRANCH-LINE ABANDONMENT: RESULTS OF A SOUTH-CENTRAL NEBRASKA CASE STUDY**

This study assesses the impact of branch-line abandonment on country elevators and the surrounding communities. A model developed at Iowa State University was used to evaluate implications of abandonment for a six-county area of south central Nebraska. The model was used to evaluate the economic feasibility of alternative grain-handling systems, given existing and prospective freight rates for alternative transport modes, elevator costs for various sizes of facilities and grain prices at alternative destinations.

Anderson, DG Gaibler, FD Berglund, M  
Nebraska University, Lincoln No Date, 26 pp, 2 Fig., 6 Tab., 13 Ref.

ORDER FROM: Nebraska University, Lincoln, Agricultural Experiment Station, Lincoln, Nebraska, 68503

DOTL HE 2321.G7B48a

22 182826

**ECONOMIC IMPACT OF RAIL BRANCH-LINE ABANDONMENT: RESEARCH PROCEDURES EMPLOYED IN A SOUTH-CENTRAL NEBRASKA CASE STUDY**

This report describes research techniques employed in a study of the grain-marketing network in six counties of south central Nebraska. The model, the study area and the data requirements are identified. The purpose of the study was to assess the impact of branch-line abandonments on



country elevators and the surrounding communities in the case study area.

Berglund, M Anderson, DG  
Nebraska University, Lincoln No. 71, Sept. 1976, 43 pp, 3 Fig., 24 Tab.,  
14 Ref., 1 App.

ORDER FROM: Nebraska University, Lincoln, Agricultural Experiment  
Station, Lincoln, Nebraska, 68503

DOTL HE 2321.G7B48

**22 182830**  
**SEGMENTING FREIGHT MARKETS**

Study of freight market segments shows shipper need varying substantially and cutting across product characteristics, traffic patterns, modal usage and industry lines. Shippers perceive their transportation needs in terms of their channels of distribution, competitiveness of their own markets and their own marketing strategies. Understanding market segments should enable carriers to compete more effectively.

McGinnis, MA (Shippensburg State College) *Transportation Journal* Vol. 18 No. 1, 1978, pp 58-68, 4 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

**22 182894**  
**COMPUTER CONTROLLED COAL LOADING**

This paper has sought in general terms to outline the operation and benefits which can be achieved by automating a coal loading station and in particular a flask or mass type system. The principles are novel although they have all been tried out in one station or another in coal or other products. The methods have been described for coal railway load out stations only because the justification appears greatest in this application but the systems can clearly be employed in stations handling other products and in other plants (such as ship loading) in which similar problems arise.

*Coal, Gold and Base Minerals of Southern Africa* Vol. 26 No. 2, Feb. 1978, n.p.

ACKNOWLEDGMENT: Energy Research Abstracts  
ORDER FROM: Pithead Press (Pty) Limited, Box 9002, Johannesburg, South Africa

**22 183344**  
**AUTOMATIC LOADING SYSTEM BETWEEN RAILROADS WITH DIFFERENT TRACK GAGES: VEVEY BOGIE CARRIER [Un système de chargement automatique entre réseaux d'écarterments différents: le bogie-transporteur VEVEY]**

A new bogie-carrier and a system for loading these bogies which is simple, efficient and fast was developed. The system makes it possible to convey bulk traffic to be rationalized between railroads with different track gages. The authors report that the carrier can be brought into service almost automatically through the intermediary of a loading station. [French]

Raeber, V (Societe Vevey, Switzerland); Hess, F *Revue Generale des Chemins de Fer* Vol. 97 Mar. 1978, n.p.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

**22 184642**  
**COAL TRANSPORTATION RESEARCH AND INFORMATION NEEDS**

Transportation planning and engineering research and data needs in the area of coal transportation are outlined using specific examples from a West Virginia coal conversion study. Coal quality parameters and coal mine characteristics that influence the transportation modes utilized are presented. Roles played by coal preparation and loading facilities are noted. Data deficiencies relative to assessing impacts of coal hauling vehicles on highway systems are considered. Although information deals primarily with the Appalachian coalfields, an effort is made to describe regional differences in coal transportation research needs. Specific data needs pertaining to the retail coal system are presented. An extensive reference list is provided for those just becoming involved in coal transportation activities.

Eck, RW (West Virginia University); Hui, CY *ASCE Journal of Transportation Engineering* Vol. 104 No. 5, Sept. 1978, pp 757-767, 26 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

**22 184654**  
**OBA--NEW DESIGN TO MAXIMISE RAILCAR LOADING**

As the major coal and iron ore stevedore in Amsterdam, OBA is well aware of the need for accurate weighing and loading into onward transport modes when handling large annual throughputs of heavy bulk material. From both economic and regulatory points of view it is essential to maximize railcar carrying capacity, for example, without exceeding maximum gross weights or wheel loadings. It is in this respect that OBA's own development division--OBA Engineering-Consulting--has developed a computer-controlled wagon loading system capable of regulating cargo flow for equal bogie loading as well as ensuring maximum payload. The article outlines the operation of the company's new system which is capable of a load-out speed of some 2000 tons/hr.

*Cargo Systems International* Vol. 5 No. 5, May 1978, pp 83-85

ACKNOWLEDGMENT: EI  
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**22 184660**  
**PROCESS OF DEVELOPING A WESTERN COAL MINE**

Major steps in the process by which an operator develops a coal mine in the West are discussed. It outlines principal activities involved in each step and the prospective time to accomplish each. Some of the major constraints are reviewed, including compliance with NEPA (National Environments Policy Act) requirements of various federal, state, and local government bodies, acquisition of sufficient coal and surface reserves to satisfy a long term coal supply agreement, and delays in permit issuance. New constraints that are likely to develop in the future and during the contract with the customer are also considered.

Paper presented at the National West Mining Conference and Exhibition, 80th Anniversary, Denver, Colorado, February 2-4, 1977.

Jones, JR (Peabody Coal Company) *Mining Yearbook* 1977, pp 132-138

ACKNOWLEDGMENT: EI  
ORDER FROM: Colorado Mining Association, 1515 Cleveland Place, Denver, Colorado, 80202

**22 184661**  
**GEX EXPANDS OUTPUT AT SWISHER MINE**

General Exploration Co. (GEX)'s expansion of its Utah coal mining operations at the Swisher Coal Co. subsidiary is described. To satisfy present contract commitments, Swisher will build a new preparation plant and a unit-train loading facility, and will add a third mine (two are already operating) in order to produce 1.5 million tpy of coal. The bulk of this output will consist of clean coal, helping Swisher deal with the problem of costly transportation in Southeastern Utah.

Jackson, D *Coal Age* Vol. 83 No. 7, July 1978, pp 152-157

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

**22 185596**  
**TEMPERATURE PROFILES OF RAIL TRANSPORTED ORDNANCE, PART 1. DESERT ENVIRONMENT**

The Naval Weapons Center has been involved in the measurement of ordnance temperatures since 1964. This report describes conditions experienced by ordnance-carrying rail stock in extreme desert environments during the period 1970 through 1977. Results of temperature measurements are given, and cumulative probability figures that are usable in predicting temperatures that are likely to be experienced by ordnance-loaded boxcars and flatcars are presented. (Author)

Schafer, HC  
Naval Weapons Center Tech Pub. NWC-TP-4917-PT-1, Apr. 1978, 83 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A058145/4ST

22 188088

**POINTS OF VIEW OF ENERGY TRANSPORT IN THE SELECTION OF SITES FOR COAL-FIRED POWER STATIONS**

[Aspekte des Energietransportes bei der Standortwahl von Steinkohlenkraftwerken]

After indicating the quantities of coal used for public power supply, the author shows for which regions the distance to the coal fields has an important effect. The siting question of a 2X600 Mw power station fired with Ruhr coal for power supply to the Rhein-Neckar region in West Germany is investigated. It is shown what facilities are today available for transport by overhead line, rail and inland shipping, the capital and material requirements for new means of transport, the consumption of energy for the transport of energy, and what space is taken up by the transport routes. [German]

Hegemann, KH *Elektrizitaetswirtschaft* Vol. 77 No. 1, Jan. 1978, pp 14-19; 8 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

22 188319

**A PERFORMANCE EVALUATION OF FREIGHT TRANSPORT MODES**

The authors consider that transport performance is a key factor in supply and distribution system planning and operation, in that it can affect inventory levels, customer service and production schedules. This article reports on a study conducted to generate relative performance information for common transport service alternatives in a broad range of circumstances. Reference to data obtained from seven, previously conducted independent surveys indicated that the key transport performance elements were speed, dependability, capability, availability and adequacy of equipment, availability of service, frequency of service, security, claims handling, shipment tracing, and problem solving assistance. As a result, a study is described which was planned to obtain an accurate picture of transport performance by various transport services for various distances. Some 10000 randomly selected shipments (out of 1.4 M Department of Defense shipments in 1973) provided the data base, with various domestic transport systems being employed as carriers. Analysis of the data revealed three important insights about transport performance. First, the differences between the speed and variability among the various transport services can be accurately compared. Second, the factors that have a particularly significant effect on average transit time and transit time variability can be identified. Third, factors affecting loss and damage experience among the various transport services can be identified. These characteristics are discussed, leading to the conclusions that (1) there is a pronounced taper in the transit curves of the

so-called slower modes of transportation that makes them highly competitive with some of the faster modes at the longer distances; (2) transit-time variability varies greatly among modes and, as shipping distances are increased, less premium services may out-perform the premium ones, and (3) loss and damage may be worse among the premium transport modes. /TRRL/

Piercy, JE (John Carroll University); Ballou, RH (Case Western Reserve University) *Logistics and Transportation Review* Vol. 14 No. 2, 1978, pp 99-116, 10 Fig., 6 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-237144)

ORDER FROM: British Columbia University, Canada, Faculty of Commerce, Vancouver V6T 1W5, British Columbia, Canada

22 188327

**UNDERSTANDING THE FREIGHT BUSINESS**

The manual is intended to form a quick-reference on the planning of forwarding cargo from producer to customer. The following chapters discuss various aspects of the industry: (1) route selection; (2) modern international surface transport; (3) airfreight-speed and security; (4) surface freight rates and transport costing; (5) packing for export; (6) hazardous goods by sea; (7) export documentation; (8) eec documentation and value added tax (vat); (9) import procedures; and, (10) marine insurance.

Meadows (Thomas) and Company Limited Monograph No Date, 142 p., Figs., Tabs., Photos.

ACKNOWLEDGMENT: TRRL (IRRD 234502)

ORDER FROM: Meadows (Thomas) and Company Limited, 36 Grosvenor Gardens, London, England

B7807633

22 188355

**BSC'S CONTRIBUTION TO THE DESIGN AND OPERATION OF MASS FLOW BUNKERS**

The problems of material sticking to bunker walls and arching across the outlet have been solved by the use of the mass flow design method based on the flow properties of the stored material. After a ten year period the British Steel Corporation has a data bank of over 200 steelworks' raw materials and about 150 mass flow designs have been produced. Examples have been given 88 designs for 9 major new plants.

Wright, H (British Steel Corporation) *Iron and Steel International* Vol. 51 No. 4, Aug. 1978, 5 p., 11 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

23 178744

**PASSENGER UTILIZATION OF LOCAL VS EXPRESS TRAINS FOR A NEW YORK CITY SUBWAY LINE: A CASE STUDY**

A survey of over 5000 passengers on the IRT #1 line was conducted in New York City in order to examine passenger attitudes, perceptions and, most importantly, travel mode preferences (local vs express). Passengers were asked whether they prefer faster or more comfortable trains. It was found that they were evenly divided in their preference between faster trains and more comfortable ones, regardless of the distance travelled. However, it was found that significant numbers of passengers opted to transfer to crowded express trains, with little or no savings in travel time, while parallel local trains ran much less crowded. Passengers were asked to estimate their travel time and the results were compared to measured travel times. Passengers consistently over-estimated their travel time and correlated their use of express trains with faster service. A major conclusion of this study is that the overall quality of service on the #1 line may be improved by inducing passengers to stay on local trains when travelling even moderate distances. This will promote a better passenger load distribution between the local and express and provide all passengers with a more comfortable level of service with no significant increase in travel time. /Author/

This article appeared in the Transportation Research Record No. 662, Planning and Design of Rapid Transit Facilities.

Wiener, R (Colorado University, Boulder); Lidor, G (City College of New York) *Transportation Research Record* No. 662, 1978, pp 8-16, 5 Fig., 4 Tab., 2 Ref.

ORDER FROM: TRB Publications Off

23 178745

**SOME AESTHETIC CONSIDERATIONS IN LIGHT RAIL DESIGN**

Concern over the visual impacts of LRT remains one of the obstacles to a more general acceptance of the mode. Nor is this concern unjustified; for often, in the past, once a project had been approved, scant attention was paid by transit engineers to the appearance of LRT overhead and trackway. Yet all the fixed elements of LRT, trackway, overhead, and stations, are amenable to visual improvement if some of the principles of visual design, widely used in other fields, are applied. This paper outlines and illustrates some of the concepts that lie behind the installation of visually satisfactory and operationally functional LRT facilities, and suggests that closer coordination is needed between technical specialists and urban designers. /Author/

This article appeared in the Transportation Research Record No. 662, Planning and Design of Rapid Transit Facilities.

Fox, GD (Tri-County Metro Transportation District of Oregon) *Transportation Research Record* No. 662, 1978, pp 17-22, 15 Fig., 2 Ref.

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23 178746

**A STUDY OF PASSENGER TRANSFER FACILITIES (ABRIDGMENT)**

Throughout the country, a considerable effort is being made to improve public transit. However, one element of the total transit system which has not been studied at any level of detail and which has not improved to any great extent is the passenger transfer facility. The success of transit is going to depend on improvements made to all segments of the system, including safe, convenient transfer facilities. This study includes an inventory of facilities in some larger communities in New England, and a classification of facilities by size of area served and extent of system. According to an attitude survey, transit operators see a need for improved transfer facilities, minimized transfer times, and provision of shelters. The survey showed that pulsating systems had the highest number of transfers, averaging 27 percent; while transfers on non-pulsating systems generally averaged about 6 percent. The study concludes that transfer facilities must be improved to make transit more efficient and to encourage usage. /Author/

This article appeared in the Transportation Research Record No. 662, Planning and Design of Rapid Transit Facilities.

Bates, EG, Jr (Urban Transportation Systems Associates) *Transportation Research Record* No. 662, 1978, pp 23-25, 1 Tab.

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23 178747

**A TRANSIT STATION DESIGN PROCESS (ABRIDGMENT)**

The state-of-the-art of transit station planning is characterized by a lack of consistency among principles, standards, and techniques. Design standards and design guidelines as developed by transit operating agencies do not address trade-offs among the different station features or design components. In order to provide for consistency among the procedures used by different agencies to design transit stations and to ensure comprehensive treatment in the station design process, a methodology which uses analytical techniques for designing and evaluating alternative transit stations has been developed. The performance of the station must be judged relative to a set of predefined objectives which derive from anticipated interests. Typical station design objectives reflect the points of view of the general user, the special user (the elderly and handicapped), and the operator concerning passenger processing, the station environment, and cost. The design objectives are then translated into a set of performance criteria which serve to define explicit performance measures that are the basis for comparisons among alternative station designs. This paper shows a method for analyzing transit interface facilities. The discussion focuses on the procedures which can be used to establish policy for station features, to provide performance measures for subsystems, and to give cost estimates. /Author/

This article appeared in the Transportation Research Record No. 662, Planning and Design of Rapid Transit Facilities.

Demetsky, MJ Hoel, LA Virkler, MR (Virginia University) *Transportation Research Record* No. 662, 1978, pp 26-28, 1 Fig., 2 Tab., 8 Ref.

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23 178751

**FUTURE RIDERSHIP ON NEW YORK CITY'S RAPID TRANSIT SYSTEM (ABRIDGMENT)**

As a necessary step in the analysis of possible future requirements for the New York City rapid transit system a model to estimate ridership on the system is developed. Analysis of historic data reveals that annual ridership on the system is positively related to employment in the Manhattan Central Business District (CBD) and to the level of transit service, measured in car-miles; it is negatively related to the number of autos registered in New York City and to the transit fare, measured in constant dollars. These four variables explain 80 percent of the year-to-year variation in ridership. A relationship for peak hour ridership was also developed. The elasticity of demand with respect to CBD employment is found to be 0.75, with respect to fare, -0.25, with respect to service, 0.13. Statistically, the relationship of subway ridership to fares and to CBD employment is very strong. The relationship to auto registrations is weaker and to service weaker still. Because the model developed relates to the economic health of the CBD and to the ownership of the automobile, it is particularly relevant to the current National goals of downtown revitalization and energy conservation. For example, it is shown that a resurgence in Manhattan CBD employment to 1969 levels would increase ridership by some 10 percent. Similar increases in transit would occur if a gasoline shortage eliminated the automobile as a CBD commuting mode. To explore alternative estimates of future ridership eight combinations of the independent variables are examined, including stable and declining CBD employment, stable and declining fares, and unconstrained and energy-constrained automobile ownership. The results suggest long-term changes in current ridership ranging from a 9 percent loss to a 34 percent increase. /Author/

This article appeared in the Transportation Research Record No. 662, Planning and Design of Rapid Transit Facilities.

Zupan, JM Pushkarev, B (Regional Plan Association) *Transportation Research Record* No. 662, 1978, pp 47-49, Figs., 1 Tab., 2 Ref.

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23 180073

**A SIMULATION OF COMMUTER RAIL POSSIBILITIES**

A simple model of commuter rail line supply and demand characteristics is discussed. By varying assumptions and the nature of the rail service proposed, the resulting energy cost, and travel time impacts can be analyzed. The model is also useful in exploring fare structures and other policies. An existing rail line in the North Central Texas region is used as a case study.

Direct request to Transportation Librarian, North Central Texas Council of Governments. Prepared for the Institute of Management Sciences/Operations Research Society of America (TIMS/ORSA) Joint National Meeting in San Francisco, California, May 10, 1977.

Barker, WG  
North Central Texas Council of Governments July 1977, 32 pp, 16 Fig.  
ORDER FROM: North Central Texas Council of Governments, P.O. Drawer  
COG, Arlington, Texas, 76011

DOTL HE4487.TAA32  
T4 A32  
#3

23 180265

**DEVELOPMENT AND PERFORMANCE OF A SIMULATION PROGRAMME FOR A RAPID TRANSIT RAILWAY [Aufbau und Leistungsfähigkeit eines S-Bahn-Simulationsprogramms]**

The authors describe a simulation programme developed with the aid of funds from the Federal Ministry of Transport and supported by the DB. The programme facilitates decision-making in respect of system-effective vehicles design, train operation, signal implementation and route layout. It can be applied with equal effectiveness to rapid transit systems, underground railways and tramway systems. Although it does not provide direct optimal solutions, it nevertheless allows--by means of repeated calculation sequences--the effect of specific measures to be examined likewise the quantitative relationships of the various system variables from which the optimal result for operator and user can be determined.

Krettek, O Lankes, P *Eisenbahntechnische Rundschau* Vol. 27 No. 6, June 1978, 5 pp, 3 Fig., 17 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

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23 180326

**SUBURBAN CONNECTION**

A variety of transit modes and operating strategies that are available to connect the core areas with suburban communities are described. These options range from capital intensive programs with transit operating on an exclusive right of way through more modest schemes of buses operating on surface streets.

Cherwony, W (Simpson and Curtin, Incorporated); Polin, L *Consulting Engineer* Vol. 50 No. 3, Mar. 1978, pp 82-88

ACKNOWLEDGMENT: EI  
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DOTL JC

23 180333

**LIGHT RAIL TRANSIT AWAITS GREEN LIGHT**

Some background, typical examples and current programs of the light rapid rail transit systems' concept are discussed.

Taylor, SF (Sanders and Thomas, Incorporated) *Consulting Engineer* Vol. 50 No. 3, Mar. 1978, pp 73-77

ACKNOWLEDGMENT: EI  
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DOTL JC

23 180334

**HEAVY RAIL--"THE VILLAIN" STILL HOLDS THE KEY**

The characteristics, role, planning, engineering and problem areas of rail rapid transit systems, as contrasted with other forms of higher speed and capacity mass transportation --light rail transit, people movers, busways, and exclusive bus lanes are discussed.

Salter, WO (Parsons, Brinckerhoff, Quade and Douglas, Inc) *Consulting Engineer* Vol. 50 No. 3, Mar. 1978, pp 66-72

ACKNOWLEDGMENT: EI  
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DOTL JC

23 180371

**SHOULD AMTRAK DEVELOP HIGH-SPEED CORRIDOR SERVICE OUTSIDE THE NORTHEAST?**

Amtrak's (National Railroad Passenger Corporation's) current extension plans focus on the Chicago-Detroit and Los Angeles-San Diego corridors. Its long-range goals provide for extending the Northeast development concept to 16 other potential corridors. Amtrak believes corridors provide greater speed, better on-time performance, lower air pollution, greater energy efficiency, more safety, and lower deficits because of increased

ridership. GAO concludes that the (1) benefits Amtrak anticipates may not be available or worth the cost and (2) substantial increases in ridership cannot be expected unless one of the other transportation modes is disrupted. The report lists a number of choices the Congress can make regarding Federal subsidy for Amtrak's corridor development plan.

General Accounting Office Cong Rpt. CED-78-67, Apr. 1978, 38 pp, 1 App.

ACKNOWLEDGMENT: General Accounting Office  
ORDER FROM: General Accounting Office, Distribution Section, P.O. Box 1020, Washington, D.C., 20548

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23 180375

**OPTIMAL PARAMETERS FOR A COORDINATED RAIL AND BUS TRANSIT SYSTEM**

To formulate a mathematical model of the system it is assumed that a radiocentric regional highway network centered at the central business district exists. Railroad lines are assumed to be radial. The demand for public transit is assumed to be deterministic and to vary slowly with location. The optimization is accomplished mainly by the use of basic calculus in conjunction with continuum approximations of certain discrete parameters. Approximate, but simple and explicit, formulations for the optimal railroad interstation spacings, feeder-bus zone boundary and train headways are determined.

Wirasinghe, SC (Calgary University, Canada); Hurdle, VF Newell, GF *Transportation Science* Vol. 11 No. 4, Nov. 1977, pp 359-374, 10 Ref.

ACKNOWLEDGMENT: EI  
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DOTL JC

23 180436

**COMPETITIVE RESTRAINTS ON AIR TRAVEL: GROUND MODES AND TELECOMMUNICATIONS**

The history of air transportation is reviewed by reference to a series of diagrams illustrating the marked increase in air travel over the last 40 years because of the large increases in speed and comfort obtained with ever decreasing costs. Information derived from a national travel survey in the United States is used to discuss US intercity modal split, and it is suggested that a detailed evaluation of the competitive characteristics by transportation modes- automobile, air, bus and rail must accept that access and egress times and costs vary in every community. In this paper the author compares modes on the basis of block times versus range, ignoring the access and egress time and costs, indicating that errors may thus arise for short range, but become of much less importance for long range. Ground modes are assumed to require 15 per cent longer actual distances than air transport to cover the same point to point distance and all cost data are based on or corrected to U.S. 1974 airline costs. Future transport aircraft development is reviewed, and comparisons drawn with improved passenger trains, track levitated systems, buses and automobiles. Information on speed and fares indicates that as ranges increase beyond 200 to 300 statute miles that the air mode becomes increasingly preferable both in speed and cost. However, it is considered that the private automobile will continue to be the most important travel mode at short ranges, and a significant mode even at ranges up to 2000 miles. /TRRL/

Shevell, RS (Stanford University) *Aeronautical Journal* Vol. 82 No. 806, Feb. 1978, pp 75-84, 16 Fig., 1 Tab., 7 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233674)  
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✓ 23 181789

**PUBLIC HEARING BEFORE SENATE TRANSPORTATION AND COMMUNICATIONS COMMITTEE ON COMMUTER RAIL SERVICE IN NEW JERSEY HELD IN TRENTON, NEW JERSEY ON OCTOBER 11, 1977**

The Committee examined what is being done to improve commuter rail service and performance. Examined were issues as regards progress on the electrification project for the North Jersey Coast Train, formerly known as the New York and Long Branch and the reasons for the proposed closings of grade crossings in Monmouth and Ocean counties and the process through which these closings are determined. It is well known that the performance of commuter rail service in New Jersey is inadequate. Riders

of Amtrak are faced with proposed service cutbacks. The Committee has invited representatives from the state, Federal Government, Conrail, Amtrak, counties, labor organizations, and the riding public to examine commuter rail service and to discuss ways of improving it. The document contains statements from the Department of Transportation as well as statements from Amtrak and Conrail. (Portions of this document are not fully legible)

New Jersey Senate 1977, 70 pp

ACKNOWLEDGMENT: NTIS  
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PB-282108/OST

**23 182023**  
**A MODAL SPLIT MODEL FOR HIGH DENSITY URBAN CORRIDORS**

The objective of the study was to develop a modal split model that would be relatively simple, require little lead time, use readily available data, and be sensitive to policy alternatives. The model is designed to contribute to the evaluation of such policy options as station closing, new route alternatives, addition of park and ride facilities, skip stop policies, and increasing capacity. This study produces modal split models specifically for high density urban corridors. In a two stage process splits are established between the automobile and public transportation, and then bus and rapid transit. The aggregate, trip interchange models are calibrated using weighted least squares, with modal disutility functions, service characteristics, and trip end densities as independent variables. The background for the modeling procedure is established by producing a multitude of computer generated maps displaying the modal split patterns and by graphing the socioeconomic correlates of modal split in the Chicago area. Special attention was given to a thorough application of the model to Howard Corridor with Chicago Transit Authority rail rapid transit service. The application estimated the effects of closing selected peak period reverse commuting platforms to expedite service. In the process the model was improved.

Soot, S Sen, A Pagitsas, E  
Illinois University, Chicago, Urban Mass Transportation Administration  
Res Rpt. UMTA-IL-11-0008-78-2, Mar. 1978, 146 p.

ACKNOWLEDGMENT: NTIS  
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PB-284745/7ST, DOTL NTIS

**23 182571**  
**LIGHT RAIL TRANSIT IN PITTSBURGH, PA**

A review of rapid transit planning and implementation in Pittsburgh with major emphasis upon the Port Authority's Early Action Program South Hills fixed guideway element. As the result of waning community consensus for proceeding with the rubber-tired "Skybus," the Urban Mass Transportation Administration (UMTA) suspended further implementation in October, 1974. In 1975, key representatives of the local and state governments as well as the Port Authority formed a Special Task Force to break the deadlocked fixed guideway transit technology issue by selecting an independent consultant to perform a final alternative analysis study. With the completion of the South Hills Alternative Analysis and acceptance of the Light Rail Transit (LRT) technology recommendations in March, 1976, a community consensus was achieved which has resulted in the implementation of engineering and environmental impact studies with the objective of having the Stage I-LRT System operational in the South Hills sector early in the 1980's.

Hardy, TC (Port Authority of Allegheny City) *ASCE Journal of Transportation Engineering* Vol. 104 No. 4, July 1978, pp 499-507

ACKNOWLEDGMENT: EI  
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**23 182600**  
**AN INTEGRATED FARES POLICY FOR TRANSPORT IN LONDON**

A common but disputed justification of public transport subsidy is that lower fares will encourage transfer from private vehicles, alleviating the congestion externality. A quantitative method is developed to judge the validity of this "second best pricing" argument and it is applied to the best available evidence on peak and off-peak bus, rail and private car models in Greater London.

Glaister, S Lewis, D *Journal of Public Economics* Vol. 9 No. 3, June 1978, pp 341-355, Refs.

ACKNOWLEDGMENT: Transportation  
ORDER FROM: Elsevier North-Holland, Incorporated, 52 Vanderbilt Avenue, New York, New York, 10017

**23 182626**  
**INTEGRATED SERVICE FOR LONG-DISTANCE PASSENGER TRAFFIC [Integriertes Bedienungssystem fuer den Schienenpersonenfernverkehr]**

Since the last World War the railway has lost its position of leader in the long-distance passenger traffic field. At the present time the private car accounts for more than 80 percent of the market and the railway for about 9 percent. Long-distance passenger transport on the DB is to be made far more attractive over the coming years, especially in 2nd class. The main features of the new Intercity offer are journey times reduced by 22 percent in 2nd class, and quicker and more frequent (one per hour) services, and more direct links. [German]

Wiedemann, J *Die Bundesbahn* Vol. 54 No. 5, 1978, pp 387-390, 2 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

**23 182835**  
**PASSENGER RAIL IN CANADA: OPPORTUNITIES FOR RATIONALIZATION AND MODERNIZATION**

The passenger rail as now operated in Canada produces increasingly large losses and provides low quality service; indeed, it is highly obsolescent and unable to compete with the newer road and air modes. Since the majority of the present rail service is already duplicated or could be replaced by faster, more frequent, cheaper and commercially viable buses, it is suggested that some 85% of passenger rail routes should be discontinued with the buses and airlines providing all public transportation. While the scope for continuation of traditional passenger services in Canada is shown to be very limited, it appears that the traffic levels in the Quebec-Windsor corridor might be high enough in the foreseeable future to allow operation of modern, 100 mph passenger rail as a mode competitive with the bus, the auto and the jetliner. The development and operation of high speed rail in the corridor would not be commercially viable, and would incur losses comparable to the losses now sustained in the operation of obsolete passenger rail throughout Canada. The introduction of the STOL mode in the corridor is not a substitute for fast rail: as a much more expensive mode than rail, STOL would serve mainly the business and the affluent passengers. Moreover, it would also require subsidization. In the long term, fast rail would be chosen as a socially more desirable and technically superior service.

Lukasiewicz, J Gelman, S Swinton, M (Carleton University, Ottawa)  
Science Council of Canada Preprint 1978, 24 pp, 4 Fig., 5 Tab., Refs.

ACKNOWLEDGMENT: Science Council of Canada  
ORDER FROM: Science Council of Canada, 150 Kent Street, Ottawa, Ontario K1P 5P4, Canada

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**23 182836**  
**REPORT OF THE THIRTY-EIGHTH ROUND TABLE ON TRANSPORT ECONOMICS HELD IN PARIS ON 24TH-25TH MARCH, 1977 ON THE FOLLOWING TOPIC: SCOPE FOR THE USE OF CERTAIN OLD-ESTABLISHED URBAN TRANSPORT TECHNIQUES: TRAMS AND TROLLEY-BUSES**

The author mentions the criteria to be fulfilled by public transport: compatibility with urban planning, basic social, environmental, accessibility and economic needs, short travel time and level of service, and describes the characteristics of some conventional transport technologies (taxi, bus, express bus, tram, express tram, underground and urban railway) of interest to the user, operator and the community. An attempt is made to show the possibility of using express trams in towns with a population of 100,000 to 2,000,000. Details are given of possible network designs and of peak hour traffic along the main transport routes. Some technological developments concerning the infrastructure, route layout, safety and control, traffic and priority rules, and rolling stock are cited. The operational aspects of standard tram routes, e.g., regularity, frequency and capacity, fare collection, and information are discussed together with their organisation. Cost-benefit analyses form the basis of the selection of a transport system for a given situation.

Vanrasi, SIM

European Conference of Ministers of Transport Monograph No. 38, 1978, 73 pp, Figs., Tabs., 20 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-232985)

ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006  
P7804182

23 182838

**VALUE OF BUSINESS TRAVEL TIME**

The book is intended to provide a detailed empirical discussion of the application of production theory to the value of saving business travel time. The main areas of interest are the examination of hypotheses concerning the determinants of business travel time values, the techniques used to determine the values, and, the estimates of value that are obtained. The estimated values of travel time differ from those derived in other studies. This variance relates to the proportion of travel time allocated to the employee's own time. Although the values derived can be applied to business air travel they would have to be modified for travel where a ground mode is the dominant journey travel mode.

Hensher, DA (MacQuarie University, Australia)

Pergamon Press, Incorporated 1977, 159 pp, 1 Fig., 56 Tab., 24 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233127)

ORDER FROM: Pergamon Press, Incorporated, Maxwell House, Fairview Park, Elmsford, New York, 10523

B7805645

23 182846

**PRICE ELASTICITY OF COMMUTER MODE CHOICE: EFFECT OF A 20 PER CENT RAIL FARE REDUCTION**

In May 1976, the N.S.W. Government announced that fares would be reduced on metropolitan rail services under its control by an average of 20%. A sample of Sydney commuters was interviewed approximately one month after the new fare structure had been introduced. These interviews were used as a basis for directly estimating the effects. The short run direct and cross-(perceived) price elasticities of commuter mode choice with respect to reduction in train fares for localities where train is an available mode are of the order of -.52 and 0.14 respectively, but the longer term elasticities may be expected to be higher. It seems that on the basis of a thorough empirical analysis that there is relatively low substitution between train and non-train usage in large cities with respect to policies related to fare charges. Cost is not a dominant variable. A more effective way to attract commuters back to rail is to make the car less attractive while at the same time improving the level of service of the rail system.

Hensher, DA Bullock, RG (Australian Bureau of Transport Economics)

MacQuarie University Monograph Research Pap No. 149, Oct. 1977, 29 pp, 9 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234085)

ORDER FROM: MacQuarie University, School of Economic and Financial Studies, Balaclava Road, North Ryde, New South Wales, Australia

23 183288

**THE RER (EXPRESS REGIONAL NETWORK) [Le RER]**

The whole issue of this journal is devoted to the RER which was extended by 17 km of additional lines in December 1977. The first part outlines the history of the RER, part 2 deals with the construction of the tunnel, the architecture of the stations, and various types of equipment: tracks, mechanical staircases, electrical equipment, traffic signals, telecommunications, energy supply, ventilation. New techniques were used, some of them being described: uplifts in large structures, aerodynamic phenomena caused by trains moving, centralized control. Part three describes the operation of the system. [French]

Paris Transport Authority RATP Doc Inf, Sept. 1977, 117 pp, Figs., Tabs., Photos.

ACKNOWLEDGMENT: TRRL (IRRD-105444)

ORDER FROM: Paris Transport Authority, 53 Ter Quai des Grands Augustins, B.P. 70-06, 75271 Paris, France

23 183289

**A MONITORING STUDY OF RAIL COMMUTING ON MERSEYSIDE: 1974 TO 1976**

The authors took advantage of marked changes in transport costs--in petrol in 1974, in rail fares in 1975/76--to examine their effects on the patterns of commuting. They were particularly interested in substitution to public transport effects of increased petrol prices from the viewpoint of their wider study of energy consumption in surface passenger transport. The paper describes the data collection procedures in the study area and the monitoring data collected over two seasons, autumn to spring, 1974/75 and 1975/76. Its major findings include a significant temporary increase in rail commuting in 1974 with a real increase of some 70 percent in the pump price of petrol, and travel decision evidence that a substantial majority of relatively new rail commuters had decided to commute by rail for more complex reasons than simple comparison of the time and money costs of travel by alternative travel modes. The monitoring data are also compared with those for rail commuting in the Merseyside conurbation as a whole. Factors which might have affected the monitoring data are examined, also the sensitivity of demand for rail commuting to increased out-of-pocket private transport costs, qualified estimates of cross-elasticities are presented. The study findings are discussed.

Maltby, D Lawler, K Monteath, IG (Salford University, England)

*Traffic Engineering and Control* Vol. 19 No. 6, June 1978, pp 278-282, 2 Fig., 7 Tab., 11 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233750)

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23 183317

**ROAD, RAIL AND AIR COMPETITION FOR PASSENGERS IN EUROPE**

The subject of this paper is the competition between air transport and other means of transport for passenger traffic in Europe, and as such is concerned with just one aspect of the European intercity transport study carried out between 1973 and 1976 jointly by the OECD, the ECMT and the EEC, with the direct participation of 12 European governments. The author explains that the data used in his paper are derived from the European study, and indicates that the principal modes of transport which compete with air for passenger trips within Europe are car, train and bus. Other modes are considered to account for less than 2 per cent of long distance trips, equally divided between goods vehicles and motorcycles, and they are not discussed in this paper. Information is provided on the use of ferries, but only as links in the road and rail networks. The paper is arranged in four parts. First, there is an analysis of the competitive features of travel by air, rail, bus and car. The importance of these competitive features is shown to depend on the needs and preferences of travellers, which are reviewed in the second part. The resulting modal split in Europe is then described, with the aid of data collected in 1974 and earlier. Finally there is a discussion of the possible impact of future developments on the volume of long-distance travel and its distribution between the competing modes.

Thomson, JM (Organization for Economic Cooperation and Devel)

*Aeronautical Journal* Vol. 82 No. 808, Apr. 1978, pp 139-147, 9 Fig., 6 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-234727)

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23 183346

**TOWARD CRITERIA IN THE DEVELOPMENT OF URBAN TRANSPORTATION SYSTEMS**

This paper discusses various facets of an appropriate balance among the three modes: Rapid rail, bus and automobile. Three cities are selected for further analysis: Baltimore, Kansas City, and Phoenix. The applicability of rapid rail transit to each city is examined in view of central city worker concentration and recent trends.

Sagner, JS (Southern Illinois University, Carbondale); Barringer, RL

*Transportation (Netherlands)* Vol. 7 No. 1, Mar. 1978, pp 87-96, 18 Ref.

ACKNOWLEDGMENT: EI

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23 183569

**NEW YORK STATE INTERCITY TRAVEL DATA, 1975**

No Abstract.

Prepared in cooperation with Union College Transportation Program,

Schenectady, NY and DOT Research and Special Programs Directorate, Office of University Research.

Erlbaum, NS

New York State Department of Transportation 1977, 40 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: New York State Department of Transportation, Planning Research Unit, Albany, New York, 12232

23 183570

**AMTRAK, AUTO-TRAIN, AND VACATION TRAVEL TO FLORIDA: LITTLE TRAINS THAT COULD**

Paper examines whether Amtrak and Auto-Train altered the demand for vacation travel to Florida by train. A profile of tourist arrivals by train reveals a downward trend until inception of effective Amtrak and Auto-Train service; the trend then reverses.

Gapinski, JH Tuckman, HP *Management Science* Vol. 24 No. 11, July 1978, 8 p., Refs.

ACKNOWLEDGMENT: Management Science

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DOTL JC

23 183572

**TRAIN CATERING: ACHILLES' HEEL OR MARKETING TOOL?**

British Rail, confronted with mounting deficits and aging equipment, has had to make some basic decisions about food service on its trains. It was necessary to identify the role of such activity on various classes of trains and a marketing survey indicated the average person's catering requirements. The recommendations have been implemented in full-service dining cars, conventional buffet cars and the buffet facilities on the new High Speed Trains.

Perren, B *Modern Railways* Vol. 35 No. 361, Oct. 1978, pp 445-453, 13 Phot.

ACKNOWLEDGMENT: Modern Railways

ORDER FROM: Allan (Ian) Limited, Terminal House, Shepperton TW17 8AS, Middlesex, England

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23 183582

**QUESTION OF PRINCIPLE AND PROFITABILITY OF THE USE OF MULTIPLE-UNIT TRAINS ON THE DB [Grundsatz-und Wirtschaftlichkeitsfragen des Triebwageneinsatzes]**

No Abstract. [German]

Lampe, D *Glaser's Annalen ZEV* Vol. 102 No. 6, June 1978, pp 169-174, 3 Tab., 10 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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DOTL JC

23 183616

**THE RAILWAY'S CHANCES WITH PASSENGER TRAFFIC [Die Chancen der Eisenbahn im Personenverkehr]**

With continuously growing auto ownership and the modernization of the road system, the mobility of the population in the Federal Republic of Germany has improved considerably in the last decade. The railway has not contributed to this higher mobility. In-depth studies show that the attraction of a means of transport grows as its speed increases and it can be concluded that one of the reasons for the railway's lack of popularity among travellers is that the journey time is longer by rail than by road. [German]

Breimeier, R *Die Bundesbahn* Vol. 54 No. 6, June 1978, pp 441-444, 2 Phot., 11 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

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23 183908

**AMTRAK: AN EXPERIMENT IN RAIL SERVICE**

This report analyzes the present and future contributions of the National Railroad Passenger Corporation (Amtrak) to the national transportation system. Chapter 1 reviews the major legislation affecting Amtrak and discusses Amtrak's program (labor, commissary, reservations, route expansion, etc.) with respect to the goals outlined by Congress. Chapter 2 analyzes Amtrak's performance in serving the national goals of safety, energy conservation, environmental protection, and provision of adequate service. The economic efficiency of the system is also analyzed. Chapter 3 examines possible future contributions of Amtrak to the same national goals between now and the year 1990. Chapter 4 offers a summary of the findings and some recommendations for restructuring the Amtrak system to reduce the operating deficit and maximize its contribution to national goals.

Mulvey, FP  
National Transportation Policy Study Commission NTPSC/SR-78/02, Aug. 1978, 210 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: National Transportation Policy Study Commission

ORDER FROM: NTIS NTPSC/SR-78/02, DOTL RP

23 184640

**COMPARISON OF RAPID TRANSIT PLANNING EFFORTS**

The recent major rapid transit planning efforts of four medium sized metropolitan regions were reviewed. Comparisons are made of existing characteristics, planning procedures, and the recommended guideway proposals. Major technical considerations that led to the proposals are also reviewed. Existing characteristics are introduced first, including political structure, demographic information, topographic features, existing transportation facilities, and transit usage indicators. Next, each region's varying approach to rapid transit planning is examined. The identification of the priority guideway corridor, the selection of the first segment for implementation, and the evaluation of technologies are all reviewed for each area. Recommended proposals are described that emphasize facility type, patronage, and cost estimates. To enhance the understanding of these programs, major technical considerations are highlighted. These include unique aspects of transit ridership forecasts, benefit-cost estimates, existing transportation system analysis procedures, and citizen participation programs.

West, CR (California Department of Transportation, San Diego);

Frystacki, WR *ASCE Journal of Transportation Engineering* Vol. 104 No. 5, Sept. 1978, pp 695-712, 12 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

23 184641

**CASE STUDY OF BUFFALO'S RAIL TRANSIT DEVELOPMENT**

The history of the Buffalo, N.Y., Light Rail Rapid Transit System is presented. The 10-yr development period includes the establishment of a regional public transportation authority, the initial planning, the alternatives analysis, and the final development of the LRRT system. Guidelines for other cities planning rail transit systems are offered from this experience. They include establishing a strong transportation authority, involving the public from the conception of the project, developing public support, organizing political leaders, being cost conscious, and emphasizing cost of delay.

Wilson, TM (Niagara Front Transportation Authority) *ASCE Journal of Transportation Engineering* Vol. 104 No. 5, Sept. 1978, pp 665-676, 5 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

23 184664

**THE PUBLIC TRANSPORT TICKET EXPERIMENT [Het experiment openbaar vervoerkaart]**

The "openbaar vervoerkaart" (public transport ticket) has been used by a number of persons for a trial period of a year. The ticket allowed unrestricted travel by all means of public transport for a low price. The experiment was accompanied by a number of inquiries. From these it has become clear that the ticket appeals especially to people already having relatively high public transport usage. As an effect of the ticket, the mobility of this group (in kilometres) rises sharply. Making the ticket available to the general public would lead to a large increase in the demand for public transport. Railway passenger kilometres would even double. As a result, the public transport deficit would increase by 700 to 900 million guilders a year (decrease of receipts and increase of running costs. /Author/TRRL/ [Dutch]

Baanders, A *Verkeerskunde* Vol. 29 No. 7, July 1978, pp 324-327

ACKNOWLEDGMENT: TRRL (IRRD-234857), Institute for Road Safety Research  
 ORDER FROM: Dutch Touring Club ANWB, Wassenaarseweg 220, Box 2200, The Hague, Netherlands

PB 13432

23 184666

**SOME BENEFITS OF AN INTEGRATED PUBLIC TRANSPORT TRAVEL INFORMATION SYSTEM**

The lack of an integrated travel information system (rail/bus/coach) can discourage the planning of journeys which would make the best use of the whole public transport network. At present, travel enquiry clerks are usually only able to provide information on the services operated by their own organizations. In order to assess benefits, comparisons were made between a comprehensive method of information extraction and four other methods which were felt to represent the range of current methods of obtaining information on quickest journeys. The benefits estimated included reductions in pre-journey waiting time, walking and waiting time at interchanges, trip time and the average number of interchanges per trip. The time savings contributed to a reduction of 8-22 percent in overall trip time, which was estimated to produce to 39M pounds in extra revenue. Also, during 1975 leisure rates for the value of time, community benefits of up to 63M pounds per annum were estimated to accrue from the reductions in overall trip time. These benefits, for non-commuter trips, have been estimated by reference to published timetables and not by the re-scheduling of any services. /Author/TRRL/

Pickett, MW

Transport and Road Research Laboratory Monograph TRRL Lab Rpt 830, 1978, 23 p., 4 Fig., 10 Tab., 12 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-233648)

ORDER FROM: TRRL

23 184687

**OPTIMUM FLEET SIZING IN THE NORTHEAST CORRIDOR**

The Regional Railroad Reorganization Act of 1973 mandated the U.S. Department of Transportation to undertake engineering and planning studies for improved passenger rail service in the Northeast Corridor. In order to obtain fleet estimates and to analyze the effects of management strategies a calculation of the optimum number of cars required for a design day service in the Northeast Corridor was undertaken. A linear programming model that determines fleet requirements for several different formulations of the objective function was formulated. Minimum fleet size was then calculated from a demand forecast based on the service standards prescribed in the Railroad Revitalization and Regulatory Reform Act of 1976. Minimum car-kilometers per day and maximum load factor were also found. The analysis indicated that the most heavily traveled portion of the corridor, Philadelphia to New York, might be better served by adding trains between these two cities.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Fourer, R (Stanford University); Gertler, JB Simkowitz, JH (Transportation Systems Center) *Transportation Research Record* No. 656, 1977, pp 40-45, 3 Fig., 3 Ref.

ORDER FROM: TRB Publications Off

23 184942

**UPGRADING OF STREET TRANSIT IN MELBOURNE**

This paper presents a summary of steps undertaken in the upgrading of street transit systems in Melbourne. Melbourne has relatively large urban rail, street tramway and bus systems. These systems have not been substantially changed for many years. The rapid growth of motor car usage in the post-war period has resulted in diminishing transit usage. Of the areas where substantial upgrading of the street transit system is possible, particular attention is paid to the improvements in passenger comfort and reduced travel times. The scope for improving transit travel times and reducing vehicle "bunching" by separating transit vehicles from motor traffic is discussed. An experiment conducted using mountable kerbing to physically separate tram and motor traffic is described. Experience to date with traffic signal priority systems is also described.

Compend Tecq Paper 47th Annual Meeting of the Institute of Transportation Engineers; 4th World Transp Eng Conference, Mexico City, October 2-6, 1977.

Grigg, JL

Institute of Transportation Engineers Conf Paper 1977, pp 539-551

ACKNOWLEDGMENT: EI

ORDER FROM: ESL, Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

23 184943

**LIGHT RAIL TRANSIT IN MEXICO CITY**

This paper presents an evaluation of the light rail transit system in Mexico City. It sets forth the effectiveness of the light rail transit mode as one of the several transport options offered to the ten million residents of Mexico City and details the operations of four of the principal routes emanating from the center of the city. The paper points out the advantages of Mexico City's light rail transit system in that it penetrates into small communities, passes easily through narrow and winding streets in the old sections of the city, and offers transport at surface level through those parts of the city more recently upgraded without polluting the areas either chemically or esthetically. The light rail transit mode operates with public fares at 30-60 percent lower than comparable alternatives in public transit.

Compend Tecq Paper 47th Annual Meeting of the Institute of Transportation Engineers, 4th World Transp Eng Conference, Mexico City, October 2-6, 1977.

Rogers, LH (Congressor PanAm de Ferrocarriles)

Institute of Transportation Engineers Conf Paper 1977, pp 552-557, Refs.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL, Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

23 184944

**IMPACT OF FARES ON TRANSIT USAGE**

The paper describes data from cities which have experienced fare increases. Citing New York as only one of several examples, fare increases of 10 percent per annum have occurred during the past decade. However, it is shown that such increases have been relatively modest, and the fare has even been stable over time when expressed in constant dollars. This situation is not unique to New York; similar patterns are reported elsewhere and are noted in the paper. The expected impact of lost patronage should be more severely experienced on bus systems in those areas where both bus and rail exist. This premise is supported in Chicago but not totally so in New York where there has been little difference between the impact on buses and rail rapid transit. Decreases in fare have been found to increase patronage in North America.

Compend Tecq Paper 47th Annual Meeting of the Institute of Transportation Engineers; 4th World Transp Eng Conference, Mexico City, October 2-6, 1977.

Hammel, LV (Tri-State Regional Planning Commission)

Institute of Transportation Engineers Conf Paper 1977, pp 558-568

ACKNOWLEDGMENT: EI

ORDER FROM: ESL, Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

23 184947

**BUS AND TRAM OPERATIONS IN MIXED TRAFFIC**

This paper discusses (with particular reference to Melbourne) the problems that street public transport services are facing because of traffic congestion, their effect on operating costs and qualitative levels of service, and measures which have been, or could be, adopted to improved public transport operation. /Author/TRRL/

Grigg, JL

Institution of Engineers, Australia June 1978, 22 p., 2 Fig., 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD-235070), Australian Road Research Board

ORDER FROM: Australian Road Research Board, 500 Burwood Road, Vermont South, Victoria 3133, Australia

23 184949

**INTERURBAN PUBLIC TRANSPORT DEMAND MODELS [Les modeles de demande en transport interurbain de voyageurs]**

This report was drafted within the framework of research conducted by the IRT on mobility and modal choice in interurban public transport systems. It reviews transport demand model principles and different analyses



conducted recently. From observations made on these models, emerge two facts: the importance of the data base and selection of adequate variables, and the interest offered by disaggregate models for bringing a better understanding of the mobility concept of the travelling public and of the way in which the latter look at transport modes and select a suitable one. Existing models have wide gaps that are inevitable in forecasting studies. [French]

Geraud, P  
Institute of Transport Research Monograph No. 10, June 1977, 59 p., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-105454), Central Laboratory of Bridges & Highways, France, Institute of Transport Research  
ORDER FROM: Institute of Transport Research, Avenue du General Malleret-Joinville, Boite Postale 28, 94 Arcueil, France

OT271

23 184970

**DEFINING DOMAINS FOR MODELS OF TRAVEL DEMAND**

This paper identifies four response domains, with a further distinction between permissive and forced changes and describes the types of models which are appropriate for each domain and discusses how the effects of a policy may be assigned to the correct domain(s).

Heggie, IG (Oxford University, England); Jones, PM *Transportation (Netherlands)* Vol. 7 No. 2, June 1978, pp 119-135, 22 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

23 185220

**THIS IS LIGHT RAIL TRANSIT**

This illustrated brochure was prepared for distribution at the National Conference on Light Rail Transit in Boston. Its short illustrated sections discuss: What Is Light Rail Transit, Right-of-Way, Vehicles, Stations, Operations, Cost, Development, Advantages.

This brochure has been compiled by the TRB Committee on Light Rail Transit for distribution at the National Conference on Light Rail Transit, Boston, MA, August 28-31, 1977.

Transportation Research Board Aug. 1977, 16 p., Photos.

ORDER FROM: TRB Publications Off

23 186112

**SURVEY OF THE ATTITUDES OF INTERCITY AUTOMOBILE TRAVELERS TOWARD INTERCITY PUBLIC TRANSPORTATION**

The study consisted of a personal survey of 2167 households, based on a national probability sample used by the U.S. Bureau of the Census for the Current Population Survey. The objective of the investigation was to examine four areas of intercity passenger travel: changes in overall travel occurring since 1972, the year of the last National Transportation Survey (NTS); conscious changes in travel behavior which have occurred as a result of the household's perceived response to the increased availability of gasoline since 1973, the year of the gasoline shortage; potential changes in non-business intercity travel which are likely to occur due to rising gasoline prices; and, the examination of unique intercity travel submarkets in which public transportation has the greatest likelihood of diverting travelers away from the private automobile for specific travel purposes. The data which were collected are primarily perceptual, i.e., no attempt was made to measure actual travel behavior (e.g., travel logs). Therefore, to the extent possible this study represents an attempt to measure the public's attitude toward various characteristics intercity travel by bus and rail (as compared to travel by automobile) and their past (and likely future) demand for intercity travel. These data were then used to define travel submarkets using a multivariate statistical procedure called discriminant analysis; identify those features of bus/rail travel which are most highly valued by potential users of public carrier modes; and, examine the price elasticity of intercity travel across travel purposes and across population subgroups. (Portions of this document are not fully legible)

Puma, MJ. Walters, PB  
Applied Management Sciences, Incorporated, Office of the Secretary of Transportation Final Rpt. AMS-G-101, Dec. 1977, 242 p.

Contract DOT-OS-60520  
ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286554/1ST, DOTL NTIS

23 186115

**ON THE DEVELOPMENT OF A THEORY OF TRAVELER ATTITUDE-BEHAVIOR INTERRELATIONSHIPS**

No abstract available.

See also Volume I through Volume III, PB-286663 through PB-286665 in RRIS 23 186116 through 186118 respectively; Bulletin 7901.

Charles River Associates, Incorporated, Transportation Systems Center 3 Volumes, Aug. 1978, 482 p.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286662-SET/ST

23 186116

**ON THE DEVELOPMENT OF A THEORY OF TRAVELER ATTITUDE-BEHAVIOR INTERRELATIONSHIPS: VOLUME I. INPUT TO THEORY DEVELOPMENT**

The first volume of this Final Report is principally directed at the generation of materials to facilitate the development of a theory of traveler attitude-behavior interrelationships. Such a theory will be useful in the design of transport systems and operating policies which satisfy passenger requirements. Literature review efforts were undertaken to survey attitudinal and marketing concepts which could contribute to theory development. Attitudes are divided into three components in order to better understand how they relate to traveler behavior. Hierarchical and multiattribute models are explicitly considered. It is recognized that not all travelers are identical, and market segmentation is an aspect of our modeling orientation designed to account for differences between groups of travelers. A tentative model framework is presented along with an overview of how to quantitatively evaluate variations within the framework. This volume concludes with a review of data collection considerations that support quantitative analyses of traveler attitude-behavior interrelationships.

See also Volume 2, PB-286664. Also available in set of 3 reports PC E06, PB-286 662-SET.

Charles River Associates, Incorporated, Transportation Systems Center Final Rpt., OL-1 CRA-347-VOL-1, DOT-TSC-RSPA-78-14-V, Aug. 1978, 195 p.

Contract DOT-TSC-1326

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-286663/0ST, DOTL NTIS

23 186117

**ON THE DEVELOPMENT OF A THEORY OF TRAVELER ATTITUDE-BEHAVIOR INTERRELATIONSHIPS: VOLUME II. THEORETICAL AND EMPIRICAL FINDINGS**

The second volume of this final report presents conceptual and empirical findings which support the development of a theory of traveler attitude-behavior interrelationships. Such a theory will be useful in the design of transport systems and operating policies which satisfy passenger requirements. A brief consideration of theoretical concepts precedes the review of the empirical methodology. The structure of traveler attitude-behavior interrelationships is examined for two transport modes, buses and carpools, over three different datasets. Among the major findings are that traveler attitudes influence behavior toward transport alternatives and that traveler attitudes and behavior mutually affect each other. Various theoretical extensions of this work are described. A new quantitative procedure for assessing differences between travel market segments is developed and implemented. The relevance of the modeling orientation to transport system design and policy analysis is noted. Some implications of the modeling approach for data collection efforts are also noted.

See also Volume 1, PB-286663 and Volume 3, PB-286665. Also available in set of 3 reports PC E06, PB-286 662-SET.

Charles River Associates, Incorporated, Transportation Systems Center CRA-347-VOL-2, DOT-TSC-RSPA-78-14-V, Aug. 1978, 246 p.

Contract DOT-TSC-1326

ACKNOWLEDGMENT: NTIS  
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PB-286664/8ST, DOTL NTIS

23 186118

**ON THE DEVELOPMENT OF A THEORY OF TRAVELER ATTITUDE-BEHAVIOR OF INTERRELATIONSHIPS. VOLUME III: EXECUTIVE SUMMARY; OVERVIEW OF METHODS, RESULTS, AND CONCLUSIONS**

The summary report offers an overview of methods, results, and conclusions which support the development of a theory of traveler attitude-behavior interrelationships. Such a theory will be useful in the design of transport systems and operating policies which satisfy passenger requirements. A summary of project methods and achievements as evidenced by project reports serves as an introduction of theoretical considerations which guided the study. Various attitudinal components are identified and defined. Brief discussions of multiattribute models, hierarchical models, market segmentation, and structural equations are offered as a basis for appreciating theoretical and empirical findings. Selected findings are presented to clarify the nature of traveler attitude-behavior interrelationships. The relevance of study findings to traveler behavior theory and transport policy analysis is noted.

See also Volume 2, PB-286 664. Also available in set of 3 reports PC E06, PB-286 662-SET.

Charles River Associates, Incorporated, Transportation Systems Center  
Final Rpt., OL-3 CRA-34-VOL-3, DOT-TSC-RSPA-78-14-V, Aug. 1978, 41 p.

Contract DOT-TSC-1326

ACKNOWLEDGMENT: NTIS  
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PB-286665/5ST, DOTL NTIS

23 186189

**OPERATING MULTI-MODAL URBAN TRANSPORTATION SYSTEMS**

The project examines the state-of-the-art in multi-modal urban transportation system operations, proposes and assesses eight model institutional arrangements for more efficient and effective urban transportation operations, assesses the influence of Federal policies in this area, and proposes possible changes to enhance coordination of urban transportation services. The report concludes that some of the more important elements determining the success of efforts to coordinate urban transportation operations are institutional structure, responsibility for coordination, incentives operating on each agency and individual, patterns of personal relationships, and specific mechanisms for coordination. Potential Federal actions and incentives for promoting coordinated urban transportation operations are proposed.

Petersilia, M Reno, A

System Design Concepts, Incorporated, Department of Transportation  
Final Rpt. DOT/P/10-78/41, Dec. 1977, 218 p.

Contract DOT-OS-60518

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287294/3ST, DOTL NTIS

23 186193

**A DESCRIPTION OF BART: ITS FACILITIES, SERVICE, AND SURROUNDINGS. BART IMPACT PROGRAM**

The report provides an overview of the BART system within its Bay Area setting. The planning, design and construction of the system are described here, as are its physical facilities, operations, and management. Physical and social characteristics of the nine-county San Francisco Bay Area, the primary BART service area (Contra Costa, Alameda, San Francisco and northern San Mateo counties) and the immediate surroundings of the system are discussed, and the populations within those areas are defined. Data is presented here without analysis or evaluation and is intended to serve as background and perspective for viewing the various studies within the BART Impact Program. (Color illustrations reproduced in black and white)

Prepared in cooperation with Metropolitan Transportation Commission, Berkeley, CA. Sponsored in part by Department of Housing and Urban Development, Washington, DC.

Graff, DL Scarlett, M

Gruen Associates, Incorporated, Metropolitan Transportation Commission, Department of Housing and Urban Development, Department of Transportation DOT-BIP-WP-44-4-77, Dec. 1977, 116 p.  
Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287338/8ST, DOTL NTIS

23 186194

**PUBLIC TRANSPORTATION FARE POLICY**

The factors which affect transit fare policy can be grouped into three categories: institutional, demand, and pricing rationale. Institutional factors include fare trends, types of fares, fare collection techniques, and the role and objectives of the various groups involved in pricing transit. Demand factors are concerned especially with the responsiveness of transit users and potential users to changes in fares, in transit service characteristics, and in the perceived price of urban automobile trips. Pricing rationale or cost factors are concerned particularly with the cost characteristics of the production of transit services. This report identifies the issues with which any fare policy must deal, and presents information that will aid individual transit operators to resolve those issues in their own operations.

See also PB-287342.

Dygart, P Holec, J Hill, D

Peat, Marwick, Mitchell and Company, Department of Transportation  
Final Rpt. 289-51864-30-40, DOT/TPI-10/77/19, May 1977, 368 p.

Contract DOT-OS-50134

ACKNOWLEDGMENT: NTIS  
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PB-287341/2ST, DOTL NTIS

23 186195

**PUBLIC TRANSPORTATION FARE POLICY. SUMMARY**

The factors which affect transit fare policy can be grouped into three categories: institutional, demand, and pricing rationale. Institutional factors include fare trends, types of fares, fare collection techniques, and the role and objectives of the various groups involved in pricing transit. Demand factors are concerned especially with the responsiveness of transit users and potential users to changes in fares, in transit service characteristics; and in the perceived price of urban automobile trips. Pricing rationale or cost factors are concerned particularly with the cost characteristics of the production of transit services. This report identifies the issues with which any fare policy must deal, and presents information that will aid individual transit operators to resolve those issues in their own operations.

See also PB-287341.

Dygart, P Holec, J Hill, D

Peat, Marwick, Mitchell and Company, Department of Transportation  
Final Rpt. 289-51864-30-40SUMM, DOT/TPI-10/77/20, May 1977, 30 p.

Contract DOT-OS-50134

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-287342/0ST, DOTL NTIS

23 188167

**THE CALTRANS PROGRAM OF INTERCITY RAIL SERVICE**

This document is a guide to development of rail passenger service in California along with Caltrans' plans for such service. It examines intercity rail corridors within the State to determine relative likelihood of success of passenger train services. Factors considered include population density, previous rail ridership, highway congestion, and circumstances affecting operating and capital costs.

CALTRANS 1978, 20 p., 5 Fig., 3 Tab.

ORDER FROM: CALTRANS, P.O. Box 1499, Sacramento, California, 95807

23 188169

**PLAN REFINEMENT STUDY FOR THE COMMUTER RAIL IMPROVEMENT PROGRAM**

This study provides a thorough analysis of commuter rail and other feasible alternatives for transit service to Boston's suburbs, indicating the best alternative for each commuter rail corridor and whether and in what form the Commuter Rail Improvement Program (CRIP) should be continued. Impacts of each alternative on operating costs, capital costs, ridership, revenues, traffic flow and regional economic considerations have been estimated.

Central Transportation Planning Staff Final Rpt. MA-09-0001, Jan. 1979, 127 p., Figs., Tabs.

ORDER FROM: Central Transportation Planning Staff, 27 School Street, Boston, Massachusetts, 02108

✓ 23 188170  
**COMMUTER RAIL IMPROVEMENT PROGRAM--PASSENGER NEEDS SURVEY RESULTS**

A November 1976 survey of all 28,500 Boston rail commuters produced a 54 percent response. The purposes were development of travel forecast projections along all commuter rail corridors and to identify socioeconomic characteristics of current commuter rail users in the study area.

Aminian, H Lynch, D  
 Central Transportation Planning Staff CTPS Tech Rpt. 4, June 1978, 37 p., 4 Fig., 16 Tab., 5 App.

ORDER FROM: Central Transportation Planning Staff, 27 School Street, Boston, Massachusetts, 02108

23 188305  
**CHALLENGE IN DEVELOPING A MULTI-MODAL URBAN TRANSPORTATION SYSTEM**

The paper discusses ways in which urban transportation systems can be planned and developed, within the framework of current issues and resources.

Smith, WS (Smith (Wilbur) and Associates) *ITE Journal* Vol. 48 No. 6, June 1978, pp 23-26, 14 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

23 188306  
**COMBINED SIMULATION OF A RAPID TRANSIT SYSTEM**

Three approaches to simulating a rail rapid-transit system are compared. The system is itself partly continuous in nature (equations of motion, for example) and partly discrete (dispatch of trains, for example). The three approaches are (1) a basically continuous model modified to accept discrete events, (2) a basically discrete model modified to accept representations of continuous portions, and (3) a combined model designed to accommodate both the discrete and continuous parts. The third approach, combined simulation, is described in detail and is illustrated by its application to an 8-train system. The value of simulation for designing rapid transit systems and analyzing their problems is discussed. The benefits of combined simulation as compared to discrete and continuous simulation are enumerated. As an example, all three methods for modelling a simple station exchange process are presented.

Eichler, J (Ben Gurion University of Negev, Israel); Turnheim, A  
*Simulation* Vol. 30 No. 5, May 1978, pp 155-167, 14 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

23 188311  
**SUMMARY REPORT OF A SURVEY "MONITORING EFFECTS OF MODAL INTERCHANGES ON TRAVEL PATTERNS"**

This report of a survey has been prepared for the Victorian Ministry of Transport, which is involved in the implementation of large structural improvements centred on Frankston and Box Hill railway stations designed to improve and facilitate modal interchange movements and thereby to stimulate the use of the rail and feeder bus services. The purpose of the survey is to collect information relating to detailed individual behaviour "before" and "after" to provide a basis for the formulation of prediction models, which explain the change in aggregated travel patterns. Data were collected for the following parameters: pedestrians, parking, taxis, traffic, buses and trains. Each different parameter is dealt with separately, and where relevant, under the following headings: description of parameter, how it was measured, problems encountered in measurement, how it relates to modal interchange, results and commentary on results. /TRRL/

Nairn (RJ) and Partners Pty Limited Monograph Dec. 1977, 80 p., 32 Fig., 18 Tab., Photos., 3 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-235137), Australian Road Research Board  
 ORDER FROM: Nairn (RJ) and Partners Pty Limited, 408 King William Street, Adelaide, South Australia, Australia

23 188324  
**AUTOMATIC FARE COLLECTION**

This short bibliography provides a selective listing of literature relating to automatic fare, or revenue collection in public transport operations. The arrangement of the data is as follows: general transport operations, buses, rail (general, France, Japan, USA), and the United Kingdom. /TRRL

Brodie, M  
 Greater London Council, (7168 1011 5) Monograph GLC Res Bibliog 94, Apr. 1978, 10 p., 50 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-236339)  
 ORDER FROM: Greater London Council, County Hall, London SE1 7PB, England

23 188336  
**THE METRO: 'PALACES FOR THE PEOPLE'**

Low cost public transport in Moscow restricts commuting by car to a low level. The metro is the most popular form of transport and although half the size of London's underground is used for an average of 5.7 M journeys per day compared with London's 2 M. The article describes the history, design and construction of the underground system which will be extended and improved before the 1980 olympic games. It is planned that there will be some 330 km of track and 300 stations by the year 2000. The first shafts were excavated by hand in 1932 through wet and variable ground-quite unsuitable for an underground rail system. Shields were not used initially; ground freezing was a common method of dealing with the poorest ground conditions. An outstanding feature of the system is the ornate architecture of the early stations; marble cladding and semi-precious stones such as onyx are still used for decoration and mosaics in the modern constructions.

*New Civil Engineer* No. 311, Sept. 1978, pp 42-43, 5 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 237270)  
 ORDER FROM: Institution of Civil Engineers, 26-34 Old Street, London EC1V 9AD, England

23 188342  
**BRITISH RAILWAYS BOARD INCREASES PASSENGER FARES**

No abstract.

Her Majesty's Stationery Office Monograph No. 225, Feb. 1978, 40 p., 4 Fig., 9 Tab.

ACKNOWLEDGMENT: TRRL  
 ORDER FROM: Pendragon House, Incorporated, P.O. Box 255, Old Mystic, Connecticut, 06372

23 188344  
**EDMONTON'S NORTH EAST LIGHT RAIL RAPID TRANSIT LINE**

The 14 papers, along with introduction and summary, constitute the proceedings of a conference on light rail transit as installed in Alberta's capital city. Five papers deal with tunnels and other civil engineering works; other papers treat signaling, station architecture, electrification, training, security, marketing and an overview of the project.

Alberta University, Canada Proceeding June 1978, n.p.

ACKNOWLEDGMENT: Alberta University, Canada  
 ORDER FROM: Alberta University, Canada, 89th Avenue and 114th Street, Edmonton, Alberta, Canada

23 188356  
**THEORETICAL CAPACITY AND SPACE REQUIREMENTS OF HEAVY RAIL AND BUS RAPID TRANSIT**

An investigation has been made to establish the theoretical capacity of an unidirectional single track heavy rail transit service as offered by the South African Railways and a similar study has been made for an exclusive unidirectional single bus-way. This information is used to examine the spatial requirements per passenger for these two modes of transport for an open section right of way, an intermediate halt and a terminal, and to subsequently determine the effectiveness of these two high density urban passenger systems.

Voort, JJP van der (South African Railway) *Civil Engineer in South Africa* Vol. 20 No. 8, Aug. 1978, pp 197-202, 6 Ref.

ACKNOWLEDGMENT: EI  
 ORDER FROM: ESL

23 188357

**PRACTICE OF SIMULATION AT RATP [Pratique de la simulation a la RATP: resultats, enseignements, perspectives]**

This article describes the results obtained by simulating the Paris subway with different models. The second part shows a model under development about a bus line. [French]

Doras, JL Girardot, M Heurgon, E *Automatisme* Vol. 23 No. 5-6, May 1978, pp 124-132, 19 Ref.

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

23 188358

**ASSESSMENT AND ALLOCATION OF RELIABILITY AND MAINTAINABILITY PARAMETERS TO MASS TRANSIT OPERATIONS**

An attempt is made to show how traditional reliability and maintainability analysis techniques developed by the aerospace industry can be refined and applied to the development of quantitative assurance parameters for rapid transit systems.

Can SRE (Soc of Reliab Eng) Reliability Symposium, Fourth Annual,

Proceedings Ottawa, Ontario, October 13-14, 1977.

Bartholomew, B *Microelectronics and Reliability* Proceeding Vol. 17 No. 1, Jan. 1978, pp 137-142

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

23 188359

**SYSTEM ASSURANCE IN A RAPID TRANSIT SYSTEM**

System assurance is a critical issue in the development of new rapid transit systems. This is especially vital when the system is completely automated, i.e. unmanned. An outline of a system, the terminology, plans and methodology used in the development of reliability and maintainability programs for rapid transit systems are discussed.

Can SRE (Soc of Reliab Eng) Reliability Symposium, Fourth Annual, Proceedings, Ottawa, Ontario, October 13-14, 1977.

Ling, AHK (Urban Transportation Development Corp Ltd) *Microelectronics and Reliability* Proceeding Vol. 17 No. 1, Jan. 1978, pp 165-172

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

24 180072

**NEW ENGLAND RAILROADS: PAST, PRESENT AND FUTURE. FIRST EDITION**

Since 1945, preferences for moving freight and passengers have shifted away from railroads. While other forms of transportation secured federal funding, railroad plant and service deteriorated to offset decreasing revenues. Federal legislation favoring rail consolidation could help to create three large competitive railroads in the Northeast. Operating extensions for the Delaware and Hudson could strengthen northern New England railroads and help them to merge. This will create two American railroad systems in New England; Canadian-owned lines would continue to be separate. Establishing two competing railroads in New England will not be enough to improve productivity. Much remains to be done in producing further technological gains, coordinating with other modes of transport, and securing proper government funding and regulation.

Fuller, RP

New England Transportation Research 1977, 95 pp, Photos., 5 App.

ORDER FROM: New England Transportation Research, P.O. Box 3032, Portland, Maine, 04104

DOTL TF23.15.F84

24 180261

**RESEARCH WILL HELP JNR CHANGE DIRECTION**

Reduction in noise and vibrations from outside is a priority problem for the Japanese Railway Technical Research Institute but efforts to cut journey times are continuing all the time.

Maruyama, H *Railway Gazette International* Vol. 134 No. 5, May 1978, pp 291-293, 4 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: ESL

DOTL JC

24 180305

**THE RAILWAY INDUSTRY: A CASE FOR FINAL OFFER SELECTION ARBITRATION**

This paper indicates the potential of economic adversities caused by the railroad industry's labor-management problems. The three significant areas are the inadequacies of the Railway Labor Act, the fragmented unions, and the long-run contractions in railroad physical plant and employment. It is recommended that the Railway Labor Act be abolished and railroads and airlines be covered by an amended Taft-Hartley Act calling for application of "final-offer selection" arbitration.

Davis, GM (Arkansas University, Fayetteville); Holley, WH (Auburn University); Sullenberger, AG (Arkansas University, Fayetteville) *Transportation Journal* Vol. 17 No. 4, 1978, pp 73-85, 7 Tab.

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

24 180330

**DEVELOPMENT PLAN OF VENEZUELAN RAILWAYS [Il piano di sviluppo delle ferrovie venezuelan]**

A vast plan of new railroad construction in Venezuela in the period until 1992 is summed up. The plan is based on the expected development of the various sectors of production in the country and on the evaluation of the required movement of goods between various centers. Calculations of the overall costs of transport on the national level are made, and allocation of the traffic to road and rail is made to reduce these costs to a minimum. Tariffs are taken into account. Possible investment programs are considered. The total length of the network envisaged is 3800 km to be built in several stages. [Italian]

Bonora, G (Planit S.R.L., Italy); Carli, G Focacci, C *Ingegneria Ferroviaria* No. 11, Nov. 1977, pp 845-854

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

24 180346

**DES MOINES TO KEOKUK RAIL/BARGE STUDY**

The feasibility of moving grain from Iowa to the Gulf of Mexico by a rail/barge system has been investigated. Grain was to be moved from heavy

producing areas in the North Central and Northwestern parts of the state by a diagonal rail line so shippers would have year-round access to low-cost water transportation. Segments of the rail line would need extensive rehabilitation. Transportation cost savings were found not enough to recover rehabilitation costs; grain shippers showed little interest; and the state might have to intervene in normal grain distribution channels to insure use of the system. The recommendation was that the study be terminated and normal branch-line upgrading for the route involved be studied.

Ramsey, SP Carter, S Kososki, J Christoff, JW

Iowa Department of Transportation Sept. 1977, 110 pp, 2 App.

ACKNOWLEDGMENT: Iowa Department of Transportation

ORDER FROM: Iowa Department of Transportation, Capitol Building, 1007 East Grand Avenue, Des Moines, Iowa, 50319

DOTL RP

24 180370

**MANAGEMENT COMPENSATION IN THE RAILROAD INDUSTRY**

This is an analysis of executive salaries on U.S. railroads based on Rail Form R-1 Annual Reports filed with the Interstate Commerce Commission. In addition to listings of each railroad's compensation at \$40,000, or more, per year, there are tables of all executives earning more than \$110,000; percentage frequency distribution of \$40,000-plus executives; and changes in executive compensation levels between 1973 and 1977.

Rice, CM

Rice (Charles M) 1978, 67 pp

ORDER FROM: Rice (Charles M), 240 Blackmer Place, St Louis, Missouri, 63119

DOTL RP

24 180380

**MANAGEMENT OF A LARGE PROJECT--BART**

The economic, political, and sociological implications of a project the size and complexity of BART are enormous. Its design, construction, and operation interacts with, and affects, most segments of the Bay Area's population. As no new large rapid transit systems had been built since the early 1900's, BART, during its planning and design period, was not able to draw on existing data banks of progressive and analytical transportation design criteria, formulas, and concepts. The BART Board of Directors decided that planning, design, and construction management would be performed by consultants under direction of the District. This decision was based on the undesirability of BART's attempting to assemble a large and diverse staff for a relatively short-term requirement, coupled with the unavailability of transit people with the necessary experience. The BART staff included a small but strong technical group to give direction to the consultants and to clear the way in nontechnical areas to enable the consultants to carry out their directives.

Hammond, DG (Daniel, Mann, Johnson and Mendenhall) *ASCE Engineering Issues-J of Prof Activities* Vol. 104 No. 3, July 1978, pp 181-191

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

24 181428

**PROCEEDINGS OF THE ANNUAL RAILROAD ENGINEERING CONFERENCE (14TH). R AND D RAILROADING: 1977. HELD AT THE UNIVERSITY OF SOUTHERN COLORADO, PUEBLO, COLORADO ON OCTOBER 18-20, 1977**

This report constitutes the proceedings of the three day railroad engineering conference held at the University of Southern Colorado on October 18-20, 1977. Conference papers were presented from the Federal Railroad Administration, Office of Research and Development, the railroad industry, and the Association of American Railroads. Generally, the papers covered a review of the R&D activities in the railroad industry during 1977. A tour of the Transportation Test Center Facilities was also included.

Federal Railroad Administration FRA/ORD-78/42, Mar. 1978, 416 p.

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-283785/4ST, DOTL NTIS

24 182081

**SEPTA MANAGEMENT STUDY**

In 1964, State Act 450 created the Southeastern Pennsylvania Transportation Authority (SEPTA) with a mission to provide or arrange for the provision of effective and efficient public transportation services in the five-county Pennsylvania portion of the Philadelphia metropolitan area. The SEPTA Management Study was commissioned by SEPTA's funding governments to evaluate how well this mission was being performed in consideration of the agency's budget constraints, and to make specific improvement recommendations. The study uses a series of diagnostics (peer group comparison, case studies, flow charts, and organizational analysis) to identify areas where SEPTA performance appeared unusual. Serious deficiencies are identified in nine functional areas (Cash Handling, ConRail Purchase-of-Service Agreement, Surface Transit Operations Planning, Vehicle Utilization, Surface Transit Maintenance, Capital Project Management, and Regional Fare Integration) and seven additional improvement areas. A key question raised in this study relates to the roles of the SEPTA Board and SEPTA's funding agencies. Specific actions, including organizational changes, are recommended which will yield near-term benefits.

Prepared by Booz-Allen and Hamilton, Inc., Philadelphia, PA., and Price Waterhouse and Co., Philadelphia, PA. Sponsored in part by Delaware Valley Regional Planning Commission, Philadelphia, Pa.

Southeastern Pennsylvania Transportation Authority, Booz-Allen and Hamilton, Incorporated, Price Waterhouse and Company, Urban Mass Transportation Administration, Delaware Valley Regional Planning Commission, (UMTA-PA-09-0039) Final Rpt. UMTA-PA-09-0039-78-1, May 1978, 72 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-285010/5ST, DOTL NTIS

24 182094

**THE UNITED STATES AND THE INTERNATIONAL MARKET FOR RAIL EQUIPMENT**

The report deals with the international market for rail transit cars and the firms which manufacture the equipment, with emphasis on the position of the U.S. domestic segment of that market at the present time and in the foreseeable future. The U.S. transit car market has been penetrated successfully in recent years by Canadian, French, and Italian carbuilders. The author discusses the circumstances surrounding these events. The report discusses the following issues: (1) the commercial and economic outlook of carbuilders and component suppliers; (2) government funding of the rail passenger equipment market (worldwide); (3) the degree of interdependence that exists among the economies of the world, the corporations who manufacture and trade on a global scale, and the rail industry itself; (4) the U.S. domestic transit car market; and (5) the implications for public policy. This report is based mainly on a series of interviews and discussions with people drawn from the rail carbuilding industry, component supply companies, transit authorities, railroads, trade associations, and government agencies. Some conclusions drawn from this study are: (1) the principal problems faced by U.S. carbuilders were strongly in evidence well before the appearance of foreign competitors; (2) transit authorities and UMTA have been faced with rising transit equipment costs and a bid pattern which shows an alarming tendency for only one or two (or none) U.S. firms to bid; and (3) none of the sources consulted expect all U.S. carbuilders to disappear, but most tend to regard a reduction in the number of carbuilders as inevitable.

Barber (Richard J) Associates, Incorporated, Urban Mass Transportation Administration, (UMTA-DC-06-0213) UMTA-DC-06-0213-78-1, Mar. 1978, 118 p.

Contract DOT-UT-80010

ACKNOWLEDGMENT: NTIS

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PB-285613/6ST, DOTL NTIS

24 182573

**DIRECT ROME-FLORENCE LINE [Direttissima Roma-Firenze]**

This is a series of 16 papers presented at 'afternoon conferences' at the College's Ingegneri Ferroviari Italiani (CIFI) in Rome between March 11 and May 4, 1977 and devoted to the description of the recently completed direct Rome-Florence line inaugurated in February 1977. Brief introduction by G. Angeleri Vice-President of CIFI and by L. Misiti, Vice-Director

General of the Italian State Railroads, followed by articles on the following subjects. The requirements and projects of traffic; problems of operation; project design and realization of quadruplication; earth works; tunnel construction, especially of the Orte tunnel; the construction of viaducts; prestressed and prefabricated concrete construction; prestressed concrete streets; electric traction installations; and design solutions; signaling and safety installations; rolling stock; locomotives and cars for fast travel; a general survey of construction planning and execution. [Italian]

*Ingegneria Ferroviaria* Vol. 33 No. 1, Jan. 1978, pp 3-136

ACKNOWLEDGMENT: EI

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24 182596

**MIDWEST RAILROADS AND NORTHEAST LESSONS**

Lessons learned in reorganizing Northeast bankrupt railroads and establishing Conrail can help solve Midwest railroad problems. New labor agreements could not be consummated. Political pressures dictated the Northeast restructuring. Courts are capable of reorganizing railroads under a modernized law in a relatively short period. Government planning through USRA proved less than perfect. Finally railroading is a business of narrow profit margins and vulnerable to weather, strikes and the national economic swings. Conrail has neither ended talk of nationalization or government ownership of rights of way.

Barnum, JW *Regulation* Vol. 2 No. 4, July 1978, pp 30-35

ORDER FROM: American Enterprise Inst for Pub Policy Research, 1150 17th Street, NW, Washington, D.C., 20036

24 182597

**RAILWAYS GO ELECTRIC**

The 150 mph trains predicted a decade ago are coming into service all around the world. But not at 150 mph. The rising costs of energy, track damage and noise are slowing them. Japan's latest Shinkansen (bullet) trains were designed to do more than 160 mph on expensively aligned track. Instead they trundle for miles at less than 100 mph, and never accelerate to their real top speed. Japanese living near the tracks objected to the noise of the Shinkansen as it whistled through suburbs and countryside. So today the bullets have to creep quietly. That is a waste of high quality railway track and signalling equipment.

*Economist* Vol. 268 No. 7037, July 1978, pp 66-67

ACKNOWLEDGMENT: Economist

ORDER FROM: Economist Newspaper Limited, 25 St James's Street, London SW1, England

DOTL JC

24 182625

**MODERNISATION OF LINES ON THE GERMAN FEDERAL RAILWAY. BASIS FOR A HIGH-PERFORMANCE NETWORK [Die Ausbaustrecken der Deutschen Bundesbahn. Grundlage fuer ein leistungsaehiges Kernnetz]**

The authors review post-war investments and then show the steps taken towards drawing up a modernisation programme for the lines on the German Federal Railway. The principles and objectives of this line modernisation programme are described and the method followed for coordinating the planning and implementation of 800 separate projects is explained. The article ends with a review of future investment possibilities. [German]

Brunotte, HP Praedel, F *Die Bundesbahn* Vol. 54 No. 4, 1978, pp 293-296, 4 Ref.

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

24 182790

**RAILROADS: BUSINESS OPPORTUNITIES FOR MINORITY-OWNED BUSINESSES**

No Abstract.

MATCH Institution, Booker T. Washington Foundation 1977, 12 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: FRA

24 182792

**THE RAILROAD-WHAT IT IS, WHAT IT DOES**

This book was prepared to introduce railroads to new employees and others interested in an overview of railroad technology and administration. Text and diagrams explain rail technology--track structures, signals, communications, cars and locomotives. Accounting, waybills, transportation ratio and return on investment are typical of the administrative functions which are discussed.

Simmons-Boardman Publishing Corporation No Date, n.p.

ORDER FROM: Simmons-Boardman Publishing Corporation, 1809 Capitol Avenue, Suite 200, Omaha, Nebraska, 68102

24 182820

**SECOND NATIONAL URBAN RAILROAD RELOCATION CONFERENCE**

This record includes reports from 13 communities on the status of their railroad relocation and consolidation projects. The roles of the Federal Highway Administration and Federal Railroad Administration in such activities are also discussed. A railroad's experience with such projects is also explained.

Texas A&M University Proceeding 1977, 59 pp

ORDER FROM: Texas A&M University, Coastal and Engineering Division, College Station, Texas, 77843

DOTL HE1613.A15N38

24 182823

**STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. RAILROAD RATIONALIZATION: BACKGROUND STUDY OF THE MIDWEST**

Rapid increases in costs, particularly the cost of capital and of freight cars, continue to make a midwest rail crisis likely. This report endeavors to show what the railroads and the federal government can and should do to restructure this rail system into a viable business enterprise. The report's recommendations are based upon studies of aggregate financial, operating, and marketing information for CRIP, MILW, C&NW, ICG, BN, ATSF SOO, and MP, focussing on the region between Chicago, Milwaukee, Twin Cities, Omaha, Kansas City, and St. Louis. Rationalization of operations and facilities in this region could, if combined with traffic growth, restore the financial health of railroads in this region. The report provides estimates of the likely potential for improvements resulting from a number of rationalization possibilities. A separate chapter is devoted to the Chicago-Omaha corridor, frequently cited as a glaring example of the need for line consolidation.

French, PW Brigham, T Brown, T Martland, CD Sussman, JM Massachusetts Institute of Technology Final Rpt. Vol. 22 MIT-R77-14, Apr. 1977, 290 pp, Figs., Tabs., 7 Ref., 1 App.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Department of Civil Engineering, Cambridge, Massachusetts, 02139

DOTL TA 1.5 M4A472

24 182824

**THE ARCHITECTURE AND ENGINEERING OF AMTRAK'S WASHINGTON-NEW YORK CORRIDOR**

The utilitarian and aesthetic architecture of the 226-mile route between Washington and New York, the southern segment of Amtrak's Northeast Corridor is described. Photographs and text do not cover every structure of this route but the major ones are portrayed and discussed briefly.

Williams, EP, Jr Maryland Historical Press 1977, 49 pp, Photos., 15 Ref.

ORDER FROM: Maryland Historical Press, 9205 Tuckerman Street, Lanham, Maryland, 20801

DOTL TF 23.1.W56

24 183307

**LOW PRODUCTIVITY STYMIES RAILROADS**

Traditional railroad operating practices are identified as wasteful, competitively inhibiting and a barrier to rehabilitation. Profit analysis of individual services is vital; a systems analysis of batch movement operating economics must follow. Obsolete facilities, operations, labor agreements and regulation have reduced railroad productivity. These factors, coupled with inflation,

have made creation of capital difficult at a time when more is urgently needed. These points were made by Robert S. Reebie before a special Senate committee investigation of railroad policy.

*Progressive Railroading* Vol. 21 No. 8, Aug. 1978, 4 pp

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

DOTL JC

24 183310

**UP'S MCDONALD: ARE WE EXPECTING TOO MUCH FROM MERGERS?**

While predicting a continued reduction in the number of major independent railroad systems, the author cautions that such consolidations cannot solve the basic economic, financial and regulatory problems confronting the industry. Noting that the bulk of rail movements are intra-regional, he sees fewer benefits from "transcontinental" mergers than from regional systems. Short of merger, he calls for reduction in duplicate facilities.

McDonald, WJ (Union Pacific Railroad) *Railway Age* Vol. 179 No. 19, Oct. 1978, pp 48-51

ORDER FROM: ESL

DOTL JC

24 183599

**ECMT. ROUND TABLE 39 (PARIS, 19-20 OCTOBER 1977). ECONOMIC PROSPECTS FOR RAILWAYS [CEMT. Table ronde 39 (Paris, 19-20 Octobre 1977) Perspectives économiques des chemins de fer]**

The Round Table first analyses the problems at the root of the Railways' current policy, and then endeavours to predict future developments and pinpoint the measures to be taken, particularly in the following sectors: passenger and freight traffic, covering of costs, questions regarding employment and international cooperation. [French]

European Conference of Ministers of Transport UIC Cat 01 N176, 1978, 71 pp, 1 Tab.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Organization for Economic Cooperation and Devel, Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006

24 183710

**DB HEADS INTO CRISIS**

Hit by a cutback in industrial production and a slump in commuting, the German Federal Railway is making changes to control its already enormous financial losses. Three articles are included. Dr. Vaerst makes a plea for political decision, details how passenger and freight services are being reorganized to improve quality and productivity, stressing the need for definitive government policy on the social tasks the railway must perform. IC speed-up heralds switch to regular-interval services by R. Scotland, explains how three interwoven levels of service will offer long-distance passengers a wider choice of departure times, while admission of second class to Inter-City trains will immediately raise travel speeds up to 30 percent for a significant number of DB customers. Market research identified need for faster, more frequent service with more through coaches. Fares will be more flexible. Streamlining the freight business discusses rationalization to win back traffic from roads and cut costs. Greater emphasis will be placed on intermodal services and unit trains along with reduction in number of yards. Faster and more reliable service, not lower tariffs, is what shippers want.

*Railway Gazette International* Vol. 134 No. 10, Oct. 1978, pp 739-750, Photos.

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24 183883

**A PROSPECTUS FOR CHANGE IN THE FREIGHT RAILROAD INDUSTRY**

This study examines the nature and extent of the problems facing the railroad industry, concentrating on the industry's ability to finance capital expenditures from the private sector. The current condition of railroad facilities is analyzed in determining future investment requirements. The desirability of restructuring the rail system to improve its efficiency and thus reduce the need for large-scale public assistance is explored. Government policy toward the rights-of-way of the other modes is discussed. Effects of deregulation and other policy reform are also explored.

A Preliminary Report by the Secretary of Transportation. Submitted in accordance with sections 504 and 901 of the Railroad Revitalization and Regulatory Reform Act of 1976 (P.L. 94-210).

Department of Transportation Oct. 1978, 186 pp, Figs., Tabs., Refs., 3 App.

ORDER FROM: DOT

DOTL RP

24 183910

**RAILROAD OCCUPATIONS**

No Abstract.

Bureau of Labor Statistics Reprint 1978, 12 pp

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: GPO

24 184613

**WHEN (AND WHERE AND WHY) RAILROADS SHARE TRACK**

The evolution and operation of various joint operating arrangements between railroads--trackage rights, detouring, joint track, paired track and car-handling contracts--are described. A list of U.S. trackage rights agreements involving segments of 50 miles or more is included.

Pinkepank, JA *Trains* Vol. 39 No. 3, Jan. 1979, 8 p., 16 Phot.

ACKNOWLEDGMENT: Trains

ORDER FROM: Kalmbach Publishing Company, 1027 North Seventh Street, Milwaukee, Wisconsin, 53233

DOTL JC

24 184623

**STRIKE BENEFITS: WHAT THE RECORD SHOWS**

The railroad industry's service-interruption insurance program is examined in the wake of the Brotherhood of Railway and Airline Clerk's strike against Norfolk and Western Railway, a stoppage which subsequently spread to many other railroads. Over the first 19 years of this program, \$132 million was paid to 48 railroads. In the past 25 years, railroads have funded benefits paid under the Railroad Unemployment Insurance Act of \$84 million to strikers and those honoring picket lines. The industry's position in maintaining its strike insurance program is detailed.

Welty, G *Railway Age* Vol. 179 No. 21, Nov. 1978, pp 32-33

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24 184624

**BREAK-POINT RAILROADING**

With heavy haul railways operating at the threshold of endurance for materials used in track and rolling stock, problems associated with rail wear, wheel wear, rail corrugation and long trains are routine. Ways of countering many of these problems were discussed at the Heavy Haul Railways Conference in Australia sponsored by five railways in the western part of that nation. Operating strategies, cars, motive power, track structures, communications, signaling and data processing for heavy-haul systems are included in the presentations from railways all over the world.

*Progressive Railroading* Vol. 21 No. 11, Nov. 1978, 4 p., 6 Phot.

ORDER FROM: Murphy-Richter Publishing Company, 20 North Wacker Drive, Chicago, Illinois, 60606

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24 184650

**GENERALIZED TRANSPORT MODEL [Modello generalizzato dei trasporti]**

A framework scheme embracing all transportation problems is described. Any and every type of problem concerning transport may be introduced into it and studied. The model which is derived from this scheme, representing a generalized transport model, consists of three moments: the purpose (design, organization), the basic components (environment, man, object of transportation, means of transportation, decision process), and the sector involved (spatial: territory, undertaking; structural: way, vehicle, transportation system). [Italian]

Orlandi, A (Bologna University, Italy) *Ingegneria Ferroviaria* Vol. 33 No. 2, Feb. 1978, pp 174-180

ACKNOWLEDGMENT: EI

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DOTL JC

24 184683

**PRESENT RAIL TRANSPORT ORGANIZATION**

This paper suggests the possibility of converting the federally directed Consolidated Rail Corporation and other financially weak railroads to public toll roads open to a broader group of users. Highways and airways have common tracks over which diversely owned vehicles operate and have a multiplicity of users that the monopoloid rail organizations lack. The institutional factors involved in such a change are seen as posing greater problems than the technological. Established status positions might be changed, and trade-offs are likely to be required. Broader use could range from extending trackage rights to the remaining successful companies to opening the railways to any competent operator willing to pay the tolls. The railway might remain in the private sector or be maintained and controlled by government agencies. Analogies would be to state highway and motor vehicle departments and to the Federal Aviation Administration. Projected federal rail funding requirements in the next decade appear substantial. Adoption of the public highway concept might leave the transportation function in the private sector, while shifting the maintenance function to the public sector. Political support of that latter function could be expected from transportation operators in the private sector.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Carter, JP (California University, Berkeley) *Transportation Research Record* No. 656, 1977, pp 18-22, 16 Ref.

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24 184684

**SURVEY OF RAIL NETWORK RATIONALIZATION PROPOSALS**

This paper surveys and summarizes eighteen proposals from the public domain since 1958 for railroad network rationalization in the United States. Network rationalization is defined as a reduction in size and shape and number of railroad companies comprising the national rail network. The proposals are compared in terms of rationalization criteria, number of railroad company systems proposed, and depth of detail. An observation is presented regarding the adequacy and potential usefulness of the proposals. The paper is intended as a synopsis for the reader of network rationalization proposals.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Allman, WP (Department of Transportation) *Transportation Research Record* No. 656, 1977, pp 24-29, 1 Tab., 17 Ref.

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24 184685

**IMPACTS OF LIGHT DENSITY RAIL LINE ABANDONMENT**

Estimates of the extent of potentially uneconomic light density railroad lines in 31 states outside the Northeast and of the amount and type of traffic on these lines were developed. The analysis utilized the Federal Railroad Administration network model, the 1 percent waybill sample, and a decision rule, derived from U.S. Railway Association planning, of 43.5 annual carloads per kilometer (70 carloads per mile) of line. It was estimated that approximately 41,000 kilometers (25,500 miles) of line, or 18 percent of the route length, in the 31 states are uneconomic. Only 24 percent of total traffic originates or terminates on these lines. Only for agriculture is the traffic on these lines significant, but mitigating factors indicate that adjustments after terminating service can be made with relatively light adverse effect. The effects of termination on the highway system, energy consumption, and the environment were also analyzed and found to be generally minor.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Matzzie, DE (CONSAD Research Corporation); Weinblatt, H Harman, J (Department of Transportation); Jones, JR (Memphis State University) *Transportation Research Record* No. 656, 1977, pp 29-35, 1 Fig., 5 Tab., 16 Ref.

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24 184691

**INTERMODAL ISSUES IN TRANSPORT PLANNING**

Economic and institutional aspects of intermodalism are discussed from the viewpoint of a fully integrated Canadian multimodal transport owner and operator. The development of Canadian Pacific Ltd. into the world's only fully intermodal transport enterprise and the Canadian institutional and regulatory environment in which it operates are described. Intermodal ownership has not been destructive to transportation competition in Canada, and Intermodal ownership was of considerable importance in the early achievement of intermodal handling of traffic there. The organization of an intermodal transport enterprise is discussed, the most workable format apparently being a fairly loosely structured company with all modes represented by self-standing profit centers that operate and market independently. Corporate management only sets overall policies and guidelines, allocates capital and personnel, and sorts out serious conflicts. This type of organization, with all its inherent conflicts, is to be preferred with a tightly structured and highly centralized system. Neither intermodalism nor multimodal ownership offers easy answers to the very serious problems facing the investor-owned transport industry. /Author/

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Romoff, HM (Canadian Pacific Limited, Canada) *Transportation Research Record* No. 656, 1977, pp 64-67

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24 185946

**THE ALASKA RAILROAD: ITS MANAGEMENT IS BEING IMPROVED; ITS FUTURE NEEDS TO BE DECIDED**

The Alaska Railroad has not effectively managed some of its affairs and there is doubt what its future role will be. Some of its weaknesses are (1) no overall marketing plan, (2) loss of revenue, and (3) inadequate financial management procedures and practices. However, the Federal Railroad Administration and the Railroad have taken actions to correct many of the problems. The Congress should decide whether the Federal Government should continue to own and operate the Railroad.

General Accounting Office Cong Rpt. CED-78-137, July 1978, 82 p.

ACKNOWLEDGMENT: NTIS

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24 188054

**PRODUCTIVITY IS THE ROAD TO PROFITS--AND CN RAIL IS SHOWING THE WAY**

Canadian National, with new management concepts and a role as a freight transport agency freed from most government regulation despite being publicly owned, has established new records of productivity and profitability. Freight car utilization is enhanced by a computerized management information system which also controls other facets of operations. Federal legislation has altered CN financial structure, granted ratemaking freedom and provided some subsidy for non-remunerative services.

Miller, LS *Railway Age* Vol. 179 No. 24, Dec. 1978, p 22, 5 Phot.

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24 188098

**AFTER THE HEARING AND THE CABINET DECISION: THE FUNDAMENTAL DECISION HAS STILL BEEN PUT OFF [Nach Hearing und Kabinettsbeschluss: Die grundlegende Entscheidung steht weiter aus]**

Success for the efforts made by staff and management over recent years to build the DB of the future is handicapped by fringe political conditions. Statements made by specialists during hearings are clear proof of this. The essential decision to be made by the Federal Government as to whether the DB should be part of the civil service or a free enterprise still has to be made. [German]

Vaerst, W *Die Bundesbahn* Vol. 54 No. 7, July 1978, pp 493-495

ACKNOWLEDGMENT: International Union of Railways, BD

ORDER FROM: Hestra-Verlag, Holzhofallee 33, 61 Darmstadt, West Germany

24 188307

**THE BRITISH RAIL PROBLEM: A CASE STUDY IN ECONOMIC DISASTER**

British Railways became a pressing national problem during the second half of the 1950s and a series of restructuring and investment programs have failed to solve the financial crises, including legislative actions of the 1968 Transport Act and the 1974 Railways Act. The situation is examined in the following chapters: Failure of the 1968 Transport Act; Prospects for Passenger Traffic; Parcels, Letters and Papers; Iron and Steel; Coal and Oil; General Freight and the Overall Position; Railway Investment; Manpower and Expenditure; Social Benefits of Rail Passenger Services; Allocation of Freight Traffic; Conclusions: Towards a Self-Financing Railway.

Pryke, RWS Dodgson, JS

Westview Press, Incorporated 1975, 294 p., Tabs.

ORDER FROM: Westview Press, Incorporated, 1898 Flatiron Court, Boulder, Colorado, 80301

DOTL HE 3017.P78

24 188686

**TEST TRAIN PROGRAM NINTH PROGRESS REPORT**

This report describes progress on the Engineering and Test Support Services for Railroad Instrumentation, Data Acquisition, Processing and Evaluation Program from 1 July 1976 through 30 June 1977. The report covers operation of the FRA track geometry measurement and data acquisition fleet, track survey operations and vehicle dynamic tests on lightweight flat cars, DOD cars, passenger cars and locomotives. Also, the report describes test activities on the Facility for Accelerated Service Testing, aerodynamic validation, track structures, vehicle vibration and ride quality, trailer-on-a-flat-car combinations; and investigations of the automated wayside inspection station concept.

Prepared for U.S. Department of Transportation, Federal Railroad Administration, Office of Research and Development, Washington, D.C. This report is intended for use by management and technical personnel concerned with accomplishments in railroad engineering.

ENSCO, Incorporated FRA/ORD-78/23, DOT-FR-78-06, Oct. 1977, 110 p., 37 Fig., 3 Tab., 2 App.

Contract DOT-FR-64113

ACKNOWLEDGMENT: FRA

ORDER FROM: NTIS

PB-289690/AS, DOTL NTIS, DOTL RP

25 176160

**MAKING FUTURE TRANSPORTATION DECISIONS: INTERMODAL PLANNING NEEDED**

Intermodal planning is an examination of interactions and relative costs and benefits between competing and complementary transportation modes. Through intermodal planning, significant savings can be realized in the areas of freight movements and urban passenger travel. To promote intermodal planning by State and local transportation agencies, the Secretary of Transportation should seek (1) congressional legislation to consolidate Federal airport, highway, railroad, and transit planning grants into a block grant for all transportation planning and (2) merge the Department of Transportation's modal planning staffs into a single, all-mode unit.

General Accounting Office Cong Rpt. CED-78-74, Mar. 1978, 26 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-278526/9ST

25 176243

**FOREIGN REGULATORY EXPERIMENTS: IMPLICATIONS FOR U.S. AN ANALYSIS AND EVALUATION OF FOREIGN TRANSPORTATION REGULATORY EXPERIENCE**

The report studies industrialized countries, which have either adhered to concepts of regulation differing from those in the U.S. in the past or have transportation regulation. The report evaluates the effect on the public and on carriers-in-competition, particularly railroads, of varying regulatory policies. The countries chosen for study were: Australia, Canada, France, the German Republic, Great Britain, and Japan plus an economic grouping of countries (The European Common Market). These were specifically selected to be comparable to the U.S. in terms of urbanization, industrialization, general standard of living, principles of representative government and general acceptance of private enterprise and historical record of regulation significantly different than that of the U.S., and/or, have significantly modernized regulatory ends and means evolving competitive conditions. Each chapter report covering a single country or economic group includes, a brief historical introduction, a discussion of the development and present status of regulation (by mode), as well as the ideological, political and economic factors motivating trends in regulatory policy.

Prepared by Whitten (Herbert O.) and Associates, Washington, D.C.

Nelson, JR Whitten, HO Baldwin, JR Boyer, KD Keeler, TE Nelson (James R), Whitten (Herbert O) and Associates, Federal Railroad Administration Final Rpt. FRA-OPPD-77/24, Nov. 1977, 552 pp

Contract DOT-FR-T5150

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-280711/3ST

25 180284

**OVERALL SWISS TRANSPORT CONCEPT (CGST). EXTRACT FROM THE FINAL REPORT ON THE WORK OF THE FEDERAL COMMISSION FOR DEVELOPING AN OVERALL SWISS TRANSPORT CONCEPT. INTRODUCTION AND FINDINGS, CONCLUSIONS, RECOMMENDATIONS [Conception globale suisse des transports (CGST). Extrait du rapport final sur les travaux de la commission federale de la conception globale suisse des transports. Introduction et aperçu, conclusions des travaux de la commission, recommandations]**

No Abstract. [French]

Office Central Federal des Imprimeries et du Materiel 1977, 61 pp, 2 Fig., 9 Tab., 1 Phot.

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Office Central Federal des Imprimeries et du Materiel, Berne, Switzerland

25 180288

**THE OBB TRANSPORT POLICY AT A CROSSROADS [Die Verkehrspolitik der Osterreichischen Bundesbahnen im Schnittpunkt divergierender Auflagen]**

The author analyses the role of railways in the transport economy concept, and more particularly that of the OBB against the background of Austrian transport policy. The variety of tasks imposed creates major problems. Since

the overall economic situation rules out implementation of the different projects within the timescales fixed, priority should be given to promoting the return of some road traffic to rail, and to putting the OBB economic structure on a sounder footing. [German]

Pucher, J *OBB-Journal* No. 1, 1978, pp 5-13

ACKNOWLEDGMENT: International Union of Railways, BD  
ORDER FROM: Austrian Federal Railways, Elisabethstrasse 9, 1010 Vienna, Austria

25 180347

**IOWA RAIL PLAN**

Requirements of the Railroad Revitalization and Regulatory Reform Act of 1976 include preparation of documents such as this State Rail Plan of the State of Iowa. The primary purpose is to identify essential rail lines to assure complimentary and coordinated transportation is available to service Iowa's citizens. The Plan identifies Iowa's freight transportation system, describes state rail programs, analyzes branch lines, reports on Federal rail service assistance and indicates associated studies and future directions of the state's transportation planning.

Iowa Department of Transportation Mar. 1978, 137 pp, Figs., 14 Tab., 5 App.

ACKNOWLEDGMENT: Iowa Department of Transportation  
ORDER FROM: Iowa Department of Transportation, Planning and Research Division, Des Moines, Iowa, 50319

DOTL RP

25 180357

**RAIL RATE EQUALIZATION TO AND FROM PORTS**

Equalization of rail rates to and from ports in the U.S. was a competitive practice unregulated until amendment of the Interstate Commerce Act in 1935. Section 202(f) of the 4R Act affirms ICC authority over port equalization of rail rates. This study is to determine if ICC involvement has had a beneficial or detrimental effect upon commerce flowing through U.S. ports. It was found that long-haul rail rates are only one element in total international distribution costs and may have only minor influence; that modal competition has significantly reduced rail market share and profit margins which had allowed railroads to support cross-subsidies; that containerization and other technological improvements in ocean transportation erode traditional reasons for maintaining port equalization; that port equalization tends to erode rail traffic because it restricts the ability to make competitive rate changes; and that certain shippers are disadvantaged because they cannot utilize the inherent advantages of a particular route and port.

Interstate Commerce Commission Final Rpt. Jan. 1979, 100 pp, 30 Tab., 1 App.

ACKNOWLEDGMENT: Interstate Commerce Commission  
ORDER FROM: Interstate Commerce Commission, Rail Service Planning Office, Washington, D.C., 20423

DOTL RP

25 180358

**FREIGHT RATES AND TRANSPORTATION POLICY**

The paper gives a brief overview of the evolution of policy respecting freight rates, with special attention to the National Transportation Act of 1967 and the setting up of the CTC. It includes an account of the various criticisms of the freight rate structure and the kinds of responses that have been made to these criticisms. An analysis of the "heating up" of debate over the freight rate question in the early 1970's is detailed. Focus is made on the Rapeseed Case as the first effort to seek relief against allegedly "discriminatory" freight rates under Section 23 of the National Transportation Act and an assessment of the Calgary Conference on Western Economic Opportunities (July, 1973) with special reference to the discussion of freight rates and subsequent policy changes is outlined.

Bell, DVJ

York University, Canada Research Rpt. 45, No Date, 53 pp

ACKNOWLEDGMENT: York University, Canada  
ORDER FROM: York University, Canada, 4700 Keele Street, Room 430 Osgoode Hall, Downsview, Ontario 3MJ 13P, Canada

25 180374

**ALLOCATION OF FUNDS TO PUBLIC TRANSPORT INVESTMENT AND OPERATING SUPPORT**

This paper reviews the present levels of operating support to, and public investment in, public transport systems in Western Europe. All internal bus, tram and rail services are included, and estimates made for total support in Britain, Sweden, West Germany, the Netherlands and France. To make comparison meaningful, these are shown in relation to GDP and traffic carried. Support levels in Britain are below average, but by no means the lowest as sometimes assumed. Reasons for providing support are considered, including existence of financial burdens arising historically, assistance to particular groups of users, problems in price discrimination and inability of other modes' charges to reflect costs. The extent to which support payments may merely subsidise inefficiency is outlined. A distinction is drawn between "productive" efficiency, i.e. the resources used to provide a specified level of service and fare, and "allocative" efficiency, i.e. the extent to which resources are allocated so as to maximise traffic, etc. The extent for reducing support yet retaining the present level of service and fare is considered. Means of raising finance for support are outlined, including relative roles of central and local government. The scope of local taxes being raised to meet local objectives is considered, notably in the French "versement transport". In conclusion, it is suggested that trunk inter-city services should cover all costs from fares, by a discriminatory pricing policy, but central government provide a basic support level for rural areas. In urban areas, practical limits exist to price discrimination, and the best policy may be "collective purchase" of facilities through a local tax.

White, PR *Transportation (Netherlands)* Vol. 7 No. 2, June 1978, pp 225-242, 3 Tab.

ACKNOWLEDGMENT: Transportation (Netherlands)  
ORDER FROM: ESL

25 180381

**IMPACT OF BART ON HIGHWAY PLANNING AND POLICY**

The construction and operation of BART resulted in no dramatic changes in State highway facilities and planning. However, the State of California and BART did enter into policy agreements to develop existing highway rights-of-way for joint transit and highway use. The policy decision-making process and BART-State interactions were traced through the period of BART planning and construction to assess changes in highway planning and policy that might have resulted from BART. The policy outcome--joint use of facilities for transit and highways--appeared to be a cost effective development strategy in terms of broad public constituencies. An assessment of this policy outcome also provides some "lessons learned" for other communities considering rapid rail transit development such as the need for an independent third party to make trade-offs during negotiations and the need for clarity and formality in policy agreements.

Graebner, LS (Booz-Allen and Hamilton, Incorporated); Higgins, TJ *ASCE Journal of Transportation Engineering* Vol. 104 No. 4, July 1978, pp 475-487, 8 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

DOTL JC

25 180388

**DEVELOPING A VIABLE WATERBORNE TRANSPORTATION SYSTEM**

This paper identifies the role that state departments of transportation can play in developing their inland waterways as an element of their total transportation plan. A review of Tennessee's activities is given to illustrate an approach to developing the water transportation element of the total system. The example includes a discussion of Tennessee Rivers Information Planning System (TRIPS) along with the various data bases that make up the TRIPS computer based file. Because Federal, state and local levels of government and private industry are involved with inland waterways planning, development, and use, the paper describes the coordination that is necessary to achieve a viable waterborne transportation system.

Second Int Waterborne Transp Conference Proceeding, ASCE Urban Transportation Division Special Conference, New York, New York, October 5-7, 1977.

Goodwin, WA (Tennessee Department of Transportation)  
American Society of Civil Engineers Proceeding 1978, pp 15-24

ACKNOWLEDGMENT: EI  
ORDER FROM: ASCE

25 180389

**STATE'S ROLE IN WATERBORNE TRANSPORTATION**

The paper reports on a study of upstate New York public ports that demonstrated the great value of these ports for New York State's economy. It showed that the trend towards increasing public port deficits can be reversed. Investments in facilities needed for each port to develop its special potential will yield high benefits to the state, as well as to individual ports. On the basis of this study and relatively brief experience in port planning, some general conclusions as to an appropriate state role in this area are drawn.

Second Int Waterborne Transp Conference Proceeding, ASCE Urban Transportation Division Special Conference, New York, New York, October 5-7, 1977.

Campbell, EW (New York State Department of Transportation); Hall, G  
American Society of Civil Engineers Proceeding 1978, pp 25-33

ACKNOWLEDGMENT: EI  
ORDER FROM: ASCE

25 180394

**ALTERNATIVE SCENARIOS FOR FEDERAL TRANSPORTATION POLICY-- VOLUME 1, SUMMARY**

The research described evaluates the economic effects of existing and prospective federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. The analysis encompasses all modes of transportation, including rail, motor, water, air and intermodal coordinative institutions, and focuses upon the impact of alternative regulatory policies.

See also Volume 2, Policy Review and Scenario Development; Volume 3, An Integrated Policy Model for the Transportation Industries; and Volume 4, Network Models for Transportation Policy Analysis.

Friedlaender, AF (Massachusetts Institute of Technology); Simpson, RW  
Department of Transportation DOT/TST-77-78, Jan. 1977, 111 pp, 32 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

25 180395

**ALTERNATIVE SCENARIOS FOR FEDERAL TRANSPORTATION POLICY-- VOLUME 2. POLICY REVIEW AND SCENARIO DEVELOPMENT**

The research evaluates the economic effects of existing and prospective federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. The analysis encompasses all modes of transportation, including rail, motor, water, air and intermodal coordinative institutions, and focuses upon the impact of alternative regulatory policies.

Friedlaender, AF (Massachusetts Institute of Technology); Simpson, RW Frankel, E De Neufville, R Sloss, J  
Department of Transportation DOT/TST-77-79, Jan. 1977, 310 pp, 28 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

25 180396

**ALTERNATIVE SCENARIOS FOR FEDERAL TRANSPORTATION POLICY-- VOLUME 3. AN INTEGRATED POLICY MODEL FOR THE TRANSPORTATION INDUSTRIES**

The research evaluates the economic effects of existing and prospective federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. The analysis encompasses all modes of transportation, including rail, motor, water, air and intermodal coordinative institutions, and focuses upon the impact of alternative regulatory policies.

Friedlaender, AF (Massachusetts Institute of Technology); Spady, R Nason, S  
Department of Transportation DOT/TST-77-80, Jan. 1977, 203 pp, 70 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

25 180397

**ALTERNATIVE SCENARIOS FOR FEDERAL TRANSPORTATION POLICY-- VOLUME 4. NETWORK MODELS FOR TRANSPORTATION POLICY ANALYSIS**

The research evaluates the economic effects of existing and prospective federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. The analysis encompasses all modes of transportation, including rail, motor, water, air and intermodal coordinative institutions, and focuses upon the impact of alternative regulatory policies.

Simpson, RW (Massachusetts Institute of Technology); Swan, WM  
Department of Transportation DOT-TST-77-81, Jan. 1977, 69 pp, 22 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

25 180703

**FINANCING URBAN TRANSPORTATION. PART 2. LOCAL STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)**

The financing of urban transportation in local areas is documented. Although these studies may be of interest to a number of metropolitan localities, they were originally prepared to study the fiscal planning of transit and travel systems for specific areas. Cities covered include Atlanta, New York City, Washington, D.C., Philadelphia, Houston, Baltimore, San Francisco, Minneapolis, Milwaukee, and many smaller localities. Among the systems involved are rapid transit rail, bus, shared taxicab, dial-a-bus, dial-a-ride, and subway. Some attention is given to metropolitan airports. (This updated bibliography contains 176 abstracts, 6 of which are new entries to the previous edition.)

Kenton, E  
National Technical Information Service May 1978, 183 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0429/7ST

25 180704

**FINANCING URBAN TRANSPORTATION. PART 1. GENERAL STUDIES (A BIBLIOGRAPHY WITH ABSTRACTS)**

Financing methods are presented to show the various ways in which urban transportation systems can be supported by communities, metropolitan areas, and regions. Systems such as bus lines, subways, rapid rail, and taxis are discussed, as well as dial-a-ride operations and transit for the elderly. Some attention is given to urban airports, fare structures, and ridership. A few case studies are reported for specific cities if they would be of general interest to other areas. (This updated bibliography contains 81 abstracts, 10 of which are new entries to the previous edition.)

Kenton, E  
National Technical Information Service May 1978, 88 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

NTIS/PS-78/0428/9ST

25 181331

**THE IMPACT OF BART ON STATE HIGHWAY PLANS AND POLICIES**

The report presents an assessment of the impact of BART on State highway plans and policies. BART impacts evaluated include changes in highway facility development to access or parallel BART, changes in State highway policies with respect to BART and the outcome of agreements between the State and BART on joint use of highway facilities.

Prepared by Booz, Allen and Hamilton, Inc., San Francisco, Calif.  
Sponsored in part by Department of Housing and Urban Development, Washington, D.C.

Higgins, TJ  
Metropolitan Transportation Commission, Booz-Allen and Hamilton,  
Incorporated, Department of Transportation, Department of Housing  
and Urban Development DOT-BIP-WP-30-8-77, Oct. 1977, 59 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282925/7ST, DOTL NTIS

25 181334

**THE IMPACT OF BART ON GOVERNMENTAL ORGANIZATION AND OPERATIONS**

The report presents an assessment of BART's impact on local, regional and state governmental structure, organization and operations; on the formation and cohesion of private and community groups and on municipal incorporation attempts in the BART District counties.

Prepared by Booz, Allen and Hamilton, Inc., San Francisco, Calif.  
Sponsored in part by Department of Housing and Urban Development, Washington, D.C.

Kelley, EW Graebner, LS Giles, PB  
Metropolitan Transportation Commission, Booz-Allen and Hamilton,  
Incorporated, Department of Transportation, Department of Housing  
and Urban Development DOT-BIP-WP-29-8-77, June 1977, 70 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282944/8ST

25 181336

**THE DISTRIBUTION OF THE TAX BURDEN OF FINANCING BART'S CONSTRUCTION AND OPERATIONS**

The 71-mile Bay Area Rapid Transit (BART) system is the first regional scale rapid transit system to open in the United States in over 50 years. This technical memorandum assesses the impacts of financing BART's \$1.5 billion capital expenditures and \$60 million annual operating expenditures on the tax burden of the region's residents. This memorandum identifies the sources of BART's capital financing and assigns the burden of each revenue source geographically and to incidence sectors. It documents the same analysis for the difference between regional transit expenditures with BART and those that would occur without BART. The equity of the BART financing plans is reviewed in the context of their impact on representative household types. The differences between financing expectation and the reality are reviewed, in addition to policy implications to the financing plan. (Color illustrations reproduced in black and white)

Report on BART Impact Program. Prepared by McDonald and Grefe,  
Inc., San Francisco, Calif. Sponsored in part by Department of Housing and  
Urban Development, Washington, D.C.

Grefe, R McDonald, A Westerfield, D Brecher, D  
Metropolitan Transportation Commission, McDonald and Grefe,  
Incorporated, Department of Transportation, Department of Housing  
and Urban Development Tech Memo DOT-BIP-TM-30-7-77, Oct. 1977,  
177 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282990/1ST, DOTL NTIS

25 181786

**NEW YORK STATE RAIL PLAN**

The Final System Plan recommended to Congress by the United States Railway Association (USRA) left to the individually affected states responsibility for identifying initial decisions regarding the future of many light density rail freight branch lines. The Regional Rail Reorganization Act of 1973, which established the USRA and called for the drafting of the Final System Plan, incorporated in Title IV provisions for federal funds to assist states and regional authorities in providing up to two year's of subsidized continuation of service on certain eligible rail lines. Under specific authorization of the State legislature, the NYS Department of Transportation undertook the development and coordination of New York's State Rail Plan. The report describes New York's basic philosophy, criteria and plan development process, discusses significant related issues and presents the specific policy and action recommendations of the New York State Rail Plan.

New York State Department of Transportation Jan. 1976, 262 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-282083/5ST

25 182601

**VALUATION OF RAILROADS AND UTILITIES FOR PROPERTY TAXATION**

The properties involved in this discussion are those owned by businesses such as railroads, pipelines, and telephone and electric companies that operate in Interstate commerce and are regulated by Federal agencies.

Green, JE *Appraisal Journal* Vol. 46 No. 3, July 1978, pp 373-384

ACKNOWLEDGMENT: Appraisal Journal

ORDER FROM: American Institute of Real Estate Appraisers, 155 East Superior Street, Chicago, Illinois, 60611

DOTL JC

25 182602

**THE 120,000 MILE VALUATION PROBLEM**

Of substantive impact on the appraisal profession in valuing railroad rights of way in the United States is the legislation recently enacted by Congress in this area, along with the resulting consultant reports and special court activity. Also of interest are the appraisal and appraisal-related activity being undertaken by the various responsible governmental agencies in railroad valuation matters. This article is an attempt by the author to address those valuation areas currently under scrutiny and to report on actions being taken that well may have a profound impact on the future valuation of railroad rights of way.

Atherton, EB *Appraisal Journal* Vol. 46 No. 3, July 1978, pp 340-372

ACKNOWLEDGMENT: Appraisal Journal

ORDER FROM: American Institute of Real Estate Appraisers, 155 East Superior Street, Chicago, Illinois, 60611

DOTL JC

25 182610

**FEDERAL TRANSPORTATION POLICIES SIGNAL MODEST GOALS FOR CONSTRUCTION, NEW TECHNOLOGIES**

Today's federal transportation priorities reflect a movement toward preservation and improvement of the pieces which make up the existing transportation network rather than a launching of new and costly technologies. Nowhere is this philosophy more evident than in the Carter Administration's proposals for revamping federal highway and public transportation programs and in the ongoing federal R&D effort.

Heyman, M *Professional Engineer* Vol. 48 No. 4, Apr. 1978, pp 14-17

ACKNOWLEDGMENT: EI

ORDER FROM: ESL

DOTL JC

25 182791

**STUDY TO IDENTIFY AND ANALYSE EXISTING IMPEDIMENTS TO THE USE OF RAILROAD CONTRACT RATES IN THE UNITED STATES**

No Abstract.

Banks (RL) and Associates, Incorporated Final Rpt. May 1973, 305 pp

Contract DOT-FR-20067

ACKNOWLEDGMENT: Monthly Catalog of US Government Publications, GPO

ORDER FROM: FRA

25 182828

**THE CHANGING MOTOR CARRIER SHARE OF INTERCITY MANUFACTURES TRAFFIC: ALTERNATIVE EXPLANATIONS**

Changes in industrial location and commodity markets do not adequately explain the increasing share of manufactures traffic being transported by motor carrier. Increasing service advantage of trucks cannot be explained solely by market forces but is a result of government policies which result in misallocation of traffic and improper use of scarce resources. The impact of government policy must be better understood.

Breen, DA (Washington State University, Pullman) *Transportation Journal* Vol. 18 No. 1, 1978, pp 19-27

ORDER FROM: American Society of Traffic and Transportation, 547 West Jackson Boulevard, Chicago, Illinois, 60606

DOTL JC

25 182888

**THE NORWEGIAN STATE RAILWAYS-PROFIT-MOTIVATED ENTERPRISE OR A COMMUNITY SERVICE?**

Theme of this article is the use of economic measures to achieve the optimum division of goods transport between the railways and roads, seen from the point of view of the community as a whole.

Norden, RF *Long Range Planning* Vol. 11 No. 2, Apr. 1978, pp 13-18

ACKNOWLEDGMENT: DOT

ORDER FROM: ESL

DOTL JC

25 182890

**FIRST RAIL LINE TO BE REHABILITATED UNDER MINNESOTA PROGRAM**

No Abstract.

Stirens, M *ASHTO Quarterly* Vol. 57 No. 2, Apr. 1978, p 9

ACKNOWLEDGMENT: DOT

ORDER FROM: American Assn of State Hwy and Transp Officials, 444 North Capitol Street, NW, Washington, D.C., 20001

25 183318

**TAXES AND SUBSIDIES IN TRANSPORT: SOME UNSETTLED ISSUES**

Relative prices play an important role in user selection of transport mode. Prices do not reflect relative real costs partly because governments influence rail and road transport prices unequally. The concept of a "non-political price" is developed as a benchmark against which actual prices can be measured. Rail and road transport are examined. Large rail deficits are argued to result in part from inability to pass on cost increases because intermodal competition prevents this, coupled with unwillingness to relinquish traffics for which out-of-pocket costs exceed revenue. Resources are not efficiently allocated because rail prices include a subsidy, while road prices include a tax. /Author/TRRL/

Australian Transport Research Forum, Fourth Annual Meeting, May 24-26, 1978, Perth, Forum Papers.

Docwra, GE Kolsen, HM (Queensland University)

Western Australia Director General of Transport, (0313-6655) Book 1978, pp 179-209, 8 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234198)

ORDER FROM: TRRL

25 183324

**FREIGHT TRANSPORT POLICY: FIVE MYTHS**

From their experience as members of the southern western Australia transport study team, the authors identify and discuss five "myths" commonly encountered when examining land freight transport policy. These "myths" pose a potential threat to the improvement of policy. They are that : 1) present, regulatory-based transport policy is ideal (no advantage is to be gained from changing it and things should therefore be left well alone). 2) the introduction of a competitive policy would only involve the de-regulation of road transport. 3) a competitive policy must imply the total abandonment of regulation. 4) correct road user charges are central to a competitive transport policy. 5) a competitive transport policy would bankrupt the railways. /Author/TRRL/

Australian Transport Research Forum, Fourth Annual Meeting, May 24-26, 1978, Perth, Forum Papers.

Hicks, SK Hodgkin, KE

Western Australia Director General of Transport, (0313-6655) Book 1978, pp 269-295, 1 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-234201), Australian Road Research Board

ORDER FROM: TRRL

25 183560

**THE RAILWAY LABOR ACT AT FIFTY. COLLECTIVE BARGAINING IN THE RAILROAD AND AIRLINE INDUSTRIES**

No Abstract.

Rehmus, CM (National Mediation Board)

Government Printing Office 1977, 301 pp

ORDER FROM: GPO

25 183711

**TRANSPORTATION REGULATION AND PUBLIC POLICY**

Regulatory reform activities of the 1970s are traced and compared with similar efforts of prior decades. The reasons that legislative proposals of recent years have met with minimal success are discussed. There is then critical examination of perceived problem areas and recommendations are given for resolving regulatory and public policy issues.

Boske, LB (Texas University, Austin); Fuller, JW (Wisconsin Department of Transportation) *Traffic Quarterly* Vol. 32 No. 4, Oct. 1978, pp 493-510

ORDER FROM: ESL

25 183713

**NATIONAL TRANSPORTATION POLICY: A STUDY OF STUDIES**

Levine examines the assumptions of major transportation studies done in the U.S. in the last 100 years. Using those assumptions, he builds a model for formulating future transportation research. An appendix summarizing twelve of the major transportation studies of the past 100 years is included.

Levine, HA (Banks (RL) and Associates, Incorporated)  
Heath Lexington Books 1978, 208 pp, Figs., Tabs., Apps.

ORDER FROM: Heath (DC) and Company, Department RS, 125 Spring Street, Lexington, Massachusetts, 02173

25 184621

**RAIL RATE EQUALIZATION TO AND FROM PORTS: SOME PRELIMINARY COMMENTS ON PRELIMINARY CONTENT**

Despite historical precedents, rail rates to different ports involving different line-haul and/or terminal services and costs should not be equalized in the economic sense unless the transportation circumstances are similar, unless a rate disparity exists that is not cost-justified in the economic sense; or the port has been adversely affected. Automatic equalization artificially inhibits the advantages of location and intermodal competition. The standards for "adverse" impact should be reviewed since rate disparity between ports does not necessarily connote harm to a port which may have other advantages.

Horn, KH (Association of American Railroads) *ICC Practitioners' Journal* Vol. 46 No. 1, Nov. 1978, pp 30-55, 3 Tab.

ORDER FROM: Association Interstate Commerce Comm Practitioner, 1112 ICC Building, Washington, D.C., 20423

DOTL JC

25 184677

**POLICY ISSUES IN STATE RAIL PLANNING**

Recent federal legislation has given a major stimulus to rail transportation planning. Virtually every state is now preparing its own rail plan. It is argued that such state rail plans should be produced in a multimodal context and should attempt to address critical policy issues in transportation. A list of 10 critical policy issues was prepared by the Transportation Research Board, but to date federal legislative focus, administrative rules, and state rail plans have been much more narrowly conceived. This focus must be broadened if state rail plans are to meet emerging policy needs.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Fuller, JW (Wisconsin Department of Transportation) *Transportation Research Record* No. 656, 1977, pp 2-5, 13 Ref.

ORDER FROM: TRB Publications Off

25 184678

**CURRENT STATE RAIL PLANNING AND RESEARCH NEEDS**

The major problems of the railroad branch-line subsidy program are identified. An alternative program that utilizes rail and motor carriers is proposed. This alternative appears to be more efficient from economic, environmental, and energy perspectives. Other research areas related to state rail branch-line planning include areas of competition, shipper roles, liability risk, taxation, prioritization and the identification of alternatives, state role in rail traffic generation, structure of management incentive fees, and labor cost issues at the macrolevel. Other problems presented are in areas of freight forecasting, rail patron credibility, energy utilization and environmental pollution, transportability of products, and highway impacts at the microlevel.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Black, WR (Indiana University, Bloomington) *Transportation Research Record* No. 656, 1977, pp 5-9, 16 Ref.

ORDER FROM: TRB Publications Off

25 184679

**ONE STATE'S VIEW OF STATE RAIL PLANNING**

This paper describes a variety of views on rail planning not held by states. It differentiates between the state role in planning for rail lines that have interstate significance and those that do not, and it describes three possible levels of involvement for the states with regard to each type of line. The paper also discusses the way in which state rail planning relates to planning by the railroads and federal rail agencies.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Harsh, WC, Jr (Illinois Department of Transportation) *Transportation Research Record* No. 656, 1977, pp 8-10

ORDER FROM: TRB Publications Off

25 184680

**ONE RAILROAD'S VIEW OF STATE RAIL PLANNING**

The Railroad Revitalization and Regulatory Reform Act of 1976 encourages and, in some ways, requires the development of a whole new set of relations between states and railroads. This paper examines these relations as they exist today and presents opinions on the directions they should take to be of greater benefit to both states and the railroads. State rail planning under the Railroad Revitalization and Regulatory Reform Act is judged to be a means by which the old adversary relations between states and railroads can change to the considerable advantage of states, railroads, and the general public.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Barriger, JW (Santa Fe Railway Company) *Transportation Research Record* No. 656, 1977, pp 11-12

ORDER FROM: TRB Publications Off

25 184681

**STATE RAIL PLANNING AND THE PUBLIC INTEREST**

Although there is general agreement on the overall aim of the public interest in transportation planning--which is to provide service to the people, areas, and institutions needing it--there appears to be a problem with rail planning. An examination of the legal backdrop against which planning is conducted suggests that the states should play an active role in the planning process, that many of the federal government's objectives are in conflict, and that not all of the multiple objectives of the public interest are of equal importance. The critical issues are improving railroad economics and determining the impact of decreased or increased service on specific areas. While the federal government is looking at pricing, production, and plant, the states should concentrate on plant. State highway planning has long been in effect; state rail planning is long overdue.

This paper appeared in Transportation Research Record No. 656, Rail Planning.

Baker, CD (Harbridge House, Incorporated) *Transportation Research Record* No. 656, 1977, pp 13-14

ORDER FROM: TRB Publications Off

25 184682

**STATE AND INTERSTATE COMMERCE COMMISSION RAIL RELATIONS**

This paper presents an outline of state and federal roles in inter- and intrastate rail decisions. Regulating intrastate rates came under Interstate Commerce Commission jurisdiction in 1920, and as late as 1958 the federal role was being extended. The Railroad Revitalization and Regulatory Reform Act of 1976 reversed the role, giving jurisdiction over intrastate rate questions to the states, but with certain strict rules. Passenger service and standards of service adequacy fell largely to Washington under the Urban Mass Transportation Act of 1964. Today, the Interstate Commerce Commission and Urban Mass Transportation Administration are calling for more state and local participation in the planning for survival and operation of passenger service. Line abandonments may also be avoided through state planning and state and federal subsidy under the Railroad Revitalization and Regulatory Reform Act.

This paper appeared in Transportation Research Record No. 656, Rail

## Planning.

Brooks, RJ (Interstate Commerce Commission) *Transportation Research Record* No. 656, 1977, pp 14-17

ORDER FROM: TRB Publications Off

## 25 184686

## ANALYSIS OF RAIL LINE ABANDONMENT PRIORITIES

Recent reorganization of railroads in the Northeast faced many kilometers of rail lines with service abandonment. The cost to the taxpayer of rail service continuation subsidies was judged to be "less than the cost of abandonment of rail service in terms of lost jobs, energy shortages, and degradation of the environment." Legislation provided federal funds and left the decision to individual states, who were required to submit state rail plans. This paper explains the process used by the New York State Department of Transportation to select analysis variables, importance weights, and impact indexes for establishing line abandonment priorities. Sensitivity testing and interpretations of the analysis are reported.

This paper appeared in *Transportation Research Record* No. 656, Rail Planning.

Trentacoste, MF (Federal Railroad Administration); Lussi, JK (New York State Department of Transportation) *Transportation Research Record* No. 656, 1977, pp 35-40, 2 Fig., 1 Tab., 11 Ref.

ORDER FROM: TRB Publications Off

## 25 184941

## LONG-RANGE REVENUE ANALYSIS AS INPUT TO STATEWIDE TRANSPORTATION PLAN

## DEVELOPMENT--MARYLAND: A PROGRESS REPORT

The paper presents the results of an in-depth analysis of long-range revenue potential and discusses the Maryland Department of Transportation's state-wide planning approach under this difficult financial situation. In particular, the paper discusses the approach to structuring long-range transportation alternatives, which include assumptions concerning operating and capital expenditures. All of these alternatives will emphasize improvements to existing facilities and reflect the new orientation of the Department's planning process towards meeting transportation needs to the maximum extent possible by improving existing facilities rather than by constructing new ones. The paper also discusses the role of systems planning in the statewide and regional transportation planning process.

Compend Tecq Paper 47th Annual Meeting of the Institute of Transportation Engineers; 4th World Transp Eng Conference, Mexico City, October 2-6, 1977.

Shafran, I (Maryland Asphalt Paver)  
Institute of Transportation Engineers Conf Paper 1977, pp 253-262

## ACKNOWLEDGMENT: EI

ORDER FROM: ESL, Institute of Transportation Engineers, 1815 North Fort Myer Drive, Arlington, Virginia, 22209

## 25 188070

## STATE TAXATION OF RAILROADS AND TAX RELIEF PROGRAMS

This report reviews the major taxes levied on railroads by states and the changes which have been and might be made. Having identified the problems of the rail industry, a series of alternative strategies states could pursue to help revitalize the railroads are discussed. Currently levied by states on railroad corporations are property, capital stock/value, income, sales and use taxes. Tax assistance strategies cover such actions as rate and taxable base reductions, tax credits or rebates, and full or partial tax exemption. Five case studies detail tax relief assistance programs. To gain proper perspective, existing state and federal rail assistance programs are also discussed.

Runke, JF Finder, AE  
Council of State Governments, Economic Development Administration  
Nov. 1977, 107 p., 4 Fig., 22 Tab., 2 App.

Grant 99-6-09586

## ACKNOWLEDGMENT: Council of State Governments

ORDER FROM: Council of State Governments, Iron Works Pike, Lexington, Kentucky, 40578

DOTL HE1071.R87.

## 25 188071

## ASSISTING PRIVATE ENTERPRISE: STATE CONSTITUTIONAL ISSUES. A RAIL PROGRAM CASE STUDY

This report examines the conflict between state constitutional law and the eligible option open to state governments under the FRA Rail Service Assistance Program of the 4R Act. The complexity of the problem is examined and alternative strategies a state may consider to be eligible to participate are outlined. Chapter 2 discusses the nature of the four types of state constitutional prohibitions: (1) loan of credit; (2) stock shareholding; (3) loans, gifts and donation of funds; (4) assumption of debt. Chapter 3 relates actions and alternatives states have used in the past with similar participatory funding, planning and program requirements. The alternatives used have been constitutional amendments; court decisions, attorney generals' opinions, service contracts, special authorities, in-kind benefits and shipper options.

Runke, JF Kannensohn, MH  
Council of State Governments, Economic Development Administration  
Apr. 1977, 62 p.

Grant 99-6-09586

## ACKNOWLEDGMENT: Council of State Governments

ORDER FROM: Council of State Governments, Iron Works Pike, Lexington, Kentucky, 40578

DOTL KF2301.Z9R87

## 25 188072

## THE WISCONSIN STATE RAIL PLAN

This planning document, the fifth in a series of reports, discusses the general condition and status of railroads serving Wisconsin and analyzes alternatives for lines potentially subject to abandonment. The plan provides the framework and guidance for public officials and others interested in attempting to solve or ease railroad problems as they arise. It is prepared in compliance with the 3R and 4R Acts and the State's Environmental Policy Act.

Wisconsin Department of Transportation Dec. 1978, v.p., Figs., Tabs., 9 App.

ORDER FROM: Wisconsin Department of Transportation, 4802 Sheboygan Avenue, Madison, Wisconsin, 53702

DOTL RP

## 25 188341

## TRANSPORT SUPPLEMENTARY GRANT SUBMISSIONS FOR 1979/80

This circular, issued to local authorities and passenger transport executives (PTE's) in England, describes the arrangements for tpp submissions for transport supplementary grant (tsg) for 1979/80. It supplements the earlier circulars on the tpp/tsg system and supersedes the advice on expenditure levels and programme priorities given in circular dtp 1/77. An index to those parts of the earlier circulars that are still current is at annex F. Reference is made to the white paper on transport policy (cmnd 6836) and the revised expenditure ceilings envisaged for local transport. The circular deals mainly with the policy and financial implications of the white paper with regard to bus and underground operations, local rail services, public transport plans, local roads and traffic management, car parking, road safety and highway maintenance. The attention of local authorities is drawn to the advantages of promoting direct rail access for industrial development, and the government's policy with regard to inner urban areas, and new and expanding towns. The final section covers expenditure generally.

Her Majesty's Stationery Office, (4 0 11 55046) Monograph Circular 3/78, Jan. 1978, 26 p.

## ACKNOWLEDGMENT: TRRL (IRRD 231938)

ORDER FROM: Pendragon House, Incorporated, P.O. Box 255, Old Mystic, Connecticut, 06372

P7803132

26 181235

**RAILROAD MANAGEMENT PLANNING. VOLUME 2.  
1974-JUNE, 1978 (A BIBLIOGRAPHY WITH ABSTRACTS)**

Studies are presented of Government and regional planning concerning costs, terminals, intermodal systems, comparisons, safety, community relations, environmental impacts, railway abandonment, and high speed systems. Other discussions include noise control, commuter services, demand characteristics, and transportation models. (This updated bibliography contains 153 abstracts, 55 of which are new entries to the previous edition.)

Kenton, E

National Technical Information Service Final Rpt. June 1978, 158 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

NTIS/PS-78/0594/8ST

26 188052

**INTERNATIONAL RAILWAY STATISTICS--STATISTICS OF  
INDIVIDUAL RAILWAYS--YEAR 1976**

No Abstract.

Rackiewicz, M

International Union of Railways, BD 1976, 213 p., Tabs.

ACKNOWLEDGMENT: UIC

ORDER FROM: International Union of Railways, BD, 14 rue Jean Rey,  
75015 Paris, France

DOTL RP

26 188315

**AN INTRODUCTION TO TRANSPORTATION ENGINEERING,  
SECOND EDITION**

The book discusses the general factors and principles that are concerned with the use of transport modes in public and freight transport from structural design to economic functioning. The second edition of the book considers the subject in the light of the approaching petroleum energy shortage, pollution and environmental considerations. The subject is considered in four parts: the transportation system-transportation function and development, historical development, the transportation system; transport technology-technological characteristics, propulsive force, horsepower and elevation, roadway, systems for the future, factors in operation-level of service performance criteria, performance criteria quality of service factors, terminals, operational control, costs of service; and planning for use and development- transportation planning goals and procedures, urban data collection and analysis, evaluating alternative systems, regional, state and national transportation planning, and, route classification, location and design. /TRRL/

Hay, WW (Illinois University, Urbana)

Wiley (John) and Sons, Limited Monograph Vol. 2 1977, 668 p., Figs.,  
Tabs., Photos., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-232745)

ORDER FROM: Wiley (John) and Sons, Limited, Baffins Lane, Chichester,  
Sussex, England

B7804663



# Ongoing Research Summaries

00 059406

## TRANSIT INDUSTRY INPUT ON THE TUNNELING TECHNOLOGY PROGRAM

The American Public Transit Association will provide transit industry input, advice, and consensus on the Tunneling Technology Program. A review program will be established to review each of the UMTA/TSC R&D Contracts. Each panel will be comprised of experienced technical representatives of the transit industry. The areas include subway system maintenance, subway station design and construction, and tunnel standardization, rapid transit concrete ties and rapid transit tracks.

Although under separate contract to UMTA, U.S. DOT, this project relates to ongoing research performed by the National Academy of Sciences' U.S. National Committee on Tunneling Technology.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration, DC-06-0129

RESPONSIBLE INDIVIDUAL: Butler, GL Tel (202) 426-0090

Contract DOT-UT-60016T (CR)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1976 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$49,054

ACKNOWLEDGMENT: TRAIS (DC-06-0129)

00 135514

## RAPID ASSESSMENT OF ROCK MASS CONDITIONS

To develop a technique for the rapid assessment of the integrity of rock slopes, tunnel rock, dam abutments, and embankments. Thermal anomalies associated with known structural defects will be studied and their significance with respect to the behavior of the structure determined. Anomalies investigated will include loose tunnel rock, voids behind shotcrete and/or concrete structures, and leakage through dam abutments or embankments.

PERFORMING AGENCY: Waterways Experiment Station

INVESTIGATOR: Huie, JS

SPONSORING AGENCY: Waterways Experiment Station, DA0M8183

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZQA138183)

00 135516

## RAPID EXCAVATION WITH EXPLOSIVES-EXPLOSIVE EXCAVATION IN DIFFERING GEOLOGIC MEDIA AND TOPOGRAPHY

Purpose of study/investigation: To develop improved techniques of excavation with explosives for civil engineering projects that lead to cost

stabilization or reduction. This program provides salary and travel funds for planning, executing and reporting field experiments at Corps project sites.

PERFORMING AGENCY: Waterways Experiment Station, Explosive Excavation Research Laboratory

INVESTIGATOR: Mills, RR

SPONSORING AGENCY: Army Corps of Engineers, Department of the Army

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1973

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 356)

00 135518

## RAPID EXCAVATION WITH EXPLOSIVES; CHARGE SHAPE, EMPLACEMENT PATTERNS AND FIRING TECHNIQUES

Purpose of study/investigation: To develop controlled Project Lost Creek and the measurements made to get a large structural excavations where some cost advantage would result from the use of larger charges.

PERFORMING AGENCY: Waterways Experiment Station, Explosive Excavation Research Laboratory

INVESTIGATOR: Mills, RR

SPONSORING AGENCY: Army Corps of Engineers, Department of the Army

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 358)

00 135550

## RATIONAL DESIGN OF TUNNEL SUPPORTS

The objective is to develop reliable design procedures & to encourage the adoption of improved construction techniques for tunnel support systems that satisfy structural and economic requirements. Various analytical solutions applicable to tunnels constructed by the Corps and other agencies will be documented and/or developed and checked for performance adequacy. The check will be accomplished by the review of instrumentation data from selected projects and follow-through construction and performance appraisal. Corrections will be made to the theoretical analysis for the purpose of arriving at reliable design approaches and construction procedures for tunnel support systems.

PERFORMING AGENCY: Department of the Army, Missouri River Engineering Division

INVESTIGATOR: Redlinger, JF Underwood, LB

SPONSORING AGENCY: Army Corps of Engineers, Department of the Army, 31214

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 529 2)

00 136152

**THE U.S. NATIONAL COMMITTEE ON TUNNELING TECHNOLOGY**

The U.S. National Committee on Tunneling Technology was established in 1972, at the request of the Chairman of the Federal Council for Science and Technology, to assess the broad range of activities and related technologies pertaining to the use of subsurface space and to stimulate improvements in underground construction technology. Improvements are needed to meet increasing national demands for providing life-support functions in urban areas and activities of the International Tunnelling Association (ITA) environmental impact. The committee's work is focused on subjects considered by the committee to be of highest priority with respect to improvement of the art of underground construction and tunneling, and improvement of conditions to accelerate the use of improved technology throughout the United States. These include both technical and nontechnical activities. The committee will continue its work in encouraging governmental agencies and industry to adopt practices in contracting for underground construction which are more appropriate for this type of work than those which have been traditionally used in this country and to improve the education of engineers, both in the university programs and in continuing education programs, with the long range goal being the general upgrading of planning, design, and construction of underground works. The committee will undertake tasks to review sectors of underground construction technology development and to recommend to government, to industry, and to the universities, actions which should be taken to upgrade both the state of the art in that sector and the application of the most advanced and appropriate technologies in the national interest. The Committee also participates in the activities of the International Tunneling Association (ITA) on behalf of the scientists, engineers, and technologists of the United States. The ITA was formed in 1974, and five cooperative projects are underway on the subjects planning use of the subsurface, research needs, and standardization, safety and contractual sharing of risk.

PERFORMING AGENCY: National Academy of Sciences; National Academy of Engineering

INVESTIGATOR: Bangert, RL Tel (202) 389-6831

SPONSORING AGENCY: Bureau of Mines

RESPONSIBLE INDIVIDUAL: Rogich, DG Tel (202) 634-1220

Contract ET-77-C-01-9051

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Mar. 1972 COMPLETION DATE: Dec. 1980

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 803 2)

00 136165

**U.S. NATIONAL COMMITTEE FOR ROCK MECHANICS**

The aims of the project are to review new developments and trends in rock mechanics; research, implement and enhance exchange of technical information among scientists; identify and encourage research activities that will advance rock mechanics technology; and participate for the United States in the International Society for Rock Mechanics and assist with international efforts to coordinate rock mechanics research. The Committee's activities include identification of research needs, preparation of advisory reports, coordination and participation in domestic and international professional conferences and symposia, and periodic reviews and surveys of national research efforts in rock mechanics and related fields. The Committee also participates in the activities of the International Society For Rock Mechanics (ISRM) on behalf of the scientists, engineers, and technologists of the United States. The ISRM, formed in 1962, sponsors international symposia and congresses and publishes the technical reports prepared by its study commissions, numbering 8 at present.

Also sponsored by 11 Federal agencies and 10 professional societies.

PERFORMING AGENCY: National Academy of Sciences; National Academy of Engineering

INVESTIGATOR: Bangert, RL Tel (202) 389-6415

SPONSORING AGENCY: Bureau of Mines

RESPONSIBLE INDIVIDUAL: Rogich, DG Tel (202) 634-1220

Contract ET-77-C-01-9050

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Dec. 1967 COMPLETION DATE: Sept. 1980

00 138477

**EVALUATION OF REPAIR TECHNIQUES FOR DAMAGED STEEL BRIDGE MEMBERS**

The first phase of this project will identify and categorize common types of accidental damage to steel bridges and the frequencies of their occurrence; analyze the state of the art of present practice and equipment used for assessing damage and repairing highway and railroad bridges and other steel structures (including heating temperatures, jacking methods, straightening tolerance and degradation of steel's mechanical properties and service life); evaluate techniques that have been applied or may be applied for correcting structural damage; preparation of report of Phase I and outline Phase II research.

PERFORMING AGENCY: Battelle Columbus Laboratories, NCHRP 12-17  
INVESTIGATOR: Mishler, HW Tel (614) 424-7378

SPONSORING AGENCY: American Assn of State Hwy and Transp Officials; Federal Highway Administration

RESPONSIBLE INDIVIDUAL: Reilly, RJ Tel (202) 389-6741

Contract HR-12-17

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: National Cooperative Highway Research Program

00 138532

**CONSTRUCTION TECHNOLOGY**

The results of the Urban Rail Construction Technology program will assist policy makers and the transit industry in evaluating construction alternatives which show areas of cost savings, safety enhancement and increased performance and reliability. The primary goal of the program is to bring about significant reduction in construction cost of urban rail transit system facilities by implementing new technologies and by improving design, construction and contracting practices in the urban rail transit construction industry. The three major thrusts of the program are underground, at-grade track and wayside, and elevated structures.

PERFORMING AGENCY: Urban Mass Transportation Administration; Transportation Systems Center

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Butler, GL

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1973 COMPLETION DATE: 1985 TOTAL FUNDS: \$30,000,000

ACKNOWLEDGMENT: UMTA

00 139169

**ENGINEERING AND GEOPHYSICAL STUDIES OF KANSAS TEST TRACK**

During the design, construction and operation of the Kansas Test Track, vibroseismic tests were performed to determine elastic properties of the subgrade. After the premature failure of KTT, an additional objective was to determine the failure mechanisms, appraise validity of built-in instrumentation's data and perform static and dynamic response investigations of unconventional track structures for validating analytical models of such construction. This includes nondestructive testing, other field testing and laboratory testing.

REFERENCES:

Vibroseismic Survey, Railway Test Embankment, Aikman, Kansas  
Curro, JR, Jr, WES Mis. Paper S-72-36

Feasibility Study for Railroad Embankment Evaluation Lundien, JR,  
Aug. 1978, AD-A058387

PERFORMING AGENCY: Waterways Experiment Station

INVESTIGATOR: Ballard, RF Tel (601) 636-3111

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Moody, HG Tel (202) 426-4377

Contract DOT-AR-30025

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Nov. 1972

ACKNOWLEDGMENT: FRA

00 153558

**DEVELOPMENT OF COLORADO LAND USE DATA SYSTEM**

To develop technical criteria for identifying potential areas of natural hazard; e.g., floods, landslides, etc. Assess legal requirements of physical data for the designation of natural hazard areas. Develop the process of land use capability classification. Develop a technique for assessing the "environ-

mental carrying capacity" as a land use planning tool. Assess the data system needs for a state land use data bank and develop appropriate software compatible with these needs.

## REFERENCES:

The River Environment Simons, DB; Lagasse, PF; Chen, HH; Schummn, SA, Dept of Intl, Fish & Wildlife Serv, Twin Cities, Minn, Reference Document, Dec. 1975

Identification of Landslides and Mudflow Hazards Related to Land Utilization Development, Simons, DB, Reference Document, 1975

PERFORMING AGENCY: Colorado State University, Fort Collins, Department of Civil Engineering, CSRS COL

INVESTIGATOR: Simons, DB Wengert, NI Heil, R

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Apr. 1977 START DATE: July 1975 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068159)

## 00 170632

**FATIGUE PHENOMENA IN WELDED CONNECTIONS OF BRIDGES AND CRANES**

Size effects shown by earlier ORE studies (D 86) are to be checked by fatigue tests on I beams and box girders, incorporating butt welds as made in a workshop and as made at a construction site. Tests also on smaller beams appropriate to use in cranes and vehicles (co-ordination with B 12) are made. Final tests to be under load spectrum (co-ordination with D 128). Object is to show possible inadequacy of some design rules for structures subject to fatigue. At this time constant amplitude tests on I beams and on box beams have been completed. Tests using load spectrum are still in progress.

Nine reports have been published to date. Question D130.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

## 00 170633

**STATISTICAL DISTRIBUTION OF AXLE LOADS AND STRESSES IN RAILWAY BRIDGES**

Calculation of the dynamic response of bridges under high speed train running (mathematical models, field tests, parameter studies, irregularities), traffic load induced bridge component fatigue (load and moment spectra are determined from traffic and track loading; counting methods, fatigue calculation). Estimates of life under given traffic were made. Traffic spectra have been derived from typical trains. Load spectra have been calculated for given single beams by means of influence lines. A method for calculating the moment range spectrum has been worked out. In the process, traffic and bridge parameters have been treated separately. Stochastic studies of the movement of a random individual load and of continuous loading on the bridge beam have been made. Measurements on bridges have been obtained for comparison with the calculations.

Seven reports have been published to date. Question D128.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1972

ACKNOWLEDGMENT: UIC

## 00 170634

**INVESTIGATION OF BRIDGE DECKS WITH CONCRETE ENCASED GIRDERS**

Testing of six different laboratory models statically, to be followed by tests on similar models first loaded dynamically to produce realistic cracking before loading statically to failure. A 40 m double span bridge deck to be tested after dynamic pre-loading to failure under static load. After failure, anticipated at the central support, a simple span of 18 m taken from the remaining, undamaged portion is to be tested similarly. Object is possible revision of design rules. Tests are completed. Interim results confirm that design methods can be improved toward economy of material and final report is being prepared.

Ten reports have been published to date. Question D123.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: 1971

ACKNOWLEDGMENT: UIC

## 00 177845

**UNDERGROUND LIFELINES IN A SEISMIC ENVIRONMENT**

Lifelines supply and distribute essential services and functions to communities (energy, communications, transportation, water). The continued maintenance of these systems in seismic areas is not only vital to the health and safety of the communities they serve, but they also represent nearly one half of the total investment in structures. The safeguarding of these services is, therefore, clearly in the national interest. At the present time, there are no more than rudimentary provisions in a few building codes regulating the planning, design and construction of underground lifelines. The major reason for this is the almost complete absence of scientific and technical knowledge regarding the detailed behavior of these structures in seismic environments. The purpose of this project is to improve such knowledge and to apply it through risk and optimization studies to planning, design and construction of life line structures. The research will concentrate on underground water distribution lifelines. The specific tasks include: (1) a survey of such underground lifelines, (2) the development of appropriate seismic input, (3) methodology development for modeling and analysis, (4) methodology application to real systems, and (5) risk and decision analyses of lifeline systems. The results of the research will be presented in the form of design aids, guides and specifications, to be utilized by legislative and policy-making bodies, building code officials, utilities, planners, engineers, and the construction industry. This is a supplement to previous Award No: ENV 76-09838.

PERFORMING AGENCY: Weidlinger Associates

INVESTIGATOR: Baron, ML

SPONSORING AGENCY: National Science Foundation, Division of Advanced Environmental Research and Technology, ENV76-09838 A01

Contract

STATUS: Active NOTICE DATE: June 1978 START DATE: June 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$42,170

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 927 1)

## 00 179326

**DEVELOPMENT OF DESIGN RECOMMENDATIONS FOR CONCRETE TUNNEL LINERS**

The objective of this procurement is to develop guidelines and recommendations for structural design of concrete linings of underground structures based upon ultimate strength concepts of concrete behaviour. This concrete may be in the form of either precast segments, cast-in-place, or shotcrete; and may be either reinforced or unreinforced.

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering

INVESTIGATOR: Paul, S

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1504

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1978 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$349,000

ACKNOWLEDGMENT: TSC

## 00 179327

**RAILROAD BALLAST AND SUBGRADE REQUIREMENTS STUDY**

No Abstract.

PERFORMING AGENCY: Goldberg, Zoino, Dunicliff and Associates

INVESTIGATOR: Simon, R Tel (617) 244-4100

SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978

## 00 179329

**DEVELOPMENT OF AN EXTRUDED TUNNEL LINING SYSTEM**

The objective of this R&D Program is to design, develop, fabricate, test and demonstrate an extruded liner tunneling system. Such a system would shorten the time requirement to excavate and line a tunnel section and

eliminate the need for primary support. The four phases of the 40 month program are: I. Laboratory Research and Development; II. System Engineering Design; III. System Development, and; IV. Field Test and Demonstration.

PERFORMING AGENCY: Foster-Miller Associates, Incorporated  
 INVESTIGATOR: Maser, K Tel (617) 890-3200  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1516  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Dec. 1977 COMPLETION DATE: Apr. 1981 TOTAL FUNDS: \$2,050,789  
 ACKNOWLEDGMENT: TSC

00 179332

#### IMPROVED DESIGN PROCEDURES FOR UNDERGROUND SUPPORTS

The objective of this procurement is the development of an analysis design approach which uses the principle of optimization, can rationally handle ground-structure behavior and allows incorporation of improved knowledge on ground structure behavior whenever this becomes available.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Einstein, HH Tel (617) 253-3598  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Silva, LP Tel (617) 494-2351

Contract DOT-TSC-1489  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1978 COMPLETION DATE: June 1979 TOTAL FUNDS: \$97,000  
 ACKNOWLEDGMENT: TSC

00 179344

#### IMPROVED DESIGN PROCEDURES FOR UNDERGROUND STRUCTURAL SUPPORT SYSTEMS IN ROCK

The research objective is to obtain improved analysis and design procedures for structural support systems of underground openings in rock. Present design procedures are based on assumed loads and do not adequately consider the influence of the construction procedure and rock-support interaction. Support systems for large vaults (such as used for underground powerhouses and subway stations) and for intersections of vaults and tunnels have been identified as areas where significant economies in construction can be realized with improved analysis and design procedures. The initial effort includes a review of analysis and design procedures used for selected projects, e.g., the Washington Metro subway system. Measured rock deformations and support strains at sections of the selected projects will also be reviewed. The observed behavior of the rock and support systems of representative underground vault or major tunnel during construction will be correlated with the response of a three-dimensional nonlinear finite element model of this installation during the same simulated sequences of construction. A second analytical study will consider a typical intersection of two underground vaults or major tunnels. After verification of the analysis procedure, the analysis of the intersection will be repeated using a more economical support arrangement than conventionally provided. Cases then will be analyzed to provide sets of parametric curves that can be used for preliminary design of selected support systems.

PERFORMING AGENCY: Agabian Associates  
 INVESTIGATOR: Raney, EM  
 SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR76-80044

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$179,900  
 ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 39)

00 185230

#### SUBSURFACE EXPLORATION FOR TRANSIT TUNNELING

Employ selected innovative geotechnical and geophysical exploration and instrumentation techniques on an ongoing transit tunnel project: Evaluate the feasibility, applicability, reliability and cost effectiveness of the selected techniques; use the selected techniques to define the real and relevant geotechnical unknowns in test sections; evaluate the accuracy of the geotechnical predictions with appropriate field instrumentations, monitoring and mapping during construction; to demonstrate the effectiveness of instrumentation and monitoring during construction in documenting the

effects of tunneling on adjacent structures; to provide data during construction for use by designers and contractors which can be employed to evaluate tunneling procedures and their effects on ground deformations so that modifications might be employed in critical areas and to evaluate need for protecting structures.

PERFORMING AGENCY: Bechtel Corporation, 12363  
 INVESTIGATOR: Sutcliffe, H Tel (617) 628-9600  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Nelson, RN Tel (617) 494-2032

Contract DOT-TSC-15 (70)  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Oct. 1981 TOTAL FUNDS: \$411,025

ACKNOWLEDGMENT: Bechtel Corporation

00 185235

#### DEVELOPMENT OF A RAIL PHOTOLOG

Ascertain requirements for field-inventory data for the existing rail system in Connecticut. Develop specifications for rail-photolog equipment. Purchase and test the specified equipment. Provide ConnDOT with a complete photolog file of the entire railway system in Connecticut.

PERFORMING AGENCY: Connecticut Department of Transportation, Bureau of Planning and Research  
 INVESTIGATOR: Bowers, DG Tel (203) 529-7741 X49  
 SPONSORING AGENCY: Connecticut Department of Transportation  
 RESPONSIBLE INDIVIDUAL: Dougan, CE Tel (203) 529-7741 X76

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1978 COMPLETION DATE: July 1980 TOTAL FUNDS: \$120,000

ACKNOWLEDGMENT: Connecticut Department of Transportation

00 188643

#### FRACTURE CONTROL IN TUNNEL BLASTING

The objective of this study is to assess the practicality, advantages, disadvantages and cost effectiveness of fracture control methods in tunnel blasting as compared to the conventional smooth wall blasting procedures. The scope of the study consists of implementing fracture control procedures through the use of grooved drill holes in a pilot tunnel under construction for the Massachusetts Bay Transportation Authority (MBTA) in Cambridge, Massachusetts for the proposed Porter Square subway station.

PERFORMING AGENCY: Haley and Aldrich, Incorporated  
 INVESTIGATOR: Thompson, DE  
 SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Sept. 1979

00 188666

#### ATLANTA APPLIED RESEARCH CAVERN

The objective of this applied research and demonstration program is to evaluate advanced tunneling techniques in a Research Chamber and subsequently to use those techniques in the major subway presently under construction in Atlanta, Georgia. A hard rock horseshoe tunnel 60' long and 18' in diameter will be excavated to create the Applied Research Chamber, as a part of the \$1.8 Billion MARTA Subway System presently under construction. Research on control blasting; geotechnical instrumentation; conventional, yieldable and rebar cage steel ribs, conventional shotcrete; steel-fiber-reinforced shotcrete; and several types of European and American type rock bolts will be accomplished.

PERFORMING AGENCY: Tudor Engineering Company  
 INVESTIGATOR: Rose, DC  
 SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1977 COMPLETION DATE: Feb. 1980

00 188668

#### FULL-SCALE DEMONSTRATION TESTS OF DOUBLE TEE GIRDERS FOR AERIAL GUIDEWAY OF RAPID TRANSIT SYSTEMS

Full-scale tests are essential to determine theoretical and practical aspects of the design and performance of the double tee girders and their potential for use as a standard aerial girder for rail rapid transit systems. These demonstration tests will verify all design methods used, confirm some of the

most important construction details, and finally will establish the dynamic performance of the girders under repetitive combined flexure, shear and torsion cyclical loading over required sixty years of service life.

PERFORMING AGENCY: Kaiser Transit Group  
SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1978 COMPLETION DATE: Mar. 1979

**00 188669****SEGMENTED CONCRETE TUNNEL LINERS AND SEALANT SYSTEMS**

The objective is to devise, fabricate, and test circular segmented liner systems displaying candidate joint configurations and sealants. The increasing cost of metal liner makes the development and use of precast concrete liner quite attractive. The weak link in a segmental concrete tunnel liner is the potential leaks that may arise at segment junctures.

PERFORMING AGENCY: Bureau of Reclamation  
INVESTIGATOR: Spencer, RW  
SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1976 COMPLETION DATE: Aug. 1979

**00 188670****TEST SECTION STUDY OF PRECAST TUNNEL LINERS IN THE BALTIMORE RAPID TRANSIT SYSTEM**

The objective is to assess the cost and technical performance of the steel-lined and pre-cast concrete-lined tunnels that will be constructed for the Lexington-Market Tunnel Contract.

PERFORMING AGENCY: Mass Transit Administration  
INVESTIGATOR: Hoppe, F  
SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1977 COMPLETION DATE: Oct. 1979

**00 188671****ASSESSMENT OF THE POTENTIAL FOR STANDARDIZATION IN RAPID TRANSIT SYSTEMS**

The objective is to assess the potential for achieving construction cost economies in tunnel construction through the standardization of components and/or parameters which effect tunnel costs. This study is divided into two phases. Phase I will basically provide a detailed catalogue of the interacting components and engineering factors that have been shown to have a significant effect on tunnel planning, design, construction and operation. Phase II consists of an evaluation of the identified critical components and parameters to establish (a) specific components and/or parameters which are suitable for standardization, and (b) future work needs in the area of standardization.

PERFORMING AGENCY: Hampton (Delon) and Associates, Chartered  
INVESTIGATOR: Hampton, D  
SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1977 COMPLETION DATE: May 1979

**00 188672****INNOVATIVE METHODS OF EXPLORATION AND INSTRUMENTATION FOR TRANSIT TUNNELING**

The objective is to evaluate the reliability and capability of various geophysical exploration methods to produce data useful for tunnel design and construction within the time, cost and rate constraints common to the industry.

PERFORMING AGENCY: Bechtel Incorporated; Haley and Aldrich, Incorporated  
INVESTIGATOR: Blanke, J Thompson, DE  
SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: June 1981

01 038973

**RAILROAD TRACK STRUCTURES RESEARCH**

The Federal Railroad Administration (FRA) and the Association of American Railroads (AAR), the contractor, enter into a program to perform specific 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 Railroad Track Structures Research Program consists of Four Tasks: Mathematical Modeling, Ballast and Subgrade Material Performance Tests, Rolling Load Facility Tests and Track Research Laboratory Facility. Work continues only on Ballast and Subgrade Material Performance Tests and on the Rolling Load Facility Tests.

**REFERENCES:**

- Technical Data Base Report (Task 2) July 1975, PB-251771
- Functional Requirements for a Facility for Accelerated Service testing (task 4), Sept. 1976, PB-263605
- Structural Model and Materials Evaluation Procedures (task 2), Sept. 1976, PB-262987
- Track Support Systems Parameter Study (Task 2) Sept. 1976, PB-263370
- Finite Element Analysis of a Railway Track Support System - User's Manual (task 2), Sept. 1976, PB-262988
- Material Evaluation Study (Task 2) Jan. 1977, PB-264215
- Lateral Stability of Ballast (Task 2) Sept. 1977, PB-275035
- A Study of Railroad Ballast Economics (Task 2) Sept. 1977, PB-275102

**PERFORMING AGENCY:** Association of American Railroads; Illinois University, Urbana, Department of Civil Engineering  
**INVESTIGATOR:** Lundgren, JR Tel (312) 567-3588 Thompson, MR Tel (217) 333-3930  
**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** Moody, HG Tel (202) 426-4377 Putukian, J Tel (617) 494-2206

Contract DOT-FR-30038 (CR)

**STATUS:** Active **NOTICE DATE:** Feb. 1978 **START DATE:** May 1973 **COMPLETION DATE:** June 1979 **TOTAL FUNDS:** \$673,029

**ACKNOWLEDGMENT:** FRA

01 038974

**CONTINUOUS MEASUREMENT OF DYNAMIC COMPLIANCE CHARACTERISTICS OF RAILROAD TRACK, PHASE 3**

The contract is for the design, fabrication, demonstration and furnishing of equipment for the continuous measurement of dynamic compliance characteristics of railroad track.

**REFERENCES:**

- A Review of Measurement Techniques, Requirements and Available Data on the Dynamic Compliance of Railroad Track, Kaiser, WD, Available from NTIS, May 1975, PB-250547/AS

**PERFORMING AGENCY:** Battelle Memorial Institute  
**INVESTIGATOR:** Prause, RH Tel (614) 299-3151  
**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** O'Sullivan, WB

Contract DOT-FR-30051 (CPFF)

**STATUS:** Active **NOTICE DATE:** Aug. 1977 **START DATE:** May 1973 **COMPLETION DATE:** 1979 **TOTAL FUNDS:** \$332,110

**ACKNOWLEDGMENT:** TRAIS (PR# RP-39)

01 058458

**FABRICATE, TEST, EVALUATE, AND DELIVER AN ULTRASONIC WHEEL PROBE INSPECTION SYSTEM**

Objectives are: 1. To provide ultrasonic wheel probes for an ultrasonic inspection system which can detect all potentially dangerous defects. Particular emphasis shall be given to the detection of vertical split heads and the inspection of welded joints in continuously welded rail. The capabilities of these components will improve the detectability of ultrasonic inspection and also provide additional defect information needed to facilitate automatic data processing. 2. To test and evaluate the ultrasonic system in the field by comparing the inspection results with that of a magnetic inspection system.

**PERFORMING AGENCY:** DAPCO Industries, Incorporated  
**INVESTIGATOR:**  
**SPONSORING AGENCY:** Transportation Systems Center, RR-519  
**RESPONSIBLE INDIVIDUAL:** Cecon, H Tel (617) 494-2000

Contract DOT-TSC-995

**STATUS:** Active **NOTICE DATE:** Feb. 1978 **START DATE:** Apr. 1975 **TOTAL FUNDS:** \$75,552

**ACKNOWLEDGMENT:** TRAIS (RR-519)

01 058644

**RAIL FLAW OCCURRENCE SURVEY**

Objectives are: 1. Develop the data base from a review of available failure records from which statistical evaluations can be made. 2. Develop and apply statistical procedures which will determine interrelationships of rail failure and train derailment occurrence. 3. Calculate severity indices for difference types of rail defects as causes of train derailments from this analysis of the data base. 4. Ascertain, for defects of important severity, the relationships between flaw occurrence, load environment and characteristics of track locations, construction, maintenance, and inspection. 5. Propose one or more approaches for the reliability analysis of rail-in-service utilizing the information generated.

**PERFORMING AGENCY:** Midwest Research Institute  
**SPONSORING AGENCY:** Transportation Systems Center, RR-519  
**RESPONSIBLE INDIVIDUAL:** Bush, MW Tel (617) 494-2361

Contract DOT-TSC-1061 (CPFF)

**STATUS:** Completed **NOTICE DATE:** Feb. 1979 **START DATE:** June 1975 **TOTAL FUNDS:** \$64,195

**ACKNOWLEDGMENT:** TRAIS (RR-519), FRA

01 059223

**STATISTICAL REPRESENTATIONS OF TRACK GEOMETRY**

The objective is to conduct analyses of existing track geometry data in order to provide power spectral density and/or other statistical characterizations of the universe of track geometry conditions and to identify fundamental processes.

**PERFORMING AGENCY:** ENSCO, Incorporated  
**SPONSORING AGENCY:** Transportation Systems Center, R6321  
**RESPONSIBLE INDIVIDUAL:** Weinstock, H Tel (617)494-2000

Contract DOT-TSC-1211 (CPF)

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** May 1976 **COMPLETION DATE:** Aug. 1978 **TOTAL FUNDS:** \$87,792

**ACKNOWLEDGMENT:** TRAIS (R6321)

01 059227

**USE OF SURFACE ELECTROMAGNETIC WAVES TO DETECT RAIL JOINT FAULTS**

The objective of this study is to determine experimentally the characteristics of surface electromagnetic waves (SEW)--transmission, reflection and radiation due to various defective and nondefective rail joints. These experiments are designed to verify the theoretical results for an ideal rail joint and to measure the effects of various perturbations of the rail joint. Also suitable techniques for coupling surface electromagnetic waves to the rail will be investigated. One outcome of this study will be a realistic evaluation of the applicability of the SEW technique to the detection of rail joint faults from a track-guided vehicle.

**PERFORMING AGENCY:** Missouri University, Rolla  
**SPONSORING AGENCY:** Transportation Systems Center, R6357  
**RESPONSIBLE INDIVIDUAL:** Cecon, H Tel (617)494-2000

Contract DOT-TSC-1217 (CR)

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** May 1976 **COMPLETION DATE:** July 1977 **TOTAL FUNDS:** \$56,690

**ACKNOWLEDGMENT:** TRAIS (R6357)

01 059295

**TRACK GEOMETRY MEASUREMENT BY HIGH-RAIL VEHICLES**

The need for increased track surveillance capability and data collection capability for transportation planning and rail assistance programming has led Iowa's Department of Transportation to purchase a high rail track geometry measuring vehicle. The objective is to examine the capabilities of this vehicle to assist in the improvement of track safety inspection and in data collection for transportation planning and assistance programming. The project will examine both technical and operational aspects of Track Geometry Car usage as an inspection device and as a data collection device.

**PERFORMING AGENCY:** Iowa Department of Transportation

INVESTIGATOR: Sherfy, MA Tel (515) 296-1222  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Liang, RT Tel (202) 426-1682

Contract DOT-FR-64243 (CR)  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1976  
 COMPLETION DATE: July 1979 TOTAL FUNDS: \$273,415

ACKNOWLEDGMENT: TRAIS

**01 059371  
 IMPROVEMENT OF MAGNETIC TECHNIQUES FOR RAIL  
 INSPECTION**

The objective is to improve the magnetic inspection techniques through improvement of the sensing and signal processing methods. The opinion in the railroad industry is that although the ultrasonic systems appear to have the greater potential, it requires further development before it can perform a thorough and complete inspection. Until these techniques are upgraded and proven in the field, magnetic inspection methods offer a good supplementary inspection. The intent is to improve magnetic inspection techniques and equipment so that the performance is improved when operated as an independent system or when providing supplementary support to ultrasonic systems.

PERFORMING AGENCY: Battelle Memorial Institute  
 SPONSORING AGENCY: Transportation Systems Center, R6345  
 RESPONSIBLE INDIVIDUAL: Cecon, H Tel (617)494-2000

Contract DOT-TSC-1244 (CPF)  
 STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1976  
 COMPLETION DATE: Nov. 1977 TOTAL FUNDS: \$97,994

ACKNOWLEDGMENT: TRAIS (R6345)

**01 059681  
 TEST AND EVALUATION OF THE TRACK GEOMETRY  
 MEASUREMENT SYSTEM (TGMS)**

The objectives are to: (1) Demonstrate the TGMS on the selected transit property. (2) Evaluate the TGMS under real world operating conditions on the selected transit property. (3) Collect track geometry data on the selected property. (4) Develop a Ways and Structures Maintenance Plan utilizing the TGMS. (5) Determine minimum requirements for real-time output from the TGMS to support Ways and Structures inspection under the Maintenance Plan, and identify the minimum component parts and operating characteristics of TSCs TGMS needed to achieve the minimum real-time output requirements.

PERFORMING AGENCY: Systems Technology Associates, Incorporated  
 SPONSORING AGENCY: Transportation Systems Center, R6732  
 RESPONSIBLE INDIVIDUAL: Nickles, JE Tel (617) 494-2302

Contract DOT-TSC-1285 (CPFF)  
 STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976  
 COMPLETION DATE: May 1978 TOTAL FUNDS: \$305,215

ACKNOWLEDGMENT: TRAIS (R6732)

**01 081797  
 INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH  
 PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK  
 1--TRACK STRUCTURES**

Task objectives are development of recommended performance specifications and maintenance and geometric design guidelines for conventional railroad track and related track structures and components. This activity is intended to quantify the adequacy of a guideway that yields an acceptable level of ride quality and safety with minimization of first cost, maintenance costs, and secondary costs such as loss and damage, and wear and fatigue to vehicles. Task will recognize that load environment is a function of track parameters, wheel load, and level of maintenance. The Track Structures Dynamic Test Facility, developed under separate AAR/FRA contract, has the capability of determining the basic structures as affected by different subgrade materials, different types of ballast, various types of ties, spacing and rail sizes. A moving load allows for compaction of ballast subgrade material. Also sensitivity studies of track parameters, including basic alignment of the structure with such factors as minimum length of tangent between curves and deviation from theoretical line and surface, have been made using computer modeling techniques developed in Phase I.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Abbott, RA Tel (312) 567-3616  
 SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre  
 RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1975  
 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

**01 099369  
 OPERATION OF TEST TRACK AND RAIL INSPECTION  
 EQUIPMENT**

Because of the interdependence between each of the newly developed components for track and rail inspection, a critical test and evaluation must be carried out on each to assess its contribution to the total system. From the results of the tests and evaluations, an assessment of the developments can provide the information needed to generate work statements for future developments. In order to facilitate an effective test and evaluation, qualified technical personnel and testing facilities are required. The facilities primarily consist of an NDT laboratory, two test tracks, and a rail inspection vehicle. The NDT laboratory contains the instrumentation needed to perform the commonly used NDT techniques. The test tracks contain machined and natural rail defects on which inspection equipment can be tested up to speeds of 40 mph. The rail inspection vehicle is a hi-rail vehicle and currently uses ultrasonics exclusively to perform the rail inspection. The hi-rail vehicle provides the mobility required for a test vehicle and has ample space to house newly developed equipment. The staff presently consists of two technicians and two engineers.

PERFORMING AGENCY: Transportation Systems Center  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Rail Safety Research  
 RESPONSIBLE INDIVIDUAL: Cecon, H Tel (617) 494-2000

In-House

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Mar. 1974

ACKNOWLEDGMENT: FRA

**01 099378  
 IMPROVED INSPECTION, DETECTION AND TESTING  
 RESEARCH**

The objectives of this program are to provide engineering and field test support services to FRA-sponsored programs and to develop additional track inspection vehicles for the Office of Safety. In the process of collecting data for Amtrak, the Northeast Corridor Project and the Office of Safety, as well as for other FRA R&D programs, 260 tests on some 25 different railroads covered approximately 100,000 miles of track. The track geometry measurement system previously developed can now be utilized to detect safety-related defects. To provide the Office of Safety with three track inspection systems, an existing vehicle is being rebuilt and a new unit is being built.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
 RESPONSIBLE INDIVIDUAL: Peterson, LA Tel 202-426-2965

STATUS: Active NOTICE DATE: Feb. 1978 TOTAL FUNDS: \$6,245,000

ACKNOWLEDGMENT: FRA

**01 099393  
 PROGRAM FOR INVESTIGATION OF RAIL FAILURES**

The objective of this program is to evaluate the metallurgical and applied stress environment coincident with failures in conventional carbon steel rail and in other types. The following steps are involved: (A) Characterize in the laboratory, service-developed defects resulting in field failures in carbon steel rails with emphasis on short service life or premature failures; (B) Determine in the laboratory the chemistry, metallography and mechanical properties of carbon steel rails in service; (C) Determine in the field the state of stress in carbon steel rails in service under a wide range of conditions track and loadings; (D) Establish possible interrelationships of material properties, service stresses and service failures; (E) Promote similar laboratory and service evaluations of economically attainable variations in rail steel and treatments, consistent with progress of work performed on carbon steel rail.

Specimens supplied consist of 8-foot rail sections containing a detected defect. These specimens are used to determine the spectrum of properties which possibly may be associated with each type of defect. Selected in-track sites are instrumented to determine service stresses associated with fatigue crack initiation. Relation between service-initiated failures and attendant stress is correlated. Work with steels other than the conventional carbon type is to be undertaken.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; American Iron and Steel Institute; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: AAR

01 099394

#### RAIL FLAW DETECTION SYSTEMS

The detector car section of the AAR Technical Center has constantly worked on materials and systems for upgrading the privately-owned and operated rail detector cars using the residual magnetic method as developed and built by the AAR. Along with this, studies of advanced technologies of rail flaw detection, such as ultrasonics, have been conducted. An ultrasonic rail test system and recording equipment to meet FRA track inspection requirements was initially tested under one of the standard magnetic detector cars. The ultrasonic system significantly increased flaw detection due to its greater sensitivity in the web area. This was followed by construction of a new detector car equipped exclusively with ultrasonics which will be used in refining techniques using this rail flaw detection system.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: AAR

01 099396

#### ACOUSTICAL EMISSION MONITORING OF FIELD AND PLANT WELDS

Acoustical emissions in the ultrasonic range can be monitored with appropriate equipment to determine the soundness of field and plant welds made in steel rails. The investigation has shown that good and bad welds can be detected by the procedure. Additional development is directed to the refinements necessary for a production installation.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Garg, VK Tel (312) 567-3596

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: AAR

01 138467

#### MECHANICS OF BALLAST COMPACTION

Formulation of ballast compaction guidelines based on a review of the theory on the compaction of ballast sized, non-cohesive materials, laboratory and field measurements. Measures of the degree of ballast compaction are being developed. Field tests being run at FAST track in Pueblo, Colorado.

PERFORMING AGENCY: State University of New York, Buffalo

INVESTIGATOR: Selig, ET Tel (716) 831-3113

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Sluz, A Tel (617) 494-2432

Contract DOT-TSC-1115

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Jan. 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$350,000

ACKNOWLEDGMENT: TSC

01 138560

#### TRACK INSPECTION AND TESTING

Develops, recommends, implements and promotes an improved inspection and detection project in support of the FRA National Track Inspection

Program. Provides for support of test activities and data collection and coordinates support with the Office of Safety, other FRA elements, government agencies, railroads and support contractors. Makes provisions for instrumentation, operation, maintenance and transportation of automated inspection equipment and for data processing services.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138561

#### AUTOMATED TRACK INSPECTION, SYSTEM DEVELOPMENT

The objective of this program is to provide automated equipment to assist the FRA Track Inspectors in monitoring the National track network. A fleet of vehicles will be procured to measure track geometry and internal rail flaws. This fleet includes three existing measurement vehicles which provide real time data to both the inspector and the host railroad. Other measurement systems will be developed and tested for potential use in inspection vehicle.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138562

#### IMPROVED TRACK STRUCTURES RESEARCH PROGRAM

The Improved Track Structures Research Program has been established to achieve improvements in the safety of train operations by reducing the frequency of train derailments through the use of guidelines, standards and techniques for achieving safer track structures and to improve the serviceability of the track structures through more effective maintenance techniques and with more durable, yet economic track structure designs. The program will accomplish these objectives through a series of contract research efforts and research at the Transportation Systems Center addressing both analytical studies and field test verification.

For subprograms see RRIS Nos. 01A 138563 and 01A 138564.

PERFORMING AGENCY: Federal Railroad Administration, Improved Track Structures Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Krick, RL Tel (202) 426-4377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138563

#### TRACK ACCIDENT REDUCTION RESEARCH SUBPROGRAM

The Track Accident Reduction Research Subprogram is directed toward improvement in the number and frequency of train accidents related to track structure causes by identification of operating limits for existing rolling stock running on contemporary track based on limiting adverse wheel/rail dynamic interaction and by specification of the safe structural load bearing limits of existing track systems and required inspection demands.

PERFORMING AGENCY: Federal Railroad Administration, Improved Track Structures Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Krick, RL Tel (202) 426-4377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138564

#### IMPROVED TRACK PERFORMANCE RESEARCH SUBPROGRAM

The Improved Track Performance Research Subprogram is directed toward improvement in track stability and life by development of cost effective guidelines for upgrading current track systems, for designing affordable track system alternatives and for making cost effective maintenance decisions. The following technical areas are being considered: new rail



quality, improved rail joining techniques, analysis and design for improved cross tie-track systems, ballast selection-material performance studies, soil stabilization studies, ballast tamping and consolidating equipment performance maximization and track maintenance studies.

PERFORMING AGENCY: Federal Railroad Administration, Improved Track Structures Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Krick, RL Tel (202) 426-4377

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

01 138568

#### COOPERATIVE RESEARCH PROGRAM ON TIMBER CROSS TIE DEVELOPMENT

Used oak railroad ties were chipped, flaked, and screened by the Forest Products Laboratory to provide face and core furnish for 11 reconstituted ties. The material was fabricated by Potlatch Corporation, Lewiston, Idaho, into flakeboards approximately 0.7 inch thick, and further laminated into 7 x 9 inch x 8 foot ties, each containing 10 laminations. The outer two layers on each face were characterized by oriented flakes, while the inner layers were made using a random-felting technique. Preliminary testing showed the ties to have an apparent modulus of elasticity (MOE) of 900 K psi and a modulus of rupture (MOR) of 3,000 psi. This was approximately 80 and 60 percent, respectively, of the stiffness and strengths of previous ties made under laboratory conditions. Lower bending properties were attributed to less face-flake alignment and poorer resin distribution. Changes in flake fabrication, adhesive application, and alignment techniques have been suggested to improve the performance of the industrially manufactured ties.

Approximately 18 hardwood Press-Lam crossties (thick, rotary-cut, press-dried, parallel laminated veneers) were manufactured under laboratory conditions and placed in track service for evaluation. All have performed satisfactorily for a period of from 3-5 years.

#### REFERENCES:

PERFORMING AGENCY: Forest Products Laboratory; Association of American Railroads Technical Center

INVESTIGATOR: Geimer, RL Tel (608) 257-2211 Youngquist, JA

SPONSORING AGENCY: Forest Products Laboratory

RESPONSIBLE INDIVIDUAL: Youngs, RL Tel (608) 257-2211

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1973

01 139163

#### ENGINEERING ANALYSIS OF STRESS IN RAILS

This program is to develop & apply procedures for predicting stresses in rails; to provide a description of stresses required for prediction of rail degradation and rail failure due to fissures, split heads and bolt hole cracks; to assess design and operational trade-offs on thermal, flexural, residual and contact stresses and to provide input to a rail reliability model. The goal is an analytical model where factors in rail degradation may be determined.

#### REFERENCES:

Preliminary Description of Stresses in Rails Johns, TG; Davies, KB, Report FRA-ORD-76-294

PERFORMING AGENCY: Battelle Columbus Laboratories

INVESTIGATOR: Sampath, S Tel (614) 424-4597

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development; Transportation Systems Center, Office of Ground Systems

RESPONSIBLE INDIVIDUAL: McConnell, DP Tel (617) 494-2649

Contract DOT-TSC-1038

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1975 COMPLETION DATE: May 1979 TOTAL FUNDS: \$429,000

ACKNOWLEDGMENT: FRA

01 139165

#### COLLECTION AND ANALYSIS OF TEST DATA

Because of the premature failure of the Kansas Test Track, the contractor is to complete analysis of available data and to conduct a post mortem study of the instrumentation originally installed in concrete cross tie/and concrete slab track. Premature termination of traffic meant that all of the data sought will not be obtained. Remaining instruments are to be examined for condition and environment with the aim of determining if the data that was obtained was valid. Reports describing track performance using the available data will be completed.

#### REFERENCES:

Kansas Test Track Instrumentation Internal Report Internal Letter Report, July 1976

PERFORMING AGENCY: Portland Cement Association

INVESTIGATOR: Colley, BE Tel (312)966-6200 Hanson, NW

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: O'Sullivan, WB Tel (202)426-4377

Contract DOT-TSC-FR-90043

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1971

ACKNOWLEDGMENT: FRA

01 148355

#### ROAD MAINTENANCE COST MODEL

The road maintenance cost model project is directed towards the construction of a large computer model which will simulate the processes by which rail, ties and ballast in a length of track deteriorate under a selected traffic to levels which necessitate their periodic replacement. Incremental costs are to be determined by a routine that deletes each segment of the traffic mix in turn, converting the estimated service life differential to an appropriate annual charge which reflects the simulated "consumption" of the track asset. Progress to date has seen the construction of a rail wear/cost model which is currently being tested in a number of railway applications.

#### REFERENCES:

Road Maintenance Cost Model Roney, MD; Lake, RW, Canadian Institute of Guided Ground Transport, Interim Report, Mar. 1977

Road Maintenance Cost Model Phase I-Rail Wear Modelling Roney, MD; Turcot, MC; Lake, RW; Schwier, C, Canadian Institute of Guided Ground Transport, May 1978

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.52.76

INVESTIGATOR: Roney, MD Tel (613) 547-5777 Turcot, MC Lake, RW

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Railway Transportation Directorate, Ministry of Transport

RESPONSIBLE INDIVIDUAL: Hanks, WG Tel (514) 877-5771 Tufts, LD Tel (514) 861-6811 Ganton, TD Tel (613) 922-9197

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Mar. 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$117,780

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

01 170600

#### THE ELECTROSLAG WELDING OF ALLOY RAIL STEELS

In the first year of research, it is hoped to establish preparation, set-up and operating conditions that are necessary to produce sound electroslag welds in both standard carbon and 1% chromium rail steels. Particular emphasis will be placed on the quality of the bottom of the weld and on the influence of preheat and postheat treatment on the microstructure of the rail steel adjacent to the weld, correlating any structural changes to possible changes in mechanical properties. The longer term objectives include optimization of the metallurgy of the weldment, reduction in the time required to complete a weld, and the introduction of further degrees of process automation. Ultimately, conversion to the fully-automated mode appears to hold the key to development of a cost-effective method of producing high-quality rail welds in track without the high degree of operator-induced variance characteristic of the thermit welding method.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 2.75.77

INVESTIGATOR: Cameron, J Tel (613) 547-5908 Mackay, WBF

SPONSORING AGENCY: Canadian National Railways; Canadian Pacific; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Rennie, RP Tel (514) 877-4337 Tufts, LD Tel (514) 861-6811 Dillon, R Tel (514) 283-4429

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1977 COMPLETION DATE: Apr. 1980 TOTAL FUNDS: \$138,000

ACKNOWLEDGMENT: CIGGT

01 170607

#### STANDARD SPECIFICATIONS FOR RAPID TRANSIT CONCRETE TIES-TEST AND EVALUATION

Preliminary specifications have previously been developed for the use of concrete ties for rapid transit. The purpose of this contract is to manufacture

both monoblock and duoblock ties in accordance with these specifications and to laboratory test them following established test procedures. Based on the results of these tests, modified preliminary specifications will be developed.

PERFORMING AGENCY: Portland Cement Association, Construction Technology Laboratories

INVESTIGATOR: Hanna, AN Tel (312) 966-6200

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Witkiewicz, P Tel (617) 494-2006

Contract DOT-TSC-1442

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$93,662

ACKNOWLEDGMENT: TSC

#### 01 170616

##### TRACK STRENGTH CHARACTERIZATION PROGRAM

The purpose of the track strength characterization program is to develop a technique for the determination of the ability of track to withstand anticipated service loads and to utilize this technique for the development of recommended track strength requirements and/or wheel force restrictions for the different categories of track. This program will feature the ability to examine and classify existing tracks with non-destructive methods and with a minimum occupation of the track.

##### REFERENCES:

Preliminary Outline Track Strength Characterization Program, Zaremski, AM, Sept. 1977

Track Strength Characterization Task Plan May 1978

Measurement of Gauge Restraints: Rail Spreader Tests Zaremski, AM, Dec. 1978

PERFORMING AGENCY: Association of American Railroads Technical Center, K103

INVESTIGATOR: Zaremski, AM Tel (312) 567-3622

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Zaremski, AM Tel (312) 567-3622

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1978

ACKNOWLEDGMENT: Association of American Railroads Technical Center

#### 01 170618

##### A THEORY FOR TRACK MAINTENANCE LIFE PREDICTION

Over a period of time, railroad track will settle as a result of permanent deformation in the ballast and underlying soil layers produced by traffic loading. After some period of time, maintenance will be needed to resurface and line the track. Suitable methods do not presently exist for predicting the maintenance life, which is a function of many factors. This study shall develop a theory for prediction of track settlement which is applicable to estimating maintenance life for new or existing track. The research approach, focusing on the inelastic behavior of soil, involves: (1) establishing required characteristics for the track system components, (2) setting up a computer model, (3) studying the behavior of ballast and soil under representative cyclic loading, and (4) validating the model using available field experience, including data from FAST in Pueblo, Colorado.

PERFORMING AGENCY: State University of New York, Buffalo, Department of Civil Engineering

INVESTIGATOR: Selig, ET Tel (716) 831-3113

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-70058

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: July 1978

ACKNOWLEDGMENT: DOT

#### 01 170625

##### UNCONVENTIONAL TRACKS

Development of track on concrete base. Various types of rail fastenings are tested in laboratory and on concrete slabs of both in-situ and pre-cast construction. Noise and vibration measurements are made under dense traffic and at high speed. Results obtained from laboratory tests and test track at Radcliffe-on-Trent include vibration and noise comparisons. Apart from experience being compared from main line installations in France,

England, Switzerland and Germany, ORE has sponsored tests under high speed at Oelde and tests on sharp curve under dense traffic at Velim. These tests have been completed. A new programme of work is being prepared. The summarizing report was presented to the ORE Control Committee in April 1977.

Seventeen reports have been published to date. Question D87.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1966

ACKNOWLEDGMENT: UIC

#### 01 170636

##### UNIFICATION OF THE GEOMETRY OF POINTS WITH RAILS OF 60 KG/M PERMITTING HIGH SPEEDS ON THE DIVERGING TRACK

The object of this study is to obtain uniformity of turnouts and crossover design with 60 kg/m rails, especially those permitting high speed running on the diverging track. Test runs have been made with the SNCF measuring coach on the SNCF and DR track systems over points with different check rail entry slopes. Furthermore, tests have been made on crossovers of different designs for high-speed running on the SNCF, SBB and DB systems. These measurements are now being evaluated. A switch with parabolic transition curve for 160 kg/m on the diverging track will be laid by the SNCF later this year.

Three reports have been published to date. Question D121.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

#### 01 170649

##### OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC

The relationship between traffic and track geometry is studied, along with the optimization of levelling and alignment operations and a definition of track supporting structures is given. Reports RP 8 and 9 were submitted to the Control Committee in October 1976. The former report deals with the track in unloaded condition and the latter with the influence of some reinforcement parameters in the performance of the track with regard to level and alignment (processing of statistical data). The definition of track supporting structures is now the main task of the D 117 Committee. The corresponding programme of work was proposed in April 1976 and approved. It has five main points: (1) Study of optimum characteristics of formation materials; (2) Study of measures to be taken against contamination of materials; (3) Study of the mechanism of water penetration into the foundation; (4) Study of the influence of frost; and (5) General dimensioning rules. The first tests were made in the last three months of 1976.

Nine reports have been published to date. Question D117.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Wattecamps, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

#### 01 170782

##### STRESSES AND DEFORMATIONS IN TRACK STRUCTURES AND SUPPORT 1978/79

The project is now in its final phase, all laboratory work having been completed late in May 1978. A draft final report for the current project year has been completed, and work has begun on a final report for the overall project, integrating current work with the results obtained in past years.

##### REFERENCES:

A Study of Stresses and Deformations under Dynamic Static Load Systems in Track Structure and Support, Raymond, GP, Canadian Institute of Guided Ground Transport, Report N 75-10, Sept. 1975

Stresses and Deformations in Railway Track Raymond, GP; Lake, RW; Boon, CJ, Canadian Institute of Guided Ground Transport, Report N 76-11, Nov. 1976

Stresses and Deformations in Track Structure and Support Raymond, GP, Canadian Institute of Guided Ground Transport, Report N 77-15

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 2.22.78

INVESTIGATOR: Raymond, GP Tel (613) 547-5904

SPONSORING AGENCY: Transport Canada Research and Development Centre; Canadian Pacific; Canadian National Railways

RESPONSIBLE INDIVIDUAL: Boon, CJ Tel (613) 547-5777

Contract 105-324

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: CIGGT

#### 01 170783

##### DOCUMENTATION AND TESTING OF MULTI-LINEAR PORTION OF FINITE ELEMENT PROGRAM CIGGT 3D

The objective of the research program is the development of a three dimensional finite element program suitable as a tool for optimizing the design of a ballasted track structure. The work being carried out under the current contract involves the testing, debugging and validation of the linear portion of the computer program. A draft user's manual will be forthcoming in early 1978. The multi-linear portion will be completed during 1978.

##### REFERENCES:

Analysis of Rail Track Structures (ARTS) User's Manual Raymond, GP; Turcke, DJ, Canadian Institute of Guided Ground Transport, Apr. 1978

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.38.77

INVESTIGATOR: Turke, DJ Tel (613) 547-5714 Raymond, GP

SPONSORING AGENCY: Transport Canada Research and Development Centre; Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Rowan, WG Tel (514) 283-5068 Lundgren, JR Tel (202) 293-4182

Contract D-500-372-3

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$25,150

ACKNOWLEDGMENT: CIGGT

#### 01 179328

##### TRANSIT TRACK SYSTEMS STUDY

The objective of this study is to evaluate and assess US rapid transit track conditions, design, construction and maintenance problems and practices, and to prioritize research requirements based on this evaluation, life-cycle cost analyses and cost-benefit analyses. Most of the information will be obtained from the transit properties with a resultant track structures data base being established. As part of the contract, a workshop will be held for the purpose of obtaining industry evaluation of the contractor's findings and to solicit recommendations for future research.

PERFORMING AGENCY: Enesco, Incorporated

INVESTIGATOR: Cunney, E Tel (703) 321-9000

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Saulnier, G Tel (617) 494-2006

Contract DOT-TSC-1502

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1978 COMPLETION DATE: July 1979 TOTAL FUNDS: \$225,678

ACKNOWLEDGMENT: TSC

#### 01 179330

##### DEVELOPMENT OF DATA PROCESSING FOR AUTOMATIC RAIL FLAW DETECTION

This project will provide a feasibility report on real time digital signal processing and pattern recognition technology in the automatic detection and classification of rail defects. Magnetic tape recordings of ultrasonic transducer echos will be used to test the formulated algorithms.

PERFORMING AGENCY: Sperry Univac Computer Systems, 01 160047

INVESTIGATOR: Phipps, PL Tel (612) 456-4872

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Mould, JC Tel (202) 426-1682

Contract DOT-FR-8180

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 TOTAL FUNDS: \$98,773

ACKNOWLEDGMENT: FRA

#### 01 179337

##### FUNDAMENTAL PROBLEMS IN RAILROAD TRACK MECHANICS

The objectives of this research are threefold. (1) The derivation and validation of equations for the description of track response to mechanical and thermal loads in the lateral plane. In this, recently derived differential equations will be generalized by including geometrical nonlinearities and the effects of temperature change. To obtain the associated boundary and matching conditions the corresponding variational equation will be derived. Expressions for bending moment, shear and axial forces for the rail-tie system will be used for the physical interpretation of the obtained boundary and matching conditions. Due to errors caused by the transition from the difference equations to the lowest order differential equations for the tie spacings it is also planned to establish a formulation in terms of difference equations. (2) The same objective for the vertical plane. Due to errors of about 10 percent previously found for lateral track deformations caused by the limiting process which yielded differential equations from difference equations it is expected that a similar situation will also exist for the vertical case. Accordingly, a study similar to that in (1) above will be followed. (3) A critical survey of foundation models. This is to include elastic and viscoelastic models used for the analysis of continuously supported structures which have been introduced since 1964. These are to be analyzed in terms of their uniqueness and physical realism with a view toward establishing a sense of order and suitability for their use in the most recently developed analytical procedures.

PERFORMING AGENCY: Delaware University, Newark

INVESTIGATOR: Kerr, AD

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG 78-25433

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1978 TOTAL FUNDS: \$43,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6620)

#### 01 179687

##### TECHNICAL AND ECONOMIC PRACTICALITY OF DOWEL-LAMINATING CROSS TIES BEFORE DRYING

Reduce the cost of manufacturing dowel-laminated crossties. Reducing this cost will make it more practical to use these crossties which are made from small, low-grade underutilized hardwood trees. Dowel-laminate a number of green oak crossties and compare their quality with those that have been doweled dry (the conventional method).

PERFORMING AGENCY: Idaho University, Moscow, College of Forestry and Wildlife and Range Sciences, IDA-ES-0128

INVESTIGATOR: Howe, JP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Dec. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072910)

#### 01 185232

##### LIFE CYCLE COST METHODOLOGY FOR THE EVALUATION OF PROPOSED TRACK-RELATED SAFETY STANDARDS

This contract is concerned with evaluating economic effects of proposed safety standards that are related to railroad track. The objectives of the contract are to develop a methodology for assessing the economic impact of alternative standards, to define the data requirements and functional relationships for the methodology, and to develop the appropriate data elements. The contract also involves application of the methodology to a set of proposed standard modifications.

PERFORMING AGENCY: Shaker Research Corporation

INVESTIGATOR: Krauter, AI Tel (518) 877-8581

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Smith, RL Tel (617) 494-2795

Contract DOT-TSC-1594

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: \$73,982

ACKNOWLEDGMENT: Shaker Research Corporation

01 185233

**TECHNICAL SUPPORT SERVICES FOR TRACK STRUCTURE FAILURE STUDIES**

Support services will be furnished in response to Technical Task Directives in areas of (1) Track Loads, (2) Track Structural Analysis, (3) Component Stress and Failure Analysis, (4) Laboratory Field Experimentation, and (5) Technical Liaison. The first two TTD's are related to instrumentation and collection and analysis of track loads data from the "Perturbed Track Tests" conducted on the Pueblo test track using different locomotives.

PERFORMING AGENCY: Battelle Memorial Institute, G6632  
 INVESTIGATOR: Meacham, HC Tel (614) 424-4484  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: McConnell, DP

Contract DOT-TSC-1595

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Sept. 1980 TOTAL FUNDS: \$465,545

ACKNOWLEDGMENT: Battelle Memorial Institute

01 188648

**MAINTENANCE-OF-WAY: TRACK LAYING SYSTEMS (TLS)**

The FRA is conducting a number of research and development programs to improve railroad service and economics. In recent years US railroads have shown some interest in the Track Renewal Train to perform maintenance-of-way. The objective of this project is to survey machines used in Europe for out-of-face replacement of ties and tracks and survey the TLS machine being used by AMTRAK to determine the usefulness of the Track Renewal Train concept to the US railroad operation. The economics of cascading ties and the rehabilitation of used cross ties for reuse in branch lines is also being studied.

PERFORMING AGENCY: Unified Industries, Incorporated  
 INVESTIGATOR: Cataldi, GR Tel (703) 750-3282 Elkheim, D. Larsen, K

SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Orth, CL Tel (202) 755-1877

Contract DOT-FR-8046

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1978 COMPLETION DATE: Mar. 1980 TOTAL FUNDS: \$220,000

ACKNOWLEDGMENT: FRA

01 188649

**MAINTENANCE-OF-WAY PLANNING PROGRAM**

A cooperative Maintenance-of-Way (MOW) Research Program between Conrail and FRA, which utilizes data from FRA's Track Geometry inspection vehicles and other related track data (traffic, physical, etc.) for MOW planning evaluation. Contractor to determine the contribution of selected set of physical and traffic parameters to the rate of deterioration of track and select the appropriate indicator(s) (track quality index), that can be calculated from data collected by a track geometry measuring vehicle, that will measure the quality of track.

PERFORMING AGENCY: ENSCO, Incorporated, 437  
 INVESTIGATOR: Kenworthy, M Tel (703) 960-8500  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877

Contract DOT-FR-64113

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1978 COMPLETION DATE: Nov. 1979 TOTAL FUNDS: \$314,000

ACKNOWLEDGMENT: FRA

01 188650

**MASTER PLAN FOR EVALUATION OF MAINTENANCE-OF-WAY EQUIPMENT**

Railroads currently spend more than \$3 billion per year on Maintenance-of-Way (MOW) and defer billions more. These same railroads have a need to evaluate the variety of equipment available to them for MOW activities. This FRA research program in cooperation with suppliers and railroads is being conducted to evaluate the performance of MOW equipment. MOW equipment evaluation techniques will be generated that Railroads can utilize in evaluating their MOW equipment needs. Contractors will also recommend additional MOW equipment evaluation research programs to be conducted by FRA and the railroad industry.

PERFORMING AGENCY: De Leuw, Cather and Company, DOT-FR-8028  
 INVESTIGATOR: Shipley, R Tel (202) 452-0860  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877

Contract DOT-FR-8028

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Mar. 1978 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$158,843

ACKNOWLEDGMENT: FRA

01 188658

**RAILROAD TRACK STRUCTURES RESEARCH**

This program of Railroad Track Structures Research 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 a series of tests conducted at the AAR Truck Structures Dynamic Test Facility Chicago Illinois. Additionally, data analysis and model validation is called for.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Zarembski, AM Tel (312) 567-3622  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Putukian, J Tel (617) 494-2206

Contract DOT-TSC-1541

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1979 COMPLETION DATE: May 1980 TOTAL FUNDS: \$316,190

ACKNOWLEDGMENT: Association of American Railroads Technical Center

01 188667

**DETERMINATION OF VEHICLE INDUCED FORCES ON TRANSIT TRACKS**

The objective is to provide experimental data for validation of the analytical tools developed under previous efforts, to obtain engineering data on key parameters of the analytical models, to evaluate the applicability of the tools to define the load environments for design of the tie, fastener and ballast/subgrade components of a transit track structure and to illustrate their application through a pilot application to the track configurations currently existing on the transit test track at the DOT Transportation Test Center at Pueblo, Colorado.

PERFORMING AGENCY: Kaman AvIDyne  
 INVESTIGATOR: Mente, LJ  
 SPONSORING AGENCY: Transportation Systems Center

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Mar. 1980

02 058257

**TRACK-TRAIN DYNAMICS RESEARCH PROGRAM, PHASE II**

In a joint international Government-industry program, the Federal Railroad Administration in cooperation with the Association of American Railroads, the Railway Progress Institute, and Transport Canada Research and Development Centre has undertaken a ten-year comprehensive Track-Train Dynamics Research Program to develop a better understanding of the kinematics of railroad performance. This joint research effort is divided into three phases, the first of which has entailed the collection and analysis of data that is necessary to define quantitatively the characteristics of the present railroad system in North America. In the second phase (3 years) this data is to be applied to the development of requirements and interim performance specifications that will lead eventually to the development of improved equipment in the third (5 years) phase of the program. Initially in Phase II investigations will be conducted in the following areas: track structures, wheel-rail contact, trucks and suspension, carbody, couplers and draft gear and the brake system. The descriptive data in this research listing pertains only to that portion of the overall program that is sponsored by the Federal Railroad Administration. This support amounts to approximately one-third of the total resources dedicated to the TTD Research Program.

PERFORMING AGENCY: Association of American Railroads  
 INVESTIGATOR: Moyar, GJ Tel (312) 567-3602  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
 RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202) 426-1227  
 Contract DOT-FR-64228 (CR)  
 STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: July 1979 TOTAL FUNDS: \$1,900,000  
 ACKNOWLEDGMENT: FRA

02 058263

**ROLL DYNAMICS UNIT/VIBRATION TEST UNIT FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY**

The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Roll Dynamics Unit (RDU) and Vibration Test Unit (VTU) at the Transportation Test Center, Pueblo, Colorado. The RDL will permit analytical and experimental studies of railroad and transit vehicles, systems, and components in a controlled, reproducible lab environment with minimal risk to equipment and personnel. Through the study of vehicle dynamics in the RDL, the number of dynamic related accidents and derailments and their attendant costs should be reduced significantly. The contractor is responsible to deliver a functional RDU and VTU. The RDU will be capable of simulating speeds of approximately 200 mph and will accommodate vehicles up to 108 feet long, 12 feet, weighing 200 tons. The VTU will subject rail equipment to vertical and lateral vibrations experienced on typical track and handle vehicles up to 90 feet long, 12 feet wide and weighing 160 tons.

PERFORMING AGENCY: Wyle Laboratories  
 INVESTIGATOR: De Benedet, D Tel (303) 597-4500  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development  
 RESPONSIBLE INDIVIDUAL: Gross, A Tel (202) 755-1877  
 Contract DOT-FR-64200  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1975 COMPLETION DATE: July 1979 TOTAL FUNDS: \$9,441,723  
 ACKNOWLEDGMENT: FRA

02 058465

**WAYSIDE DERAILMENT INSPECTION REQUIREMENTS STUDY**

The main objective is to establish the impact and causes of railroad derailments and derailment-related accidents, and to assess existing and possible new wayside inspection means for preventing or reducing the occurrence of these events. It is also the objective to produce an analysis and presentation of derailments and pertinent related matters organized in a manner to facilitate understanding, identification of common characteristics and ultimately, effective methods of correction. Finally, the effort seeks to establish a posture on future action with respect to wayside detection and prevention of derailments: what changes and improvements should be made, and what innovations can best effect improvement with respect to wayside detection and prevention of accidents.

Final Report in process of publication.

REFERENCES:

Wayside Derailment Inspection Requirements Study for Railroad Vehicle Equipment, Frarey, JL; Smith, RL; Krauter, AI, FRA/ORD-77-18, May 1977, RRIS 7801 167080

PERFORMING AGENCY: Shaker Research Corporation  
 INVESTIGATOR: Frarey, JL  
 SPONSORING AGENCY: Transportation Systems Center, RR-523  
 RESPONSIBLE INDIVIDUAL: Ehrehbeck, R Tel (617) 494-2273 X2046  
 Contract TSC-1029 (CPF)  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1975 TOTAL FUNDS: \$77,114  
 ACKNOWLEDGMENT: TRAIS, FRA

02 059427

**FREIGHT CAR DYNAMICS RESEARCH PROGRAM**

Develop mathematical models that may be used to understand the dynamic behavior of freight cars and the effects of various truck, car and track design parameters on their behavior. Validate these models with data gathered by the Track-Train Dynamics Program.

PERFORMING AGENCY: Clemson University  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Tsai, N Tel (202)755-1877  
 Contract DOT-OS-40018 (CR)  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1973 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$313,787  
 ACKNOWLEDGMENT: TRAIS

02 081796

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II**

The objectives of this program are the development of recommended performance specifications and design guidelines for railroad freight cars, track structures, and their components and subsystems. Performance specifications are to coincide with the demands of the dynamic operating environment to which such systems are subjected. Details of methods and scope are included under specific task references.

PERFORMING AGENCY: Association of American Railroads Technical Center  
 INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584  
 SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre  
 RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979  
 ACKNOWLEDGMENT: AAR

02 081799

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II, TASK 2--WHEEL/RAIL**

Overall task goals are to improve knowledge of the mechanics of wheel/rail interactions and to establish recommended performance specifications and design guidelines for wheels and rail. Task will involve applied research in wheel and rail metallurgy in order to determine requirements for improved performance. Research will also be conducted in stress analysis and fracture mechanics with the goal of developing improved design techniques and life cycle prediction methods. Stress analysis will especially concentrate on the contact stresses at the wheel/rail interface. Wear research conducted under Task 9, Advanced Analytical Techniques, will supply important input to this task. Rail corrugation, with initial effort by Canadian participants in TTD, has been studied. The rail stress analysis investigation, with particular effort on determining the stresses within rails as developed by passage of a vehicle, is progressing. In the wheel area, present effort is on developing an elastic-plastic stress analysis because mechanical and thermal stresses can go beyond the yield point of steel.

PERFORMING AGENCY: Association of American Railroads Technical Center  
 INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584  
 SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602  
 STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

**02 081803**  
**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH**  
**PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK**  
**7--TEST MANAGEMENT**

Task objective is to coordinate and conduct such tests as are necessary for the pursuit of Tasks 1-6 of Track Train Dynamics, Phase II. Task will provide clearinghouse function for data requests and will design and conduct appropriate laboratory and field tests.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Darien, NJ Tel (312) 567-3621

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

**02 081804**  
**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH**  
**PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK**  
**9--ADVANCED ANALYTICAL TECHNIQUES**

Task objective is to assure that Track Train Dynamics-Phase II, Tasks 1-6 are equipped with the latest advances in applicable analytical techniques. Task will essentially be performed through contract efforts in such areas as stress analysis, fracture mechanics, and wear properties of ferrous materials.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Moyar, GJ Tel (312) 567-3602

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

**02 081805**  
**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH**  
**PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK**  
**8--PROGRAM ANALYSIS**

The objective of this task is to assure economic justification of recommendations which result from research activities conducted in Tasks 1-6 of Phase II of the Track Train Dynamics Program. Task will include prior evaluation of research and implementation strategies to forecast potential economic benefits as an aid to priority determination. Areas selected for priority determination will be selected by program management. The principal technique for priority determination will be life-cycle costing based on data accumulated through existing industry channels supplemented by field surveys. Task will supply economic justification package for final recommendations based on industry status and forecasts and time of release.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: McGovern, WR Tel (312) 567-3617

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

**02 099367**

**PILOT STUDY FOR THE CHARACTERIZATION AND REDUCTION OF WHEEL/RAIL LOADS**

This project will be carried out in two phases, with the first phase developing a method for the analytic and experimental characterization of wheel/rail loads. In addition, this phase will provide a detailed program plan and a W/R load field measurement and data reduction plan for a specified track route that will then be implemented in Phase II. During Phase II, the W/R loads on selected track sections will be determined through implementation of the field measurement plan. These loads will be compared with those predicted through application of the analytical methodology. After modification and/or validation, the prediction method will be used to extrapolate W/R load data to alternative track, vehicle and operating conditions. This is intended to identify alternate strategies for reducing those W/R loads which are most closely associated with track degradation.

REFERENCES:

Evaluation of Analytical and Experimental Methodologies for the Characterization of Wheel/Rail Loads, Ahlbeck, D; Harrison, H; Prause, R; Johnson, M, FRA-OR&D 76-276, Intrm Rpt., Nov. 1976

PERFORMING AGENCY: Battelle Memorial Institute

SPONSORING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

RESPONSIBLE INDIVIDUAL: Weinstock, H Tel (617) 494-2459

Contract DOT-TSC-1051

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: May 1979 TOTAL FUNDS: \$583,000

ACKNOWLEDGMENT: FRA

**02 099390**

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH**  
**PROGRAM ON TRACK TRAIN DYNAMICS. PHASE II. TASK**  
**10--SPECIAL PROJECT, LOCOMOTIVES**

The objective of this task is to review accident statistics relating to derailments due to, or related to, locomotives for the purpose of determining whether or not six-axle locomotives are more prone to derailment than four-axle locomotives. Should the data reveal correlation between truck types and accidents, existing and/or newly developed computer models of locomotive trucks will be utilized for developing strategies for alleviating the problems.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Garg, VK Tel (312) 567-3596

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Lind, EF Tel (312) 567-5790

STATUS: Active NOTICE DATE: Feb. 1979 COMPLETION DATE: 1979

ACKNOWLEDGMENT: AAR

**02 128041**

**CALCULATION OF TRAIN AERODYNAMIC DRAG (FOR ENERGY MANAGEMENT PROGRAM)**

The purpose of this project is to: 1. Calculate the steady and unsteady aerodynamic drag of vehicles in tunnels and free air. 2. Modify and/or develop computer programs for the calculation of the aerodynamic drag of vehicles as required by the energy management program. A literature survey and review of the aerodynamics of trains in tunnels under project 3603 is well underway. Also, a computer program has been acquired to estimate the unsteady aerodynamic drag of vehicles in tunnels. With this program, it is now possible to start to perform the drag calculations for the purpose of obtaining preliminary power profile and energy loss estimates. It is anticipated that the program will have to be modified to incorporate the latest information obtained in the literature review. This project covers the calculation of aerodynamic drag for the three cases of deep tunnel, cut and cover, and free air, and studies on propulsion systems with and without energy storage. The result, conceptual designs on a total energy basis. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 3605

INVESTIGATOR: Colavincenzo, O

SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: 1975  
ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 138469

**TRUCK DESIGN OPTIMIZATION PROJECT, PHASE II**

Phase II of the Truck Design Optimization Project (TDOP) will finalize the performance and testing specifications and economic methodology generated in Phase I; characterize the performance and economics of Type II, special service freight car trucks; develop performance and testing specifications as well as the economic methodology for Type II trucks incorporating wear and performance indices; provide related economic and analytical models of freight car trucks; and determine the feasibility of advanced designs and integrated carbody support systems.

PERFORMING AGENCY: Wyle Laboratories  
INVESTIGATOR: De Benedet, D Tel (303) 697-4500 Cappel, K  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Tsai, N Tel (202) 426-0851

Contract DOT-FR-742-4277

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: Dec. 1980 TOTAL FUNDS: \$2,639,100

ACKNOWLEDGMENT: FRA

02 139178

**FACILITY FOR ACCELERATED SERVICE TESTING (FAST)**

Accelerated life testing of track structures and certain components of rolling stock. A 4.8 mile loop of track, divided into 22 sections, with experiments on rail metallurgy, ties (hardwood, soft wood, concrete, steel), ballast (different materials, depths, shoulder width), etc. Four 2,000 HP locomotives pulling more than 80 cars (hoppers, tanks, flats) each grossing over 100 tons, at average speed of 42 MPH for a period not to exceed 16 hrs/day five day/week. Measurements taken during other 8 hours. Started operation in September 1976; approximately 359 million gross tons and 196,000 miles have been accumulated thru January 1, 1979. Experiments which have been completed include those involving wheel wear, steel ties, frogs and fabricated trucks. Reports covering the results on these completed experiments are currently in preparation.

PERFORMING AGENCY: Federal Railroad Administration, Office of Research and Development  
SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development; Association of American Railroads  
RESPONSIBLE INDIVIDUAL: Spanton, DL Tel (202) 426-0850

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1976

ACKNOWLEDGMENT: FRA

02 148358

**EXPERIMENTAL RESEARCH ON RAIL VEHICLE SAFETY USING DYNAMICALLY SCALED MODELS**

The objective of this research is to develop experimental techniques for the study of rail vehicle dynamics. Through the use of scaled models, a structural experimental data base on the characteristics of rail car trucks will be assembled. The establishment of this data base (more complete and systematically structured than that feasible from large scale testing) will enable the validation of analytical tools useful in the design of railroad components. An 800 foot test track has been installed and experiments have been conducted on single wheelsets. These confirm predictions from a theoretical model developed for this project. Additional experiments will focus on the dynamics of a complete freight truck.

PERFORMING AGENCY: Princeton University, Department of Aerospace and Mechanical Sciences  
INVESTIGATOR: Sweet, LM Tel (609) 452-5305  
SPONSORING AGENCY: Department of Transportation, Office of University Research  
RESPONSIBLE INDIVIDUAL: Lee, HS

Contract DOT-OS-60147

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: \$203,000

ACKNOWLEDGMENT: TSC

02 157664

**EXPERIMENTAL MEASUREMENTS OF NORMAL SHOCK AND VIBRATION ENVIRONMENTS**

Extract and document, in a usable format, the current information on normal shock and vibration loading experienced by radioactive material shipping containers. This will involve: (1) Extraction of data from existing data banks; (2) Conducting of dynamic analysis of switching and coupling shocks; (3) Participation in appropriate test programs.

REFERENCES:

Shock and Vibration Environments for Large Shipping Containers on Rail Cars and Trucks, Magnuson, CF, SAND-76-0427; NUREG-76-6510, May 1977

PERFORMING AGENCY: Sandia Laboratories, A-1049  
INVESTIGATOR: Magnuson, CF Tel (505)264-2765  
SPONSORING AGENCY: Nuclear Regulatory Commission  
RESPONSIBLE INDIVIDUAL: Lahs, W Nuclear Regulatory Commission Tel (301)427-4356

Contract B&R-60190504

STATUS: Active NOTICE DATE: July 1977 START DATE: Dec. 1975 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$365,000

ACKNOWLEDGMENT: Nuclear Regulatory Commission

02 160409

**LADING DAMAGE PARAMETERS**

This project is aimed at the reduction of the current \$300 million annual loss and damage in paid claims and the several billion dollar expense in support costs, unpaid claims and lost revenue. Testing of various product densities and shipments will be used to determine dynamic mechanical response lading parameters such as force constants and damping coefficients. Through analysis the response of various lading as it is influenced by vibration, variations in shipping containers and pallet configurations can be determined. The data will also be used in the development of predictive models to be used in optimizing the rail transportation system.

PERFORMING AGENCY: Rutgers University, New Brunswick  
INVESTIGATOR: Morrow, D Tel (201) 932-3679 Richardson, G Vinatoru, M  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Orth, CL Tel (202) 755-1877

Contract DOT-FR-767-4323 (CC)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$125,000

ACKNOWLEDGMENT: TRAIS, FRA

02 170591

**EXPERIMENTAL DETERMINATION OF COEFFICIENT OF ROLLING ADHESION IN RAIL TRACTION AND BRAKING**

The coefficient of rolling adhesion is strongly a function of speed and material, but also is influenced by other parameters, such as surface condition, curvature, traction or braking in the stress contact area. It has never yet been well-determined in these respects, and a VPI test rig of my design has now produced some definitive results never before achieved.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, 808440-1

INVESTIGATOR: Whitelaw, RL Tel (703) 951-6801  
SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$67,000

ACKNOWLEDGMENT: Virginia Polytechnic Institute & State University

02 170594

**INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF RAIL FREIGHT ROLLING STOCK**

The objective of this project is to obtain information on the aerodynamic characteristics of a variety of standard railroad freight rolling stock and of selected configurations, modified to improve their aerodynamics, by means of a series of scale-model wind tunnel investigations. The final report shall indicate applicability and limitations of the test data to full-scale railroad operations.

PERFORMING AGENCY: Hammitt (Andrew G) Associates; California Institute of Technology; Raines Engineering  
SPONSORING AGENCY: Federal Railroad Administration, Office of Re-

search and Development

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

Contract DOT-FR-8058

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1978 COMPLETION DATE: May 1979 TOTAL FUNDS: \$110,728

ACKNOWLEDGMENT: FRA

#### 02 170595

##### TRAIN RESISTANCE

Investigations and analyses of rail freight train aerodynamic and mechanical resistances are being conducted to assist the FRA/OR&D in developing an overview of both near-term and long-range considerations of energy requirements for improved rail freight service. This effort will utilize results of on-going FRA aerodynamic research on various types of rail rolling stock and previous rail energy-related studies conducted by government and industry. Potential energy benefits resulting from freight car design or operational modifications will be assessed from technical and economic considerations.

Train Resistance in Rail Freight service, 1977. Paper presented at 4th National Conference: Effects of Energy constraints on Transportation Systems. Union College, Schenectady, NY. John Koper, Office of Res & Dev/FRA, DOT. Volume II to be published.

##### REFERENCES:

Resistance of a Freight Train to Forward Motion Volume I Methodology and Evaluation, Muhlenberg, JD, Available at NTIS., FRA/ORD 78/04.I, Apr. 1978, PB-280969/AS

PERFORMING AGENCY: Mitre Corporation, Metrek Division, 06.30.09.200

INVESTIGATOR: Muhlenberg, JD Tel (703) 790-6692

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202) 426-0808

30000

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: FRA

#### 02 170644

##### PREVENTION OF DERAILMENT OF GOODS WAGONS ON DISTORTED TRACKS

In April 1975 the B 55 Specialists Committee presented report RP 6 "Conditions for negotiating track twists. Calculation and measurement of important vehicle parameters" which gives guiding principles to the vehicle designer. These will enable him to examine new rolling stock for its safety against derailment on track twists as early as the design stage. In addition, the methods of measurement and the evaluation of the principal vehicle parameters are specified. It is planned to incorporate these conditions in the specifications and the programme of tests for new rolling stock. Further work of the Committee will aim at supplementing the recommendations given in report RP 6 by guiding principles for the cant dependent on the radius of the curve. This still requires the study of its effects on the guiding force. The studies were initiated by a detailed inquiry among the ORE administrations and they are, at present, continued by extensive tests on 2 administrations. Final report, RP 8, in preparation.

Seven reports have been published to date. Question B55.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1965 COMPLETION DATE: Apr. 1978

ACKNOWLEDGMENT: UIC

#### 02 170645

##### BRAKING AND ACCELERATION FORCES ON BRIDGES AND INTERACTION BETWEEN TRACK AND STRUCTURE

Study of braking and starting forces on bridges, is now expanded to interaction between long welded rails and bridges. Initial program included tests on plain line to evaluate magnitude and sequence of tractive and braking reactions, tests on steel bridges with and without ballast, and multiple span bridges, to develop theory and recommendations for code of practice. Tests on steel bridges and plain line together with theoretical studies have provided basis for provisional recommendations. Further work is needed to verify reactions on a bridge with continuous deck. The

theoretical and experimental methods already developed by the Committee will contribute towards study of temperature reactions from long welded rails, and appropriate arrangements will be combined in future testing.

Twelve reports have been published to date. Question D101.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1968

ACKNOWLEDGMENT: UIC

#### 02 170648

##### INTERACTION BETWEEN VEHICLES AND TRACK

Track irregularity spectra, setting up a mathematical model (track and vehicle), specification of vehicle/track conditions for ensuring adequate contact, extending knowledge about the wheel/rail contact zone. At this time, work is being done on: 1. Further development and finalisation of the mathematical model for bogie vehicles; 2. Study of comfort standards; and 3. Optimisation of track parameters.

Eight reports have been published to date. Question C116.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Pettelat, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

#### 02 170657

##### EFFECT ON THE TRACK OF RAISING THE AXLE LOAD FROM 20 TO 22 T

It is intended to study the effect of raising the axle load through simulation tests and full scale tests on the Velim test loop. At this time track tests are at present being carried out in varying the values of different parameters such as rails, sleepers and ballast, and for each axle load. Ballast settlement tests are also being made for symmetric and asymmetric wheel loading. In addition, in cooperation with the B 142 Committee, tests are being conducted on the Velim loop with a test-train with 22 t axle load. A first series of tests, corresponding to 50 million tonnes of traffic, has now been terminated.

Question D141.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976

ACKNOWLEDGMENT: UIC

#### 02 170660

##### PERMISSIBLE MAXIMUM VALUES FOR THE Y AND Q FORCES AS WELL AS THE RATIO Y/Q

The studies are being carried out in 3 directions: 1) Track displacement forces S: the quasi-static tests carried out at Bucharest on a specially fitted track are practically terminated as far as the bogie wagon is concerned and also the line tests with measurements of dynamic forces being carried out by FS, which will be continued by measurements on the test rig by PKP. 2) Criterion of derailment: new series of tests will be made in Derby and in Bucharest toward the end of the year and also on SBB. 3) Limiting values for Y and Q: The additional calculations and the practical work of verifying them will be undertaken by PKP and CFR.

One report has been published to date. Question C138.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Pettelat, A Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

#### 02 170661

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III

This phase contains new tasks not dependent on completion of Phase II work, as well as some of the longer range subtasks of Phase II that were not yet undertaken. The Phase III program, projected to cover a period of five years, has as its goal the development of requirements for advanced systems to meet the future needs of America's railroads as well as the introduction of advanced technology to improve the safety and reliability of present



systems. The first stage of Phase III will last about two years and has four major tasks: TTD technology sharing and implementation; advanced design methodology development; train operation aids; and future system studies. A fifth task was added in 1979: advanced freight car research.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Moyer, GJ Tel (312) 567-3602

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1978 COMPLETION DATE: 1982

ACKNOWLEDGMENT: AAR

#### 02 170663

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III, TASK 2--ADVANCED DESIGN METHODOLOGY DEVELOPMENT

Task will integrate and apply analytical and experimental techniques to provide a validated design evaluation system to assist in the prevention of catastrophic mechanical failures and support advanced system development in the railroad industry. The subtasks: (2.1) Adapt and illustrate a prototype interactive graphics-supported design evaluation capability; (2.2) Use the Rail Dynamics Laboratory at Pueblo, Col., to validate structural dynamics, freight-car models and component design methods; (2.3) Complement load-environment data on track structures with investigations of ultimate track strength; (2.4) Conduct a controlled investigation of locomotive or heavy-vehicle/track interactions; (2.5) Provide up-to-date data on fatigue, fracture and wear for railroad materials in a form suitable for advanced design.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hamilton, AB Tel (312) 567-3649

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

#### 02 170666

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE II

The overall goal is development of recommended performance specifications and relevant design guidelines to assure the safety of railroad operations with current generation track and equipment. Although originally programmed to end in 1977, many of its subtasks are not complete and some contracts will carry into and beyond 1978. Phase II work continues in these areas: Field testing, wheel/rail integrity studies, dynamic analysis, and specification guidelines. Field tests will complete wayside track data collection at six sites, implement an over-the-road load environment sampling with an instrumented six-car consist, measure wheel thermal/mechanical environment in typical revenue service, and use instrumented brake shoes in single-car stopping and drag brake testing. Wheel/rail integrity studies will publish findings of first-stage wheel/rail and centerplate laboratory wear research, determine residual stress states in rail, validate a risk model that relates rail inspection methods to probability of flaw propagation, develop cost-effective methods to detect damaged wheels. Dynamic analysis will complete final report on harmonic roll and bounce of freight cars due to track irregularities, complete the analytical representation and optimization of draft gear and cushioning units, evaluate results of auxiliary snubbing tests, complete evaluation of truck hunting, issue final evaluation report on instrumented-wheelset tests performed on Amtrak locomotive. Complete specifications for fatigue tests for couplers and truck bolsters; promote introduction of fatigue design guidelines and wheel stress limits into AAR specifications.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Hawthorne, KL Tel (312) 567-3584

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Re-

search and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

#### 02 179333

##### TIEDOWN OF NUCLEAR FUEL CASKS TO RAILCARS

An experimental program has been undertaken jointly by the Savannah River Laboratory (with DOE funding) and the Sandia Laboratories (with NRC funding) to investigate shock, vibration, accelerations, stresses, and tiedown forces in a cask-car system during car coupling operations. Results will be extended beyond the experimental range by analytical methods. A standard for tiedown of casks to railcars is to be developed.

PERFORMING AGENCY: Du Pont de Nemours (EI) and Company, Incorporated, Savannah River Laboratory

INVESTIGATOR: Petry, SF Tel (803) 824-6331 Magnuson, CF

SPONSORING AGENCY: Department of Energy; Nuclear Regulatory Commission

RESPONSIBLE INDIVIDUAL: May, GW Tel (803) 824-6331

Contract AT (07-2)-1

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$315,000

ACKNOWLEDGMENT: Du Pont de Nemours (EI) and Company, Incorporated

#### 02 188653

##### REVIEW AND SUMMARY OF COMPUTER PROGRAMS FOR RAILWAY VEHICLE DYNAMICS

Available computer programs are to be identified and categorized as the following: Lateral Stability; Curving Dynamics; Vertical Dynamics; Wheel/Rail Contact Geometry and Force; Train Dynamics; Freight Dynamics and Analog/Hybrid Simulations. Authorities are to be selected for evaluation of each computer program group. Formats are to be developed for presentation of summaries and of results. Potential user of the railway vehicle dynamics programs are to be identified.

PERFORMING AGENCY: Virginia University

INVESTIGATOR: Pilkey, WD Tel (804) 924-3291 Reid, RE

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Tsai, N Tel (202) 426-0851

Contract DOT-FR-8076

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1978 COMPLETION DATE: Sept. 1979

#### 02 188663

##### INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III, TASK 5--ADVANCED FREIGHT CAR RESEARCH

Performance specifications will be developed in this task for freight car designs that will have improved dynamic performance and structural integrity having particular benefits in the area of reduced track and road bed damage. The task will draw upon the advanced design methods, materials research, vehicle testing, engineering economics, and advanced concept evaluation studies within the Track Train Dynamics program. It will also use the results of the track and rolling stock experiments in the FAST and FEEST projects and other freight car subsystem research projects such as the Truck Design Optimization Program and other D.O.T. programs.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Manos, WP Tel (312) 567-3585

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1979 COMPLETION DATE: 1981

03 025403

**URBAN RAPID RAIL VEHICLE SYSTEMS PROGRAM**

To enhance the attractiveness of rapid rail transportation to the urban traveler by providing existing and proposed transit systems with service that is comfortable, reliable, safe, and as economical as possible. Short range goals: Demonstration of the state-of-the-art in rapid rail vehicular technology. The Advanced Concept Train (ACT-1) phase calls for delivery of two next generation rail transit vehicles by August 1977 and Advanced Subsystems Development Program (ASDP) calls for component development for near-term industry application.

Subcontractors for the project are St. Louis Car Company, AiResearch Manufacturing Company, Delco Electronics, Westinghouse Air Brake and the Budd Company.

PERFORMING AGENCY: Boeing Vertol Company  
 INVESTIGATOR: O'Brien, T Tel (215) 522-3200  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

Contract DOT-UT-10007

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1971 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: \$45,700,000

ACKNOWLEDGMENT: UMTA (IT-06-0026)

03 046502

**RAILROAD WHEEL INVESTIGATION**

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. The theory is being extended to include inelastic analysis which should permit the determination of residual stresses developed in the wheel. When an adequate mathematical model is developed to predict the temperature influenced stresses in a car wheel, these stresses will be superimposed on the stresses developed by the railroad. These results should lead to a better understanding of the various types of failures experienced in service.

PERFORMING AGENCY: Illinois University, Urbana, Department of Theoretical and Applied Mechanics

INVESTIGATOR: Wetenkamp, HR  
 SPONSORING AGENCY: Griffin Wheel Company

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1971

ACKNOWLEDGMENT: Science Information Exchange (JGF 25)

03 050338

**STEERING TYPE RAIL CAR TRUCK DEVELOPMENT**

Develop rail car trucks with superior tracking characteristics and ride quality. Freight Car Trucks-DR-1 Steering Assembly for retrofitting conventional 70 & 100-Ton three-piece freight car trucks--to add steering and high speed stability. Multiple units now being manufactured by Dofasco in Canada, and Dresser in the U.S. AAR Certification has been received for these units. DR-2 to be developed in 1979 & 1980, by some manufacturers. These units will be much like a conventional three-piece freight car truck, but with the addition of steering, positive aligned braking, improved ride quality, and high speed stability. Passenger-Transit Car Trucks-Light rail vehicle trucks to be developed by The Budd Company--starting with a retrofit version of the PCC car truck. Heavy rail and passenger truck also to be developed during 1979 & 1980.

**REFERENCES:**

An Evaluation of Recent Developments in Rail Car Truck Design, List, HA, ASME #71-RR-1, Apr. 1971, RRIS #050340 in 7401

Proposed Solutions to the Freight Car Truck Problems of Flange Wear and Truck Hunting, List, HA; Cardwell, WN; Marcotte, P, American Society of Mechanical Engineers, ASME #75-WA/RT-8, July 1975, RRIS #128632 in 7601

The DR-1 Radial Truck, A Significant Advance in Freight Car Truck Technology, DOT Engineering Conference, Pueblo, Colorado, Oct. 1977

Performance Analysis & Testing of a Conventional Three-Piece Freight Car Truck Retrofitted to Provide Axle Steering, Marcotte, P; Caldwell, WN; List, HA, Winter Annual Meeting ASME, Dec. 1978

PERFORMING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways; Dresser Transportation Equipment Division; Dominion Foundries and Steel, Limited; Budd Company

SPONSORING AGENCY: Railway Engineering Associates, Incorporated; Canadian National Railways; Dresser Transportation Equipment Division; Dominion Foundries and Steel, Limited; Budd Company

RESPONSIBLE INDIVIDUAL: List, HA Cope, GW Bexon, H Marvin, R

In-House

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1971 COMPLETION DATE: 1980

ACKNOWLEDGMENT: Railway Engineering Associates, Incorporated, Dresser Transportation Equipment Division, Dominion Foundries and Steel, Limited

03 055604

**A STRUCTURAL SURVEY OF CLASSES OF VEHICLES FOR CRASHWORTHINESS**

It is the purpose of this contract to provide the technical data required for the evaluation and improvement of the crashworthiness of several classes of rail vehicles as required in the rail safety effort. This contract is also to provide preliminary technical data for planning of possible future crashworthiness tests efforts.

PERFORMING AGENCY: Boeing Vertol Company  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Tong, P Tel (617)494-2539

Contract DOT-TSC-856 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1974 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$239,139

ACKNOWLEDGMENT: UMTA, TRAIS

03 055916

**IMPROVEMENT OF RAILROAD ROLLER BEARING CERTIFICATION TEST PROCEDURES AND DEVELOPMENT OF ROLLER BEARING DIAGNOSTICS**

The problem of railroad roller bearing failure shall be reviewed giving consideration at a minimum to the effects of the following factors: 1. over and under lubrication. 2. loose bearing components (i.e. cap screws, seals, backing rings). 3. bearing component design. 4. adaptor condition. 5. rebuild procedures. 6. environment (speed, load, temperature). The interaction of factors leading sequentially to different modes of failure should be clearly established. An analytical model of the bearing may be useful in assessing the importance of interaction between these factors leading to bearing failure. Under a modification to the contract concepts for railroad roller bearing detection systems are to be evaluated. These systems are: 1. On-board Thermally Powered Transmitter Bolt; 2. Pulse Echo Ultrasonic Lubrication Detector, and 3. Shock Pulse Damage Detector.

A Final Report is in preparation.

PERFORMING AGENCY: SKF Industries, Incorporated  
 INVESTIGATOR: Allen, G Tel (215) 265-1900  
 SPONSORING AGENCY: Transportation Systems Center, RR-523  
 RESPONSIBLE INDIVIDUAL: Thompson, W, III Tel (617) 494-2511

Contract DOT-TSC-935 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1974 COMPLETION DATE: May 1979 TOTAL FUNDS: \$113,885

ACKNOWLEDGMENT: TRAIS (RR-523)

03 059420

**PERFORMANCE EVALUATION OF LIGHTWEIGHT INTERMODAL FLAT CARS**

Measurement of ride vibration and wear characteristics of one experimental lightweight skeleton TOFC and one COFC flat car in addition to standard TTAX car. Program included 150,000 miles of revenue service with periodic measurements of ride vibration and wear.

Co-sponsored by an industry group including the Trailer-Train Company, Pullman-Standard Division, National Castings Division of Midland Ross, American Steel Foundries Company, and the Santa Fe Railway.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway; ENSCO, Incorporated

SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Blanchfield, JR Federal Railroad Administration Tel (202)426-0808

Contract DOT-FR-65218

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1976 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$750,000

ACKNOWLEDGMENT: TRAIS

03 081786

**RAILROAD COUPLER SAFETY RESEARCH AND TEST PROJECT**

Because of the recognition of a general lack of knowledge regarding the environment to which couplers and yokes are subjected because of the increased power from modern locomotives, higher operating speeds and increased use of high capacity cars, this project has as its objectives: (1) Study the operating and service conditions of couplers and yokes; (2) Investigate the technical, economic and safety aspects of coupler failures in service; (3) Evaluate standard coupler and yoke designs; (4) Prepare detailed guidelines for the proposed performance and test specifications for couplers and yokes; (5) Conduct a preliminary evaluation of current standard designs of coupler components under conditions listed in Item 4. Data has been acquired from instruments installed in a special test box car which has operated in various services. With service testing nearly complete, attention is now being given to laboratory tests required for recommendations for purchase and acceptance specifications. Fatigue and fracture toughness characteristics of steels used in couplers and the stress levels in the components must be determined. Agreement has been given to merge this project into Phase II of the Track-Train Dynamics Project, Task 5. All of the objectives of the Coupler Safety Project will be retained.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Morella, NA Tel (216) 229-3400

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Morella, NA Tel (216) 229-3400

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1972

ACKNOWLEDGMENT: AAR

03 081787

**RAILROAD TRUCK SAFETY RESEARCH AND TEST PROJECT**

This project has the objective of developing guidelines for new specifications for truck bolsters and side frames to meet the increasingly strenuous demands of rail freight transportation. Road service environmental tests to measure loads/stresses to which components are subjected under all types of operating conditions are essentially complete. IITRI reduction and analysis of recorded data is being translated to methods of laboratory bolster dynamic tests. Initial lab tests of 1975 and 1976 were conducted at the Test Engineering Department of American Steel Foundries. Further lab testing started in November, 1976, and was completed in 1977-78 at the Testing Laboratory of Dresser Transportation Equipment, Division of Dresser Industries. Additional lab testing is projected for 1979 at the AAR Technical Center, to broaden the experience base and to validate proposed guidelines for an interim bolster fatigue test specification. This work is to be used as environmental and physical test basis for the Track Train Dynamics Phase II task on trucks.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Evans, RA Tel (312)567-3598

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Evans, RA Tel (312)567-3598

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1973 TOTAL FUNDS: \$230,000

ACKNOWLEDGMENT: AAR

03 081798

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 3--TRUCKS AND SUSPENSION**

Overall task objectives are the development of recommended performance specifications and test specifications for conventional three piece trucks. Specifications will be developed through a comprehensive research project built upon the RPI-AAR Railroad Truck Safety Research and Test Project and utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. Test specification development will involve determination of service loading and development of techniques necessary for predicting failure under dynamic loads. Task will also involve developing capability to fatigue test truck components. Field testing will include validation of the truck stability model developed by Clemson University and Arizona State University in conjunction with FRA and the

TTD program. The model evaluates dynamic stability of a truck under a wide variety of service conditions and validation will enable it to be used in the study of phenomena such as truck hunting. The Harmonic Roll Series computer programs have been used to show how suspension characteristics could be matched with the vehicle to alleviate problems related to rock and roll and harmonic bounce.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Bulloch, R

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

03 081800

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 4--CAR STRUCTURES**

Task objective is the development of recommended performance specifications and design guidelines for railroad freight car structures. Method will involve development of suitable fatigue analysis approach coupled with evaluation of advanced structural analysis methods. Task will include establishing test program goals for environmental loading tests to be pursued during the program. Test plans will be developed and tests conducted to validate fatigue analysis methods for car structural components. The basic approach adopted is a cumulative damage approach using the methodology which has been used in the aerospace and heavy-equipment industries. Development of interim guidelines using this methodology and presently available load spectrum and material fatigue performance was made available to TTD by ACF Industries. Further work in fatigue methodology and acquisition of additional load spectra from environmental sampling is progressing.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Zaremski, AM Tel (312) 567-3622

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

03 081801

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 5--COUPLERS, DRAFTGEAR, AND CUSHION UNITS**

Task objectives are development of recommended performance and/or test specifications and design guidelines for railroad freight car couplers, draftgear, and cushion units. Task will build on current RPI-AAR Railroad Coupler Safety Research and Test Project and will utilize dynamic simulation computer models developed during Phase I of the Track Train Dynamics Program. Coupler effort will concentrate on stress and fatigue analysis. Draft gear and cushion unit efforts will be directed toward investigations of opportunities for improved train handling through optimized operating characteristics.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Punwani, SK Tel (312) 567-3601

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: Mar. 1979

ACKNOWLEDGMENT: AAR

03 099382

**WHEEL RESEARCH PROGRAM**

It is the objective of this program to prevent the formation of cracks in various wheel locations which can occur because of various conditions and can ultimately result in catastrophic failure. The initial step was a full review of wheel failure statistics to isolate wheel contours generating the most frequent failures. The problem is to be alleviated by considering changes in wheel design and wheel material, with emphasis on design. Finite element analysis is conducted on each characteristic shape of wheel involving stress due to tread loading, lateral loading and to thermal inputs resulting from drag or emergency braking. Such analysis would be followed by service or dynamometer tests to verify results. The initial phase of this involved the 28-inch wheel and was a joint project with Trailer Train Co. It involved cracked wheel plates and shattered rims, and indicated some solutions which would be generally applicable. In addition to the loading problems, research is being conducted to define problems associated with overheated wheels. It was initially found that criteria for rejecting such wheels were overly restrictive. Non-destructive residual stress measurement techniques, such as the Barkhausen method, are being evaluated for detecting thermally damaged wheels. The thermal fatigue behavior of wheel steels is also being investigated. Detection of rim thermal cracks, utilizing ultrasonic techniques like those used in AAR's rail test program, are also proceeding.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

STATUS: Active NOTICE DATE: Aug. 1976

ACKNOWLEDGMENT: AAR

03 099426

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 9-DESIGN STUDY-TANKS AND ATTACHMENTS**

Phase 09 concerns the behavior of tank car tanks and their appurtenances (fittings and attachments) in the mechanical environment of railroad accidents. The objectives are to study designs of tank shells, fittings, and attachments in relation to the potential of product loss under mechanical impacts in accidents and to analyze, on a cost-effective basis, the feasibility of reducing losses through design improvements. This general area of study will continue under the Project. Currently, an extensive series of tests have been completed and a report will be published. The tests included impact testing of several bottom outlet configurations and protective skid proposals. The objectives are to develop design parameters for bottom fittings breakage grooves and protective skids.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1979 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

03 099435

**LOCOMOTIVE CAB DESIGN DEVELOPMENT**

The objective of this effort is the development of a locomotive control compartment based on an evaluation of the operator's functional requirements and comprehensive human factors engineering studies. The contractor has developed specifications for the design, test, and evaluation of a locomotive cab which are in concert with all operational, human factors, safety, and occupant protection considerations. The cab design incorporates the predictable technical and operational progress, as well as 10 to 15 year projections of train handling and control requirements. In Phase I of the original contract, a number of potentially feasible conceptual alternative locomotive cab configurations were developed. The most suitable alternate was selected on the basis of human factors, structural integrity, and cost trade-off studies. In Phase II of the original contract, a detailed human factors design of the optimal locomotive cab was accomplished, and a full scale mock-up fabricated. Operational feasibility was determined in a limited series of performance tests utilizing the mock-up. Under the present contract the scope of the test programs was increased to include a nationwide sample of evaluators from heavy rail properties. The sample consisted of engineers and trainmen representing geographic, operational and experimental variables necessary to accomplish a broad based evaluation. As a result of the

evaluation, human factors engineering functional specifications for a new locomotive cab were written to include requirements for all man/software/-hardware interfaces of the cab design. In addition, recommendations were made on appropriate areas for further work, including suggestions for areas other than the immediate cab environment, such as the potential for new methods of train handling, communication techniques, and signalling systems.

Funds for this project are administered by DOT/Transportation Systems Center, Cambridge, Mass.

**REFERENCES:**

PERFORMING AGENCY: Boeing Vertol Company, D339-10044

INVESTIGATOR: Robinson, J Tel (215) 522-2760

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Devoe, DB Tel (617) 494-2199

Contract DOT-TSC-1330

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Mar. 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$451,619

ACKNOWLEDGMENT: FRA

03 099439

**HOT JOURNAL SENSOR AND LOCAL DERAILMENT DETECTOR**

This multi-year program is aimed at reducing the number of train derailments. Active anti-derailment devices are needed by the railroad industry which when installed on a train will automatically stop the train upon detection of a hot journal or a wheel on the ground. NAV-SURFWPNCEN/WOL will develop, install and initiate in-service demonstrations of the Hot Journal Sensor (HJS) & the Local Derailment Detector (LDD) on a limited number of railroad cars. Hot box tests, over-the-road shock tests and normal bearing tests have been conducted on the Duluth, Missabe & Iron Range Railway at Duluth, Minn. Data from these tests will establish a design base for both the LDD and HJS. Laboratory testings has been conducted on a piezo-electric power source for an electro-explosive HJS device.

PERFORMING AGENCY: Naval Surface Weapons Center

INVESTIGATOR: O'Steen, JK

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

IA AR54162

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

03 136342

**DESIGN OF AN ADVANCED CONCEPT TRAIN**

Description: The object of this project is to demonstrate new concepts for the subway and commuter rail car industry. These concepts will reduce life cycle costs; increase passenger appeal; and reduce the impact on the environment. Two vehicles are being built for test and evaluation at TSC. The methods for reducing life cycle costs are: 1. An efficient propulsion system which stores the vehicle braking energy in a flywheel to be used later to accelerate the vehicle. All accessories are shaft driven from this flywheel. 2. Reliability-Designing for reliability and designing parts out of the vehicle. 3. Designing more maintainable equipment. 4. Reducing operating personnel by automaticity and closed circuit T.V. monitors. 5. Reducing track wear thru a better slip-slid control and better ride quality. Less environmental impact thru: 1. Reduced noise using composite wheels. 2. Less thermal emission since the braking energy is stored as rotational energy interferences due to advanced propulsion design.

PERFORMING AGENCY: AiResearch Manufacturing Company; Boeing Vertol Company

INVESTIGATOR: O'Brien, T

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1972 COMPLETION DATE: Aug. 1978

03 138537

**GAS TURBINE-ELECTRIC (GT-E) COMMUTER CARS**

The objective is to develop advanced dual powered commuter cars capable of gas turbine or electric propulsion which is equivalent to all-electric car performance, and can provide a no-change ride to suburbs beyond electrified

territory. Four GT/E cars were built by General Electric and four by Garrett AiResearch. Two Garrett cars were tested briefly at the DOT Transportation Test Center, Pueblo, Colo. All eight cars were tested in non-revenue service beginning in 1975 on the Long Island Rail Road, and entered revenue service in 1976 for a 12 month evaluation period.

Subcontractors are Garrett AiResearch and General Electric Company and Louis T. Klauder and Associates.

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0005

SPONSORING AGENCY: Urban Mass Transportation Administration; Metropolitan Transportation Authority (New York)

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090

Contract DOT-UT-613

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1971 COMPLETION DATE: July 1979 TOTAL FUNDS: \$14,800,000

ACKNOWLEDGMENT: UMTA

**03 138539**

**ADVANCED SUBSYSTEMS DEVELOPMENT PROGRAM (ASDP)**

The objective of this investigation, a part of the Urban Rapid Rail Vehicle Systems Program, is to achieve transit vehicles that are as reliable, safe and economical as possible, choosing subsystems which reduce the cost of operation and maintenance, reduce energy requirements and/or improve safety, comfort and performance. The components chosen for detailed development are the self-synchronous a-c traction motor, the monomotor truck with active suspension and the synchronous spin-slide control braking system with improved emergency stopping capability.

Subcontractors are Delco Electronics, Budd Company and Westinghouse Air Brake Division.

PERFORMING AGENCY: Boeing Vertol Company

INVESTIGATOR: O'Brien, T

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Tucker, HL Tel (202) 426-0090

Contract DOT-UT-10007

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1976 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$8,650,000

ACKNOWLEDGMENT: UMTA

**03 138559**

**VEHICLE INSPECTION**

Provides surveillance and non-destructive inspection of both vehicle and components. Directs and monitors government and contractor development and evaluation efforts in the areas of automated vehicle on-board surveillance, wayside inspection, and non-destructive inspection of components. Provides for the design and fabrication of transducer, computerized data collection and automated detection systems.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1976

ACKNOWLEDGMENT: FRA

**03 138565**

**ROLLING STOCK SAFETY**

The goal of the Rolling Stock Safety Program is to improve railroad safety through the development of (a) performance criteria for vehicles and vehicle components which are less prone to failures, (b) techniques and mechanics for predicting, detecting, and reacting to the failures which do occur, and (c) concepts to increase the accident survivability of vehicle occupants. Work is being undertaken concerning locomotives, hazardous material tank cars, component failure prevention, and track-train dynamics.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1976

ACKNOWLEDGMENT: FRA

**03 138796**

**RADIAL-AXLE FREIGHT CAR TRUCKS**

Agreement with South African Inventions Development Corp. covers application of radial-axle freight car trucks in North America based on Scheffel principles originated on South African Railways. Special wheel tread profile and diagonal bracing between axles minimize flange guidance in curves. Reductions in truck hunting, and wheel and rail wear, and rolling resistance in curves are major objectives.

REFERENCES:

Self-Steering Wheelsets Will Reduce Wear and Permit Higher Speeds., Scheffel, H, Railway Gazette International, Vol. 132 No. 12, 453-456 pp, Dec. 1976

PERFORMING AGENCY: Standard Car Truck Company, Proj. No. 30000

INVESTIGATOR: Bullock, RL Tel (312) 427-1466

SPONSORING AGENCY: Standard Car Truck Company

In-House

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Oct. 1973 COMPLETION DATE: Dec. 1977

**03 138797**

**RADIAL-AXLE PASSENGER CAR TRUCKS**

Agreement with South African Inventions Development Corp. covers development and prototype testing in North America of radial-axle trucks for main-line passenger, commuter and transit cars based on Scheffel principles organized on South African Railways. Objectives include improved running stability and riding comfort, and decreased wheel and rail wear.

See also 03A 138796.

PERFORMING AGENCY: General Steel Industries, Incorporated

INVESTIGATOR: Jackson, KL

SPONSORING AGENCY: General Steel Industries, Incorporated

STATUS: Active NOTICE DATE: Aug. 1976 START DATE: July 1976

**03 148336**

**HOPPER-BOTTOM BOXCAR FOR RAILROAD TRANSPORTATION**

Evaluate in the railroad operating and in the physical distribution system environments for bulk agricultural and various types of packaged agricultural and non-agricultural products two prototype hopper-bottom boxcars as a potential method for reducing the seasonal car shortages and costs of transporting grains and soybeans. Two prototype hopper-bottom boxcars will be placed in shuttle service on the Milwaukee Railroad. The service environments designed to exploit their potential will be determined by computer analysis of traffic flow patterns on the railroad. Revenue ton miles of both bulk and packaged shipments in relation to total car mileage and total car days will be determined for the prototype and for conventional box and covered-hopper cars transporting the same quantities of the same products. The performance levels and engineering design characteristics of both prototypes will be evaluated. Costs, advantages, and disadvantages of using the cars will be determined. Engineering design parameters for improving the cars and their performance will be developed. Cooperative Agreement No. 12-14-1001-951, under which this research will be done, was developed and signed early in the reporting period. Arrangements for the leasing of the two prototype hopper-bottom boxcars by the Milwaukee Railroad were subsequently completed with the British Columbia Railway, and arrangements were made with the U.S. Customs Service to bring the cars into the United States duty-free for evaluation. Applicable railroad freight tariffs were amended to permit shippers to use the experimental cars in lieu of regular equipment. A survey by the railroad identified potential cooperating shippers and receivers and specific freight traffic movements in which the cars could be evaluated were pin-pointed. Arrangements for cleaning, repair, and repainting of the cars in preparation for shipping experiments were made and specific plans for the evaluation were developed.

PERFORMING AGENCY: Chicago, Milwaukee, St. Paul and Pacific Railroad

INVESTIGATOR: Porter, EA

SPONSORING AGENCY: Agricultural Research Service, Department of Agriculture; Chicago, Milwaukee, St. Paul and Pacific Railroad

RESPONSIBLE INDIVIDUAL: Breakiron, PL

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1976 COMPLETION DATE: 1978 TOTAL FUNDS: \$60,000

ACKNOWLEDGMENT: Department of Agriculture, Current Research Information Service (CRIS-0043369)

03 159630

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 6. UTILIZATION IMPACTS OF FREIGHT CAR DESIGN AND SERVICEABILITY**

Evaluate the relationships between serviceability and freight car utilization. Analyze utilization costs associated with car purchase decisions based on initial purchase price alone. Standardization of car design will be investigated. Evaluate the utilization costs related to the rejecting of cars by shippers including the costs and benefits of different strategies to reduce the number of expected bad-order cars. Conduct a study to quantify the benefits of cooperative repair programs by individual railroads.

PERFORMING AGENCY: Association of American Railroads  
 SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads  
 RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
 Wooden, DG Tel (202) 293-5018

92500

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$92,500

ACKNOWLEDGMENT: AAR

03 159632

**MAINTAINABILITY METHODOLOGY FOR THE EVALUATION OF ALTERNATIVE HIGH SPEED PASSENGER TRAIN TRUCKS**

This work is for the development of a maintainability model for use on advanced passenger trains capable of at least 125 MPH (200 KPH). Passenger train locomotives and powered and non-powered cars will be considered. The model is to include costs associated with all truck components, such as braking equipment, generators, suspension systems, structural elements and traction motors. Acquisition and utilization of design and maintenance data in an appropriate model to provide a methodology suitable for specifying and evaluating new passenger train trucks is the major thrust of this project. Early in the project, the simulation cost model (SCM) technique was identified as being the most appropriate technique to use. It calculates the cost per unit time needed to operate the component or system under consideration. Sensitivity analyses can be run and future cost and component or system usage projections can be made. Since the technique incorporates dynamic analysis, the effects of gradually introducing a new or improved component can be estimated. A Final Report is in preparation.

PERFORMING AGENCY: Shaker Research Corporation  
 INVESTIGATOR: Krauter, AI Tel (518)877-8581  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (614)494-2046

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Dec. 1976 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$70,806

ACKNOWLEDGMENT: TSC

03 159633

**FABRICATE AND PACKAGE AN ENGINEERING PROTOTYPE NONDESTRUCTIVE RAILROAD ROLLER BEARING DIAGNOSTIC SYSTEM**

The purpose of this contract is to develop a nondestructive instrumentation system for evaluation. This system, a Railroad Roller Bearing Shock Emission Analyzer, will be used as a diagnostic tool to detect spalling and brinelling on roller bearings while mounted on wheelsets. Work on a Pulse Echo Ultrasonic Lubrication Detector has been discontinued due to technical problems and the development of No Field Lubrication (NFL) roller bearings.

PERFORMING AGENCY: SKF Industries, Incorporated  
 INVESTIGATOR: Board, D Tel (215) 265-1900  
 SPONSORING AGENCY: Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (617) 494-2046

Contract DOT-TSC-1377

STATUS: Terminated NOTICE DATE: Feb. 1979 START DATE: Aug. 1977 TOTAL FUNDS: \$156,792

ACKNOWLEDGMENT: TSC

03 160405

**IMPROVED PASSENGER EQUIPMENT EVALUATION PROGRAM**

The objectives of this program are to evaluate new passenger train systems and equipment now under development throughout the world, to develop standard methods and techniques for the evaluation of passenger train equipment, and to develop specifications for passenger train equipment.

REFERENCES:

Improved Passenger Equipment Evaluation Program Technology Review. Semiannual Report, Dow, AL, Unified Industries, Inc.; Federal Railroad Administration, FRA/ORD-77/74 32 pp, Oct. 1977, PB-277264/8ST

PERFORMING AGENCY: Unified Industries, Incorporated/SBA  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Lampros, AF Tel (202) 426-9564

Contract DOT-FR-74249 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$2,487,428

ACKNOWLEDGMENT: TRAIS

03 165811

**RAILCAR STANDARDIZATION--PHASE II**

The broad objectives of UMTA's Railcar Standardization program are to reduce or stabilize railcar initial and life cycle costs, reduce maintenance costs, increase fleet availability and permit evolutionary technology improvements. The contractor will perform a series of tasks including one requiring the development of a minimum number of car performance and dimensional specifications which collectively bracket future transit industry requirements.

REFERENCES:

Determination of The Optimal Approach to Rail Rapid Transit Car Standardization, Morris, R, Available at NTIS, UMTA-IT-06-0131-76-1 131 pp, 1976, PB-259-363

PERFORMING AGENCY: PB/Decision Group, IT-06-0175  
 INVESTIGATOR: Morris, RE Tel (703) 827-0227  
 SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment  
 RESPONSIBLE INDIVIDUAL: Mora, J Tel (202) 426-0090 Rhine, W Tel (202) 426-9545

Contract DOT-UT-70043

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Dec. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$850,000

ACKNOWLEDGMENT: UMTA

03 170601

**RAIL CAR STANDARDIZATION, PHASE II**

APTA will provide industry input, advice and consensus to UMTA contractor in their work in developing the standard rapid rail transit car specification.

PERFORMING AGENCY: American Public Transit Association  
 SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60004

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$140,000

ACKNOWLEDGMENT: American Public Transit Association

03 170604

**URBAN RAPID RAIL VEHICLES AND SYSTEMS PROGRAM PHASE IV**

The Urban Rapid Rail Vehicles & Systems (URRVS) Program includes two parallel efforts. One activity is directed towards completion of the Advanced Concept Train (ACT) and the other activity supports the Advanced Subsystem Development Program (ASDP).

PERFORMING AGENCY: American Public Transit Association  
 SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60060

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: \$389,309

ACKNOWLEDGMENT: American Public Transit Association

03 170608

**ENGINEERING DATA FOR CHARACTERIZATION OF RAILWAY ROLLING STOCK AND REPRESENTATIVE LADINGS AND WHEEL PROFILES**

This contract will provide engineering data to characterize the fleet of U.S. railway rolling stock, representative ladings and wheel profiles, for the range of freight, passenger and locomotive vehicles in current use or proposed for use in the near future. This data is intended primarily for use in parametric studies of rail vehicle/track system dynamic interactions, performed under separate contract (DOT-TSC-1302), and may also be useful to freight systems studies. The efforts of the contractor are expected to result in 1-Definition of major generic families of rail cars and locomotives based on similar configurational features; 2-Definition of truck configurations, couplers and representative ladings for each generic vehicle family; 3-Engineering parameters describing generic families of vehicles, trucks and ladings; 4-Descriptions of representative in-service wheel profiles for freight vehicles.

PERFORMING AGENCY: Pullman-Standard Car Manufacturing Company, Champ Carry Technical Center

INVESTIGATOR: Johnstone, B

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Di Masi, FP Tel (617) 494-2210

Contract DOT-TSC-1362

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1977 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: FRA

03 170617

**PERFORMANCE LIMITS OF RAIL PASSENGER VEHICLES**

The objective of this research is to identify the dynamic performance capability of conventional and innovative passenger truck designs. As a part of this objective, the best performance capability of generic optimum passive passenger trucks, employing conventional wheel-sets, will be established so that specific truck designs may be compared against the general optimum design. The research consists of defining, in an engineering sense, the performance boundaries (hunting, curving, derailment, ride quality, wheel-track force levels, etc.) of current and proposed passenger truck configurations. This work will compare the performance of conventional passenger trucks, optimized conventional trucks and new truck designs (e.g. the radial truck), to determine the performance limits of each class of passenger trucks.

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Mechanical Engineering

INVESTIGATOR: Hedrick, JK Wormley, DN Richardson, HH

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-70052

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1977 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: DOT

03 170630

**WHEELSETS WITH ASSEMBLED AXLEBOXES: DESIGN, MAINTENANCE AND STANDARDISATION**

Standardization of wheelsets with assembled journal bearings. Maintenance recommendations. Standardization of axles. Comparison of calculation methods. Comparative study of various types of roller bearings. Study of current flow through roller bearings. Fixation of brake discs on small wheels. Present state; (1) Standardisation of wheelsets with assembled journal bearings: a. Field tests on wheels of 920 mm Ø will be continued up to end of 1977. b. Tests on wheels of 1,000 mm Ø according to B 136/RP 2 have been commenced. c. Studies and tests for wheelsets fitted with small wheels are being carried out. Standardisation of axleshafts and fixation of brake discs on small wheels will also be dealt with here. (2) Establishment of a calculation method applicable to future standard wheelsets and recognised by the Member Administrations. The first interim report B 136/RP 3 was approved on October 1976. A full report B 136/RP 6 will be presented in April 1978. (3) Studies of maintenance methods for wheelsets with assembled axleboxes used by the different Administrations; report B 136/RP 7, October 1978. (4) Study of current flow phenomena. Inquiry results being evaluated; Report in April 1979. (5) Study of standardization of dimensions of roller bearings is being made with an inquiry (April 1978). Six reports have been published to date. Question B136.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973 COMPLETION DATE: 1979

ACKNOWLEDGMENT: UIC

03 170638

**STANDARDISATION OF AIR-CONDITIONING AND HEATING INSTALLATIONS**

With the delivery of the Eurofima prototype standard passenger coaches the B 107 Committee has been given an opportunity to study, in conjunction with the B 108 Committee, different air-conditioning systems (single and twin duct systems) installed in virtually identical coaches. Relevant measurements were taken in accordance with a test programme worked out by a joint group of the two Committees B 107 and B 108, the tests being carried out at the Vienna Arsenal Climatic Chambers. The results of these tests are described in the report B 107/RP 4 of October 1975. Further studies concern the interchangeability of given parts of air-conditioning systems and the improvement of the air distribution in the compartments.

Four reports have been published to date. Project B107.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

03 170639

**CONDITIONS WHICH SHOULD BE COMPLIED WITH BY WAGON COMPONENTS FOR 22 T AXLE LOAD**

Study concerning the adaptation of the present cars to an axle load raised from 20 to 22 t. Theoretical and tentative analysis of the structural elements of the car liable to affect directly the operational reliability and fatigue strength at increased axle loads. In the spring and summer of 1976, measurements were made on some test wagons at the PKP. In December 1976, a test train was subjected to fatigue tests on the test loop at Velim (in cooperation with the D141 Committee). At the beginning of May, the distance run by the test train was estimated at 20,000 Km (1st series with an axle load of 22 tons).

Question B142.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1976

ACKNOWLEDGMENT: UIC

03 170641

**ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTRE BUFFERS)**

Research, comparison and development of elastic systems for current and future traction and shock systems. Devices to protect the load (long-stroke shock absorbing systems, other means); preparation of leaflets for elastic systems and long-stroke shock absorbing systems. Acceptance testing of spring systems. Comparative tests with representative specimens of the five families of elastic systems have been concluded. All the results have been summarised in a report (RP 14). A joint leaflet has been prepared which will also include the special conditions for the friction cone, hydrodynamic compression and hydrostatic compression families of elastomers (from reports B 36/RP 12 and 13). The acceptance procedure for elastic elements has been initiated; the "ring spring types B 412B" (RP 16) and "B 412A" (RP 17) have been accepted; acceptance of types Jarret DC 13, Rheinmetall 129-11U and Sagem 12054 is in progress. Testing of load protecting devices (so far dealt with in reports No. 10, 11 and 15) is still to be completed. A leaflet for long-stroke shock absorbing systems has been prepared (RP 18). A joint UIC/OSJD leaflet is being prepared for an elastic system for passenger coaches (all elastic elements between two coupled coaches). Theoretical calculations are in progress for elastic systems dependent on speed.

Eighteen reports have been published to date. Question B36.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Lage, HH Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1959

ACKNOWLEDGMENT: UIC

03 170643

**TESTS ON AUTOMATIC COUPLING**

Work has continued to perfect the automatic coupler for wagons, chiefly regarding the interchangeability of various sub-assemblies and the design of the operating components. The engineering work on the automatic coupler for wagons has been completed in time. The revised complete set of drawings for the production of the automatic coupler is available. A rather large number of these couplers are already in use in trains on scheduled services to gather more findings on the wear characteristics and maintenance conditions. In this connection, trains with a total mass of about 5400 tonnes are also being equipped for ore traffic; they were placed in operation early in November 1976. Tests in progress on revenue earning services on the system of various administrations which, in to some extent difficult operating and climatic conditions, are being made with trains of a total mass of up to 5000 tonnes and fitted with couplers of the 1969 type will be continued. Studies covering the final design of the automatic coupler for passenger coaches have been completed. Some details of this coupler vary from that for wagons to do justice to the special conditions of a modern passenger coach; direct coupling with the automatic coupler for wagons in ensured. The first couplers will be supplied during the period ending 1977/beginning 1978. Preliminary tests will then be carried out immediately. The Specialists Committee is taking part in a large number of other studies: devices on the head stocks of wagons, installation drawings and automation questions connected with the automatic coupler.

Twenty reports have been published to date. Question B51.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Lang, M Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1968  
ACKNOWLEDGMENT: UIC

03 170646

**STANDARDISATION OF PASSENGER CARS**

Inquiry report B 106/RP 1 "Design of passenger accommodation" was presented in October 1971. In conformity with the decision of the 79th meeting of the ORE Control Committee in April 1977, application will be made to UIC to include question S 2031 "Permissible stresses on internal and external parts of passenger coaches" in the B 106 programme of work. Setting up a Specialist Committee B106 had been deferred until the bases for producing a program of work have been provided.

One report has been published to date. Question B106.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Lage, HH Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970  
ACKNOWLEDGMENT: UIC

03 170647

**UNIFICATION OF ELECTRICAL EQUIPMENT FOR PASSENGER COACHES**

Standardization of given electrical equipment of passenger coaches such as batteries, lighting, switch boards and instrument cabinets, remote control system for lighting and doors. In connection with the air-conditioning test being carried out by the B 107 Committee, the B 108 Committee is testing power supply systems in the same coaches. These tests cover several (380 V three-phase a.c., 50 Hz and 1000 V d.c.) with rotary transformer as well as systems with a static converter. The results of these tests were published in report B 108/RP 3. Further studies will serve to standardise the electrical equipment of passenger coaches, such as relays, safety fuses, lighting, batteries.

Three reports have been published to date. Project B108.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973  
ACKNOWLEDGMENT: UIC

03 170654

**MODERN SUSPENSION SYSTEMS FOR TWO-AXLED WAGONS**

The Specialists Committee made extensive strength and running tests with several selected solutions for existing suspension designs, which were assessed according to specified criteria and, taking as a basis the results of the studies and the tests, presented in April 1976, a proposal for a vertical type of progressive suspension system for two-axled wagons in service (B 13

4/RP 1). Operating tests concerning these solutions, and also studies regarding the profitability and suitability of this wagon for taking an axleload of 22 t, will be continued with a view to preparing a standard solution proposal. Completion of this work is expected in 1977. In addition, studies with newly developed progressive suspension systems for future two-axled wagons were initiated.

One report issued to date. Project B134.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1975 COMPLETION DATE: 1977

ACKNOWLEDGMENT: UIC

03 170658

**NON-POLLUTING SANITARY INSTALLATIONS**

In view of the doubts existing among passengers and authorities concerning the hygienic conditions of toilet systems installed in railway coaches (as a result of which several Administrations have already tested new solutions and suggested possible improvements) an examination is being made of the present position and of possible improvements. The differences in purchasing and maintenance costs for different variants of non-polluting toilets have also been established. The inquiry report B 140/RP 1, was approved by the Control Committee in October 1975. In accordance with the suggestions of the report, the rapporteur was asked to continue his work of observing the tests being made by the different administrations and to prepare a new report within two years. The second enquiry report was approved in October 1977. A Specialists Committee which presented its programme of work and Action Sheet to the Control Committee in October 1977 has meanwhile been set up.

Two reports have been published to date. Question B140.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1974  
ACKNOWLEDGMENT: UIC

03 170659

**NON-DESTRUCTIVE EXAMINATION PROCEDURES**

The E 139 Committee is studying the standardisation of non-destructive examination procedures for the acceptance testing of running gear at the works. It has initiated its studies by ultrasonic tests in the laboratory on axles; the results are now being evaluated; magnetoscopic tests are in progress. Ultrasonic tests on wheel tyres and solid wheels, which had been collected on various railways were made. A Working Group is preparing a list of expressions used in ultrasonic and magnetoscopic examinations. The E 139 Enlarged Committee, with the participation of representatives from 8 suppliers as Invited Specialists, had been set-up and had held its first meeting.

Question E139.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Minkes, S Office for Research and Experiments  
STATUS: Active NOTICE DATE: Aug. 1978  
ACKNOWLEDGMENT: UIC

03 170665

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 4--FUTURE SYSTEM STUDIES**

This task will evaluate critically future rail systems options, needs and proposed advanced-concept proposals in order to assess their potential for safe, cost-effective operation to provide direction and priorities for developments of the second stage of Phase III. The subtasks: (4.1) Compile a list of present and future test facilities and match these with future TTD requirements; (4.2) Investigate problem areas in current braking systems, including use of pneumatic system simulation models; (4.3) Survey the scope of options for development of hardware systems from a standpoint of future market opportunities and constraints; (4.4) Explore the engineering economics of car size and include the wheel-load/rail-wear relationships; (4.5) Catalog and evaluate currently proposed advanced concepts and development efforts for couplers, brakes, trucks and other components.

PERFORMING AGENCY: Association of American Railroads Technical Center  
INVESTIGATOR: Punwani, SK Tel (312) 567-3601 Sammon, JP Tel



(202) 293-4027

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

03 172456

### STANDARDISATION OF WAGONS

Standardization of freight cars (vehicles, subassemblies and parts) is being achieved in accordance with decisions of the Joint Meeting of the 4th/5th Committees of UIC--Operating and Rolling Stock and Motive Power. Test specifications and test programs are being developed. Plans are also made for adaption of operating rolling stock to receive the automatic coupler. Designs of eight types of cars, including three for transporting containers, have been completed with drawings. The ninth and tenth types to be standardized will be complete in 1978, an eleventh in 1979 and work on the 12th type is being undertaken. Standardization of car components is also progressing. To date a welded car truck, a cross gangway and 20-ft ISO container have been completed. Work on two other truck designs is to be concluded in 1978. Preliminary work on car ends and on the mechanical components of the brake system is also proceeding. Test programs are being developed; current attention is directed at leaf springs, fatigue strength of cars and buffing test conditions.

Twenty seven reports have been published to date. Project B12. An extended edition of report B12/RP17 has been published.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutte, H Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

03 179688

### IMPROVED AIR DELIVERY SYSTEMS FOR MECHANICALLY REFRIGERATED RAILCARS

Determine feasibility of through-the-load air circulation in railcars, effect of heavier loading on cooling rates and fruit quality. Determine type, size, and location of vent holes in boxes and slipsheets required for improved air circulation in tightly-stacked unitized loads. Stationary tests will be conducted to determine which of three air distribution systems and stacking patterns will give more rapid and uniform cooling of fruit. Paired shipping tests with citrus will then be made from California to eastern markets in conventional and modified railcars with the experimental systems. Condition of shipping container and product in a solid-stacked, in-register, and conventional pattern will be compared. Refrigeration equipment performance, cooling rates, and condition of product will be monitored in transit and evaluated. Costs of handling equipment, materials, and labor will be obtained to determine potential savings from unitized and palletized handling compared with conventional handling of individual boxes.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory, 1104-20614-008

INVESTIGATOR: Kindya, WG

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Feb. 1978 COMPLETION DATE: Feb. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0044323)

03 179689

### CONTAINER SYSTEM FOR GRAIN

Develop a concept for a container system for the handling, storage, and transportation of grain. Develop the basic configuration, characteristics, and technique of operation for all major elements of the system including the container, container fabricating equipment, container filler, handling equipment, storage facility, and highway, railroad, and ocean transport vehicles. The end product of this work unit is to be a concept report setting forth working drawings, description of operation, and preliminary projected cost comparison with the present system.

PERFORMING AGENCY: Agricultural Marketing Research Institute, Transportation and Packaging Research Laboratory, 1104-20614-006

INVESTIGATOR: Guilfooy, RF, Jr

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: July 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043920)

03 185234

### PLAN AND ESTABLISH A TRANSPORTATION EQUIPMENT RELIABILITY PROGRAM

TRIP is a government-initiated response to an acknowledged need to collect and analyze national transit equipment reliability information. The information generated will be disseminated to the transit operating industry, equipment suppliers, and federal organizations in order to define reliability problem areas, evaluate improvements, upgrade maintenance, improve equipment service and reduce cost. TRIP will cover rail vehicle reliability data and consists of two phases: Phase I covers the planning, designing, and testing of a small scale transit reliability data bank for a select group of rail vehicle components. Phase II is the establishment and operation of a full scale railcar reliability data bank.

PERFORMING AGENCY: Dynamics Research Corporation

INVESTIGATOR: Limpert, SB Tel (617) 658-6100 Silvia, PJ

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Robichaud, RH Tel (617) 494-2302

Contract DOT-TSC-1559

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: July 1980 TOTAL FUNDS: \$411,943

ACKNOWLEDGMENT: Dynamics Research Corporation

03 188652

### TRANSIT RELIABILITY INFORMATION PROGRAM (TRIP)

APTA will provide transit industry input, advise, and consensus to U.S. DOT-TSC and its contractor in their work to increase the operational reliability of transit equipment. Initial effort of TRIP is to develop an Experimental Data Bank (EDB) for analyzing reliability of selected components used on Heavy Rail Rapid Transit Cars. The EDB will serve to validate the basic concepts of TRIP. Application of the TRIP concepts will be eventually expanded to all transit car and wayside equipments including that used for fare collection, power, signalling, control, and communication.

PERFORMING AGENCY: American Public Transit Association

INVESTIGATOR: Gordon, TS Tel (202) 331-1100

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Robichaud, RH Tel (617) 494-2302

Contract DOT-TSC-1615

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 TOTAL FUNDS: \$20,954

ACKNOWLEDGMENT: American Public Transit Association

03 188657

### RADIAL-AXLE PASSENGER CAR TRUCKS

Design and production of a self-guided radial-axle passenger car truck capable of operation at speeds of 125 mph. Based on the Scheffel cross-anchor design (RRIS 03 138797), the non-powered version will be installed under Amcoach equipment for extended testing at Transportation Test Center.

PERFORMING AGENCY: General Steel Industries, Incorporated; Buckeye Steel Castings

INVESTIGATOR: Jackson, KL

SPONSORING AGENCY: Federal Railroad Administration, Office of Passenger System Research and Development; National Railroad Passenger Corporation

RESPONSIBLE INDIVIDUAL: Mitchell, MB Tel (202) 426-0966

STATUS: Active NOTICE DATE: Feb. 1979

04 054561

**ON BOARD ENERGY STORAGE FOR TRANSIT CARS**

Description: The design, development and testing of an electric propulsion system with an onboard energy storage unit for use on subway 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. Performance by computer analysis indicates a potential energy savings of 30%. Verification of performance compared to conventional car will be accomplished by operation on the NYCTA subway lines.

Subcontractor is Garrett AiResearch

**REFERENCES:**

Energy Storage Propulsion System for Rapid Transit Cars: System Design and Equipment Description, Raskin, D; Yutko, R, Available at NTIS, UMTA-NY-06-0006-75-1 46 pp, 1975, PB-249063

PERFORMING AGENCY: Metropolitan Transportation Authority (New York), NY-06-0006

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Technology Development and Deployment; Metropolitan Transportation Authority (New York)

RESPONSIBLE INDIVIDUAL: Mora, J Tel (202)426-0090

Contract DOT-UT-550

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1971 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$1,900,000

ACKNOWLEDGMENT: UMTA

04 058270

**ELECTRIFICATION AND ELECTRIC TRACTION**

This sub-program is a continuous effort and is concerned with advanced analytical and laboratory studies in electrical propulsion, as well as basic studies for electrification. The work includes power conditioning systems, linear electric motors, power collection, power distribution, and cost analyses.

PERFORMING AGENCY: Transportation Systems Center

INVESTIGATOR: Raposa, FL Tel 617-494-2031

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9665

PPA-RR-05

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

04 058280

**POWER AND PROPULSION SYSTEM, TECHNICAL AND SCIENTIFIC SERVICES AND DATA**

Task effort is to include: (1) energy charging analysis and charger station requirements for flywheel propulsion systems for various urban vehicles; (2) power conditioner surveys for the linear synchronous motor; (3) cost data and economic analysis of linear electric motor propulsion systems; (4) review of advanced propulsion, power, and train control approaches for improved freight operations; (5) updating of cost data of wayside power supply systems; (6) design analysis, including both magnetic field and circuit modeling of synchronous and asynchronous linear motors; (7) complex computer modeling and analysis of propulsion drive systems.

PERFORMING AGENCY: Kusko (Alexander) Incorporated

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Raposa, FL Tel (617)494-2031

Contract DOT-TSC-965 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1976 TOTAL FUNDS: \$124,000

ACKNOWLEDGMENT: TRAIS (612-0218)

04 059676

**INVERTER POWER SYSTEM FOR METROLINER**

To build a static inverter system capable of operating on a Metroliner vehicle which will be used in place of existing motor alternator system in providing auxiliary power. Due to the contract, Model unit will not be designed for under car installation.

PERFORMING AGENCY: Rohr Industries, Incorporated

INVESTIGATOR: Holt, J Tel (714) 575-2207

SPONSORING AGENCY: Transportation Systems Center, R6351

RESPONSIBLE INDIVIDUAL: Wlodyka, RA Tel (617) 494-2143

Contract DOT-TSC-1284 (CPFF)

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$393,000

ACKNOWLEDGMENT: TRAIS (R6351)

04 099377

**FLYWHEEL ENERGY STORAGE SWITCHER (FESS) SYSTEM ENGINEERING**

There are three phases which cover the system analysis, fabrication, testing and demonstration of a yard switching locomotive incorporating a flywheel energy storage unit. This project will utilize available hardware and existing knowledge to design, fabricate, and test the system. The three phases are, Phase I--System Analysis, Economic Analysis, and Bench Testing, Phase II--Design, Hardware Fabrication, Testing and Phase III--Demonstration.

Further work will depend on the results of Phase I, System analysis and Bench Testing.

PERFORMING AGENCY: Garrett Corporation

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel 202-426-0855

Contract DOT-FR-74247 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$428,000

ACKNOWLEDGMENT: FRA

04 159663

**WAYSIDE ENERGY STORAGE SYSTEM (WESS)**

Feasibility study assessing energy storage concepts for wayside application on long downgrades in railroad freight operations. Technical/engineering economic assessment will include location sites, integrated system concepts or flywheel stations and locomotives, power and energy requirements, locomotive modifications, wayside third rail and/or catenary, flywheel station hardware concepts, control system analysis, energy supplement concepts, interface with electrified railroads, economic viability and cost sensitivity, and recommendations for suitable follow-on work.

PERFORMING AGENCY: AiResearch Manufacturing Company

INVESTIGATOR: Lawson, LJ Tel (213) 323-9500 X2209 Cook, LM

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Koper, JM Tel (202)426-0808

Contract DOT-TSC-1349

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: May 1977 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$190,000

ACKNOWLEDGMENT: FRA

04 170637

**TRANSMISSION OF INFORMATION THROUGH A TRAIN-LINE**

This study concerns the definition, selection and development of a system for the transmission, first through the UIC loudspeaker cable and subsequently through the automatic coupler, of information which should serve to assist the subsequent automation within the train. Specifications for the transmission system are currently being prepared. These specifications which take into account the results of test runs on the systems of DB, FS, PKP and SNCF will enable recommendations for the choice of a system to be drawn up.

Four reports have been published to date. Question A103.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Vokac, P Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1967

ACKNOWLEDGMENT: UIC

04 179335

**ASSESSMENT OF THE PROSPECTS FOR A NEW ENGINE FOR PASSENGER AND FREIGHT RAIL SYSTEMS**

Evaluate propulsion for railroads and advise FRA on integration of propulsion R&D with related programs in other government agencies and with industry. Tasks include literature survey of prime movers which have

potential for replacing the diesel engine for locomotive propulsion; development of FRA R&D plan for replacement of diesel locomotives with locomotives not requiring petroleum fuel; analysis of plans to study and/or develop prime movers to meet needs of the railroad industry; recommendations for an overall FRA plan in this field.

PERFORMING AGENCY: Spriggs, (JO)

INVESTIGATOR: Spriggs, JO Tel (301) 946-3527

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Kamalian, N Tel (202) 426-9564

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1978 COMPLETION DATE: 1979

05 081802

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS--PHASE II. TASK 6--BRAKE SYSTEM**

Task objective is evaluation of the performance of present braking systems to identify those areas where improvements would result from the establishment of performance specifications and/or design guidelines. Evaluation will include stopping distance, reaction time, recharge time, wheel tread temperatures, rigging efficiency, etc. Evaluation will include parametric sensitivity study utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. If desirable, field testing of modified braking systems will be conducted. Task will also include field testing of effects on stopping performance caused by different brake shoes. These tests will be single car "breakaway" tests and will be augmented to full train characteristics using the dynamic simulation computer models.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Misner, GR Tel (312) 567-3587

SPONSORING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1975 COMPLETION DATE: 1978

ACKNOWLEDGMENT: AAR

05 148340

**STUDY OF ADVANCED PASSENGER TRAIN BRAKING SYSTEMS**

Purpose is to assess the functional performance and economics of various concepts for electromagnetic braking systems for use on locomotives, powered coaches, and non-powered coaches in passenger train operations. The assessment is to be carried out on all such systems in use or proposed regardless of the degree of development to actual hardware. Emphasis of the study will be upon those braking systems which utilize eddy-current effects for the braking force. A comparison study will also be made of braking systems in common use.

PERFORMING AGENCY: Kearney (AT) and Company, Incorporated

INVESTIGATOR: Eshelman, LL Tel (215) 563-3783

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Hazel, M Tel (617) 494-2651

Contract DOT-TSC-1298

STATUS: Terminated NOTICE DATE: Feb. 1979 START DATE: Oct. 1976 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$44,900

ACKNOWLEDGMENT: TSC

05 157901

**SYSTEMS ENGINEERING FOR BRAKING AND COUPLING SYSTEM DESIGN**

This program will evaluate the economic impact and engineering performance of various existing and innovative braking and coupling system concepts which might be candidates for future R&D implementation strategies.

PERFORMING AGENCY: Bolt, Beranek and Newman, Incorporated

INVESTIGATOR: Bender, EK Tel (617) 491-1850

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Jacobs, ME Tel (202) 426-0808

Contract DOT-FR-8091

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Nov. 1979 TOTAL FUNDS: \$350,000

ACKNOWLEDGMENT: FRA

05 159634

**DESIGN AND FABRICATION OF A WAYSIDE BRAKE INSPECTION SYSTEM FOR RAILROAD VEHICLES**

This contract is for the development of a brake inspection system. It is expected that the system will be able to determine the braking performance of freight cars in a dynamic mode as a train passes through the wayside system. Two techniques are to be integrated into the total system. Infrared measurement of the energy dissipated by the wheels. The second technique will use a short instrumented "reaction rail" section spliced into one rail to give a quantitative indication of the retarding force of the wheels.

A Final Report is in preparation.

PERFORMING AGENCY: Novatek Incorporated

INVESTIGATOR: Spaulding, D Tel (617)272-6230

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Yearwood, KW Tel (617)494-2046

Contract DOT-TSC-1323

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: \$77,753

ACKNOWLEDGMENT: TSC

05 170652

**BRAKE PADS FOR DISC BRAKES AND COMPOSITION BRAKE BLOCKS**

Report No. 1 contains the provisional acceptance conditions for brake pads. Studies concerning the physical and chemical properties of pads have been completed and the results are laid down in RP 2. Further tests should demonstrate the suitability of given test procedures for quality checks and also the correlation with the braking performance. Comparative tests on six different test rigs have been completed, studies concerning the causes of differences in the results are in progress and a report No. 4 will be presented in April 1978. Another enquiry concerning the use of composition brake blocks on all ORE administrations has been evaluated and the contents are laid down in RP 3 (initial enquiry B 64/RP 10). On the basis of reports B 64/RP 10 and B 126/RP 1 the final drafts of two UIC leaflets 541-3 and 541-4 have been worked out in co-operation with the UIC Sub-Committee for Braking. Tests in winter conditions (in the dynamic chamber of the Vienna Arsenal Vehicle Testing Station-MBVA) began in September 1977. Results are being analysed, and decisions on future tests will be taken early in 1978. The revised Action Sheet was approved by the Control Committee in October 1977. The B 126 Committee has been asked to prepare a detailed programme and a supplement to the Action Sheet on the problem of brake power limits.

Three reports have been published to date. Question B126.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

05 170656

**STANDARDISATION OF THE MATERIAL FOR CAST-IRON BRAKE BLOCKS**

Programme of work and the Action Sheet were approved by the Control Committee in October 1977. The selected cast-iron brake shoes are currently being supplied and the laboratory tests will be started in December 1977. Question B146.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Osuch, K Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1977

ACKNOWLEDGMENT: UIC

06 136338

**COMPUTER APPLICATIONS IN CONTROL OF RAILWAY SYSTEMS**

**DESCRIPTION:** This project encompasses development activity in the application of computers to the control of main line rail traffic, rail classification yards and high density rail and rapid transit interlockings. The general goals of these efforts are improvement of resource utilization, minimization of delays, and greater rail system throughput. Benefits are reduction in energy consumption and increased attractiveness of rail transport as an alternative to more energy intensive forms of transportation. Classification yard control includes automatic computer control of retarder for precise coupling speeds and the switching network for accurate car routing. Computer based management information systems operate in conjunction with the above for maintenance of rolling stock inventory. Development efforts are aimed at improving yard throughput while maintaining or improving coupling speed accuracy. Main line control projects currently underway emphasize centralization and simplification of dispatching and routing functions. Systems deployed to date utilize computer-aided control with the basic decision processes being performed by operating personnel. Development efforts are directed toward higher levels of automatic control encompassing larger areas of controlled territory to yield increased operating efficiency. High-density rail and rapid transit interlockings are ideal candidates for computer control because of their complexity and frequency of traffic. Computerized route finding is currently used in GRS systems, and systems in development will automatically perform many more of the necessary control functions allowing higher traffic densities to be accommodated.

**PERFORMING AGENCY:** General Railway Signal Company  
**INVESTIGATOR:** Means, JB  
**SPONSORING AGENCY:** General Railway Signal Company

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** July 1975

**ACKNOWLEDGMENT:** Smithsonian Science Information Exchange (AX 615 1)

06 138529

**TRACK CIRCUIT RESEARCH PROJECT**

The objectives of the Track Circuit Research Project are: 1) to develop a comprehensive file and bibliography on track circuits; 2) to develop analytical and computer models of the track circuit which can be used as research tools; 3) to collect the necessary data in order to validate the track circuit models; 4) to prepare several reports containing the information produced by the project. These reports fall into two separate categories, documentation of the track circuit models and a handbook containing the necessary information to understand track circuits.

**PERFORMING AGENCY:** Association of American Railroads Technical Center  
**INVESTIGATOR:** Patel, S Tel (312) 567-3618  
**SPONSORING AGENCY:** Association of American Railroads

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Sept. 1975

**ACKNOWLEDGMENT:** AAR

06 159656

**RAILROAD CLASSIFICATION YARD TECHNOLOGY: NEW CONCEPTS AND ADVANCED TECHNOLOGY IN FREIGHT CAR SPEED CONTROL**

The objective of this study is to select only the most promising car speed control concepts and technology and recommend them as candidates for yard integration and test demonstration. The most promising concepts and technology are to be selected on the basis of cost effectiveness, technical suitability and likelihood for near term (ten years or less) application in upgraded or new U.S. yards. The project will assess the advances in the state-of-the-art. The project will result in a recommended plan for yard integration and tests of the most promising concepts and advanced technology.

Contract to a performing agency has not yet been awarded.

**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** Cracker, WF, Jr Tel (202) 426-0855

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Feb. 1977 **TOTAL FUNDS:** \$250,000

**ACKNOWLEDGMENT:** FRA

06 159657

**RAILROAD CAR PRESENCE DETECTION DEVICES**

The objective of this study is to develop a performance specification for car presence detection devices. The project will assess the function and requirements for the device and evaluate the performance of present day devices. The effort will identify and evaluate causes of device failures and collect reliable data on performance. Engineering cost elements will be identified and an analysis of trade-offs between performance and cost.

**PERFORMING AGENCY:** Shaker Research Corporation  
**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** Cracker, WF, Jr Tel (202) 426-0855

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Sept. 1978 **COMPLETION DATE:** Nov. 1979 **TOTAL FUNDS:** \$210,000

**ACKNOWLEDGMENT:** FRA

06 160400

**EVALUATION OF SIGNAL/CONTROL SYSTEM EQUIPMENT AND TECHNOLOGY**

The status of present-day signal/control equipment and technology both in the United States and abroad will be evaluated. The results will be publicized and recommendations made for further developments and fabrication of a prototype system using the most advanced techniques. One goal of the program is to provide a standardized system for use on passenger routes with emphasis on using the best techniques of present day technology as used throughout the world.

**PERFORMING AGENCY:** STV, Incorporated  
**SPONSORING AGENCY:** Federal Railroad Administration

**Contract DOT-FR-773-4236 (CPFF)**

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Sept. 1977 **COMPLETION DATE:** Apr. 1979 **TOTAL FUNDS:** \$538,294

**ACKNOWLEDGMENT:** TRAIS

06 170610

**OPTICAL AUTOMATIC CAR IDENTIFICATION**

The overall objective of this task is the development of a performance specification for an OACI Scanner System of improved readability, to be achieved following design and test of selected modifications to existing equipment. The project is also intended to assess the possibility for improving the scanner reliability and maintainability with reduced life cycle costs. Specific goals include laboratory demonstration of improved readability, particularly for degraded labels and difficult ambient conditions; preparation of design guidelines for a compact self-calibrating scanner configuration requiring no air conditioning; and identification of maintenance benefits associated with improved system design. Under this task, modified scanner configurations will be demonstrated in the laboratory and will include the general improvements designed in FY '77 plus improved digital label data processing. A microprocessor will be selected to replace the existing label data processor, interfaced with the system, and necessary programming carried out. The end deliverables are performance specifications for a high performance, cost effective OACI scanner and documentation of the technical work leading to the performance specification.

**REFERENCES:**

Optical ACI--A New Look Specification, Wiseman, R; Ingrao, HC; Cracker, WF, Oct. 1978

Optical Automatic Car Identification (OACI) Scanner Long, LE, July 1978

Rail Car Identification Apparatus Long, LE; Wiseman, RL, U.S. Department of Transportation, PB-279347/9ST

Optical Automatic Car Identification (OACI) Volume I-Advanced System Specification, Long, LE, U.S. DOT-Res & Spec Prog Admin, Fed Railroad Admin, FRA/ORD-78/15.I Final Rpt., Dec. 1978

**PERFORMING AGENCY:** Transportation Systems Center, R8313  
**INVESTIGATOR:** Long, LE Tel (617) 494-2234  
**SPONSORING AGENCY:** Federal Railroad Administration  
**RESPONSIBLE INDIVIDUAL:** Long, LE Tel (617) 494 2234

**Contract DOT-RR-816 (78-RR)**

**STATUS:** Completed **NOTICE DATE:** Feb. 1979 **START DATE:** Nov. 1976 **COMPLETION DATE:** May 1978 **TOTAL FUNDS:** \$771,000

**ACKNOWLEDGMENT:** FRA

06 170628

**TRANSMISSION OF DATA TO 9.6 KBIT/S**

The Committee was set up in October 1976. At the request of the UIC Committee "Data processing", the A 145 Specialists Committee was entrusted with the task of carrying out practical investigations concerning data transmission, particularly on international railway transmission circuits at speeds from 4.8 to 9.6 kbit/s for application on the future international data processing (teleprocessing) network. The tests will only concern those modems that are recommended by the CCITT (V 29). It is suggested that the tests on modems should be made at Vienna-Arsenal and the measurements concerning the bit and block-error rates on the circuits proposed. The following circuits are proposed: Paris, Frankfurt, Vienna, Warsaw, Lucerne, Rome. The first three series of measurements have been made on the above mentioned circuits and the measured values are currently being processed.

Question A145

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Vokac, P Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976

ACKNOWLEDGMENT: UIC

06 170629

**ADAPTATION OF MARSHALLING YARDS FOR TAKING WAGONS WITH WHEEL BASE OF MORE THAN 14 M**

Adaptation of electric installations in classification yards for shunting of cars with wheelbase of adjacent axles of more than 14 m. The first stage consists of a technical analysis and an economic survey of existing solutions. The following stage will consist of the choice of solutions(s) for existing yards and/or yards still to be constructed.

Question D147.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Savarit, R Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

06 170631

**PROPAGATION OF RADIO WAVES**

The studies are intended to produce guiding principles and data for planning radio links on railway property, covering stations, lines and tunnels. ORE A 133/RP 1 reviewed the documentation available on radio wave propagation and proposed a classification system for railway terrain. Further to this report, methods for the measurement and test of radio propagation on lines, stations and tunnels were produced and applied to collect a considerable amount of experimental data in a number of Administrations. The first series of measurement for the studies were taken in all of the three principal areas of railway terrain. Further measurements are in progress.

One report has been published to date Question A133.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

06 170635

**APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES**

Analysis of possible interference in information transmission installations. Theoretical considerations for different d.c. and a.c. thyristor vehicles and tests. A brief summary of the previous work carried out by the A 122 Committee and of the results obtained have been published in an interim report (A 122/RP 16). It can be said that all important questions relating to tractive vehicles have been cleared up. Basically this also applied to signalling systems. Further studies serve to reveal the disadvantages as regards power collection, determination and definition of interference source characteristics, establishment of sensitivity characteristics of objects subjected to interference, superimposition of multiple source interference and confirmation of methods for calculating induced voltages. Results of investigations into the effects on telecommunication circuits and data transmission due to operating thyristor controlled a.c. tractive units (15 kV 16 2/3 Hz and 25 kV 50 Hz) are given in report A 122/RP 22 of April 1977.

Twenty two reports have been published to date. Question A122.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Hoppe, S Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

06 170650

**USE OF ELECTRONIC COMPONENTS IN SIGNALLING**

The ultimate object of the studies is to determine the types of electronic component which may be used in railway safety systems, also specifying their applications and the conditions in which they may be applied. The present phase of studies in this field has now been completed. A review of the work of this Committee leads to the following results: 1. Description of the working environment for electronics in railway signaling applications (RP 4 and RP 10). 2. General principles, definitions and methods of calculations applicable to safe electronic systems (RP 1, RP 3, RP 5, RP 6, RP 7). 3. Aids to the design of fail-safe electronic circuits (RP 2, RP 8). 4. Safe electronic systems based on computer technology (RP 9, RP 11, RP 12). Furthermore, a general review of the work of this Committee has been prepared (RP 13) and a problem description concerning the transmission of safety information is being prepared to serve as a basis for future work. It has also been agreed that a colloquium on the subject studied by A 118 will take place in 1980 to report on new developments and recent experience in this field.

Thirteen reports have been published to date. Question A118.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1971

ACKNOWLEDGMENT: UIC

07 049659

**HUMAN FACTORS IN RAILROAD OPERATIONS**

This continues a program of research and consultation on human factors in railroad safety in support of FRA regulatory responsibilities involving human performance. Current work includes measurement of air contaminants in the train crew environment, development and evaluation of train handling aids, studies of crew alertness, design of a locomotive cab based on functional requirements, and study of employee motivation.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

INVESTIGATOR: Devoe, DB

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

07 148352

**ALCOHOL AND DRUG ABUSE PROGRAMS IN THE RAIL INDUSTRY: PHASE II**

To develop techniques and program factors that can be used in the development and improvement of alcohol and drug abuse programs. Included in this development will be the verification cost effective measures, and of program effectiveness evaluation techniques. The end goal is to provide information necessary for every railroad to voluntarily develop an alcohol and drug rehabilitation program that will meet its own organizational objectives and needs.

PERFORMING AGENCY: University Research Corporation

INVESTIGATOR: Mannelo, T Tel (301) 524-3936

SPONSORING AGENCY: Federal Railroad Administration; Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: Jan. 1979

ACKNOWLEDGMENT: FRA

07 170590

**CONFERENCES ON RAILROAD PERSONNEL DEVELOPMENT/ASSISTANCE**

Co-sponsor conferences which familiarize railroad labor and management officials with FRA research activities. Topics of these conferences include but are not limited to alcohol and drug rehabilitation research, training and labor-management communications improvement.

Summaries and/or proceedings available on request.

**REFERENCES:**

Conference on the Detection, Prevention, and Rehab of the Prob Drinker Employee in the RR Industr, Cornell U, Jan 1976, Proceedings 1975

Employee Assistance--An Alternative to Tragedy, Texas Transportation Institute, November 1976, Proceedings 1976

Local Level Labor-Management Workshop (Carson Inn Project) Chicago, Milwaukee, St Paul & Pacific Railroad, Nov. 1976

Conference on Public Support for Railroad Training Stewart (DA) and Associates, Jan. 1978

SPONSORING AGENCY: Federal Railroad Administration, Office of Policy and Program Development

RESPONSIBLE INDIVIDUAL: Vass, TJ Tel (202) 472-7280

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1975

ACKNOWLEDGMENT: FRA

07 170598

**A STUDY OF HUMAN FACTORS ASPECTS IN LOCOMOTIVE CAB DESIGN**

The purpose of this study is to make recommendations and to specify further research needs with respect to locomotive cab design with a view to maximizing crew job satisfaction, crew safety and work efficiency.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 7.65.76

INVESTIGATOR: Wilde, GJS Tel (613) 547-6219

SPONSORING AGENCY: Association of American Railroads Technical Center

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3604

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Oct. 1976 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$80,000

ACKNOWLEDGMENT: CIGGT

07 170662

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 1--TTD TECHNOLOGY SHARING AND IMPLEMENTATION**

This task will develop effective education and training program aids to facilitate dissemination to operating levels of what is known now as a result of the TTD research program. The subtasks: (1.1) Promote safer train make-up through improvement in the knowledge of yardmasters, locomotive engineers and other operating personnel; (1.2) Improve safety awareness of maintenance-of-way and maintenance-of-equipment of conditions of track and equipment that affect derailment tendency and catastrophic failure; (1.3) Tell the TTD story through a newsletter to the rail and supply industry, the government and educational community; (1.4) Develop workshops to coordinate and support the technology transfer of the TTD program; (1.5) Plan, organize and promote a TTD conference to involve the general research community, railroads, suppliers, government and universities.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Zotti, RF Tel (312) 567-3585 Miller, CJ

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyar, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1978 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

08 049658

**RAIL SAFETY/GRADE CROSSINGS PROTECTION**

The program will consist of three major tasks: (1) Development of Application Guidelines for Train 'on board' conspicuity and impact attenuation devices. (2) Innovative System development will study new grade crossing protection concepts. (3) System Analysis will establish inter-administration state and railroad requirements for a data system to accommodate new FRA grade crossing inventory and other data.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

INVESTIGATOR: Hopkins, JB Tel (617) 494-2023

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

08 058459

**ON-BOARD LOCOMOTIVE/AUTO IMPACT TEST DEVICE**

Develop a locomotive/auto impact test device to be evaluated in train-strikes-vehicle validation tests at the DOT High Speed Ground Test Site at Pueblo, Colorado. The development is part of TSC Grade Crossing Safety Research and Development sponsored by the Federal Railroad Administration, Office of RD&D, and is directed toward possible improvement in protection for automobile occupants during grade crossing accidents. The attenuator is also intended to decrease the possibility of train derailment due to automobile engine block entrapment under the locomotive.

PERFORMING AGENCY: Minicars, Incorporated

SPONSORING AGENCY: Transportation Systems Center, RR-502

RESPONSIBLE INDIVIDUAL: Tong, P Tel (617) 494-2539

Contract DOT-TSC-997 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1975 COMPLETION DATE: Apr. 1978 TOTAL FUNDS: \$122,180

ACKNOWLEDGMENT: TRAIS (RR-502), FRA

08 159644

**COMPUTER SIMULATION OF DERAILMENT IN RAILWAY GRADE CROSSING COLLISION (ENDEV)**

Development of a digital computer program to analyze the collision of road and rail vehicles at grade crossings and a sensitivity analysis of the effect on rail vehicle derailment by several variables.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 8.35.77

INVESTIGATOR: Churchas, D

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: English, GW Tel (613) 547-5777

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$80,725

ACKNOWLEDGMENT: Queen's University, Canada

08 159654

**GRADE CROSSING SAFETY**

Development of reliable and intelligent train detection, constant warning time devices, off-track train detection and warning devices, and active advance warning signals.

PERFORMING AGENCY: Federal Railroad Administration

SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1977 TOTAL FUNDS: \$800,000

08 185241

**IMPACT OF INCREASED COAL SHIPMENTS IN THE MINNESOTA-NORTH DAKOTA RAIL CORRIDOR**

This study of the Burlington Northern mainline from the western border of North Dakota to Minnesota's Twin Cities and to the Minnesota-Wisconsin border near Superior, WI, will focus on low-cost solutions to problems encountered by communities through which frequent unit trains are handling increasing coal traffic. Of particular concern will be grade crossings and problems involving environment, socioeconomic factors and community development.

PERFORMING AGENCY: Department of Energy; Department of Transportation; Burlington Northern, Incorporated

SPONSORING AGENCY: Department of Energy; Department of Transportation; Burlington Northern, Incorporated

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1978 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: \$2,500,000



09 058267

**METALLURGICAL TESTS AND ANALYSIS FOR HAZARDOUS MATERIAL RAILROAD TANK CARS**

The objectives of this task are to (a) collect a data base on railroad tank car and pressure vessel steels, (b) prepare guidelines for steels to be used in railroad tank car construction, (c) evaluate the elevated temperature performance characteristics of TC-128 steel, and (d) perform a metallurgical evaluation of full scale tanks tested at White Sands Missile Range and tanks involved in actual rail accidents.

PERFORMING AGENCY: National Bureau of Standards, Institute for Materials, Metallurgy Division

INVESTIGATOR: Interrante, CG Tel 301-921-2997

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202)426-1227

AR-40008

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1973 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: FRA

09 104358

**FIBER REINFORCED CONCRETE**

Economical sophisticated mix designs involving different cementitious materials and properties are being developed for steel fiber reinforced concrete. Fracture characteristics are being studied for concretes reinforced with different fibers. /SIE/

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering

INVESTIGATOR: Kesler, CE

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1972 COMPLETION DATE: 1978

ACKNOWLEDGMENT: Science Information Exchange (NIL 753 4), Illinois University, Urbana

09 135495

**EVALUATION OF SHOTCRETE THEORY AND TECHNIQUES**

Purpose of study/investigation: To evaluate shotcrete as a construction material for application to Corps project, i.e., to determine correct sampling techniques, pertinent physical properties, problem areas, and limitations of usage. Approach or plan: A summary of what is known about (1) shotcrete from various users, (2) available equipment, and (3) laboratory tests will be made. Both fine and coarse aggregate mixtures will be utilized using the two types of shotcreting equipment (wet and dry). Basic properties, procedures, limitation, and applications will be studied. Progress to date: (1) To date. Laboratory work, approximately 80 percent complete, has been conducted on four types of shotcrete: fine and coarse dry process and fine and coarse wet process shotcrete. Information has been developed on the compressive, tensile, and shear strength of each type of shotcrete. In addition, data have been secured on bond of old shotcrete to fresh shotcrete, permeability and freeze-thaw resistance, and bond to reinforcing steel. (2) Anticipated FY 74. The remaining data on tests mentioned above will be secured, tabulated, and analyzed. The field application phase will be planned and initiated.

PERFORMING AGENCY: Waterways Experiment Station, Concrete Laboratory

INVESTIGATOR: Mather, B

SPONSORING AGENCY: Army Corps of Engineers, Department of the Army

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1973

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (ZTK 367)

09 136093

**PROTECTION OF WOOD IN USE**

OBJECTIVE: Modify existing procedures and develop new ones for imparting a high resistance to wood against biological degradation and harmful weathering action, with special attention to minimizing objectionable environmental side effects. APPROACH: Develop new concepts and procedures for preserving wood such as chemical modification of the polysaccharides in wood. Determine the practicality of diffusion-type treatments for various wood species by studying the effectiveness of various combinations of salts and pretreating steps. Develop improved water-repellent-preservative finishes by increasing the permanence of fungicidal chemicals used in such finishes. Improve the permanence of coatings by

modifying the surface of wood as an acceptor of finishes. Assess benefits derived from wood preservatives and from treated wood products.

REFERENCES:

Nonconventional Wood Preservation Methods Rowell, RM, ACS Symposium Series 43(4): 47-56, 1977

Characterization of the Attack on Wood by the Marine Borer Limnoria Tripunctata, Kalnins, MA, Amer. Wood-Preserver's Assoc. Proc. 72: 250-262, 1976

Performance of Single- and Dual-Treated Panels in a Semi-Tropical Harbor, Johnson, BR, Amer. Wood-Preserver's Assoc. Proc., 1977

PERFORMING AGENCY: Wisconsin University, Madison, Forest Products Laboratory

INVESTIGATOR: Feist, WC Tel (608) 257-2211 Gjovik, LR Johnson, BR Rowell, RM

SPONSORING AGENCY: Forest Products Laboratory, 0040038 FPL3212

RESPONSIBLE INDIVIDUAL: Youngs, RL Tel (608) 257-2211

In-House

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GY 40038 2), Forest Products Laboratory

09 138557

**IMPROVED INSPECTION, DETECTION AND TESTING RESEARCH**

This Division will plan, implement, sponsor and provide overall technical control and direction to development programs in the area of improved inspection, detection and testing techniques and equipment designed to improve railroad safety. The Division is the FRA contact point for all such programs and will provide for interchange of technological information among interested parties within the department, other government agencies and industry. Programs include Safety Life-Cycle Testing, Vehicle Inspection, Track Inspection and Testing, and Automated Inspection System Development.

For the subprograms see RRIS Nos. 03A 138558, 03A 138559, 01A 138560 and 01A 138561.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202)426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975

ACKNOWLEDGMENT: FRA

09 138558

**SAFETY LIFE-CYCLE TESTING**

Develops, recommends, promotes and implements, a safety life-cycle testing and evaluation program. Provides facilities, equipment and technology necessary to detect and evaluate the cause and effect of rolling stock and track deterioration/failure thru the accumulation of Life-Cycle testing, data and experience.

PERFORMING AGENCY: Federal Railroad Administration, Improved Inspection, Detection and Testing Research Division

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Winn, JB Tel (202) 426-1682

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977

ACKNOWLEDGMENT: FRA

09 148320

**FLAMMABILITY STUDIES AND TOXICOLOGICAL EVALUATION OF MATERIALS USED IN TRANSPORTATION VEHICLES**

The increasing use of plastics and other man-made materials in various vehicular interiors poses new flammability, toxicity, and smoke generation hazards. Various government agencies and manufacturers have been considering the establishment of performance standards for materials used in interior finishes and several new materials have been developed in anticipation of such standards. This research describes a comprehensive approach to the general materials testing problem, leading to the establishment of design criteria and standards which shall result in fire-safe vehicles for the future. A complete study shall be made of the burning characteristics of various interior materials ignited inside simulated enclosures. Test conditions shall be varied to investigate the effects of the following factors:

1) Flammability ratings of the materials as obtained from laboratory tests.  
 2) Ventilation rates as provided by different size openings into the enclosure.  
 3) Partitioning of the enclosure by use of a fire barrier curtain. 4) Discharge of toxic gases into the interior space. A comparison of the flame resistant properties offered by different materials will be conducted. Results of the research will be used to propose new flammability test standards and specific recommendations for increasing vehicle-interior fire protection will be offered.

PERFORMING AGENCY: Rice University, Rice Center for Community Design and Research

INVESTIGATOR: Margrave, JL

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Bolger, PH

Contract DOT-OS-60149

STATUS: Active NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$175,000

ACKNOWLEDGMENT: DOT

#### 09 170603

##### SMOKELESS CABLE

APTA is providing industry input to UMTA and UMTA's contractor in the determination of representative insulation materials from a wide sampling of manufacturers and the determination of whether any of these can meet criteria which will be established by taking into consideration the fire hazards inherent in transit systems.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Transportation Systems Center

Contract DOT-TSC-1277

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1976 COMPLETION DATE: Oct. 1978 TOTAL FUNDS: \$24,000

ACKNOWLEDGMENT: American Public Transit Association

#### 09 179345

##### COMPOSITE MATERIALS COMPRISING REACTION-INJECTION-MOLDING COMBINATIONS OF CARBON FIBERS AND THERMOSETTING RESINS

The objective of the research is to establish feasibility of utilizing chemical compositions comprising polyurethanes and polyepoxides, suitable for adaptation to RIM manufacture, in combination with carbon fibers, carbon fiber veil mats, and carbon fiber kevlar mats. It is the further objective of Phase I to define typical physical characteristics of the composites which can be expected to be processable by means of RIM technology. Finally, it is a still further objective of the study of Phase I to define a part suitable in the transportation industry which would serve as a model for the program to be conducted in Phase II of the project. The research consists of a) definition of a rigid polyurethane matrix suitable for use of RIM machines, comprising the selection of a suitable polyether-diphenyl-methane diisocyanate polymer; b) preparation of test composites the above-described fiber products (chopped fibers, mats), and rigid polyurethane or polyepoxide on a laboratory scale with catalyst systems which are known to be operational in RIM equipment; and c) the more promising products resulting from the above machine casting work will be tested. The transportation field, specifically, the automotive vehicle, is receiving considerable attention because of high energy usage. A much lighter-weight vehicle would help solve this and related problems. However, in order to be of use in the automotive industry, these composites must be manufactured by means of high-speed processes. This research will demonstrate the usefulness of RIM techniques. This research is being supported under the NSF Program Solicitation, "Small Business Innovation Applied to National Needs."

PERFORMING AGENCY: Plastics Technology Associates, Incorporated

INVESTIGATOR: Hostettler, F

SPONSORING AGENCY: National Science Foundation, Division of Intergovernmental Science and Public Technology, ISP-77-19711

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$24,725

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 417)

#### 09 179346

##### TECHNOLOGY ASSESSMENT OF ADVANCED COMPOSITE MATERIALS

Advanced composites are relatively expensive high-technology materials that are now used selectively in high-performance applications. Manufactur-

ers of advanced composites are predicting that their costs will decrease significantly over the next few years, so that these materials will be competitive with metals in specific mass market applications. Such continuing cost reductions and an increasing need for high-performance materials in at least two major sectors of the economy, automotive transportation and energy conversion, may result in a period of major growth for the advanced composites industry. If this occurs, a new commodity material industry would emerge with all the concomitant changes and impacts implied. The objective of this work is to develop a framework, through the identification of issues and questions related to the development and use of advanced composite materials, for carrying out a comprehensive assessment of potential long-term socioeconomic and environmental impacts which would result from the increasing uses of these materials in various sectors of the economy.

PERFORMING AGENCY: Argos Associates Incorporated

INVESTIGATOR: Kaiser, R

SPONSORING AGENCY: National Science Foundation, Division of Exploratory Research and Systems Analysis, ERS77-19647

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$24,969

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 402)

#### 09 179691

##### CORRUGATED PACKAGE ENGINEERING

Determine ways to utilize wood resources more efficiently through improved engineering, design, and converting of both existing and underutilized fibers. Determine what performance criteria are needed in converting linerboard and corrugating medium to corrugated fiberboard as produced from existing and underutilized fibers; determine the most efficient placement of fiber in the corrugated structure; establish the relationships between the performance of the component paperboards, combined board and finished containers; provide improved and new engineering and design information about the physical requirements of packaging materials for their efficient performance in the service environment. Determine that the strength of particleboard is affected by rate of loading and duration of load in much the same way that solid wood and hardboard are affected. Evaluate the effect of moisture content on the engineering properties of structural particleboards made from forest residues. These properties generally were not changed by low humidities but were reduced by high humidity. Engineering properties of Forest Service Structural Flakeboard are being evaluated. A number of laminated particleboard railway crossties have been fabricated from discarded ties and evaluated. Results are promising. This development could solve supply, disposal, and pollution problems. A first draft of a performance standard for packaging was presented to ASTM D-10. The performance of pallets assembled with staples was found to be acceptable. Further confirmation was found that the use of an impact panel on a forklift truck greatly extends pallet life. Pallets using medium density hardboard as deck material were found to give good resistance to forklift impacts. For conventional nailed wood pallets, butting the first and second to deckboards increased resistance to handling impacts. Auxiliary walls to improve the sound insulation between living spaces in existing buildings were evaluated and found to give significant improvement if not limited by flanking paths. An interrelationship between partition, flanking, and field sound-transmission loss was developed to establish empirical flanking limits.

PERFORMING AGENCY: Forest Products Laboratory

INVESTIGATOR: Koning, JW, Jr

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1972 COMPLETION DATE: June 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0040039)

10 058132

**PROGRAM FOR LOCOMOTIVE AND MARINE DIESEL ENGINE PERFORMANCE AND EMISSIONS**

To improve engine efficiency and reduce emissions from large medium speed diesels. Methods include the use of waste lube oil, determining ship duty cycle, optimization of prop/pitch loading, development of engine diagnostics, and the use of water-in-fuel emulsions.

## REFERENCES:

A Study of Fuel Economy Emission Reduced Methods for Marine and Locomotive Diesel Engines, Storment, J, Sept. 1975

Waste Oil Burn-off in CG Powerplants Storment, J, July 1976

Use of water-in-fuel-Emulsions in a Single Cylinder Diesel Engine, Storment, J

PERFORMING AGENCY: Southwest Research Institute

INVESTIGATOR: Storment, JO Tel (512)684-5111x2643

SPONSORING AGENCY: Transportation Systems Center, CG-407; United States Coast Guard

RESPONSIBLE INDIVIDUAL: Mason, RL Tel (617)494-2514

Contract DOT-TSC-920

STATUS: Active NOTICE DATE: Jan. 1977 START DATE: Nov. 1974 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$400,000

ACKNOWLEDGMENT: TRAIS (CG-407)

10 058621

**RAILROAD RETARDER NOISE REDUCTION**

A cooperative effort is planned between DOT (TSC), and the BN to collect, assess and disseminate information regarding the character of the noise environment associated with the operation of active retarders in railroad classification (hump) yards and also, to present in useful form information on how to reduce retarder noise locally and to surrounding communities by the use of noise barriers. Information will be obtained by a measurement, barrier construction and evaluation program to be conducted at the Northtown freight classification yard of the Burlington Northern Railroad, Fridley, Minnesota.

PERFORMING AGENCY: Burlington Northern, Incorporated

SPONSORING AGENCY: Transportation Systems Center, OS-507

RESPONSIBLE INDIVIDUAL: Rickley, EJ Tel (617)494-2372

Contract DOT-TSC-1035 (CPFF)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1975 TOTAL FUNDS: \$69,150

ACKNOWLEDGMENT: TRAIS (OS-507), FRA

10 058675

**DEVELOPMENT OF ENGINEERING DATA ON IN-SERVICE PERFORMANCE AND COSTS OF METHODS FOR CONTROL OF URBAN RAIL SYSTEM NOISE**

The objective is (1) to develop definitive engineering data on long term costs and performance of four noise control techniques, and (2) to organize and present the data to permit engineering estimates of costs and performance of the techniques on any urban rail transit system in the United States. The techniques are: (a) use of resilient wheels on transit cars, (b) use of damped wheels, (c) use of wheel truing equipment to remove wheel flats and reduce wheel roughness, and (d) use of rail grinding equipment to reduce rail roughness.

## REFERENCES:

In-Service Performance and Costs of Methods for Control of Urban Rail System Noise. Experimental Design, Holowaty, M; Saurenman, H; Rosen, S, UMTA-MA-06-0025-76-4Intrm Rpt., May 1976

In-Service Performance and Costs of Methods to Control Urban Rail System Noise. Test and Eval Plan, Saurenman, H; Holowaty, M, UMTA-MA-06-0025-7710Intrm Rpt., Apr. 1977

In-Service Performance and Costs of Methods to Control Urban Rail System Noise, Initial & Final Rpt Test Series Rpt, Shipley, RL; Saurenman, H

PERFORMING AGENCY: De Leuw, Cather and Company

SPONSORING AGENCY: Transportation Systems Center, UM-949

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1975 COMPLETION DATE: May 1979 TOTAL FUNDS: \$480,000

ACKNOWLEDGMENT: TRAIS (UM-949), TSC

10 138534

**NOISE ABATEMENT**

Identified as a major systems problem for transit authorities, this program has as its objective the reduction of noise and vibration on urban rail transit systems. Problem areas have been identified and the noise climate on operating authorities has been appraised. Tests and evaluation of available abatement hardware are to be made. New technology is to be developed. A handbook on noise and vibration control is to be produced.

PERFORMING AGENCY: Transportation Systems Center

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Spencer, PR Tel (202) 426-0090

Contract DOT-UM-604

STATUS: Active NOTICE DATE: July 1976 START DATE: 1971 COMPLETION DATE: June 1979 TOTAL FUNDS: \$3,500,000

ACKNOWLEDGMENT: UMTA

10 148341

**WHEEL/RAIL INTERACTION SIMULATOR**

Design of a machine which simulates interaction of rails and wheels for purposes of noise measurements.

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication

INVESTIGATOR: Curmi, RA Tel (416)248-3771

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication

RESPONSIBLE INDIVIDUAL: Curmi, RA Tel (416)248-3771

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Dec. 1976 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: Ontario Ministry of Transportation & Communication, Roads and Transportation Association of Canada

10 148349

**ADDITIONAL RAIL RAPID TRANSIT NOISE STUDIES BASED ON THE NEW YORK CITY TRANSIT AUTHORITY**

This work is a continuation of the work performed by the Polytechnic Institute of New York on "Noise Assessment and Cost of Abatement in the NYCTA Rail Transit System." Three efforts are being undertaken: 1) Cost Data and Analysis work will aim at improved quantification of the costs associated with noise control treatments. 2) Field Measurements of noise in and near selected cars or trackage will quantify rates of degradation of improvements in terms of noise. 3) Analysis of Car Maintenance Records will be used to correlate car status with noise characteristics and to help determine useful life and costs of car improvements, overhaul and time since certain key repairs.

PERFORMING AGENCY: Polytechnic Institute of New York

INVESTIGATOR: McShane, WR Tel (212) 643-5525 Slutsky, S

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

Contract NY-11-0002

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Mar. 1976 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$62,304

ACKNOWLEDGMENT: UMTA

10 170655

**RAILWAY NOISE**

The reference values for the noise and vibration stresses to which people are exposed is established along with the propagation of train running noise and the influence of sound protection barriers and vehicle skirting. Proposals for noise abatement measures for older railway vehicles and the effect of time on the acoustic behaviour of railway vehicles are presented. Noise generation during the wheel/rail rolling contact and when braking and negotiation sharp curves are discussed. A report about noise levels inside and outside the vehicles of various Administrations was approved in the meantime. It takes into account statutory regulations and gives provisional guide values for noise levels. A further report explains radiation and propagation conditions for railway noise in free field on embankments and in cuttings. A detailed work program is being drawn up for dealing with sound variation from bridges. Furthermore, the influence of sound protection barriers and vehicle skirting has been studied. Curve screech and braking noise tests are terminated. The findings have been summarized in a report. An interim report is now available concerning experience with technical noise abatement measures for old vehicles.

Seven reports have been published to date. Question C137.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Thiele, W Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UIC

#### 10 179325

##### TRANSPORTATION NOISE RESEARCH

Transportation noise is the single most intrusive noise as rated by the American public. In an effort to reduce this noise, the U.S. Department of Transportation has recognized that the development of appropriate noise measurement methodologies and their substantiating data bases are a necessity for the development of quieter transportation systems. In order to assist DOT in this area, NBS is conducting in-cab locomotive noise measurements sponsored by the Federal Railroad Administration. The objective of this program is the development of a measurement methodology and instrumentation system for assessing the noise environment in locomotive cabs. The information obtained from this assessment is to be in a form such that the total noise exposure or "dose" of each of the crew members can be determined. In addition, the measurement techniques utilized are to provide a means of identifying individual component sources as well as specific locomotive operations which might contribute to the noise levels in the locomotive cab. As a further extension of this program, the feasibility of developing a stationary measurement methodology which provides information that can be correlated to the results obtained for in-service operations is to be examined.

##### REFERENCES:

Locomotive In-Cab Noise--Towards a Standardized Measurement Methodology, Clark, RM; Kilmer, RD; Blomquist, DS, 77 Nat'l Noise Conf on Transp Noise Control Hampton, Va 7710, Proceedings, 1977

PERFORMING AGENCY: National Bureau of Standards, 7353432

INVESTIGATOR: Kilmer, RD Tel (301) 921-3381

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Clarke, RM Tel (202) 426-1227

Contract IAG-AR-T4269

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: National Bureau of Standards

#### 10 179685

##### RAILROAD RIGHT-OF-WAYS AS WILDLIFE HABITATS IN STORY COUNTY, IOWA

Inventory the kinds and numbers of mammals and birds that utilize habitats found along railroad right-of-ways in an intensely farmed region of central Iowa. Associate bird and mammal use with specific right-of-ways habitats. Assess the relative importance of railroad right-of-ways to the total available wildlife habitat in Story County, Iowa. Sampling plots will be selected by a stratified random method and will comprise about 5% of the rural, right-of-ways in Story County, Iowa. The strata will be active Right-of-ways, abandoned right-of-ways, right-of-ways with exceptional native prairie, and right-of-ways adjacent to wetlands. Vegetation in all sampling plots will be covermapped. A census of birds and rabbits will be taken in each season of the year using a plot method known as the bounded count. Small mammal populations will be evaluated by trapping. Other mammal activity will be determined by evaluating "sign". The relative importance of right-of-way habitats will be assessed by comparisons with similar evaluations done on other wildlife habitat in Story County.

PERFORMING AGENCY: Iowa State University, Ames, Department of Animal Ecology, IOW02268

INVESTIGATOR: Klaas, EE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073892)

#### 10 188647

##### URBAN RAIL NOISE ABATEMENT PROGRAM

Provide services of an Advisory Board comprised of cognizant transit

professionals recruited from rail transit properties (those operating, under construction and in design). Advisory Board, from the transit operators point of view, will review with U.S. DOT-TSC and its contractor both the progress and findings on the following contracts: (1) SEPTA In-Service Test & Evaluation Project--Acoustical performance and cost-benefits of various types of resilient/damped wheels and techniques for wheel truing and rail grinding. (2) Elevated Structure Noise Control Project--Inventory of elevated rail rapid transit structures and assessment of noise reduction techniques. (3) Handbook of Urban Rail Noise & Vibration Control--Development of design, construction, operation and maintenance guidelines for control/minimization of noise and vibration associated with urban rail systems.

PERFORMING AGENCY: American Public Transit Association, 7232

INVESTIGATOR: Gordon, TS Tel (202) 331-1100

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2124

Contract DOT-TSC-1123

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1976 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$68,000

ACKNOWLEDGMENT: American Public Transit Association

#### 10 188654

##### HANDBOOK OF URBAN RAIL NOISE AND VIBRATION CONTROL

The objective of this contract is to produce a Handbook for the Prediction and Control of Urban Rail Noise and Vibration. This Handbook is intended to serve as a major source of information for transportation engineers and acousticians as well as a convenient tool for transit property personnel in this daily requirements for measurement, assessment, and control of rail noise and vibration.

PERFORMING AGENCY: Wilson, Ihrig and Associates, Incorporated, MA-06-0025

INVESTIGATOR: Wilson, G Tel (415) 658-8386

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

Contract DOT-TSC-1613

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Dec. 1979 TOTAL FUNDS: \$110,000

#### 10 188655

##### DEVELOPMENT OF A NOISE CONTROL DESIGN GUIDE FOR EXISTING ELEVATED RAIL TRANSIT STRUCTURES

Primary objective will be development of rules for reducing noise on those types of urban rail elevated structures which have the greatest environmental noise impact in the U.S. Deliverables will include an "Inventory of U.S. Urban Rail Transit Elevated Structures," computer implementation of relevant elevated structure noise models, a "Noise Control Design Guide for Existing Elevated Rail Transit Structures," and an experimental design for in-service test and evaluation of selected treatments.

PERFORMING AGENCY: Bolt, Beranek and Newman, Incorporated, UM-06-0025

INVESTIGATOR: Ungar, E Tel (617) 491-1850

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Kurzweil, LG Tel (617) 494-2142

Contract DOT-TSC-1531

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1978 COMPLETION DATE: July 1980 TOTAL FUNDS: \$322,000

#### 10 188673

##### ENHANCEMENTS TO THE SES COMPUTER PROGRAM AND ITS APPLICATIONS

The objective is to improve the current version of the Subway Environment Simulation (SES) computer program, expand its applications based on current needs of the transit industry, and facilitate its utilization by the industry. Task work involves the review and analysis of the state-of-the-art in subway environmental control, particularly with regard to fire-emergency control techniques; major revisions in the SES program and its documentation; and transfer of software maintenance capabilities to TSC computer equipment.

# Environmental Protection

10A

PERFORMING AGENCY: Parsons, Brinckerhoff, Quade and Douglas, Inc  
INVESTIGATOR: Kennedy, WD  
SPONSORING AGENCY: Transportation Systems Center  
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept.  
1978 COMPLETION DATE: Mar. 1980

11 058273

**EVALUATION OF ELECTRICAL PROPULSION BY MEANS OF IRON-CORED SYNCHRONOUSLY OPERATING LINEAR MOTORS**

This project constitutes the initial research phase of synchronous linear motors for transportation. The motors considered are restricted to those having both the excitation and armature windings on the same structure, i.e., on board the vehicle. The primary objectives are to determine the feasibility of two types (the homopolar inductor and the claw-pole) for propulsion of railroad vehicles, and to establish a basis for further exploratory R&D on a test wheel. The aim is to develop an alternate to the present linear induction motor, with the potential for higher efficiency and power factor, larger clearances with the reaction rail, and useful attraction and guidance forces to inhibit vehicle derailment.

PERFORMING AGENCY: Polytechnic Institute of New York

INVESTIGATOR: Levi, E Tel (212) 643-4486

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9564

STATUS: Active NOTICE DATE: Aug. 1977 COMPLETION DATE: Apr. 1979

ACKNOWLEDGMENT: FRA

11 058375

**MORGANTOWN PERSONAL RAPID TRANSIT SYSTEM IMPACT EVALUATION PHASE I**

This study consists of four phases as follows: (1) Pre-PRT phase prior to passenger service of the system, (2) Interim Phase during initial passenger service, (3) Operational Phase following introduction of revenue service, and (4) Final Phase integrating all data about Phase I system. The study objectives include (a) to measure the service and accessibility of the system, (b) to determine the nature of system patronage, (c) to describe the operational costs and revenues of the system, (d) to examine the attitudes toward the systems, (e) to measure the impact of the PRT on travel and traffic, the economy, the society, and the environment in the PRT corridor. The Pre-PRT and Interim Phases have been completed. The Operational Phase is scheduled for completion in February 1979. The Final Report Phase is scheduled for completion in March 1979.

PRT Impact Study, Pre-PRT Phase. March 1976, Volume 1- Travel Analysis, SEG Elias; Volume 2-Data Collection Methodology and Coding Manual; Volume 3-Frequency Tabulations from Transportation Related Surveys, CN Redwine. Interim Phase. June 1977, Impact Evaluation of Morgantown PRT 1975-1976 Ridership: Interim Analysis, M.D. Stearns and K.H. Schaeffer.

PERFORMING AGENCY: West Virginia University, WV-03-0006 DOT-TSC-1316

INVESTIGATOR: Elias, SEG Tel (304) 293-5536

SPONSORING AGENCY: Transportation Systems Center, UM-839; Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Stearns, MD Tel (617)494-2796 Rubin, D Tel (617) 494-2160

Contract DOT-TSC-985

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1975 COMPLETION DATE: May 1979 TOTAL FUNDS: \$272,333

ACKNOWLEDGMENT: UMTA, West Virginia University, TSC

11 059365

**ANALYSIS OF THE MORGANTOWN INDUCTIVE COMMUNICATION SYSTEM DESIGN**

Provide a report documenting the Morgantown Inductive Communication System Design. The report shall contain the following elements: a) Provide a general description of the MPRT System and its operation including a description of the Control and Communications System; b) Describe the system level design requirements and the resulting design, analysis and development test program undertaken to meet and validate these requirements as well as the rationale that led to the selection of the communication techniques implemented in the MPRT System; c) Describe the significant analysis and test results obtained, with emphasis on the major problem areas encountered at Morgantown and the solutions to these problems; d) Provide a detailed description of efforts made to develop a guideway analytical model, any validation tests performed and known limitations of work done to date. Define areas which must be expanded or validated to develop a useful guideway model.

PERFORMING AGENCY: Boeing Company, P.O. Box 3999, DOT-TSC-1275

INVESTIGATOR: Johnstone, T Tel (206) 773-1826

SPONSORING AGENCY: Transportation Systems Center, R6782

RESPONSIBLE INDIVIDUAL: Yoh, P Transportation Systems Center Tel (617)494-2271

Contract DOT-TSC-1275 (CPF)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1976 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$21,525

ACKNOWLEDGMENT: TRAIS (R6782)

11 059380

**SYSTEMS OPERATION STUDIES FOR AUTOMATED GUIDEWAY TRANSIT SYSTEMS**

No Abstract.

PERFORMING AGENCY: General Motors Corporation

SPONSORING AGENCY: Transportation Systems Center, R6709

RESPONSIBLE INDIVIDUAL: Priver, AS Tel (617) 494-2357

Contract DOT-TSC-1220 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$3,683,091

ACKNOWLEDGMENT: TRAIS (R6709)

11 059421

**LINEAR INDUCTION MOTOR RESEARCH VEHICLE (LIMRV) TEST PROGRAM**

The primary object of this test program is to obtain essential test data on linear induction motors and on truck/rail dynamics, as well as correlation of this data with theory and mathematical models. The LIMRV is considered an important testbed because of its unique instrumentation and speed range. The LIMRV has established a world speed record for steel-wheel on steel-rail vehicles of 411.5 Km/h.

PERFORMING AGENCY: AiResearch Manufacturing Company

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202)426-9665

Contract DOT-FR-64226 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Apr. 1976 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$1,210,000

ACKNOWLEDGMENT: TRAIS

11 059435

**ALTERNATIVE GUIDEWAY CROSS SECTION STUDY**

The successful implementation of advanced technology transportation systems-systems more advanced than those currently being investigated in UMTA's Automated Guideway Transit (AGT) program-may well depend on the ability of system designers to develop low cost, elevated, aesthetically pleasing guideways permitting extensive switching and carrying two-way vehicle flow. Possible guideway configurations which meet these criteria include those with an elevated single beam span which can support two-way flow by either suspending the vehicles from the side of the beam or in an over-and-under configuration. What is needed is a rational approach to measure the overall effectiveness of the various guideway possibilities, particularly with regard to structural efficiency and cost.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Wormley, DN

SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-9364

ID DOT-AS-70005

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 TOTAL FUNDS: \$20,000

ACKNOWLEDGMENT: TRAIS

11 059924

**MULTI-DISCIPLINARY STUDY OF THE USE OF TRAINS OR PLATOONS OF VEHICLES FOR URBAN AUTOMATED GUIDEWAY TRANSPORTATION (AGT)**

The project undertakes research on the use of trains or platoons of vehicles in combination with individual small vehicles for urban automated transportation. The multi-disciplined study will undertake two tasks: 1) System Operations-Relate the technological characteristics of the trained AGT

systems to the potential economic and service advantages these systems offer. 2) Vehicle Control- Investigate vehicle control configurations. Determine what kind of vehicle control system will permit operations at the highest capacity level. Derive and justify the safety assumptions and synthesize and simulate the controller configuration. Conduct a single-vehicle/train capacity analysis.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Shladover, SE  
 SPONSORING AGENCY: Urban Mass Transportation Administration, MA-11-0029  
 RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Grant DOT-MA-11-0029

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Nov. 1978 TOTAL FUNDS: \$47,000

ACKNOWLEDGMENT: TRAIS (MA-11-0029)

11 135604

#### COMMAND AND CONTROL SYSTEMS FOR ADVANCED TRANSPORTATION SYSTEMS

This project is a study of new "people mover" concepts which may evolve to provide practical attractive alternatives to the private automobile as a mode of transportation. Each concept requires a command and control system not only to provide safety but also to ensure efficient and expeditious movement of traffic. In all cases operation is automatic with respect both to the onboard control of the propulsion and brakes of the individual vehicles and also to the overall coordination of system functions. Development effort has been directed toward meeting new requirements of advanced system concepts. Especially in the area of Personal Rapid Transit, controls are being developed to meet the conflicting need to achieve traditional standards of rapid transit safety while permitting the short headways necessary for acceptable capacity with small vehicles. A family of control systems is being realized for applications varying widely with respect to vehicle characteristics, guideway configuration, and operating policy (scheduled or demand modes of service).

PERFORMING AGENCY: General Railway Signal Company  
 INVESTIGATOR: Auer, JH  
 SPONSORING AGENCY: General Railway Signal Company

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1974

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (AQ 881 2)

11 138792

#### MORGANTOWN PRT SYSTEM

Develop a personal rapid transit system capable of carrying 5,000 passengers per lane per hour at a 15-second headway, prove the technical feasibility of a fully automated PRT, determine economic and service benefits of a PRT system and assess the institutional problems encountered in building such a system in an urban environment. The concept of automatic control for a vehicle system operating on close headways and the fail-safe concept using checked redundancy have been validated. Design for expansion of the system is underway. Present system is being expanded under an UMTA Capital Grant of \$63.5M to the West Virginia Board of Regents from 3 stations, 5.4 miles single lane guideway, and 45 vehicles to 5 stations, 8.4 miles single lane guideway, and 73 vehicles. An Additional maintenance facility, a heated power rail, and other technical improvements will also be added.

#### REFERENCES:

Morgantown PRT System Boeing Aerospace Company, Nov. 1975  
 PRT Impact Study (Pre-PRT Phase) Elias, SEG, Mar. 1976  
 Morgantown PRT Operation & Maintenance History Stone, AL, Boeing Aerospace Company, Jan. 1977  
 Morgantown PRT Impact Evaluation. Interim Analysis Of Ridership, Stearns, M; Schaeffer, K, Mar. 1977

PERFORMING AGENCY: Boeing Company; West Virginia University  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Barsony, SA Tel (202) 426-2896

Contract WV-06-0005

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1970 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$60,000,000

ACKNOWLEDGMENT: UMTA

11 148334

#### NON-CONTACT SUSPENSION/PROPULSION TECHNOLOGIES

An integrated magnetic levitation/propulsion system is a possible candidate for achieving noiseless, lightweight urban and moderate speed interurban transportation. The objective of this research is to explore the feasibility of such systems for high-speed interurban transportation. A single-sided linear induction motor (LIM) and reaction rail will be fabricated and tested on the rotating wheel facility operated by the Canadian Institute of Guided Ground Transport at Queens University in Kingston, Ontario. These tests and subsequent analysis will be used to place SLIM performance in context with competing magnetic levitation schemes.

PERFORMING AGENCY: Mitre Corporation, Metrek Division  
 INVESTIGATOR: Milner, JL Tel (703) 790-6456  
 SPONSORING AGENCY: Urban Mass Transportation Administration  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-UT-50016

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$409,362

ACKNOWLEDGMENT: DOT

11 148346

#### NON-CONTACT SUSPENSION/PROPULSION TECHNOLOGIES

This is a US/Federal Republic of Germany cooperative research project. The objective is to determine the limits of allowable guideway flexibility and roughness for high-speed attraction magnetic levitation systems. Tests will be conducted using the German-developed 400 K/h KOMET test vehicle and track. The test data will be used to validate vehicle/guideway computer simulations which will be used to perform parametric studies.

PERFORMING AGENCY: Mitre Corporation, Metrek Division  
 INVESTIGATOR: Milner, JL Tel (703)790-6456  
 SPONSORING AGENCY: Office of the Secretary of Transportation; Transportation Systems Center  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-TSC-1263

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: Sept. 1977 TOTAL FUNDS: \$90,000

ACKNOWLEDGMENT: DOT

11 148347

#### ASSESSMENT OF TECHNOLOGY BASE AND APPLIED RESEARCH FOR NON-CONTACTING VEHICLE SUSPENSION AND PROPULSION SYSTEMS

The research shall assess critically the technological base available for the evaluation of non-contacting suspension and propulsion systems in urban and intercity transport systems. The assessment involves critical reviews of existing data, identification of gaps in current technology and areas which show promise for the future. An applied research program to provide performance data for selected ferromagnetic and fluid non-contacting propulsion and suspension systems complements the general assessment.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Hedrick, JK Tel (617)253-2246 Richardson, HH  
 SPONSORING AGENCY: Office of the Secretary of Transportation  
 RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202)426-9365

Contract DOT-OS-60135

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: June 1979 TOTAL FUNDS: \$250,000

ACKNOWLEDGMENT: DOT

11 149463

#### SYNCHRONOUSLY OPERATING LINEAR ELECTRIC MOTORS FOR GROUND TRANSPORTATION

To conduct studies, primarily analytical, of certain aspects of linear synchronous motor operation and design. To review work of General Electric, done under a related contract, on the design of linear synchronous motors, and on the construction and testing of a small scale model of such machines.

#### REFERENCES:

Preliminary Method for Design of a Linear Synchronous Motor, Inductor Type, Levi, E, Jan. 1977

PERFORMING AGENCY: Polytechnic Institute of New York, Department of Transportation Planning & Engineering, PR-4227  
 INVESTIGATOR: Levi, E Tel (212)643-4486 Birenbaum, L Zabar, Z  
 SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202)426-9665

Contract DOT-FR-64227

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1975 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$62,660

11 156700

**DYNAMIC EXPERIMENTS OF ALTERNATIVE GUIDEWAY-VEHICLE SYSTEMS**

The broad purpose is to experimentally investigate vehicle-elevated guideway response dynamics. Non-dimensional system responses such as critical bending moments on multiple-span bridges and associated heave accelerations of passing, sprung-mass vehicles are correlated with computer-aided predictions. Similar results are being obtained for cable-stayed bridges and curved spans.

REFERENCES:

Experiments in Guideway-Levitation Vehicle Interaction Dynamics, Wilson, JF, NTIS, FRA-OR&D 76-259, July 1976

Experiments in Guideway-Levitation Vehicle Interaction Dynamics, Wilson, JF, NTIS, July 1976, PB-257941

Transient Dynamics of Curved Guideway Structures: Frequency Spectra, Wilson, JF; Garg, DP, AIAA/ASME 18th Structures Conference, Paper 77-371, Mar. 1977

Transient Dynamics of Curved Guideway Structures for Urban Vehicles Dynamic Responses, Wilson, JF, Proc 8th Annual Conf on Modeling and Simulation, Apr. 1977

Orthotropic Plate Responses to Convective Loads Wilson, JF, Developments in Theoretical and Applied Mechanics, Volume 9, 1978

Dynamics of Curved Guideway Spans for AGT Vehicles Wilson, JF; Joseph, TP, Proc Conf Automated Guideway Transit Tech Devel; US DOT, Mar. 1978

Frequencies of Annular Plate and Curved Beam Elements Wilson, JF; Garg, DP, AIAA Journal, Mar. 1978

Dynamic Experiments of Alternative Guideway-Vehicle Systems, Part I, Wilson, JF, DOT/RSPA/DPB-50/7711, June 1978

PERFORMING AGENCY: Duke University, 343-9934

INVESTIGATOR: Wilson, JF Tel (919) 684-2434 Garg, DP

SPONSORING AGENCY: Office of the Secretary of Transportation

RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-60130

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1976 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$116,361

ACKNOWLEDGMENT: Duke University

11 159658

**AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, SYSTEM SAFETY AND PASSENGER SECURITY PROJECT**

The objectives of the project are to develop automated guideway transit guidelines for: (1) passenger security, (2) evacuation and rescue, (3) passenger safety and convenience services, (4) develop a model of the passengers values and needs with regard to personal security, (5) determine safe emergency deceleration and jerk maxima and passenger seat retention characteristics, and (6) evaluate and disseminate guidebook information through safety and security workshops.

As part of this effort a study on the effects of a closed-circuit television system on passenger security perception is being conducted in cooperation with the New York City Transit Authority. Subcontractors are University of Virginia and the Vought Corporation

PERFORMING AGENCY: Dunlap and Associates, Incorporated

INVESTIGATOR: Pepler, RD Tel (202)655-3971

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Sussman, ED Tel (617)494-2041

Contract DOT-TSC-1314

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977 COMPLETION DATE: Jan. 1979 TOTAL FUNDS: \$588,000

ACKNOWLEDGMENT: UMTA

11 159659

**AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, VEHICLE LATERAL CONTROL AND SWITCHING (VLACS) PROJECT**

The VLACS project will develop AGT vehicle lateral control and switching concepts that (1) reduce cost, weight, and complexity, (2) improve performance (ride quality), life, reliability, and increase switching capability. The VLACS project provides for an experimental program to validate and evaluate the analytical design studies. Both contact (mechanical) and non-contact (wire follower) lateral control systems will be evaluated. To aid government officials, transit planners and system manufacturers, the VLACS project will develop lateral control and switching system guideline specifications and data base of the current technology.

PERFORMING AGENCY: Otis Elevator Company, Transportation Technology Division

INVESTIGATOR: Haines, GA Tel (303) 343-8780

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4048

Contract DOT-UT-70088

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$869,477

ACKNOWLEDGMENT: UMTA

11 159660

**AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, VEHICLE LONGITUDINAL CONTROL AND RELIABILITY**

Reduce cost and complexity and increase reliability of Longitudinal Control Systems through the following steps: (1) Technology Evaluation and Model Development; (2) Vehicle Longitudinal Control Studies; (3) Reliability Enhancement Studies; (4) Entrainment and Platooning Studies; (5) Experimental Program; (6) Data Base Development and Guidelines Specification and Requirements.

PERFORMING AGENCY: Otis Elevator Company, Transportation Technology Division

INVESTIGATOR: Schumacher, PJ Tel (303)343-8780

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Contract DOT-UT-70048

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$2,562,000

ACKNOWLEDGMENT: UMTA

11 159662

**AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY. SYSTEMS OPERATION STUDY**

The objectives of the System Operation Study are to evaluate the applicability of AGT systems to alternative application areas as well as to make AGT computer analysis tools available to AGT systems and investigate the operational characteristics of automated guideway transit systems in network configurations such as simple shuttles or loop, line haul networks and complex or area-wide networks.

PERFORMING AGENCY: General Motors Corporation, Transportation Systems Division

INVESTIGATOR: Thompson, J Tel (313)575-8485

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: MacKinnon, D Tel (202) 426-4047

Contract DOT-TSC-1220

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 TOTAL FUNDS: \$3,200,000

ACKNOWLEDGMENT: UMTA

11 160276

**AUTOMATED GUIDEWAY TRANSIT TECHNOLOGY PROGRAM, GUIDEWAY AND STATION TECHNOLOGY PROJECT**

Develop guideway, station and weather protection concepts which will reduce the cost of AGT systems. The work includes: state-of-the-art reviews of existing AGT guideways and stations found at AGT and AGT related systems and weather protection provisions and techniques; the development of design guidelines for AGT guideways and stations including site integration; the development of evaluation models, including cost and



implementation time, for AGT guideways and stations; and the development of a dynamic model calibrated by using ride quality data from selected AGT systems.

## REFERENCES:

AGT Guideway and Station Technology, Volume 2, Weather Protection Review, Stevens, RD; Nicarico, TJ; McGean, TJ, UMTA-IT-06-0152-79-1Aavail NTIS, Mar. 1978

AGT Guideway and Station Technology, Volume 3, Guideway and Station Review, Stevens, RD; Dolan, CW; Pour, RJ; Nettles, TA, UMTA-IT-06-0152-79-2Aavail NTIS, Sept. 1978

PERFORMING AGENCY: De Leuw, Cather and Company, P2914

INVESTIGATOR: Stevens, RD Tel (312) 346-0424

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4047

Contract DOT-UT-70066 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$999,685

ACKNOWLEDGMENT: TRAIS

## 11 160399

## FRA ADVANCED SYSTEMS PROGRAMS

The FRA Advanced Systems Programs were reduced to that of only monitoring activities of other countries. The Department took this action to reflect the position that revitalizing and upgrading our existing railroads was of a higher priority than developing technology for advanced systems that would not be needed for some years to come. The Department should keep abreast of the technology developments in other countries so that when it is again decided that this country needs to develop advanced systems, we will have the right information on which to base our technical choices from our own independent evaluations of the state-of-the-art.

PERFORMING AGENCY: Massachusetts Institute Of Technology

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Kamalian, N

Contract DOT-FR-751-4331 (CR)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$9,945

ACKNOWLEDGMENT: TRAIS

## 11 170589

## ACCELERATING WALKWAY DEMONSTRATION

A moving walkway which accelerates a user from a 1.5 mph entrance speed to a 7.5 mph cruise speed and then decelerates the user back to a 1.5 mph exit speed is being developed, tested and demonstrated. The system provides an up to five times improvement in cruise speed compared to conventional constant speed moving walkways.

PERFORMING AGENCY: Port Authority of New York and New Jersey, IT-06-0126

INVESTIGATOR: Fruin, J Tel (201) 963-7205

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Izumi, G Tel (202) 426-4048

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1976 COMPLETION DATE: Dec. 1982

ACKNOWLEDGMENT: UMTA

## 11 170593

## ECONOMIC FEASIBILITY OF A MAGNETICALLY LEVITATED TRANSPORTATION SYSTEM IN THE CANADIAN CORRIDOR

The economic feasibility of a magnetically-levitated high-speed (350 km/h and (450 km/h) passenger system in the Canadian Corridor is being evaluated in terms of its relative viability vis a vis very-high-speed conventional rail (300 km/h) and intermediate-speed conventional rail (200 km/h) alternatives. Project objectives include design optimization, the investigation of possible implementation scenarios and development time frames, and an assessment of economic and/or commercial viability.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 8.48.77

INVESTIGATOR: Lake, RW Tel (613) 547-5777 Boon, CJ Eastham, AR

SPONSORING AGENCY: Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Audette, M Tel (514) 283-2880

Contract OST-77-00109

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Dec. 1977 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: CIGGT

## 11 170605

## AGTT/AGRT SUPPORT AND CONSENSUS

APTA will provide UMTA's AGRT and AGTT programs with transit industry input, advice, and consensus on automated guideway transit technology and advanced group rapid transit in such areas as classification, basic requirements, service and operational requirements, passenger accommodations, system and subsystem design requirements, and system verification, certification, and acceptance.

PERFORMING AGENCY: American Public Transit Association

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-70058

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Feb. 1977 COMPLETION DATE: June 1979 TOTAL FUNDS: \$99,738

ACKNOWLEDGMENT: American Public Transit Association

## 11 170621

## VEHICLE DATA ACQUISITION SYSTEM

One of the SEATAC SLT vehicles will be instrumented with sensors, scanner, and data storage device to be designed and developed. The device will record the condition of 32 sensors for the most recent 20 minutes in order to aid with vehicle diagnostics in the event of a failure. A data processing system will produce a strip chart of the recorded sensor outputs within one hour of a failure. A failure analysis wing VDAS will be carried out for 6 months, and the results, including cost effectiveness of such a system, documented in a Final Report.

PERFORMING AGENCY: SEA-TAC International Airport, Port of Seattle

INVESTIGATOR: Bitts, MK Tel (206) 433-5407

SPONSORING AGENCY: Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Hoyler, RC Tel (202) 426-4047

Grant DOT-WA-06-0009

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: July 1978 TOTAL FUNDS: \$88,295

ACKNOWLEDGMENT: UMTA

12 055784

**TOXICOLOGICAL AND SKIN CORROSION TESTS ON HAZARDOUS MATERIALS**

Toxicological data are inadequate for classifying certain of the materials being transported. The work is to verify further the suitability of proposed transportation health hazards classification criteria and to permit classification of additional materials according to these proposed criteria.

PERFORMING AGENCY: Department of the Air Force, Toxic Hazards Division

SPONSORING AGENCY: Materials Transportation Bureau, Department of Transportation

RESPONSIBLE INDIVIDUAL: Harton, EE, Jr Tel 202-4262311

IA AS-40079

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: June 1974 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$88,860

ACKNOWLEDGMENT: TRAIS, Materials Transportation Bureau

12 058266

**RAILROAD TANK CAR FIRE PROGRAM**

The objectives of this task are to (1) perform laboratory scale fire tests to evaluate the effectiveness of coatings in providing fire protection for tank cars and (2) develop analytical models of pool and torch fires.

PERFORMING AGENCY: Ames Research Center, Aeronautics and Space Technology Office, NASA

INVESTIGATOR: Mansfield, J Tel 415-965-5991

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202)426-1227

AR-30033

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: May 1973 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: FRA

12 058838

**SYSTEM SAFETY-AN INTERDISCIPLINARY APPROACH TO TRANSPORTATION SAFETY**

The effort concerns an analysis of system safety at the planning and design stages of new transportation facilities, equipment or programs and in the operational stages of existing facilities or ongoing programs. Specific results shall be generated in methodology and guidelines and in case studies. The specific objectives of the first phase of the research are: 1. To transfer applicable systems reliability concepts to the transportation safety sector. 2. To identify and resolve key issues in transportation safety. 3. To develop a preliminary systems safety methodology applicable to the transportation modes.

**REFERENCES:**

Transportation Systems Safety. A Literature Search and Annotated Bibliography, Cantilli, EJ et al, Mar. 1976

Key Issues in Transportation Safety Horodniceanu, M et al, June 1976

Transportation System Safety Methodology Cantilli, EJ et al, Jan. 1977

Safety Issues in Transportation Horodniceanu, M et al, Feb. 1978

TSSM: Applicability to the Highway Mode Horodniceanu, M et al, Feb. 1978

A Behavioral Consideration of the Pilot-Air Traffic Controller Interface, Salzinger, K et al, Feb. 1978

TSSM: Applicability to Rail Rapid Transit Cantilli, EJ et al, Feb. 1978

PERFORMING AGENCY: Polytechnic Institute of New York, Transportation Training and Research Center

INVESTIGATOR: Pignataro, LJ Tel (212) 643-5272 Cantilli, EJ

SPONSORING AGENCY: Department of Transportation

RESPONSIBLE INDIVIDUAL: Bolger, PH Tel 202-4264458

Contract DOT-OS-50241

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1975 COMPLETION DATE: June 1979 TOTAL FUNDS: \$174,588

ACKNOWLEDGMENT: TRAIS (PUR-50315), OST, Polytechnic Institute of New York

12 059864

**EVALUATION OF SAFETY OF LOADING AND SECUREMENT HARDWARE FOR TRANSPORTING WHEELCHAIR PASSENGERS ON TRANSIT VEHICLES**

The objectives includes: (1) developing safety guidelines for wheelchair loading equipment, (2) determining the crashworthiness of standard wheelchairs secured by selected, representative securement systems, (3) comparison of parameters other than safety of systems being tested (i.e., ease of use, acceptability to user, costs), (4) recommendation of design modifications if they are found to be needed, (5) establishment of the cost effectiveness of the securement systems, and (6) development of educational materials for users and operators of wheelchair loading and securement facilities.

PERFORMING AGENCY: California Department of Transportation

INVESTIGATOR: Stewart, C

SPONSORING AGENCY: Urban Mass Transportation Administration, CA-06-0098-00-01

Contract CA-06-0098-00-01 (FFP)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$195,000

ACKNOWLEDGMENT: TRAIS (CA-06-0098-00-01)

12 081788

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT**

This project is directed at improving the performance of tank cars in derailments and minimizing the danger of catastrophic tank car accidents. When initiated, it consisted of 12 Phases with additional Phases subsequently added. Phase 03--Materials Study; Phase 05--Head Study; Phase 07--Safety Relief Devices; Phase 08--Reduced Scale Model Studies; Phase 10--Design Study Car; Phase 12--Vessel Failure Research; Phase 13--Head Shield Study; Phase 14--Stub Sill Buckling Study and Phase 15--Switchyard Impact Tests are completed. The other phases, on which work is continuing, are the following: Phase 01--Accident Review; Phase 02--Accident Data Analysis; Phase 04--Literature Review; Phase 06--Safety Valve in Liquid Study; Phase 09--Design Study, Tanks and Attachments; Phase 11--Thermal Effects Studies; and Phase 16--Tank Car Wear Experiments.

PERFORMING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

INVESTIGATOR: Phillips, EA Tel 312-5673607

SPONSORING AGENCY: Association of American Railroads Technical Center; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel 312-5673607

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 099389

**RAIL VEHICLE SAFETY RESEARCH PROGRAM**

This program has as its objectives: (1) Increase the safety of hazardous material cars; (2) Decrease number and severity of accidents caused by vehicle component failures; (3) Decrease the number of accidents caused by human error; (4) Reduce the number and severity of grade crossing accidents; (5) Improve communication and control systems. Torch and relief valve test facilities have been completed and used for the on-going hazardous material tank car project. On-board automatic inspection and monitoring systems are being developed as a means of component failure prevention. Development of cab and train handling simulator as part of the human factors project began late in FY 75. Modularized grade crossing equipment has been developed under the grade crossing safety project, which started in early FY 75.

PERFORMING AGENCY: Federal Railroad Administration, Office of Rail Safety Research

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Levine, D Tel (202) 426-1227

STATUS: Active NOTICE DATE: Aug. 1977

ACKNOWLEDGMENT: FRA

12 099392

**LOCOMOTIVE CAB SAFETY**

A number of special projects directed toward improving the safety of the work space provided for operating crews in the cabs of locomotives have

been undertaken. After an in-depth review of FRA-funded studies of accidents and potential hazards, it was determined that the railroad industry should respond with effective cab improvements. AAR had Electro-Motive and General Electric develop "clean" locomotive cab mock-ups. Modifications were based on reviews of these mock-ups. As a result, about 20 improvements are being incorporated in the cabs of production locomotives. These changes eliminate potentially hazardous sharp corners and edges, provide protective padding on certain exposed surfaces, provide added protection to prevent injuries associated with cab doors, provide improved drinking water facilities and improved sanitary facilities. Another project is a study of the consequences of head-on and rear-end collisions between trains. A test program is intended to provide the information necessary to redesign locomotives to increase the survival rate in train-to-train collisions. Furthermore locomotive cab seats are being examined in light of human factors criteria to arrive at generic specifications for the design and development of safer, more comfortable seats to be incorporated in new locomotive deliveries.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Hawthorne, KL Tel (312) 567-3584

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1973

ACKNOWLEDGMENT: AAR

12 099424

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 2-ACCIDENT DATA ANALYSIS**

Analysis of accident data is handled under this phase. A general breakdown of the 1965-1970 data shows two main damage categories-mechanical and thermal. With few exceptions, the mechanical damage occurs first in the accident sequence. Exceptions involved fires originating from non-tank car sources. The analysis under this Phase includes the assignment of dollar losses incurred by the railroads due to product loss from the tank cars in these accidents. These losses are categorized by the specific types of damage which cause them. From this, the potential values of design solutions are determined. The values of overlapping solutions are also given. Some overlap positively and some negatively. For example, the value of a combined head and shell shield is greater than the sum of their individual values. Conversely, the value of a combined head and thermal shield is less than the sum of their individual values. All values must be reduced by the estimated efficiencies of actual design solutions which are developed. This leads to actual "benefit" values for each solution. The final cost effectiveness evaluation is made simply by comparing actual benefit values with the estimated costs of solutions.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 099425

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 11-THERMAL EFFECTS STUDY**

The whole thermal question, including fire environment and thermally induced stresses, is being covered under this phase. The major activity has been a search for a practical heat shield material, such as an ablative, intumescent, or simply an insulative coating, that can be applied to the non-insulated 112A (114A) pressure tank cars, which are the cars most vulnerable to violent rupture from external heat. Many companies which produce fire protective coatings have submitted samples which were studied in a laboratory fire test apparatus which was designed for initial screening. Two of the most promising materials were selected for application to 1/5 scale model tank cars which were subjected to large enveloping fires. These tests were conducted at the White Sands Missile Range in cooperation with the FRA. The objectives were to confirm laboratory findings and theoretical analyses, to ascertain some of the properties of fires which were not yet defined, finally prepare subsequent full scale tests. This was followed by two full scale pool fire type tests, one with uncoated and the other with sprayed

on type coating tank. A report on these fire tests has been published. Other current major activities under this Phase concerned impact and accelerated service tests (ALT) of tank cars equipped with sprayed on coating type and insulation-jacket type thermal shields. These tests were conducted at the DOT Transportation Test Center to evaluate in service reliability of the thermal shields. The tank cars will accumulate a total of approximately 160,000 miles in the facility for accelerated tests (FAST) program at the DOT Test Center. A report covering the results of inspections after 2 to 5 years simulated life has been published. The ALT program was completed May 31, 1978. However, the tank cars are continuing in the FAST program to help provide tonnage for the track experiments.

See also RRIS 12A 081788 and 12A 058266.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel 312-5673607

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 099428

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 6-SAFETY VALVE DISCHARGE CAPACITY**

When a tank car carrying liquified compressed gas is heated in a fire, its contents can expand to where the tank can become nearly shellfull at the safety valve pressure setting. The safety valve must then maintain safe tank pressure by momentarily discharging liquid. It may also be called upon to do this through liquid discharge in the event the tank is overturned and exposed to fire. As in other pressure vessel codes, the tank car specifications require that safety valves be sized and tested on the basis of vapor discharge. There being no firm data on liquid discharge capacities, this Phase was established with the objective of determining such capacities by means of full-scale test. Toward this end, a special 20,000 gallon test tank was fabricated with provisions for mounting the currently used safety valves on both the top and bottom of the tank. The tank has been installed at Edwards Air Force Base, and tests have been run using water, air, and vapor and liquid LPG. This program is being conducted on a cooperative basis with the FRA. Results, not yet available, will be published after all data is reduced.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center; Federal Railroad Administration

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute; Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 099436

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT. PHASE 1-ACCIDENT DATA COLLECTION**

This is a major Phase and deals with the collection and cataloging of accident data. Any accident involving a tank car, loaded or empty, in which there is damage to the tank, its attachments and fittings, or its insulating steel jacket, is included. During the first two years of the project, such data were collected for the six year period 1965-1970. Currently, an update is complete covering the five year period 1971-1975 and a report is in preparation. Following this, procedures are established for collecting data on a continuing basis. Most of the information has been coded and computerized. For the six year period 1965-1970 the files contain data on 3853 tank cars damaged in 2321 accidents. This corresponds to an annual average of 642 tank cars damaged in 387 accidents.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1970

ACKNOWLEDGMENT: AAR

12 130946

**QUANTITATIVE DESCRIPTIONS OF TRANSPORTATION ACCIDENTS INVOLVING HAZARDOUS MATERIALS**

Description: Sandia's continuing effort in this area includes the following major components: Assessment of the probability of occurrence and the severity of the five major environments (impact, fire, puncture, crush and immersion) experienced by casks or containers in air, highway and rail transportation. Analyses of these predicted environments to assess possible revisions or regulatory standards. Consideration of specific examples, e.g., the response of a radioactive material shipping cask involved in a rail grade crossing accident, to determine threat probabilities for potentially large contamination incidents. Revision of analytical descriptions to make the results more applicable to an increasing number of specific risk analysis studies aimed at optimizing procedures for transporting radioactive materials. Compilation of pertinent accident information in a data bank to provide retrievability of specific information to parties performing analyses.

This project is also supported by Sandia Laboratories.

PERFORMING AGENCY: Sandia Laboratories, Applied Mechanics Division II 1282

INVESTIGATOR: Priddy, TG Hartman, WF Foley, JT

SPONSORING AGENCY: Department of Energy, Division of Waste Management and Transportation

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GPW 51 1)

12 135594

**PHYSICAL PARAMETERS OF TRANSPORTATION ACCIDENTS**

Sandia's continuing effort in this area includes the following major components: Assessment of the probability of occurrence and the severity of five major transportation accident environmental categories (impact, fire, puncture, crush and immersion) that may be experienced by casks or containers in air, highway, rail, and water transportation. Analyses of these environmental categories can be used in the consideration of possible revisions of the regulatory standards. Consider the specific examples, e.g., the response of a radioactive material shipping cask involved in a rail grade crossing accident to determine the threat probabilities for potentially large contamination incidents. The analytical description available in these studies are applicable to specific risk analysis studies aimed at optimizing procedures for transporting HAZARDOUS materials. Compilation of pertinent accident information in a data bank provides retrievability of specific information to parties performing transportation accident analyses.

PERFORMING AGENCY: Sandia Laboratories, Applied Mechanics Division II 1282, ALO 117B

INVESTIGATOR: Priddy, TG Tel (505) 264-6764 Foley, JT Davidson, CA McClure, JD

SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Brobst, WA Tel (202) 353-5361

Contract AL051 (AL0517B)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1975

ACKNOWLEDGMENT: Department of Energy

12 135596

**MAINTENANCE OF A TRANSPORTATION ACCIDENT ENVIRONMENTAL DATA BANK**

The maintenance of this data bank involves the active pursuit of sources of new data, the updating of indices, and responding to official users who wish to obtain environmental data. A necessary part of this continued work is the processing of data and entry into the storage and retrieval system. As needs for new data are identified, these will be sought. User requests for nonexisting data are expected to be a major contributor to this identification.

**REFERENCES:**

Transportation Accident Environment Data Index Foley, JT; Davidson, CA, SAND 75-0248

PERFORMING AGENCY: Sandia Laboratories, AL 0517A

INVESTIGATOR: Foley, JT Tel (505) 264-3036

SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract AT(29-1) 789

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1974 TOTAL FUNDS: \$216,000

ACKNOWLEDGMENT: Department of Energy

12 135599

**FULL SCALE VEHICLE TESTING PROGRAM**

This project plans full scale accident tests to determine the integrity of shipping casks for transportation of nuclear wastes. The problem of transporting nuclear wastes becomes more acute as operating reactors increase. Demonstrations of shipping container integrity are necessary. Three extreme accident full scale tests using obsolete casks are planned: (1) High speed locomotive impact on stalled truck cask; (2) High speed derailment of rail cask into solid abutment followed by fire; (3) Truck mounted cask at high speed into solid barrier. Modeling and analysis will precede instrumented tests. Results will aid in prediction of performance of currently used, better designed casks.

PERFORMING AGENCY: Sandia Laboratories, AL 3617A

INVESTIGATOR: Yoshimura, HR Tel (505) 264-2452

SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract E(29-1)-789

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1975 TOTAL FUNDS: \$1,170,000

ACKNOWLEDGMENT: Department of Energy

12 135719

**DYNAMIC PROPERTIES OF PACKAGING MATERIALS IN TRANSPORT ACCIDENTS**

The aim of the project is to develop data on dynamic material properties for materials of construction for shipping casks, particularly those properties required for analysis of transport accidents. Structural problem areas during dynamic loading of shipping casks will be delineated; experimental techniques (mostly models) will be used for material and structure studies. Results will be used as benchmarks for computer codes being developed at LASL for dynamic loading problems of shipping casks.

PERFORMING AGENCY: Battelle Memorial Institute, CH 0407A

INVESTIGATOR: Robinson, RA Tel (614) 424-6424 X3414

SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5361

Contract W-7405-ENG-92

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: July 1975

ACKNOWLEDGMENT: Department of Energy

12 136084

**TRANSPORTATION SAFETY STUDIES**

The aim of the project is to develop and use a model for assessing the risks associated with the shipping of radioactive and other hazardous materials. Failure characteristics and thresholds will be determined for crush, impact, puncture, fire, and water immersion. Evaluation of release consequences will be assessed. Existing data sources on equipment failure rate, accident frequency, and accident severity will be used to fullest extent possible, supplemented by surveys or other means when data is not available.

**REFERENCES:**

An Assessment of the Risk of Transporting Plutonium Oxide and Liquid Plutonium Nitrate by Truck, McSweeney; Hall, BNWL-1846, Aug. 1975

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs, RL 5917B

INVESTIGATOR: Rhoads, RE Tel (509) 942-3607

SPONSORING AGENCY: Department of Energy, Environmental Control Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5466

Contract DOE-AT-45-1-1830

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1973 COMPLETION DATE: July 1978 TOTAL FUNDS: \$968,000

ACKNOWLEDGMENT: Department of Energy

12 138531

**SAFETY AND RELIABILITY**

The objective is to improve the safety and reliability of urban rail systems through data gathering, analysis and hardware development. This includes vehicle crashworthiness analysis (current and proposed models) and computer models, feasibility studies of obstacle detection and study of safety hardware along with establishment of National Reliability Data Bank.

PERFORMING AGENCY: Transportation Systems Center  
SPONSORING AGENCY: Urban Mass Transportation Administration  
RESPONSIBLE INDIVIDUAL: Spencer, PR Tel (202) 426-0090

Contract UM-604

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: 1974 TOTAL FUNDS: \$2,800,000

ACKNOWLEDGMENT: UMTA

12 138567

**SAFETY VALVE STUDY**

By analysis and small scale experiments, study the flow phenomena occurring when a safety valve of a pressurized tank car discharges when engulfed in a fire.

PERFORMING AGENCY: Maryland University, College Park  
INVESTIGATOR: Sallet, DW Tel (301) 454-4216 Ext 4  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Dancer, DM Tel (202) 426-1227

Contract DOT-FR-64181

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: Feb. 1980

ACKNOWLEDGMENT: FRA

12 148324

**THE DEVELOPMENT OF A SYSTEMS RISK METHODOLOGY FOR SINGLE AND MULTI-MODAL TRANSPORTATION SYSTEMS**

The purpose of the research is to develop and verify a probabilistic systems methodology for the quantitative risk assessment of existing or future transportation systems. The objective of the first phase of the research was to develop primary risk models for estimating the probability of failure of each major component in air transportation, rail transportation and highway transportation. The second year work involves continuation and verification in the highway mode only.

**REFERENCES:**

Development of a Risk Methodology for Transportation Systems Safety, Transportation Systems Safety Research Group, Technical Report, Feb. 1976

Development of a Risk Methodology for Transportation System Safety, Final Report, Oct. 1976

PERFORMING AGENCY: Illinois University, Urbana, Department of Mechanical & Industrial Engineering  
INVESTIGATOR: White, RA Tel (217) 333-0356  
SPONSORING AGENCY: Department of Transportation; Illinois University, Urbana  
RESPONSIBLE INDIVIDUAL: Ravera, RJ Tel (202) 426-0190

Contract DOT-OS-50238

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1975 TOTAL FUNDS: \$159,000

ACKNOWLEDGMENT: DOT

12 148348

**TRANSPORTATION SAFETY INFORMATION SYSTEM (TRANSIS)**

The objective of this system is to make data and information on safety performance and on on-going safety activities in all transportation modes readily available to DOT managers to allow intermodal comparisons. The system contains national data on accidents, injuries, and fatalities by month and by transportation mode, with certain exceptions due to limitations within modal accident reporting systems. Data and information are collected from DOT operating elements on a quarterly basis.

The quarterly Transportation Safety Information Report is available from NTIS.

PERFORMING AGENCY: Transportation Systems Center, OP-939

INVESTIGATOR: Gay, WF Tel (617) 494-2192

SPONSORING AGENCY: Department of Transportation, Office of Environment and Safety

RESPONSIBLE INDIVIDUAL: McDonald, G Tel (202) 426-4492

STATUS: Active NOTICE DATE: Feb. 1979 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: DOT

12 170651

**AUTOMATIC WARNING OF TRACK MAINTENANCE GANGS**

Study of problems linked with the perception of acoustic warning signals (noise produced by track working machines) and determination of optimum acoustic and visual signals for the warning, of maintenance gangs working on the track, of the approach of trains. Study of systems for the automatic initiation and transmission of the announcing of trains approaching the track working site. The study of the noise produced by track working machines has formed the subject of a draft UIC leaflet, examined by the competent Sub-Commissions of the UIC in 1974. The studies and tests should, in a few months, permit the best acoustic signals for the warning of gangs working on the track to be defined. Tests on automatic radio transmission announcing systems are shortly going to be undertaken.

Eight reports have been published to date. Question A124.

PERFORMING AGENCY: International Union of Railways  
RESPONSIBLE INDIVIDUAL: Gelbstein, E Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1970

ACKNOWLEDGMENT: UIC

12 170780

**SAFETY AND SYSTEM ASSURANCE**

This project will continue the development and design of a program which reflects the priorities and requirements of transit operating properties (rail, bus and light rail) to implement the highest priority management/software work statement, develop safety plans in transit matters concerning Safety and System Assurance.

PERFORMING AGENCY: American Public Transit Association  
SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-60061

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Dec. 1976 COMPLETION DATE: Nov. 1979 TOTAL FUNDS: \$531,613

ACKNOWLEDGMENT: American Public Transit Association

12 179336

**STANDARDIZED ANALYSIS OF FUEL SHIPPING CONTAINERS**

**OBJECTIVE:** Develop a system of unified computer programs for the standardized criticality safety, shielding and thermal analyses of fuel shipping containers. **SCOPE:** The scope of work for FY1978 includes: (1) Implementation of the functional modules (NITAWL, XSDRNPM, KENO-IV COUPLE, ORIGENS, ICE, MORSE, BONAMI), the control models (CSAS1, CSAS2, SAS1, SAS2, SAS3, SAS4) and the SCALE system data base on the Brookhaven National Laboratory CDC-760C computer for NRC use (May 1978). (2) The HEATING5 module will be implemented into the SCALE system. HTAS1, heat transfer analysis in multidimensional systems, will be written. HEATING5 and HTAS1 will be documented as sections in the SCALE system user's manual. Heat transfer libraries will be added to the SCALE system data base (August 1978). (3) The Monte Carlo criticality code KENO-V (Supergrouping and COMGEOM) will be implemented into the SCALE system. KENO-V will be documented as a section in the SCALE system user's manual (April 1978). (4) A Monte Carlo heat transfer code will be implemented into the SCALE system (August 1978). (5) The criticality safety and shielding analytical sequences will be modified such that they can be operated on a CRT terminal interactive basis. The Materials Information Processor will be modified to accept the arbitrary specification of material compounds and material mixtures (April 1978). (6) Development of a geometry graphics package will be initiated. This package will provide the SCALE system user to represent his problem geometry. A hard copy device for recording this information will be acquired. (September 1978). (7) An optimization package will be written for the SCALE system. This package will be used in the development of the following standard analytical sequences (September 1978). CSAS-3-Criticality Safety Analysis in One-Dimensional Geometry with Most-Reactive Fuel-Moderation Search. CSAS-4 -Criticality Safety Analysis in Multidimensional Geometry

with Most-Reactive Fuel-Bundle-Lattice-Pitch Search. (8) The KENO-COMGEOM geometry package will be incorporated in the SCALE system version of MORSE.

PERFORMING AGENCY: Oak Ridge National Laboratory  
 INVESTIGATOR: Greene, N Henderson, R Petrie, L Turner, W Westfall, R Whitesides, G  
 SPONSORING AGENCY: U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, B0172

Contract

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$280,000

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CU 811 2)

#### 12 188661

##### RAIL SAFETY INFORMATION SYSTEM

This information system consists of accident/incident reports and exposure data; inspection data on track, locomotives, equipment, signals, operating practices and hazardous materials; and the National Railroad-Highway Crossing Inventory. The system is used for report generation, statistical analysis, and research.

PERFORMING AGENCY: Federal Railroad Administration, Office of Safety, Reports and Analysis Division  
 SPONSORING AGENCY: Federal Railroad Administration, Office of Safety, Reports and Analysis Division  
 RESPONSIBLE INDIVIDUAL: Haden, RB Tel (202) 426-2762

STATUS: Active NOTICE DATE: Feb. 1979

ACKNOWLEDGMENT: FRA

#### 12 188664

##### DEVELOPMENT OF A TRAINING PACKAGE FOR HANDLING TRANSPORTATION EMERGENCIES INVOLVING RADIOACTIVE MATERIALS

This training package is designed to improve the knowledge, performance and confidence of emergency response personnel in the characteristics of radiation and the measure which must be taken for their own protection and the protection of the public. This training, although not highly technical, will be practical so that students will grasp the fundamentals of radiation safety and retain sufficient information to assist them in providing the proper response. The training program will include practical class training periods and suitable reference material for later self study and review. This training package will extend the knowledge and performance methodology of personnel who have taken the training course "Handling Hazardous Materials Transportation Emergencies," which will be a prerequisite. The length of this course is estimated to be eight classroom hours, and include a set of 35 mm slides, pulsed synchronized audio tapes, interactive Student Workbooks, an Instructor's Guide, lesson plans and Student Evaluation Instruments.

PERFORMING AGENCY: Canyon Research Group, Incorporated, 3058  
 SPONSORING AGENCY: Office of the Secretary of Transportation  
 RESPONSIBLE INDIVIDUAL: Carricker, W

Contract DOT-RC-82040

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: June 1979 TOTAL FUNDS: \$64,912

ACKNOWLEDGMENT: Canyon Research Group, Incorporated

**13 164812****COMPUTER SIMULATION OF THE OPERATION OF SUBWAY AND ELECTRIC-TRAINS**

An accurate mathematical model of electric train systems is prepared including models of the powering and braking systems, track configuration, etc. Equations of motion are solved numerically, and the operation of the system is simulated taking into consideration operating and other constraints. A numerical optimization routine determines the optimum operating and design parameters by minimizing an objective function. The objective function is the energy consumption of the system, or the travel time of the trains, or a suitable weighted combination of the energy consumption and travel time. The method can be used in designing new systems, or modifying existing systems using the objective evaluation of the simulated results for decision making, or the method can be used for finding the optimum operating mode of existing systems and thereby reducing the energy requirement or travel time, or both. /RTAC/

PERFORMING AGENCY: Toronto-York University Joint Program in Transp  
INVESTIGATOR: Fenton, RG

STATUS: Active NOTICE DATE: May 1977 START DATE: Apr. 1977  
COMPLETION DATE: Mar. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

**13 170609****PARAMETRIC STUDIES FOR RAILROAD ELECTRIFICATION AND TRACTION**

This effort includes site specific system studies of various train consists for passenger and freight transportation. A simple computer train operation program is available permitting us to simulate traction equipment parameters and speed profiles along the route in order to achieve the specified goals. Traction equipment characteristics and their interaction with the assumed speed profiles are evaluated. Speed profiles are modified to match the anticipated track improvements. The work centers around the Northeast Corridor, though studies of other high density lines are anticipated. Findings are published, at frequent intervals, in the form of letter reports to the sponsor.

PERFORMING AGENCY: Jet Propulsion Laboratory

INVESTIGATOR: Macie, TW Tel (213) 354-4432

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Guarino, M, Jr Tel (202) 426-9665

Contract DOT-AR-30006

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1977  
COMPLETION DATE: Oct. 1978

ACKNOWLEDGMENT: FRA

**13 170653****HIGH POWER TRACTION CURRENT COLLECTION AT HIGH SPEED**

This study concerns the performance of the "overhead contact system/pantograph system" at high speeds and also the problem of power transmission under severe loading conditions. The first remit was to prepare a mathematical model for the study of the "overhead contact system/pantograph system". A first recommendation has been produced for pantographs and lightoverhead contact systems for high voltage current. Exact recommendations concerning the same problem are now being prepared. The study of other sections of the program of work is progressing (measuring equipment to determine the upward contact force, determination of the currents acceptable at the point of contact, etc.).

Nine reports have been published to date. Question A129.

PERFORMING AGENCY: International Union of Railways

RESPONSIBLE INDIVIDUAL: Jutard, M Office for Research and Experiments

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1973

ACKNOWLEDGMENT: UIC

**13 179334****ELECTRIFICATION OF HIGH-DENSITY LINES**

The 4R Act provides loan guarantees for electrification of high-density lines if it can be shown economically beneficial. The 300-mile line between Harrisburg, Pa., (Enola) and Pittsburgh, Pa., (Conway) carries the heaviest freight tonnage of any U.S. route. This segment and certain segments of presently electrified lines east of Harrisburg will be studied in terms of projected traffic levels; projected costs of electric power and diesel fuel; most effective methods of electrified operation; electric power supply and catenary system; effects of electrification on signals and communications; and financial implications of electrification.

PERFORMING AGENCY: Gibbs and Hill, Incorporated

INVESTIGATOR: Hulme, WN Tel (212) 760-4697

SPONSORING AGENCY: Consolidated Rail Corporation

RESPONSIBLE INDIVIDUAL: DeGennaro, RE Tel (215) 594-1000

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: 1977  
COMPLETION DATE: 1979

15 129701

**METRO IMPACT STUDY**

As part of its ongoing programs, the Metropolitan Washington Area Council of Governments is conducting for UMTA an assessment of impacts of the METRO rail system in the Washington area. The program is somewhat narrower in scope than the BART Impact Work, concentrating on traveler impacts.

PERFORMING AGENCY: Metropolitan Washington Council of Governments, 1225 Connecticut Avenue, NW

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Planning Assistance, UPM-13

RESPONSIBLE INDIVIDUAL: McQueen, J

STATUS: Active NOTICE DATE: Aug. 1978

ACKNOWLEDGMENT: UMTA

15 148353

**COMMUNITY AND CITIZEN INITIATIVES FOR DEVELOPING PASSENGER TRANSPORTATION CENTERS AT EXISTING HISTORIC RAILROAD STATIONS**

To encourage joint use of existing historic terminals as intermodal transportation centers in combination with other community uses and community use of other historic transportation facilities and to identify implementation and funding problems, a study of railroad terminal locations is underway. This study of transportation facilities will be made in consultation with municipal, civic and private organizations concerned with preservation and reuse programs. The study will document the following: Adaptive reuse as transportation centers and benefits therefrom; other adaptive community uses and their benefits; financial data and procedures involved in achieving such utilization.

Publication available January 1979.

PERFORMING AGENCY: Anderson Notter Finegold, Incorporated

INVESTIGATOR: McGinley, PG Tel (617) 227-9272

SPONSORING AGENCY: Department of Transportation, Office of Environment and Safety

RESPONSIBLE INDIVIDUAL: Crecco, RF Tel (202)426-4298

STATUS: Completed NOTICE DATE: Feb. 1979 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: DOT

15 160469

**BART IMPACT PROGRAM, THE LAND USE PROJECT**

A major study area of the overall BART Impact Program, the Land Use Project will examine the effects of BART on (1) decisions about the location or residences, urban development, and activity patterns within the San Francisco Bay Area, (2) the behavior of the market for real property which exercises a major influence of such decisions, and (3) the resultant spatial distributions of people, activities, and development.

PERFORMING AGENCY: Metropolitan Transportation Commission

SPONSORING AGENCY: Office of the Secretary of Transportation

Contract DOT-OS-30176/205 (CC)

STATUS: Active NOTICE DATE: June 1978 START DATE: Jan. 1977 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$600,000

ACKNOWLEDGMENT: TRAIS

15 179331

**MARTA IMPACT STUDY**

This study is designed to provide a continuing assessment of the impacts of the new rail rapid transit system in Atlanta. Work prior to the scheduled opening in later 1978 concentrates on obtained "before" and base-case data and on the impacts of construction. Operational impact measurement begins in 1979.

PERFORMING AGENCY: Atlanta Regional Commission

INVESTIGATOR: Day, B Tel (404) 656-7700

SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Planning Assistance, UPM-13

RESPONSIBLE INDIVIDUAL: McQueen, J Tel (202) 426-2360

Contract GA-09-0037

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Mar. 1976 COMPLETION DATE: Dec. 1983 TOTAL FUNDS: \$750,000

ACKNOWLEDGMENT: UMTA

15 179338

**THE URBAN TRAVEL DEMAND FORECASTING PROJECT: WORKSHOP FOR TRAVEL DEMAND POLICY ANALYSIS**

This research project was funded to develop and apply behavioral travel demand forecasting models for different policy issues. To date, the project has prepared a data base and methodology for study of the forecasting validity of behavioral travel demand models. Under the current research grant (APR74-20392) the investigators have carried out validation tests of the data and models, and have applied these techniques to selected policy analyses in cooperation with local transportation authorities. In addition, with Department of Transportation funding, they have conducted a short course in forecasting methods for planning officials. This supplemental grant will allow for further validation of the models by providing easy access to project data and software, so that researchers and planners from other regions may supplement, check and generalize project findings.

## REFERENCES:

Demographic Data for Policy Analysis McFadden, D; Cosslett, S; Duguay, G; Jung, W, June 1977

Disaggregated Supply Data Computation Procedures Reid, FA, June 1977

Attitudes, Beliefs, and Transportation Behavior Johnson, MA, Aug. 1977 Survey Data and Methods Johnson, MA, Oct. 1976

Forecasting Travel Demand in Small Areas Using Disaggregate Behavioral Models: A Case Study, Johnson, MA; Adiv, A, Aug. 1977

Demand Model Estimation and Validation McFadden, D; Talvitie, AP, June 1977

PERFORMING AGENCY: California University, Berkeley

INVESTIGATOR: McFadden, D Tel (415) 642-3304

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, DAR74-20392 A06

RESPONSIBLE INDIVIDUAL: Miller, TC Tel (202) 634-1785

Grant DAR74-20392 A06

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1974 COMPLETION DATE: June 1979 TOTAL FUNDS: \$1,002,364

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1917)

15 179339

**LABORATORY TESTING OF PREDICTIVE MODELS**

This project will improve the existing Integrated Transportation and Land Use Model Package (ITLUP) developed previously by a team headed by the present principal investigator. Several existing models will be incorporated into ITLUP, including a basic employment model, a nonbasic employment model based on the Harris model, and a residential model disaggregated by income class based on the DRAM model, a derivative of IPLUM developed by the principal investigator under a previous grant. Several other existing models will be evaluated for possible integration, including modal split models, multipath assignment procedures, and air pollution emission and diffusion models. In addition, an attempt will be made to develop an operational housing characteristics model, and to incorporate simple models to investigate the energy consequences of different urban forms and transportation networks. Finally, the improved package will be used to test the impact of several policy options: Several low capital options in urban transportation will be tested such as gasoline taxes or quotas, parking taxes, parking space restrictions, and commuter taxes. The difference in the land use impacts of rail transit lines and busways will also be tested.

PERFORMING AGENCY: Pennsylvania University, Philadelphia, School of Arts & Sciences, City and Regional Planning

INVESTIGATOR: Putman, SH

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR73-07840 A04

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Dec. 1977 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$99,950

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1344 1)

15 179672

**EVALUATION OF ALTERNATIVE RURAL FREIGHT, TRANSPORTATION, STORAGE AND DISTRIBUTION SYSTEMS**

Measure the social and economic costs and benefits of alternative rural transportation networks on rural communities. Develop and employ procedures to evaluate the costs and benefits of ownership alternatives and



abandonment of railroad lines. The study will examine the social and economic impacts of six specific branchline abandonments which have taken place since World War II. Criteria of community success such as sales tax receipts, bank deposits, property values, school enrollment, telephone and utility services, and population will be utilized to compare communities on abandoned branchlines with: Nearby communities with continued rail service; distant communities with continued rail service; and nearby communities without rail service for an extended period, within the abandoned communities, the economic success of firms directly affected by abandonment, such as elevator and trucking firms, will be analyzed in terms of investment, profitability, and commodity and product mix.

PERFORMING AGENCY: South Dakota State University, Department of Economics, SD00789

INVESTIGATOR: Lamberton, CE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072991)

**15 188644**

**SOCIOECONOMIC IMPACTS RELATED TO THE PLANNING, CONSTRUCTION AND OPERATION OF URBAN TRANSPORTATION TUNNEL PROJECTS**

The objective of the study is to investigate the social and economic impacts arising from the planning, construction and operation of transportation tunnels. These tunnels can be either highway tunnels or mass transportation (subway) tunnels. Only tunnels in urban areas are being studied. The work consists of three phases. Phase I identified and listed impacts, using as source materials 100 recent EISs, as well as other relevant literature, particularly that concerning citizen involvement. Phase II will begin with the measurement of the identified impacts. Existing measurement methods will be utilized where possible, new measurement devices will be suggested where needed and feasible, and impacts that are not capable of being quantified will be so identified. An impact prediction model will then be constructed. In Phase III, the impact prediction model will be tested as to both applicability and reliability. Impacts will be predicted in a real-life situation in order to determine whether the model can actually be used by planners.

PERFORMING AGENCY: ABT Associates, Incorporated

INVESTIGATOR: Wolff, PC

SPONSORING AGENCY: Federal Highway Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: May 1981

**15 188646**

**URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES TRANSPORTATION TASK FORCE--THIRD YEAR**

This activity will develop a prioritized and augmented set of transportation needs as seen by the nation's largest cities and urban counties. A set of summary bulletins on these needs will be developed and disseminated. Summary briefs on DOT demonstrations in priority areas will be prepared and distributed. Information packages on handicapped and elderly transportation transit pricing and transit systems performance will also be developed.

REFERENCES:

Transit Actions (Preliminary Version) Dec. 1978

PERFORMING AGENCY: Public Technology, Incorporated

INVESTIGATOR: Burke, AC Tel (202) 452-7839

SPONSORING AGENCY: Office of the Secretary of Transportation; Urban

Mass Transportation Administration; Federal Highway Administration

RESPONSIBLE INDIVIDUAL: Linhares, AB Tel (202) 426-4208

Contract DOT-OS-80060

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1978 COMPLETION DATE: June 1979 TOTAL FUNDS: \$697,000

ACKNOWLEDGMENT: DOT

**15 188656**

**METHODS FOR THE PREDICTION OF TRANSPORTATION SYSTEM IMPACTS**

This project will recommend procedures to be used in predicting the impacts of high capital transit. The purpose is to offer guidance in the preparation of Alternatives Analyses required by UMTA. The project focuses on those impacts which can be used by UMTA to decide which urban corridors are most worthy of study and which transit alternatives are most cost-effective.

PERFORMING AGENCY: Charles River Associates, Incorporated

INVESTIGATOR: Dunbar, F Tel (617) 266-0500 Winston, B

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Spear, B Tel (617) 494-2276

Contract DOT-TSC-1572

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1978 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$139,077

ACKNOWLEDGMENT: Charles River Associates, Incorporated

16 128051

**RAIL VEHICLE POWER AND ENERGY CONSUMPTION STUDY**

The purpose of this study, which is part of the general Energy Management Program, is to determine the power requirements and energy consumptions of transit vehicles operating in free air and in tunnels under various conditions as specified by operational parameters such as acceleration, maximum speed, station spacing etc. The study first establishes the mechanical limits of power requirements, energy consumption, regeneration and energy storage in terms of the operational conditions and free air and in tunnels. The calculations within this part of the study will use the results of the aerodynamic drag study (project #3605) and operational criteria established in other studies. The study then incorporates the performance characteristics of various propulsion systems-DC series, shunt or separately excited motors, as well as AC motors-with and without energy saving devices such as choppers and flywheels. The study relies here on input from investigations carried out by the Electrical Group. The resulting calculations will produce actual power and energy consumption profiles of the different propulsion systems under the various operational conditions considered. The energies associated with drags, momentum change, regeneration and equipment losses will be identified. The results will be used in the Economic Evaluation Program to determine the viabilities of the various propulsion options. The viable alternatives will then be investigated further with refined performance data and extended operational ranges in order to provide basic data for preliminary conceptual design of the total energy system. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communic, Can, 3607

INVESTIGATOR: Soots, V

SPONSORING AGENCY: Ontario Ministry of Transportation & Communic, Can

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

16 148321

**ENERGY MANAGEMENT FOR ELECTRIC POWERED TRANSPORTATION SYSTEMS**

The purpose of this research is to further the state-of-the-art of energy management in electrically powered transportation systems. Inherent in this objective is the determination of the relationships between the energy consumption of electric vehicles and their design capabilities and operating practices. Through this understanding, energy management strategies may be evaluated within a cost-benefit framework. The objectives of the work are: 1) To develop a realistic computer-based simulation model of energy consumption and cost in electric-powered transportation systems. This model will incorporate and link together the following three modules: (a) Train Performance Programs; (b) Energy Consumption Simulation; (c)

Energy Cost Simulation. The advantage of this approach lies in its flexibility as it is anticipated that this technique will be able to accommodate any present or future system. 2) To develop strategies and guidelines for increasing the energy efficiency of electrically powered transportation systems. Used by the transit operators and designers, these guidelines would be applied to the modification of present systems and the construction of new ones. The strategies will be evaluated within the framework of the simulation model, and validated through application to selected real-world systems.

PERFORMING AGENCY: Carnegie-Mellon University, Department of Mechanical Engineering

INVESTIGATOR: Uher, RA Tel (412) 578-2960

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Hopkins, JB Tel (617) 494-2023

Contract DOT-OS-60129

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$170,840

ACKNOWLEDGMENT: DOT

16 165021

**ENERGY INTENSITY OF VARIOUS TRANSPORTATION MODES**

This study provides an overview of the existing literature related to Energy Intensity (EI) of various transportation modes. These transportation modes include intracity (auto, bus, automated guideway transit system, vans, heavy rail, and light rail transit), and intercity (airplanes, autos, buses, trucks, rail, waterways and pipelines) modes of transportation for passenger and freight movement. Wherever possible, an attempt has been made to correlate energy intensity as a function of operating conditions such as speed, load factor, type of commodities being moved, etc. Use of both statistical and engineering approaches has been made for estimating energy intensity figures. It is concluded that energy intensity values have a considerable range depending upon the operating conditions, types of hardware, trip characteristics, load factor and type of commodities being shipped. The major output of the study is a list of suggested EI values for several transportation modes. The study is highly data intensive. Finally, guidelines are also provided for furthering the state-of-the-art related to energy intensity work.

PERFORMING AGENCY: Mittal (RK)

INVESTIGATOR: Mittal, RK Tel (213) 648-6633

SPONSORING AGENCY: Oak Ridge National Laboratory; Department of Transportation

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Jan. 1978

ACKNOWLEDGMENT: Mittal (RK)

17 059062

**SOFTWARE DEVELOPMENT FOR THE PROJECTION OF COMMODITY FLOW PATTERNS**

The objective is for the development of data reduction and analysis programs to project commodity flow patterns as an input to development of a national transportation simulator capability.

PERFORMING AGENCY: Transportation Systems Center  
SPONSORING AGENCY: Transportation Systems Center  
RESPONSIBLE INDIVIDUAL: Chamberlain, C Tel (617) 494-2087

In-House

STATUS: Active NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: TRAIS (R6831)

17 059866

**COMPUTER ASSISTED INFORMATION SYSTEM ON TRANSIT SCHEDULES, ROUTES, AND FARES**

This project will develop, demonstrate, and evaluate a prototype computer assisted transit information system to more effectively respond to telephone requests for information on transit schedules, routes, and fares.

PERFORMING AGENCY: Washington Metropolitan Area Transit Authority  
INVESTIGATOR: Warrington, J Tel (202) 637-1326  
SPONSORING AGENCY: Urban Mass Transportation Administration, DC-06-0154

RESPONSIBLE INDIVIDUAL: Durham, JS Tel 202-4264022

Grant DC-06-0154 (FFP)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1976 TOTAL FUNDS: \$435,000

ACKNOWLEDGMENT: TRAIS (DC-06-0154)

17 099386

**RAIL SAFETY INFORMATION SYSTEM**

This computer system contains carrier originated accident and exposure data, government originated inspection data on track, equipment, signals, operating practices and hazardous materials and, in addition, the national railroad-highway crossing inventory is part of the system. The system is used for report production and research.

PERFORMING AGENCY: Federal Railroad Administration, Office of Safety, Reports and Analysis Division  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Haden, RB Tel (202) 426-2762

STATUS: Active NOTICE DATE: Feb. 1979

ACKNOWLEDGMENT: FRA

17 138526

**MISSOURI PACIFIC'S COMPUTERIZED FREIGHT CAR SCHEDULING SYSTEM**

To develop and implement an automated freight car scheduling system. A prototype capability will first be developed. This research and demonstration project will establish the feasibility and determine the operational benefits of automated freight car scheduling. The project will provide considerable impetus to interline freight car scheduling reports and demonstrations will be made available to the railroad industry and the procedures, computer programs and related documentation of MoPac's Transportation Control System including the automated freight car scheduling system will be made available to interested railroads.

## REFERENCES:

- State-of-the-Art Survey Apr. 1976
- Project Work Plan Mar. 1976
- System Functional Requirements July 1977
- System Performance Measurements Feb. 1978

PERFORMING AGENCY: Missouri Pacific Railroad  
INVESTIGATOR: Sines, GS  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608

Contract DOT-FR-65139

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1975 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$5,500,000

ACKNOWLEDGMENT: FRA

17 148350

**EMPLOYEE INFORMATION SYSTEM. PHASE I**

To review and analyze for validity and usefulness currently available railroad employee wage and employee operating statistics and to develop an employee information system that will consist of valid and useful data from currently available sources in a form readily transferable to research and publication. Preliminary productivity measurements will be developed and recommended to the FRA.

PERFORMING AGENCY: Booz-Allen Applied Research, Incorporated  
SPONSORING AGENCY: Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

Contract DOT-FR-T5164

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Sept. 1976 COMPLETION DATE: May 1977 TOTAL FUNDS: \$69,768

ACKNOWLEDGMENT: FRA

17 159625

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 1. STRUCTURING ORGANIZATIONAL CONTROL MECHANISMS TO IMPROVE CAR UTILIZATION**

Examine information systems and corporate relationships which foster utilization improvements. Case studies will be conducted which focus on those decisions which require joint analysis by various departments. Based on this analysis, a new approach will be developed and tested and recommendations then will be made to the industry. Investigate the most critical information needs associated with improved car utilization and the changes in the line of responsibility required to facilitate effective use of the information.

PERFORMING AGENCY: Association of American Railroads  
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads  
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
Wooden, DG Tel (202) 293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$295,000

ACKNOWLEDGMENT: AAR

17 159628

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 4. NATIONWIDE FREIGHT CAR MANAGEMENT**

To begin planning a more efficient nationwide freight car management system. Continue the evaluation of the expended Clearinghouse Experiment. Continue the evaluation of Car Service Rules, Orders, and Directives. Design and implement a car grading and commodification to support national level car distribution. Evaluate the impact of customer regulations on the utilization of cars moving in international service. Evaluate the conflict between owner's equity and car utilization embodied in current and proposed freight car management systems. Initiate and freight car management experiments considered necessary. Using the information gained, recommend a nationwide freight car distribution and management system.

PERFORMING AGENCY: Association of American Railroads  
SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads  
RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608  
Wooden, DG Tel (202) 293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$300,000

ACKNOWLEDGMENT: AAR

17 159631

**RAILROAD OPERATIONS MODULAR PROCESSING SYSTEMS (ROMPS)**

ROMPS is a mini-computer based telecommunications data processing system for smaller railroads which will assist them in automating many clerical railroad functions presently undertaken manually. Data is input through CRT terminals located at each short line railroad. An on-line data base provides each road with car location and management information inquiry responses. ROMPS provides data to the AAR TRAIN II system for improved informational context of the national freight car information system.

## REFERENCES:

Railroad Operations Modular Processing System: System Design Sum-

mary, Apr. 1978, NTIS PB-285442/AS

PERFORMING AGENCY: Ocean Data Systems Incorporated

INVESTIGATOR: Bochner, A Tel (301)881-3031

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1976 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$700,000

ACKNOWLEDGMENT: AAR

#### 17 159648

##### NETPAC/2 PROJECT COST AND RESOURCE ACCOUNTING COMPUTER PROGRAM DEVELOPMENT

To produce a resource and cost accounting system for project planning and control to be added to an existing critical path time program (NETPAC/1). The program will produce 7 report classes (1) progress data (2) project cost (3) cost of work (4) cumulative cost (5) cost histogram (6) resource histogram (7) account code. The program is intended to provide reasonable accurate but timely cost and resource usage information on demand.

##### REFERENCES:

Handbook of Critical Path Law, CE; Lach, DC, Published by the Authors, 9th Printing, 1975

Project Management and Cost/Budget Control AREA Conference, Pittsburgh, Penn, 19-20 Oct 1976.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 5.63.76

INVESTIGATOR: Law, CE Tel (613)547-5777 Lockhart, M

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

RESPONSIBLE INDIVIDUAL: Law, CE Tel (613)547-5777

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1967 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$4,000

ACKNOWLEDGMENT: CIGGT

#### 17 160402

##### FAST DATA MANAGEMENT AND ANALYSIS

To provide a data management system for the Facility for Accelerated Service Testing (FAST) test data, conduct appropriate data analysis and evaluation efforts, and report the resultant conclusions. FAST data analysis and report will provide the foundation for engineers in the railroad industry to make technical and economic decisions to update and improve railroad design, maintenance, and operations practices.

PERFORMING AGENCY: Association Of American Railroads, 1920 L Street, NW

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Gray, D Tel (202) 755-1877

Contract DOT-FR-74293 (CR)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: Mar. 1978 TOTAL FUNDS: \$454,094

ACKNOWLEDGMENT: TRAIS

#### 17 179340

##### MODELS FOR COMPLEX SYSTEMS

This research will develop probabilistic models for complex systems. The investigation of parametrically simple models for dependent sequences of random variables will be continued. Situations represented by such models include, the sequence of access path lengths in a data base system, the number of vehicles in moderately congested traffic crossing a fixed point on a road during consecutive time intervals of fixed length; and daily river flow data. The structural and limiting results of these dependent sequences of random variables in queueing models will be studied. Finally, the processes will be investigated in a randomly changing environment.

PERFORMING AGENCY: Naval Postgraduate School, School of Engineering, Operations Research

INVESTIGATOR: Jacobs, PA

SPONSORING AGENCY: National Science Foundation, Division of Engineering, ENG77-09020

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Nov. 1977 TOTAL FUNDS: \$22,032

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSE 6664)

#### 17 188645

##### TARIFF MODERNIZATION PROGRAM--PHASE II

This industry-wide program, involving shippers, carriers and tariff publishers, is planned to convert the requirements developed in Phase I into specific recommendations and solutions for simplifying, modernizing and improving the presentation of transportation tariff information. The plan contains tasks for nine technical work groups, each of which will require the support of experienced tariff and systems personnel.

PERFORMING AGENCY: Transportation Data Coordinating Committee

INVESTIGATOR: Guilbert, EA Tel (202) 293-5514

SPONSORING AGENCY: Transportation Data Coordinating Committee

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1979

#### 17 188651

##### LOCOMOTIVE DATA ACQUISITION PACKAGE (LDAP)

The objective is to produce a sophisticated, rugged and portable Locomotive Data Acquisition Package (LDAP) for line-haul data recording and analysis directly on board the locomotive. Currently such systems do not exist. This system will be used to systematically monitor, define, and analyze those parameters directly affecting locomotive operational efficiency and reliability.

PERFORMING AGENCY: California University, Berkeley

INVESTIGATOR: Abbott, RK Tel (415) 843-2740 X6450

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Jacobs, ME Tel (202) 426-0808

Contract AR-74348

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$400,000

ACKNOWLEDGMENT: FRA

18 059894

**STUDY OF FEASIBILITY AND IMPACTS OF ALL-INCLUSIVE TRANSPORTATION TRUST FUNDS AS A MECHANISM FOR TRANSPORTATION FINANCE**

This study will study the feasibility of designing and implementing multi-modal transportation trust funds at the Federal state and regional level. The feasibility analysis will address the following factors: 1) existing and potential funding sources at the respective levels; 2) compatibility among the funds and their levies; 3) institutional changes required to implement these funds; 4) effect on political decision-making process; and 5) flexibility to meet differing transportation needs in the various states and localities.

PERFORMING AGENCY: Polytechnic Institute of New York, Transportation Training and Research Center

INVESTIGATOR: Roess, RP Crowell, WH

SPONSORING AGENCY: Urban Mass Transportation Administration, NY-11-0014

RESPONSIBLE INDIVIDUAL: Stratton, J

Grant NY-11-0014

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: June 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$50,000

ACKNOWLEDGMENT: TRAIS (NY-11-0014)

18 059897

**REGIONAL FINANCING ALTERNATIVES FOR MASS TRANSIT**

The project will compare alternative regional financing mechanisms for mass transit in terms of their economic efficiency, equity, fiscal impact, locational and land use incentives, and administrative feasibility. Six alternative revenue sources will be analyzed and evaluated according to the following criteria; 1) property (and land) taxes; 2) income taxes; 3) sales taxes; 4) user charges; 5) intergovernmental grants; and 6) general revenues.

PERFORMING AGENCY: Syracuse University

INVESTIGATOR: Puryear, D

SPONSORING AGENCY: Urban Mass Transportation Administration, NY-11-0003

RESPONSIBLE INDIVIDUAL: Jasper, N Tel (202) 426-0081

Grant NY-11-0003

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: July 1978 TOTAL FUNDS: \$98,062

ACKNOWLEDGMENT: TRAIS (NY-11-0003)

18 080324

**THE RAILWAY FREIGHT RATE ISSUE IN CANADA**

The historical development of the railway freight rates in Canada is traced to provide the basis for explaining the complex roles played by freight rates and their evolution from an economic function to a sociological or political phenomenon. The inhibiting effects on the development of sound transportation and regional development policies are also analysed. The task of completing the report of the principal investigator is more than halfway completed.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.33.74

SPONSORING AGENCY: Canadian Institute of Guided Ground Transport; Canadian National Railways; Canadian Pacific; Department of Transport, Canada

RESPONSIBLE INDIVIDUAL: Schwier, C Tel (613) 547-5777

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1974 COMPLETION DATE: May 1979 TOTAL FUNDS: \$45,000

ACKNOWLEDGMENT: CIGGT

18 129724

**FREIGHT CAR AND LOCOMOTIVE COSTING**

Develop a set of methodologies and procedures for use in estimating the nature of cost and its variability in purchasing, maintaining, and operating freight cars and locomotives with application to pricing control and other management purposes.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company; Southern Railway System; Reebie (Robert) and Associates, Incorporated

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lawler, JD Tel 202-426-0771

Contract DOT-FR-55055

STATUS: Active NOTICE DATE: July 1976 START DATE: June 1975 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$485,021

ACKNOWLEDGMENT: FRA

18 129729

**RAILROAD YARD OPERATIONS COSTING METHODOLOGY**

To develop, test, and justify a set of methodologies and procedures to be used for estimating the cost of providing, maintaining, and operating Yards and Terminals and their application to pricing, control, investment and other management purposes.

PERFORMING AGENCY: Haskins and Sells; Seaboard Coast Line Railroad; Whitten (Herbert O) and Associates

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lawler, JD Tel 202-426-0771

Contract DOT-FR-65135

STATUS: Active NOTICE DATE: July 1976 START DATE: June 1976 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: \$482,299

ACKNOWLEDGMENT: FRA

18 138514

**GENERAL AND ADMINISTRATIVE SERVICES COSTING METHODOLOGY**

To develop, test, and justify a set of methodologies and procedures to be used for estimating the economic costs of providing and maintaining railroad general administrative services and for management control and decision making.

PERFORMING AGENCY: Price Waterhouse and Company

INVESTIGATOR: Scanlan, J

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Lawler, JD Tel (617)423-7330 x219

Contract DOT-FR-5167

STATUS: Active NOTICE DATE: Aug. 1978 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: FRA

18 159635

**RAILWAY COSTING ORDER REVIEW**

This work is not a stand-alone project, but consists of integrating CIGGT costing work with that of research teams assembled by the Canadian Transport Commission for the purpose of thoroughly revising railway costing order procedures.

REFERENCES:

Railway Costing Study, Phase I Report Canadian Transport Commission, Nov. 1977

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 8.36.77

INVESTIGATOR: Lake, RW Tel (613) 547-5777 Schwier, C Roney, MD Turcot, MC Boon, CJ Bunting, PM Ellert, JC

SPONSORING AGENCY: Canadian Transport Commission

RESPONSIBLE INDIVIDUAL: Lake, RW Tel (613) 547-5777

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: May 1977 COMPLETION DATE: Mar. 1979 TOTAL FUNDS: \$70,000

ACKNOWLEDGMENT: CIGGT

18 177624

**COSTING OF RAIL SERVICE**

Development of new methods for obtaining an empirical understanding of the costs or providing various types of rail service. Using mathematical techniques based on engineering principles and statistical analyses based on cost and output data, hybrid techniques will be developed to examine the relation between output and costs. A relatively simple rail operation will be identified where commodities are relatively homogenous, the network is simple and terminal activities are as uncomplicated as possible. An example might be a train service moving grain from a country elevator to a river terminal.

**PERFORMING AGENCY:** Northwestern University, Evanston, Transportation Center, 425

**INVESTIGATOR:** Daughety, A Tel (312) 492-5183 Turnquist, M

**SPONSORING AGENCY:** Department of Transportation

**RESPONSIBLE INDIVIDUAL:** Ravera, RJ Tel (202) 426-0190

**Contract DOT-OS-70061**

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Sept. 1977 **TOTAL FUNDS:** \$57,999

**ACKNOWLEDGMENT:** Northwestern University, Evanston

**20 055810**

**TRANSPORTATION SYSTEM DEVELOPMENT FOR ALASKA**

This project is directed at the analysis of policy and transportation system development alternatives upon the economy of the State of Alaska as well as upon the performance of the intercity freight transportation networks. A macroeconomic model, previously developed by the Brookings Institution shall be adopted for use in representing the basic structure and interrelationships of the Alaskan economy. A transportation network simulation model shall also be developed as part of this effort which includes each of the major intercity freight carrying modal systems operating or expected or be operating in Alaska.

A recent Federal Railroad Administration study used the research demand forecasting models to predict Alaska Railroad freight flows by commodity type. Rail data was also used by the Canadian government in studying the feasibility of a Canadian railroad system extension to Alaska.

PERFORMING AGENCY: Alaska University, College  
 INVESTIGATOR: Gorsuch, L  
 SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation  
 RESPONSIBLE INDIVIDUAL: Swerdloff, CN

Contract DOT-OS-40008 (CS)  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1973 COMPLETION DATE: June 1979 TOTAL FUNDS: \$222,959

ACKNOWLEDGMENT: TRAIS (PR# PUR-2-30685)

**20 058460**

**TRANSPORTATION REQUIREMENTS FOR COAL MOVEMENTS THROUGH 1985**

Develop and analyze rail and barge industry estimates of the total coal flows by 1985 and the equipment and facilities required to handle increased coal traffic. Critical system constraints that may hinder traffic growth will be determined and carrier solutions sought. The rail and barge industry planning processes to 1985 will also be examined and discussed.

**REFERENCES:**

Rail and Water Transportation Requirements for 1985 U.S. Coal Flows, IOCS, Cambridge, Mass., Dec. 1978

PERFORMING AGENCY: Input Output Computer Services, Incorporated  
 INVESTIGATOR: Desai, SA Tel (617) 890-2299 Witten, J  
 SPONSORING AGENCY: Transportation Systems Center, OP-602  
 RESPONSIBLE INDIVIDUAL: Maio, D Tel (617) 494-2258

Contract DOT-TSC-1282  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1976 TOTAL FUNDS: \$155,000

ACKNOWLEDGMENT: TRAIS, OST

**20 058467**

**DATA REQUIREMENTS ON INTERCITY FREIGHT DEMAND PLANNING**

The objective is a critical review of present data sources and reporting methods. Emphasis is on the usefulness of the data in calibration and estimation of existing forms of demand models and recommendations on better sources or collection techniques for more effective forecasting of commodity flows. Data of primary concern are indications of shippers' choice; commodity attributes; production, consumption and pricing of commodities; and transportation attributes. A careful review of the form of the model and variables needed to predict modal choice by shippers is made. Various methods of data collection, processing, storage and retrieval and their related costs are evaluated for achieving the goals.

**REFERENCES:**

Design of a Structure and Data Analysis Scheme for Intercity Freight Demand Forecasting, Chung, C; Roberts, PO, CTS Rept. #75-15, 154 pp, Sept. 1975

A Commodity Attribute Data File for Use in Freight Transportation Studies, Samuelson, RA; Roberts, PO, CTS Rept. #75-20, 27 pp, Nov. 1975

Developing Freight Origin-Destination Data for Use in Freight Planning, Roberts, PO, CTS Rept. #76-3, Feb. 1976

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies  
 INVESTIGATOR: Roberts, PO Tel (617) 253-7123  
 SPONSORING AGENCY: Transportation Systems Center, OP-509  
 RESPONSIBLE INDIVIDUAL: Wright, DG Tel (617) 494-2196

Contract DOT-TSC-1005 (CR)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1975 TOTAL FUNDS: \$38,000

ACKNOWLEDGMENT: TRAIS, Massachusetts Institute of Technology

**20 059189**

**FORECAST OF NATIONAL ECONOMIC ACTIVITY**

The main purposes of this procurement are to obtain from the Bureau of Economic Activity (BEA) the basic data files needed to translate forecasts of national economic activity into regional projections; to obtain examples of applications of the Regional Industrial Multiplier System useful in estimating the direct, indirect and induced effects of changes in the output of an industry on a region; and to obtain research assistance in developing a sound commodity flow projection method.

PERFORMING AGENCY: Department of Commerce, Bureau of Economic Analysis  
 SPONSORING AGENCY: Transportation Systems Center

IA RA-76-29

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1976 TOTAL FUNDS: \$10,000

ACKNOWLEDGMENT: TRAIS

**20 083533**

**ECONOMIC ANALYSIS OF THE UNITED STATES GRAIN EXPORTING SYSTEMS**

Evaluate private versus state trading systems for grain with respect to: Returns to producing, marketing and processing firms; relative market power between countries with different systems; comparative advantage; relative efficiencies of time, farm and place utilities under different systems; rate of technological change and progress including capital losses and replacement; their respect to commodity futures markets. Evaluate alternative export marketing techniques and strategies with respect to: the adequacy of the U.S. system of grades and standards; the logistics of costs of marketing and transportation. Comparative data will be collected on Canadian and U.S. grain handling costs and procedures. Structural and policy differences will be compared wherever possible. System performances will be compared on the basis of handling costs and producer returns. Analysis of capital investment decisions in the two systems will also be made. Data on price quality relationships for wheat will be collected and analyzed to determine the validity of present grading factors. North Dakota production data will be assembled on a county basis for use in a transportation model designed to analyze various rate policies for west bound shipments of wheat and barley. Existing transportation rates will be used to generate optimal flow patterns. Alternative rate policies will be compared to existing rate solutions. A manuscript is in process on a study of North Dakota Farmers Grain Marketing Strategies. The major factors influencing the selection of market outlet by farmers were price, convenience, grading practices, loyalty to firm, credit provisions for purchases and availability of farm supplies. Price and availability of labor were major factors in determining timing of grain sales. A survey of country elevators designed to basic marketing strategies and to review sale and procurement practices used by a random sample of firms was initiated. This study was a part of a regional study of country elevator marketing practices. The state and regional data are being analyzed and a Master's thesis is expected to be completed in early 1976. Preliminary results indicate that country elevators make limited use of futures markets in covering grain purchases. To-arrive contracts with terminal grain merchants are the predominant method of covering long grain positions in most states. The predominant method of transfer of grain ownership is still cash purchase at delivery by farmers; however forward contracting and farming of deferred pricing and pooling arrangements are becoming popular in several states of the North Central Region.

**REFERENCES:**

The Cost of Seed Processing Anderson, DE, NDSU, Agricultural Experiment Station, Nov. 1973

Grain Marketing Methods in the United States: Theory Assumptions and Approach, Anderson, DE, NDSU, Agricultural Experiment Station, AA-EA-CAES-WAEA Conf Paper, Aug. 1973

A Budget Analysis of the Logistics System for North Dakota Small Grains, Jensen, RC, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, May 1974

North Dakota Farmers Grain Marketing Strategies Bedker, GM, NDSU, Department of Agricultural Economics, Unpublished MS Thesis, Mar. 1974

North Dakota Farmers Grain Marketing Practices Bedker, GM; Ander-

son, DE, NDSU, Agricultural Experiment Station, North Dakota Farm Research, Oct. 1974

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, ND01354

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: North Dakota State University (CRIS 0060238)

20 099645

#### EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniform. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

#### REFERENCES:

Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing and Transportation Sit., MTS-191, pp 22-28, Nov. 1973

The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974

Nature and Quality of Livestock Transportation Services Used by Shippers, Hoffman, LA, Transportation Committee of American Nat'l Cattlemen's Assn, Jan. 1974

Changing Technology in Grain Transportation Hutchinson, TQ, International Conr Quality Conference, Champaign, Illinois, Oct. 1973

Problems in Transporting Fiscal 1974 Grain and Soybean Exports, Umberger, DE; Hutchinson, TQ, Economic Research Service, For. Agri. Trade of U.S., pp 18-24

PERFORMING AGENCY: Washington State University

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: Department of Agriculture, NEA-14-125-53-01-X2

Contract 12-17-04-8-917-X

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (G4 41788 46 286117)

20 099646

#### EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about

for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

#### REFERENCES:

Livestock, Trucking Services: Quality, Adequacy and Shipment Patterns, Hoffman, LA; Boles, PP; Hutchinson, TQ, Economic Res Service, AFR-312, Oct. 1975

Operations of For-Hire Livestock Truckers Boles, PP, Economic Res Service, AER-342, July 1976

Impact of Higher Gasoline Prices on Rural Households, Hoffman, LA, Economic Res Service, 4 pp, Apr. 1976

Discussion of a Sequential Link Approach to Evaluating Transportation Facility Adjustments, Gerald, JO, Sou. Journal of Agric Econ., V8 N1, pp 35-37, July 1976

Estimation of Demand for Transp of Agric Commod Miklius, W; Casavant, KL; Garrod, PV, Amer Journal of Agric Econ, V58 N2, pp 217-223, May 1976

PERFORMING AGENCY: Economic Research Service

INVESTIGATOR: Gerald, JO Hutchinson, TQ

SPONSORING AGENCY: Department of Agriculture, NEA-14-125-11-00

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (G4 41660)

20 099647

#### EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulations at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation



were analyzed for their impacts on agriculture.

**REFERENCES:**

Grain and Soybean Transportation Problems in Fiscal 1974 Umberger, DE; Hutchinson, TQ, Economic Research Service, Marketing & Trans Sit., MTS-191, pp 22-28, Nov. 1973

The Price of Agricultural Transportation Gerald, JO, Grain Transportation Forum, Bismarck, North Dakota, Mar. 1974

Nature and Quality of Livestock Transportation Services Used by Shippers, Hffman, LA, Transportation Com Amer Nat'l Cattlemen's Ass, San Diego, Jan. 1974

Changing Technology in Grain Transportation Hutchinson, TQ, International Corn Quality Conference, Champaign, Ill.

Problems in Transporting Fiscal 1974 Grain and Soybean Exports, Umberger, DE; Hutchinson, TQ, Economic Research Service, For. Agri. Trade of U.S.

PERFORMING AGENCY: Illinois University, Urbana, USDA, National Economic Analysis Division

INVESTIGATOR: Bunker, AR

SPONSORING AGENCY: Economic Research Service, NEA-14-125-17-01

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (GY 41787), Smithsonian Science Information Exchange (CRIS 0041787)

**20 129727**

**DOMESTIC AND INTERNATIONAL TRANSPORTATION OF U.S. FOREIGN TRADE: 1976-GENERAL CARGO COMMODITIES (PHASE II)**

Objective is to obtain, (a) New Data on the domestic origins and destinations, and the characteristics of domestic transportation, for commodities being transported via international air and vessel movements in U.S. foreign trade, and (b) New data on the transshipment of this type of commodity by truck and rail between U.S. and Canada (or Mexico) for trade with other foreign countries. Data will be collected by a sample survey (50,000 observations) and merged with existing data on international trade.

Co-sponsors are St. Lawrence Seaway Development Corp., U.S. DOT; U.S. Army Corps of Engineers, Institute for Water Resources, Ft. Belvoir, Virginia; Maritime Admin, Dept of Commerce, Office of the Secretary-U.S. DOT. A similar study for bulk commodities, but excluding grains and crude petroleum, is also being performed under a separate contract and managed by the IWR/CCE.

**REFERENCES:**

Domestic & Intl Transportation of U.S. Foreign Trade: 1975- Gen Cargo Commod; Phase I: Prelim Studies, Spec & Plans, Bureau of the Census

PERFORMING AGENCY: Department of Commerce, Economic Surveys Division, 63-7108

INVESTIGATOR: Torene, R Tel (202)763-5430

SPONSORING AGENCY: Office of Policy and International Affairs; Department of Transportation, Office of Intermodal Transportation

RESPONSIBLE INDIVIDUAL: Murphy, RD Tel (202)426-4448

Contract DOT-AS-50059

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1975 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$600,000

ACKNOWLEDGMENT: Office of Policy and International Affairs

**20 136085**

**STUDY OF RADIOACTIVE MATERIAL TRANSPORT PROBLEMS 1976-2000**

The aim of the project is to examine future transportation systems, trends, and problems associated with transport of nuclear fuel cycle materials, petroleum, coal & natural gas to assure a more orderly problem solving approach. Work areas included: (1) characterize the current transportation systems; (2) project future transportation needs and systems; (3) identify and analyze potential future transportation problems; (4) suggest actions to minimize impact of potential problems.

**REFERENCES:**

Identification and Prioritization of Concerns in Coal Transportation Now Through 2000, DeSteele, JG; Franklin, AL, PNL-SA-6527, May 1978

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs, RL 6617B

INVESTIGATOR: DeSteele, JG Tel (509) 946-2519

SPONSORING AGENCY: Department of Energy, Environmental Control

Technology Division

RESPONSIBLE INDIVIDUAL: Sisler, JA Tel (301) 973-5466

Contract DOE-AT-45-1-1830

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: July 1978 TOTAL FUNDS: \$575,000

ACKNOWLEDGMENT: Energy Research and Development Administration

**20 138364**

**EVALUATION OF ALTERNATIVE TRANSPORTATION SYSTEMS AND POLICIES FOR RURAL MISSOURI**

Estimate transport requirements to 1985 and 1990. Estimate economic effects of alternative rural transport systems. Assess state and federal roles in setting transport policy and planning and regulating transport systems. Study economic effects of alternate plans and policies on carriers, shippers and rural areas. Present Missouri rural transport system will be described. Demand for services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated modal combinations and regulatory patterns. Merits of alternative systems and policies will be evaluated. 1. A study of grain production and marketing in Northwest Missouri has been completed together with a projection of transportation demand for movement of grain to 1980 and 1985, to determine a grain distribution system which would yield the highest net return to producers and marketers within the region. Study results indicate the possibility of a contribution of as much as \$2.6 million per year in farmer net income, before considering transportation and elevator upgrading costs, through adjustment of assembly and storage patterns to permit long-haul transport in larger volume shipments at lower cost. 2. A study of the condition, capacity and impediments to efficiency in Missouri's transportation system has been finalized for publication. The study documents the need for special attention to upgrading of rural roads and bridges; identifies segments of the railroad system with service limitations requiring attention; and highlights the possibilities for improved utilization of our underemployed inland waterway resources as a promising target for further study. Findings of this study have important implications for both public and private sector decision making. 3. Data collection is proceeding for estimation of transportation demand for grain and fertilizer, on a state-wide basis by counties, in 1980 and 1985.

**REFERENCES:**

Missouri Rural Transportation in Jeopardy Moser, DE, Missouri University, Extension Division, Vol. 18; No. 8, Aug. 1975

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068730)

**20 138367**

**NATIONAL TIMBER AND WOOD PRODUCTS REQUIREMENTS**

Analyze the present and prospective consumption of timber and wood products in the national economy by components and relate these requirements to the national to the national timber supply situation. Develop and apply sampling systems to measure quantities consumed in construction, manufacturing, shipping, and other major end uses. Develop and apply accurate models which monitor shifts in wood raw materials use. Develop and apply techniques for converting wood product consumption estimates into estimates of timber supply requirements. PROGRESS REPORT: A study of nonresidential and nonhousekeeping building construction activity found it increased from 1 billion square feet in 1961 to 1.7 billion square feet in 1973. The largest increase was in commercial buildings such as stores, warehouses, and office buildings. Nonhousekeeping, hospital, and other buildings also showed increases. Construction of industrial, religious, and educational buildings declined during the period. Lumber, plywood, hardboard, and particleboard usage in these structures increased during the period, while glue-laminated lumber, insulation board, and structural wood-fiberboard decreased. Construction value for all building increased from \$16.05 per square foot of floor area in 1961 to \$24.15 in 1973--an average annual rate of 3.5 percent. A computer retrieval and compiling system has been established, containing primary wood processing

mill capacity, type, and location for analysis of trends and regional patterns in timber requirements. Annual woodpulp capacity in the U.S. has increased from 4.4 to 51.5 million tons since 1920, with average mill capacity increasing nearly ten times to 426 tons per day. Kraft pulp capacity now dominates the industry with the South leading in total pulping capacity. Panelboard production capacity data have been collected.

PERFORMING AGENCY: Forest Products Laboratory, FPL-4202  
 INVESTIGATOR: Stone, RN Marcin, TC Reid, WH  
 SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Apr. 1975 COMPLETION DATE: Apr. 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0042894)

20 138370

#### EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. PROGRESS REPORT: For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate service and other proposals for change in transportation were analyzed for their impacts on agriculture.

#### REFERENCES:

Effects of the Proposed Northeast-Midwest Rail Reorganization on Rural Areas, U.S. Senate, Agriculture and Forestry Comm, Mar. 1975

PERFORMING AGENCY: Kansas State University, USDA Transportation Economics Division, NEA-14-125-53-01-X1  
 INVESTIGATOR: Casavant, KL  
 SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041974)

20 138376

#### IMPACT OF CHANGES IN WORLD FOOD SUPPLY-DEMAND UPON SELECTED AGRICULTURAL MARKETS

Estimate input usage to achieve the projected agricultural production, considering probable price and availability of farm inputs. Determine the adaptability of the existing agricultural input market organization to meet projected changes in agricultural output (and to suggest alternative organization in case input market structure is found to be inadequate). Input usage ranges will be estimated based on technical coefficients from secondary sources: input studies, farm management budgets and LP analyses. Consideration will be given to likely changes in resources mixes. Budgeting or linear programming procedures will be used to determine

expected future resource utilization rates. Production projections from secondary sources will be used in estimating total input requirements. A multiple-product (LP) cost evaluation model will be used to measure the effect of price changes on farm input retailing costs. Sensitivity analysis applied to cost coefficients will facilitate the measurements. The effects of factor and product price changes on scale, volume and product diversity economies will be measured by rerunning the LP model using alternative price assumptions. Results of the LP runs will be used to compare optimum-cost structural conditions with actual assess operational efficiency.

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-10-060

INVESTIGATOR: Anderson, DG Lytle, PW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Feb. 1977 START DATE: Aug. 1971 COMPLETION DATE: June 1977

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0060266)

20 153650

#### MULTI-MODAL, MULTI-STATE TRANSPORTATION SYSTEM EVALUATION

Evaluate the feasibility of a multi-modal, multi-state corridor extending from Kansas City, Missouri to Jacksonville, Florida for the movement of goods and people.

PERFORMING AGENCY: University of North Florida, Jacksonville, Department of Transportation and Logistics, DOT-OS-60512; Georgia Institute of Technology, 225 North Avenue, NW

INVESTIGATOR: Jones, PS Tel (904) 646-2860 Smith, JA, Jr

SPONSORING AGENCY: Department of Transportation, Office of University Research; University of North Florida, Jacksonville

RESPONSIBLE INDIVIDUAL: Jones, PS Tel (404) 894-2308

Contract DOT-OS-60512

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Feb. 1977 COMPLETION DATE: May 1979 TOTAL FUNDS: \$1,000,000

ACKNOWLEDGMENT: University of North Florida, Jacksonville

20 156542

#### EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation storage and distribution system. Evaluate the economic effects of alternative railroad ownership and financial policies. Develop models to estimate the volume of agricultural outputs and inputs requiring transportation and project to 1985 and 1990 the spatial and temporal pattern of products to be transported. With this information an optimal rural freight transportation storage and distribution system will be estimated using a time staged transshipment model of spatial equilibrium. alternative rail reorganization schemes and assess the sensitivity of the suggested transportation system to changes in the cost of alternative modes of transportation. In addition, we will inventory and describe existing ownership patterns and develop procedures to evaluate the costs and benefits of ownership alternatives and abandonment of railroad lines. Substantial progress has been made toward the completion of an estimate of the demand for rural transportation in the State of Michigan. Appropriate methodology has been developed and is currently being implemented to make demand projections to 1985 and 2000 under alternative domestic and foreign demand scenarios. Michigan State has taken a leadership role in developing appropriate methodological procedures to be used by other stations cooperating in the NC-137 regional project. Specific results will be forthcoming on projected quantities of grain requiring transportation services in the State of Michigan. In addition, we are in the initial stages of research directed toward the estimation of an optimal rural freight transportation storage and distribution system in a selected geographical region of Michigan.

PERFORMING AGENCY: Michigan State University, East Lansing, Department of Agricultural Economics, CSRS MICL

INVESTIGATOR: Thompson, SR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, MICL01254

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070878)

20 156591

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION, STORAGE, AND DISTRIBUTION SYSTEMS**  
Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage and distribution system. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. Comparison of costs, rates, and services under regulated vs. unregulated conditions will provide the basis for evaluating the merits of alternative regulatory policies. A model will be constructed which will describe rural transportation systems as they would exist under alternative state and federal regulations. The likely performance of the transportation systems will be estimated as a function of the intramodal competitive environment of the participating states. A survey of area grain shippers and carriers was conducted to identify the basic procedures and policies related to ICC regulation of the railroads as they affect grain transportation. Also, opinions on the practical effectiveness of regulation and suggestions for regulatory reforms were solicited. A manuscript summarizing these surveys was prepared. Included in this manuscript is a discussion of the relationship between regulated rail rates, unregulated rates for other modes, and the economic problems confronting U.S. railroads. This manuscript will be published in the January 1977 edition of the Minnesota Agricultural Economist. Another manuscript was prepared which outlines the essential arguments surrounding the Lock and Dam No. 26 replacement controversy. This work centered its attention on the relationship between the economic, environmental, and natural resource value of the Mississippi River. This was viewed in terms of the impact of Lock and Dam No. 26 on these issues. This manuscript will be a portion of an aggregated article on agricultural policy perspectives for 1977 which will appear in the February 1977 issue of the Minnesota Agricultural Economist.

REFERENCES:

Railroad, Grain Transportation and the Interstate Commerce Commission, Martin, M; Dahl, R, Minnesota Agricultural Economist, Jan. 1977

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, CSRS MIN

INVESTIGATOR: Dahl, RP Tel (612) 376-3436 Martin, MV

SPONSORING AGENCY: Department of Agriculture, MIN-14-043; Minnesota University, St Paul, Department of Agricultural and Applied Economics

RESPONSIBLE INDIVIDUAL: Dahl, RP Tel (612)376-3436

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Oct. 1981 TOTAL FUNDS: \$6,200

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071288), Minnesota University, St Paul

20 156604

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**  
The project will: estimate rural freight transportation requirements to 1985 and 1990, estimate the optimal rural freight transportation, storage and distribution system; evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. The present rural transport system will be described. Demand for transportation services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated model combinations and regulatory patterns. Merits of alternative systems and policies will be evaluated. Project activated October, 1976. Proceeding with collection and processing of data for estimation of production and flow patterns for transportable surplus of grain, and for transportation demand for movement of grain and fertilizer.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, CSRS MO

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, M000040-1

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070255)

20 164822

**ONTARIO FREIGHT MODEL**

The design of this model will meet the following specific objectives: The development of an understanding of commodity movements and factors influencing commodity movements to and from, through and within the Province of Ontario; assistance to the planning of capital improvements to the transportation network; the provision of data and expertise to assist in the development policy for the regulation of movements on the transportation network; the production of a tool to aid in the effective operation of the existing system. The project is divided into 8 phases: (1) Review of Data and Existing Work, (2) Selection of Commodities, (3) Determination of Functional Relationships, (4) Definition of the Network, (5) Model Development and Timing, (6) Model testing, (7) Monitoring model usage, and (8) Model review. /RTAC/

PERFORMING AGENCY: Ontario Ministry of Transportation & Communication

INVESTIGATOR: Kher, R

SPONSORING AGENCY: Ontario Ministry of Transportation & Communication

STATUS: Active NOTICE DATE: Dec. 1976 COMPLETION DATE: Dec. 1979

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 179664

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**  
Estimate rural freight transportation requirements to 1985 and 1990 and estimate the optimal rural freight transportation, storage and distribution system. Historical data on agricultural production and input usage by Texas subregions will be gathered. Models will be developed to provide estimates of agricultural output and input usage by subregion to 1985 and 1990. With this data, spatial and temporal flow patterns of agricultural products and inputs will be estimated. Transportation cost and rate data will be gathered by mode as it relates to projected agricultural output and input flows. With supply and demand estimates and storage, processing and transportation costs, normative spatial and temporal flows will be resolved with spatial equilibrium models. Optimal number, size and location of storage, processing and distribution facilities will be resolved. The social and economic costs and benefits with alternative configurations will be evaluated.

PERFORMING AGENCY: Texas A&M University, Department of Agricultural Economics, TEX03376

INVESTIGATOR: Fuller, SW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070225)

20 179665

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**  
Estimate rural freight transportation requirements to 1985 and 1990. Develop models which will provide uniform estimates of agricultural output and input usage by state to 1985 and 1990. Collect historical data on agricultural production and input usage of commodities and states. Project spatial and temporal pattern of outputs and inputs to be transported. Develop procedures for estimating and estimate elasticities and cross elasticities of demand with respect to price and service, by mode of transport and commodity group. The analysis would include the response of individual firms to price and service changes in transportation as well as aggregate response relationships.

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01648

INVESTIGATOR: Johnson, MA

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071995)

20 179666

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEM**

To estimate rural freight transportation requirements to 1985 and 1990. To estimate the optimal rural freight transportation, storage and distribution system. To evaluate the economic effects of alternative railroad ownership and financial policies. Steering committees for each objective will be appointed from participants cooperating in each objective. The purpose of these committees will be to coordinate research methodologies and to provide for data sharing. Joint publications summarizing regional findings are planned. Historical production data by counties has been collected for major crops, livestock and fertilizer during the 1960 and 1975 period. National projections will be used in conjunction with this data to project rural freight transportation requirements to 1985 and 1990.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO00572

INVESTIGATOR: Larson, DW Tel (614) 422-6731

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071704)

20 179667

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal grain transportation, storage, and distribution system which can maximize farmers' benefits. Evaluate the economic effects of alternative railroad ownership and financial policies. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural commodities. Objectives 1, 2, and 3 will be completed by using a multi-stage transportation model. This model is based on a combinational algorithm, which compares alternative grain distribution systems and selects the optimal configuration. Interregional mathematical programming models are applied for Objective 4. This programming model determines the amount and directional flows of grain between producing and consuming regions. Completion of developing both plant location model and linear programming model. Completed the estimation of truck and barge costs for grain shipments. Completed a mileage matrix from 172 shipping points to domestic and export markets. Grain sale estimation for 1985, 1990 and 2000 will be completed. Subterminal investment cost, rail line upgrading cost and multiple car cost will be estimated.

## REFERENCES:

Shipment Patterns of Montana Wheat and Barley Under Alternative Rail and Truck-Barge Rate Structures, Koo, WW; Cramer, G, Montana State University, Staff Paper 76-26

Shipping Patterns of Montana Grain Koo, WW; Cramer, G, NOW, Agricultural Experiment Station, Montana State Univ

A Study of the Interaction of Weather with Alternative Environmental and Grain Reserve Policies, Koo, WW; Bogges, WG; Heady, EO

PERFORMING AGENCY: Montana State University, Bozeman, Department of Agricultural Economics, MONB00077

INVESTIGATOR: Koo, WW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-007118)

20 179671

**INTERMODAL TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER**

Estimate adjustments required in facilities and operations to enable barge transportation to perform its optimal role in transportation of grain and fertilizer in the Mississippi River basin in 1985. Develop data on estimated fertilizer usage and exportable grain production in Missouri to 1985. Participate with Iowa State University and NC-137 contributors in Projection of Mississippi River basin usage of fertilizer and production of exportable grain surpluses to 1985. Develop and evaluate data on number, location and capacity of river ports, barge lines, transfer facilities and fleet

and switching services for grain and fertilizer on the Mississippi River system. Determine structural and procedural adjustments needed to minimize cost of barge transportation and handling of grain and fertilizer on the Mississippi River System. Participate with Iowa State University and Louisiana State University in estimation of intermodal allocation of fertilizer and grain traffic to minimize costs of transporting quantities of these commodities expected to move through deepwater Mississippi River ports by 1985.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040-2

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072803)

20 179678

**ECONOMIC PROJECTIONS PROGRAM**

Synthesize technical and economic data and relationships into component models of the ERS National Interregional Agricultural Projections (NIRAP) System. Coordinate ERS-wide projection teams for evaluating and making necessary modifications in the NIRAP System and resulting projections and document all components and interrelationships in a User's Manual. Generate projections and analysis of alternative futures encompassing major variables in the U.S. food and fiber system and its input supply, farm production, transportation, processing and distribution subsectors. Disseminate information via staff reports, professional papers, technical bulletins and a publication, Agriculture the Third Century. "First generation" component models for essential technical and economic relationships will be followed by additional first generation components and "second, third and more advanced generation" modified components to expand ERS's capability to simulate alternative futures more useful in economic research, public policy formulation and program planning and administration. Eleven scenarios were developed for a study for Resources for the Future. Alternative growth rates in GNP and population were combined with moderate and high trade, current trends and stringent environmental controls, and moderate and high technology growth rates to project 31 commodities at the farm level to 1985, 2000, and 2025. The most difficult case combined high population, high GNP growth, stringent environmental controls, high trade, and moderate technological growth, then environmental controls were eased, GNP and population growth slowed, technology growth slowed, technology growth accelerated, and plant protein substituted for animal protein in other scenarios to evaluate their ability to ease resource requirements. Output consisted of aggregate prices received and prices paid by farmers, gross farm income, production expenses, net farm income, indexes of total farm output, livestock & crop production, exports and imports, food use, feed use, per capita consumption, and prices. Crop yields, land use, inputs such as fertilizer and fuel, and regional distribution were also projected.

PERFORMING AGENCY: Michigan State University, East Lansing, Division of Economics and Statistical Analysis, NEA-19-165-26-01-X

INVESTIGATOR: Rosmiller, E

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1974 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-004-3559)

20 179679

**EVALUATION OF ALTERNATIVE TRANSPORTATION SYSTEMS AND POLICIES FOR RURAL MISSOURI**

Estimate transport requirements to 1985 and 1990. Estimate economic effects of alternative rural transport systems. Assess state and federal roles in setting transport policy and planning and regulating transport systems. Study economic effects of alternative plans and policies on carriers, shippers and rural areas. Present Missouri rural transport system will be described. Demand for services will be measured and projected to 1985 and 1990. Expected changes in the system will be identified. Cost and service levels will be compared under simulated modal combinations and regulatory patterns.

Merits of alternative systems and policies will be evaluated. A study of grain production and marketing in Northwest Missouri has been completed, together with a projection of transportation demand for movement of grain to 1980 and 1985, to determine a grain distribution system which would yield the highest net return to producers and marketers within the region. Study results indicate the possibility of a contribution of as much as \$2.6 million per year in farmer net income, before considering transportation and elevator upgrading costs, through adjustment of assembly and storage patterns to permit long-haul transport in larger volume shipments at lower cost. A study of the condition, capacity and impediments to efficiency in Missouri's transportation system has been finalized for publication. The study documents the need for special attention to upgrading of rural roads and bridges; identifies segments of the railroad system with service limitations requiring attention; and highlights the possibilities for improved utilization of our underemployed inland waterway resources as a promising target for further study. Findings of this study have important implications for both public and private sector decision making. Data collection is proceeding for estimation of transportation demand for grain and fertilizer, on a state-wide basis by counties, in 1980 and 1985.

PERFORMING AGENCY: Missouri University, Columbia, Department of Agricultural Economics, MO00040

INVESTIGATOR: Moser, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068730)

#### 20 179692

##### ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate private versus state trading systems for grain with respect to: Returns to producing, marketing and processing firms; relative market power between countries with different systems; comparative advantage; relative efficiencies of time, farm and place utilities under different systems; rate of technological change and progress including capital losses and replacement; their respect to commodity futures markets. Evaluate alternative export marketing techniques and strategies with respect to: the adequacy of the U.S. system of grades and standards; the logistics of costs of marketing and transportation. Comparative data will be collected on Canadian and U.S. grain handling costs and procedures. Structural and policy differences will be compared wherever possible. System performances will be compared on the basis of handling costs and producer returns. Analysis of capital investment decisions in the two systems will also be made. Data on price quality relationships for wheat will be collected and analyzed to determine the validity of present grading factors. North Dakota production data will be assembled on a county basis for use in a transportation model designed to analyze various rate policies for west bound shipments of wheat and barley. Existing transportation rates will be used to generate optimal flow patterns. Alternative rate policies will be compared to existing rate solutions. Work was completed on a study of North Dakota Farmers Grain marketing strategies. This study indicated the principal factors influencing farmers market selection were price and market convenience. A paper was prepared and presented at the NC-104 research symposium held in Chicago in September 1976. This presentation summarized some of the research findings of a study on grain title transfer arrangements conducted by eight states in the North Central Region. The study indicated that there are significant differences among elevators in the region with respect to business procedures and marketing practices. New work initiated under this project includes a comparative study of the U.S. and Canadian grain handling systems. This study will compare policies and marketing practices of North Dakota and Manitoba. A study was also initiated to evaluate grade standards and basic quality considerations in spring wheat. It will evaluate

price quality relationships to determine economic significance of selected quality factors in spring wheat.

#### REFERENCES:

Grain Marketing Strategies of North Dakota Farmers Anderson, DE; Bedker, G, North Dakota Agricultural Experiment Station, Dept Agri Econ, Report No. 111, Dec. 1975

Grain Title Transfer Arrangements in the North Central Region. Presented at NC104 Grain Marketing Sem Sept 8, 1976, Anderson, DE, North Dakota Agricultural Experiment Station, Dept Agri Econ, 1976

Abstract of Research Results-NC-104-Systems Analysis of the Economics of Grain Marketing, Stroup, J, Ohio Agricultural Research and Development Center, Wooster, Sept. 1976

Analysis of Grain Title Transfer Arrangements Fisher, N, North Dakota State Univ, Dept of Agricultural Economics, MS Thesis (unpublished)

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics

INVESTIGATOR: Anderson, DE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0060238)

#### 20 185240

##### THE INFLUENCE OF COAL TRANSPORTATION COSTS ON THE OPTIMAL DISTRIBUTION OF COAL AND THE OPTIMAL LOCATION OF ELECTRIC POWER GENERATING PLANTS

The project is a theoretical and empirical investigation of the impact of space on the movement of coal. Market area analysis will be the first step, to be followed by the adjustment due to structural changes and the locational impact of power generating plants. The final step will be to determine current and future optimal utilization and distribution of coal among regions.

PERFORMING AGENCY: West Virginia University

INVESTIGATOR: Campbell, TC Tel (304) 293-5531 Hwang, MJ

SPONSORING AGENCY: Department of Transportation, Research and Special Projects Administration

RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: \$40,000

ACKNOWLEDGMENT: West Virginia University

#### 20 188659

##### IMPACTS OF CHANGES TO TRUCK SIZE, CONFIGURATION AND WEIGHT LIMITS

This project provides an assessment of the freight market and energy impacts of increased truck size and weight limits. Impacts on competition among highway, rail and water carriers are estimated in terms of traffic diversion as a result of changing state limits, prohibiting multiple trailer operations or having weight limits below current federal allowable levels. Estimates of changes in revenues and profitability of carrier groups as well as freight rates are also under study.

PERFORMING AGENCY: Transportation Systems Center, OP-840

INVESTIGATOR: Maio, D Tel (617) 494-2418

SPONSORING AGENCY: Office of Policy and International Affairs, Intermodal Studies Division

RESPONSIBLE INDIVIDUAL: Swerdloff, CN

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1978 COMPLETION DATE: Oct. 1980

ACKNOWLEDGMENT: DOT

21 138527

**CHICAGO TERMINAL PROJECT**

To increase the reliability, speed and efficiency of car movements through a major existing railroad terminal so that the quality and saleability of rail transportation is improved, thereby attracting additional traffic improving employment opportunities. The improvements are to be made without capital expenditures. This objective is being achieved through a series of experiments involving changes in operating practices, labor agreements, rates, and regulations.

Co-sponsors include Railroad Labor Organizations, Association of American Railroads and Chicago Railroad Terminal Information System.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

INVESTIGATOR: Adamson, E McGuire, T

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202)472-7280

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: July 1979 TOTAL FUNDS: \$495,000

ACKNOWLEDGMENT: FRA

21 157598

**HOUSTON TERMINAL PROJECT**

The purpose is to establish a cooperative railroad labor-management experimental program for the Houston Railroad Terminal. The Houston terminal continues to experience significant car delays. Therefore, the principal objective of this project is to improve the efficiency of rail terminal operations in the Houston area.

Additional funding provided by railroad labor organizations and Houston, Texas, area Railroads.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

INVESTIGATOR: Joiner, D Tel (713)224-3662 Dessens, F Tel (713)224-3662

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads; Railroad Labor Unions

RESPONSIBLE INDIVIDUAL: Collins, DM Federal Railroad Administration Tel (202)472-7280

Contract DOT-FR-75244 (CC)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1977 COMPLETION DATE: Aug. 1980 TOTAL FUNDS: \$195,000

ACKNOWLEDGMENT: FRA

21 157902

**INTERMODAL FREIGHT SERVICES EAST OF THE HUDSON RIVER**

The objective is to improve rail freight connections with truck and marine operations in the New York City and Long Island areas. In addition to New York City, the Long Island counties of Nassau and Suffolk will be involved in the study.

Announcement of this study was published in Traffic World, V 171, N 1 (July 4, 1977), P 18.

**REFERENCES:**

Transportation Priorities in New York State 1978

1978 Winter Storm Operations of the Long Island Railroad 1978

PERFORMING AGENCY: New York City Planning Commission, New York City Department of City Planning; New York State Department of Transportation, Planning Division

SPONSORING AGENCY: New York State Legislature

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 TOTAL FUNDS: \$400,000

21 159624

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II**

As freight car utilization is a nationwide problem beyond the ability of a single railroad to solve, a cooperative research program (Phase I) between the railroad industry and the Federal Government was started in 1975 and completed in 1977. The second phase of this program will oversee the establishment and conduct of six different task forces to address and overcome those critical facets of the freight car utilization problems identified in Phase I. These task forces will structure case studies and

demonstration programs which will facilitate the adoption of improvements throughout the industry. Each group will address a different facet of the utilization problem to include management organizations and practices, utilization impacts of railroad operating plans, railroad customer coordination, nationwide freight car management, railroad freight car distribution, and utilization impacts of freight car design and serviceability. All will emphasize the need for explicit adoption of systems which respond to the need to more actively and integrally manage the car fleet.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$2,388,420

ACKNOWLEDGMENT: AAR

21 159626

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 2. UTILIZATION AND SERVICE RELIABILITY IMPACTS OF OPERATING PLANS**

Identify those operating practices which most directly impact utilization or service reliability. Needed mechanisms to initiate change will be developed. Theoretical work coupled with demonstration project will be used to define those strategies which best integrate operating decisions. Physical and financial changes resulting from the implementation of hourly car hire will be measured. Major elements of existing labor rules will be analyzed as they relate to the relationships between operating plans and car utilization. Continue previous analysis of the car cycle.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202)426-2920 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$370,000

ACKNOWLEDGMENT: AAR

21 159627

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 3. UTILIZATION IMPACTS OF CUSTOMER-RAILROAD RELATIONSHIPS**

Improved rail-customer coordination is necessary for many strategies to improve freight car utilization. Car studies will be developed quantifying the impact which specific customer practices have on railroad service and fleet utilization. Initiate studies designed to reduce the number of cars needed in specific assigned pools. Develop a theoretical framework which permits an explanation of potential improvements in car distribution efficiency through demand leveling. Define additional strategies to improve rail-customer coordination.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$265,000

ACKNOWLEDGMENT: AAR

21 159653

**INTERMODAL SYSTEM DEMONSTRATION**

Test and demonstrate new concepts in intermodal services on designated routes. The AAR will subcontract with railroads through competitive bidding and will provide management to monitor and coordinate demonstrations. It will also collect and analyze data and make a final report. Among techniques to be tested are piggyback trains providing direct origin-to-destination service without intermediate yarding; scheduled services with two or more departures daily, increased labor productivity; improved terminal connections; and specialized information and control systems to respond to market changes.

PERFORMING AGENCY: SRI International  
 INVESTIGATOR: Minger, WK Tel (202) 293-5323  
 SPONSORING AGENCY: Federal Railroad Administration

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1978  
 COMPLETION DATE: Oct. 1979 TOTAL FUNDS: \$190,000

21 160398

**SYSTEMS ENGINEERING FOR INTERMODAL FREIGHT SYSTEMS-PHASE 1**

The findings of the initial phase of the Federal Railroad Administration's (FRA) Intermodal Systems Engineering Program are presented in five volumes. This work is intended to accelerate the rate of technological evolution in the equipment, facilities and subsystems used in intermodal rail freight transportation. The Phase I reports, entitled: "Exploratory Planning" include: (1) characterization of present intermodal equipment and operations, (2) identification of problems or opportunities where technology could be utilized to improve service, efficiency and return on investment (3) identification of improved equipment, subsystem, facility concepts having potential future application, (4) synthesis of alternate systems comprised of improved equipment in various combinations, (5) development of a methodology for assessment of the relative merit of system alternatives in quantitative terms under various operating scenarios, and (6) evaluation of synthesized systems and identification of most promising alternatives. The work reported was performed by two contractor teams working independently, each using slightly different approaches. Each contractor prepared separate reports. The findings from Phase I will be used in a more in-depth examination of the most promising alternatives during Phase II, Development Planning, Scheduled for completion in October 1979.

PERFORMING AGENCY: Kearney (AT) and Company Incorporated; Peat, Marwick, Mitchell and Company

SPONSORING AGENCY: Federal Railroad Administration  
 RESPONSIBLE INDIVIDUAL: Blanchfield, JR Tel (202) 426-0808

Contract DOT-FR-749-4273 (FFP)

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1977  
 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$500,000

ACKNOWLEDGMENT: TRAIS

21 170596

**NETWORK FREIGHT FLOW**

The project has two main thrusts: (a) railcar blocking and train scheduling models and (b) traffic assignment with elastic demand. Both investigations rely on the technique of formulating a large scale problem as a number of subproblems. Under (a) above, these are formulated as a set of dynamic programming/shortest path problems, and under (b) as a set of linear complementary problems.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Magnanti, TL

SPONSORING AGENCY: Department of Transportation  
 RESPONSIBLE INDIVIDUAL: Crosby, RW Tel (202) 426-9638

STATUS: Programmed NOTICE DATE: Aug. 1978 TOTAL FUNDS: \$80,000

ACKNOWLEDGMENT: DOT

21 170620

**RAILROAD CLASSIFICATION YARD DESIGN METHODOLOGY STUDY**

This research is to establish a set of practical guidelines, precedures, and principles which will facilitate the process of classification yard design and engineering. Phase I includes preparation of a basic methodology in preliminary form. In Phase II these precedures will be applied to a case study involving a cooperating railroad. The third phase will comprise refinement and expansion of the preliminary methodology, and documentation in a user-oriented form.

PERFORMING AGENCY: SRI International, 6364-1

INVESTIGATOR: Wong, PJ Tel (415) 326-6200 X2104

SPONSORING AGENCY: Transportation Systems Center; Federal Railroad Administration, Office of Research and Development  
 RESPONSIBLE INDIVIDUAL: Cracker, WF, Jr Tel (202) 426-0855

Contract DOT-TSC-1337

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Apr. 1977  
 COMPLETION DATE: Oct. 1980 TOTAL FUNDS: \$430,000

ACKNOWLEDGMENT: TSC, FRA

21 170622

**ST. LOUIS TERMINAL PROJECT**

This project is an expansion of the original St. Louis Terminal Project. The original pilot project involved the St. Louis terminal of the Missouri Pacific Railroad. With the success of this pilot, the involved parties expanded the Task Force concept of experimentation to include the entire St. Louis Terminal. The gist of the Task Force concept is to create a mechanism whereby labor and management can work in cooperation to solve mutual problems. As the original St. Louis Project has shown, significant improvements in operating efficiencies can be brought about if the proper labor-management environment is produced.

PERFORMING AGENCY: Federal Railroad Administration, Task Force on Rail Trans of Labor/Management Committee

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railroad Labor Organizations

RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

Contract 75232

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1976  
 COMPLETION DATE: May 1979 TOTAL FUNDS: \$300,000

ACKNOWLEDGMENT: FRA

21 170664

**INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS: PHASE III. TASK 3--TRAIN OPERATION AIDS**

This task will develop computer-assisted train operation and makeup aids to improve current system safety and reliability without significant hardware changes and take advantage of rapidly developing microprocessor technology. The subtasks: (3.1) Determine the manner in which an on-board computer can interface with operating personnel to assist in safe train operation; (3.2) Develop the technical requirements for reliable on-board microprocessor systems to help monitor/control conditions on locomotives and in the train; (3.3) Identify the sensor systems with the best near-term potential for use in future on-board monitoring and train signal and control systems; (3.4) Use locomotives in FAST test service at Pueblo to obtain early experience with on-board computer-assisted operations; (3.5) Develop a yardmaster's minicomputer to optimize train makeup based on delivery efficiency and dynamic stability.

PERFORMING AGENCY: Association of American Railroads Technical Center

INVESTIGATOR: Ambrose, WG Tel (312) 567-3649

SPONSORING AGENCY: Association of American Railroads; Federal Railroad Administration; Railway Progress Institute; Transport Canada Research and Development Centre

RESPONSIBLE INDIVIDUAL: Moyer, GJ Tel (312) 567-3602

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1978  
 COMPLETION DATE: 1980

ACKNOWLEDGMENT: AAR

21 185236

**FREIGHT CAR UTILIZATION STUDY**

Continuation of this project proposes to consider rail organization structures designed to enhance car utilization; develop an operations analysis model; develop a terminal control system; and consider relation between car utilization and locomotive productivity.

PERFORMING AGENCY: Massachusetts Institute of Technology

INVESTIGATOR: Sussman, JM Martland, CD

SPONSORING AGENCY: Association of American Railroads

STATUS: Proposed NOTICE DATE: Feb. 1979

ACKNOWLEDGMENT: Massachusetts Institute of Technology

21 185237

**USRA CAR UTILIZATION STUDY**

A detailed study of existing car distribution practices, procedures and organizational relationships on Conrail will be performed and comparison between Conrail and other major US railroads will be documented. Potential changes to the car distribution system will be developed; specific changes to organization, information systems and analysis procedures will be based upon a determination of those areas which offer the most potential for improvement.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Sussman, JM  
 SPONSORING AGENCY: United States Railway Association  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept.  
 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$24,863  
 ACKNOWLEDGMENT: Massachusetts Institute of Technology

**21 185238****UNION PACIFIC CAR UTILIZATION STUDY**

A detailed study of existing car distribution practices, procedures and organization relationships on Union Pacific will be performed and comparison between UP and other major U.S. railroads will be documented. Potential changes to the car distribution system will be developed; specific changes to the organization, information system and analysis procedures will be based upon a determination of those areas which offer the most potential for improvement.

PERFORMING AGENCY: Massachusetts Institute of Technology  
 INVESTIGATOR: Sussman, JM  
 SPONSORING AGENCY: Union Pacific Railroad  
 STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept.  
 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$12,214

ACKNOWLEDGMENT: Massachusetts Institute of Technology

**21 188662****BUFFALO TERMINAL PROJECT**

The purpose is to establish a cooperative railroad labor-management experimental program in Conrail's Buffalo, New York terminal. The objective of the program to experiment with innovative operating practices that will facilitate the movement of cars through the terminal. The scope of these experiments include labor work rules, management practices and government regulations. Part of the project involves use of a computer system to monitor movement of cars and to measure factors that determine car speed and reliability.

PERFORMING AGENCY: Conrail Task Force on Rail Transportation  
 INVESTIGATOR: Bethge, C Tel (716) 856-5940 Morey, J  
 SPONSORING AGENCY: Federal Railroad Administration; State Government of New York; Consolidated Rail Corporation; Railroad Labor  
 RESPONSIBLE INDIVIDUAL: Collins, DM Tel (202) 472-7280

Contract DOT-FR-8186

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July  
 1978 COMPLETION DATE: 1981 TOTAL FUNDS: \$200,000

ACKNOWLEDGMENT: FRA



22 059960

**POLICY SENSITIVE FREIGHT MODEL DEVELOPMENT**

This effort will support the development and testing of disaggregate, behavioral models of intercity freight demand which can be used for the analysis of a wide range of Federal policy and program options. The proposed model must allow the Federal Government to address a wide spectrum of policy, program legislative and regulatory issues. The model should permit examination of the effects of mode specific development, pricing, technology, and deregulation alternatives upon the shipper decisions regarding the selection of transportation alternatives and be able to estimate national flows of freight by commodity and geographic detail.

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies, 84778

INVESTIGATOR: Roberts, PO Tel (617) 253-7123

SPONSORING AGENCY: Office of Policy and International Affairs; Office of Intermodal Transportation, Department of Transportation

RESPONSIBLE INDIVIDUAL: Swerdloff, CN Tel (202) 426-4163

Contract OS-70006

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$292,584

ACKNOWLEDGMENT: Massachusetts Institute of Technology

22 083483

**ECONOMIC ANALYSIS OF THE UNITED STATES GRAIN EXPORTING SYSTEMS**

Evaluate alternative inventory and export policies with respect to: Market efficiency, price stability, producer and consumer utility, their effects on private state trading systems, servicing the export markets, and the effects of export embargoes on prices and market share. Use historical data to estimate and project demand and supply imbalance in world grain trade. Calculate the variability in supply and demand and surplus and deficits under alternative assumptions of world production and consumption. Develop models that will show the effects of alternative inventory policies on the size and variability of world grain surplus or deficit. Estimate the effects of alternative inventory policies on farm income, U.S. and world grain prices, and the variability of grain marketing firms. Estimate the costs and other economic effects of alternative policies and alternative ownership arrangements for given levels of inventory. Estimate the relationship between alternative inventory policies and volume and destination of exports. Further work was done on a study of grain marketing patterns by Indiana farmers. A survey of truck shipments of grain by Indiana country elevators for the 1973-74 marketing year was tabulated and preparation of a manuscript for publication was begun. Truck shipments accounted for 64 percent of total grain handled by country elevators in 1974-75, up from 58 percent in the 1968-69 marketing year. This was a continuation of a long time trend. A manuscript was prepared summarizing the results of a study of vertical coordination in cooperative grain marketing systems.

**REFERENCES:**

Vertical Coordination in Cooperative Grain Marketing Systems, Schwartz, DR, Purdue University, Unpublished PhD Thesis, 1974

PERFORMING AGENCY: Purdue University, Department of Agricultural Economics, IND01732

INVESTIGATOR: Jones, BF

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: July 1971 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Purdue University (CRIS 0060205)

22 083506

**DETERMINE COSTS FOR DIFFERENT SYSTEMS FOR MARKETING POTATOES FROM THE GROWER TO THE RETAIL STORE**

Develop the least cost system(s) for handling, distributing, storing, processing and packaging potatoes by improving the efficiency for each function in the marketing systems. Establish the cooperation of growers, packers, processors, wholesalers, retailers and transportation firms to participate in the study. Run test shipments from the producing areas to the retail store level. Make industrial engineering studies, economic analyses and cost evaluation comparisons to determine the optimum system(s) for marketing potatoes. It will be necessary to enlist the aid of Federal and State agriculture extension personnel, land grant colleges, potato associations and the knowledge of other laboratories within the Agricultural Marketing Research Institute. This research has been divided into three phases. The

first included harvesting, loading the truck, transporting from field to packinghouse, and unloading. This phase has been completed and published. The second phase includes packinghouse operations and an MRR entitled "Operating Costs In Four Potato Packing Plants" is now edited and ready for camera copy. This study shows packing plant costs ranged from \$0.971 to \$1.027 per 50 pounds packed in 5 or 10 pound consumer bags and labor production ranged from 709 to 1,131 pounds per man-hour. The third part includes movement of potatoes from the packinghouse, to wholesale receiver and retail store. Studies were conducted on transporting potatoes by truck from the packinghouse to a wholesale receiver both handstacked and unitized. Research will be conducted on other methods of unitization. Research is also being conducted to determine costs for various systems in wholesale warehouses and retail stores.

**REFERENCES:**

A Cost Evaluation for Two Systems of Handling Bulk Potatoes from Field to Packing Shed, Volz, MD; Anthony, JP, Jr; Mongelli, RC, Oct. 1974

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15842-001

INVESTIGATOR: Volz, MD Anthony, JP Bouma, JC

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1973 COMPLETION DATE: May 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040246)

22 083511

**IMPROVED SYSTEMS FOR SHIPPING AND HANDLING GROCERIES FROM MANUFACTURER TO WHOLESALE WAREHOUSE**

Measure the cost for less-than-truckload (LTL) shipments of groceries from manufacturer to wholesaler and determine feasibility of reduced cost with a regional warehouse to store products of several manufacturers and ship full truckloads of grocery products from several manufacturers. Determine extent of less-than-truckload (LTL) receipts of grocery products at wholesale warehouses, measure labor productivity, detention charges, and other costs for LTL shipments. Develop a model based on actual productivity in receiving utilized truckloads of groceries, intermediate warehousing and transportation costs. Enlist the support and cooperation of the National American Wholesale Grocers Association, National Association of Food Chains, and Super Market Institute. Data were obtained from 129 food warehouse operators concerning truck receipts of grocery products. The typical warehouse received 60 percent of its groceries by carrier truck, 30 percent by railroad, and 10 percent by backhaul. Of carrier truck arrivals, 60 percent were full truckloads and 40 percent were less-than-truckload. The typical firm had received only 10 percent of its carrier truck receipts in unitized form although 92 percent of the firms had received products that were unitized on pallets and 28 percent had received products on slipsheets. Standard productivity in unloading trucks by handstacking cases on pallets and removing the unit load with a pallet jack averaged 5 tons per man-hour compared with 59 tons per man-hour for unloading unitized products. Efficiency of truck receiving can be improved by use of the following principles: (1) Schedule incoming truck receipts; (2) specific unitized loads when ever possible; (3) provide sufficient temporary storage area; (4) keep temporary storage clear as much as possible; and (5) provide proper type and quantity of materials handling equipment.

**REFERENCES:**

Methods for Receiving Groceries by Truck Bouma, JC, Nat American Wholesale Grocers' Assoc, Chicago, Proceedings, Mar. 1975

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute, 1104-15864-001

INVESTIGATOR: Bouma, JC

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Nov. 1973 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040668)

22 083516

**CONTROL OF DAMAGE AND LOSS IN DISTRIBUTION**

Find characteristics of commodities and items which are damaged in distribution, determine environment factors causing damage, propose methods of damage reduction and develop an economics of distribution loss control. Procure damage histories for specific commodities and items. Analyze package systems used in connection with damage history in the laboratory and in the field. Using established design procedures, redesign

packages to reduce loss. Establish total economic advantages in use of redesigned package including resource use and the ecological impact. Using information assembled in case by case approach, establish generalities relating to damage control. Develop sub-projects to explore specific problems in the areas of cushion properties, distribution environment, item fragility and system evaluation procedures. Conducted free-fall drop test experiments to determine the effect of different container materials and impacting surfaces on shock levels. Evaluated the accuracy of different techniques used to measure velocity change. Determined the free-fall drop height equivalents of shock machine drop heights for a specific product-/package combination.

## REFERENCES:

A Critical Analysis of Vibration Measurement of the Transportation Environment, Hausch, JR, Michigan State University, School of Packaging, Tech Rpt 23, Sept. 1975

The Correlation of Shock with Free-Fall Drop Height Chatman, RS; Goff, JW, Michigan State University, School of Packaging, Technical Report 24, Aug. 1976

PERFORMING AGENCY: Michigan State University, East Lansing, School of Packaging, MICL 03108

INVESTIGATOR: Goff, JW

SPONSORING AGENCY: Department of Agriculture

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1971 COMPLETION DATE: July 1999

ACKNOWLEDGMENT: Michigan State University, East Lansing (CRIS 0060632)

22 099624

#### IMPROVING TRANSPORT AND HANDLING OF CONCENTRATED FORAGE PRODUCTS TO OVERSEAS MARKETS

Develop and evaluate improved methods and equipment for transporting and handling overseas shipments of concentrated forage products. Evaluate present forms and methods of concentrating forage products, and handling, storing, transporting and using the products. Determine how these steps interface and the effect of such interfacing. Develop improved equipment and techniques or modifications of present technology. Evaluate improvements in commercial shipping experiments to overseas markets. Determine comparative handling and transport efficiencies in terms of physical performance and costs. Recommend best equipment and methods and develop guidelines for their use. Data collected from an experiment in a laboratory cold room indicates: (1) Use of a high volume blower to move air through a small number of palletized boxes of cherries decreases the amount of time required to cool; (2) location of the blower on top of the row of pallets or at the end of the row does not significantly change rate of cooling; (3) location of boxes within the pallet units influences the rate of cooling; and (4) moisture loss in cherries may be a problem at certain locations within the pallet load. Efforts will continue to develop techniques to properly precool packed and unitized boxes of cherries prior to shipment.

PERFORMING AGENCY: Agricultural Research Service, Western Region Oregon-Washington Area

INVESTIGATOR: Fountain, JB

SPONSORING AGENCY: Department of Agriculture, 5805-15880-001

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1973 COMPLETION DATE: Nov. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0040669)

22 099636

#### ECONOMICS OF CONSUMPTION, DISTRIBUTION, AND PRODUCTION OF SECONDARY MANUFACTURED WOOD PRODUCTS

Improve the efficiency of performance of the markets for secondary manufactured wood products in Eastern United States in satisfying the needs of society and using available resources effectively. The major research will be concerned with the pallet, furniture, and flooring industries. Studies will seek to determine the optimum raw material mix. Industrial trends and consumer preferences will be studied. Wooden pallet standards will be developed. Studies will be made to develop a model for optimizing the flow of pallets to meet the demands for shipment, handling and storage of product. This will include evaluation of a pallet exchange pool. Other studies will be concerned with developing alternatives to the labor intensive nature of the production of many wood products. The two requirements of a successful pallet exchange system are guaranteed uniform-valued pallets and

an agency to provide the guarantee to the pallet user. Pallet construction standards have been written and tested that insure that species and grades are compatible with the fastening system and that pallet production procedures assure uniform performance. The design objective is uniform performance in service, irrespective of the materials used. The grading and utility-rating standard establish uniform shock-performance classes; and account must be taken in design of the differences between the classes in order to build pallets that perform in a uniform manner. To insure equal quality in a pallet exchange program, the pallets should be produced and procured under the auspices of a third-party inspection and certification system. This third party would also be responsible for maintaining the value of the pallet during its life and managing the exchange pallet inventory. The time appears right for the establishment of a major pallet exchange program in the U.S.

## REFERENCES:

Required Pallet Research: Economic Aspects Opportunities for Virginia's Pallet, Industry, Proceedings, Wallin, WB, VPI & State University, 121, pp 32-38, 1971

The Performance of Wooden Pallets in Pallet Exchange Programs, Sardo, WH, Jr; Wallin, WB

Quality Distribution of Pallet Parts From Low-Grade Lumber Large, HR; Frost, RE, USDA Forest Service Research, Paper NE-266, 6pp, illus, 1974

Factors Influencing the Selection of State Office Furniture Anderson, RB, USDA Forest Service Research, Paper NE-266,6 pp, illus., 1973

Factors Affecting the Use of Hardwood Flooring in Urban Rehabilitation, Nevel, RL, Jr, USDA Forest Service Research, Paper NE-273, 7 pp, illus., 1973

Design of Pallet Deckboard-Stringer Joints Part II: Reinforced Aspen Pallet Joints and Aspen Pallets, Stern, EG, VPI and State Univ, Wood Res & Wood Constr Lab, Bulletin 133, 24 pp, 1975

Recent Pallet Fastening Research can Reduce Pallet Costs, Stern, EG, VPI & State Univ., Wood Res & Wood Constr Lab, Bulletin 128, 8 pp, 1974

Tentative Nailing Standards for Warehouse and Exchange Pallets, Wallin, WB; Stern, EG, VPI & State Univ., Wood Res & Wood Constr Lab, Bulletin N129, 16 pp, 1974

PERFORMING AGENCY: Northeastern Forest Experiment Station

INVESTIGATOR: Martens, DG

SPONSORING AGENCY: Department of Agriculture, NE-4304

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Sept. 1967 COMPLETION DATE: May 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0023183)

22 099639

#### SYSTEMS FOR MARKETING BEEF FROM SLAUGHTERHOUSE TO RETAIL FOOD STORE

Determine costs for various systems of marketing beef from slaughterhouse to retail food store and to develop improvements in these systems or develop a composite of two or more systems that would reduce marketing costs. Leadership will be provided by the Market Operations Research Laboratory. The objective will be met by detailed cost studies of 11 different systems for marketing beef. Cost data will be gathered from 16 firms including slaughterers, packers, central processors, and retail stores. Data gathered will include transportation methods and cost, labor cost and productivity, cutting losses, product shrinkage, description of methods, and other pertinent information. Most information will be based on company records with labor costs verified by time studies. Upon completion of data gathering, an analysis will be made to determine the most efficient system. Following this, field tests will be implemented to verify findings as to the system that appears to hold the greatest potential for cost reduction.

A study was initiated to compare the costs of two systems for handling prefabricated cuts of beef between the wholesale chain warehouse and retail stores. One system utilizes wire baskets stacked on a four-wheel dolly; the other utilizes cardboard boxes on pallets. The data-gathering stage is nearly complete and rough draft report should be initiated by June, 1975.

PERFORMING AGENCY: Agricultural Research Service, Agricultural Marketing Research Institute

INVESTIGATOR: Goulston, CL

SPONSORING AGENCY: Department of Agriculture, 1104-15864-005

STATUS: Active NOTICE DATE: Aug. 1977 START DATE: Aug. 1974 COMPLETION DATE: Aug. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0041735)

22 099640

**MAINTAINING AND IMPROVING QUALITY AND MARKET LIFE CALIFORNIA-ARIZONA CITRUS IN FOREIGN MARKETS**

Determine the effects of transit temperatures and relative humidities, postharvest fungicidal treatments, and handling, packaging, palletizing and containerization on arrival condition and appearance, quality, and market life of California-Arizona citrus in foreign markets. Ship citrus fruit, or hold in simulated transit conditions, after treating with individual or combinations of fungicides. Determine fungicide concentrations necessary to control storage decays and fruit spoilage. Determine fungicide residues on or in fruit at time of treatment and upon arrival in Europe or Japan. Develop and improve analytical methods for fungicides now used or expected to be used, as needed. Compare palletized and hand stacked shipments in mechanical and iced rail cars and containers for fruit cool-down rates, uniformity of fruit temperature control, and fruit injury and carton deterioration due to cargo shifting during loading, unloading and in transit. Citrus fruit are not adequately cooled in mechanically refrigerated rail cars during warm weather. Cooperative arrangements were initiated with ARS, rail and citrus groups to modify the air distribution system of a rail car for test purposes. A reversed air flow system was developed by ARS for evaluation in this rail car application. A laboratory procedure was devised for the quantitative determination of benomyl, a fungicide used on citrus after harvest. The method is less accurate than existing methods but is faster, more convenient and useful when greater accuracy is not necessary.

**REFERENCES:**

Recommendations for Exporting Florida Lemons Hale, PW; Houck, LG; Risse, LA, Citrus and Vegetable Magazine, V37 N7, 4 pp, Mar. 1976

**PERFORMING AGENCY:** Agricultural Research Service, Market Quality Laboratory

**INVESTIGATOR:** Houck, LG Norman, SM

**SPONSORING AGENCY:** Department of Agriculture, 5210-15880-001

**STATUS:** Active **NOTICE DATE:** Aug. 1977 **START DATE:** Mar. 1974 **COMPLETION DATE:** Mar. 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS 0041023)

22 099642

**MARKETING MARGINS AND COST COMPONENTS IN THE OIL CROPS INDUSTRY**

Determine price spreads and cost components in producing transporting, storing, and manufacturing oil crops and major products; and relate changes in structure, technology, and practices to changes in prices, margins and costs. Determine farm-to-retail price spreads from secondary data and develop cost components from special studies and surveys, using economic-engineering data and budget analyses. Develop costs for producing, storing, transporting and manufacturing oil crops and major products with initial attention being given to costs of manufacturing margarine, cooking and salad oil, and crushing soybeans. Progress was made toward improved ability to respond effectively to requests for marketing margins and cost components information. Close working relationships were maintained with VPI on cooperative work relating to costs of crushing and manufacturing salad dressing and mayonnaise. A cost simulation model, developed at VPI is now operational for crushing soybeans, refining soybean oil, and manufacturing margarine, cooking oil, mayonnaise, and shortening. These models along with information now in the FEDS provide a basis for estimating costs from the production of soybeans through the processing sector. The overall system can also provide information and resource use including capital, labor, energy, etc. The system was used during the year to develop a staff report on energy uses in the crushing sector.

**REFERENCES:**

US Situation for Oil Crops-Soybeans, Cottonseed, Peanuts, Sunflower, Safflower and Other Oilseeds, Doty, Ho, Jr, Res to Meet U.S. & World Food Needs, ARPAC Conf, Vol 1, pp 150-173, July 1975

Decision Making in Oilseed Processing Doty, Ho, Jr, Oil Mill Gazetteer, pp 20-26, Aug. 1975

A Representative and Deterministic Cost Component Model of the U.S. Vegetable Oil Industry, Lamm, R.M, Jr; Johnson, J.M, VPI and State Univ in Coop with Econ Res Service, Bulletin 107, 93 pp, Dec. 1975

**PERFORMING AGENCY:** Economic Research Service

**INVESTIGATOR:** Doty, HO

**SPONSORING AGENCY:** Department of Agriculture, CE-07-062-11-00

**STATUS:** Active **NOTICE DATE:** Aug. 1977 **START DATE:** July 1974 **COMPLETION DATE:** July 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS 0041588)

22 099643

**ORGANIZATION AND EFFICIENCY OF THE PRODUCTION AND MARKETING SECTOR FOR OIL CROPS**

Develop a structural schematic for producing, storing, processing, and distributing products in the oil crops industry. Analyze the competitive position of the oil crops industry with competing commodities and with the same commodities from competing countries. Evaluate the impacts of changes in economic, technical, and regulatory factors on the organization and efficiency of the oil crops industry. Determine the present economic structure of the oil crops industry and quantify the product flow through the various marketing channels as background to the development of the oil crops research program. Evaluate marketing patterns, regional competition, stock management and storage and transportation problems. Develop a spatial-temporal model for soybeans to analyze the impacts on industry organization and efficiency of changes in supply, demand, cost and institutional factors. Research on world relationships in the oil crops complex continued with the preparation of a paper for the World Soybean Research Conference held at the University of Illinois. World historical data were collected and used to estimate intercorrelations among several fats and oils to estimate consumption functions for fats and oils in several countries. Staff papers were prepared which analyzed alternative peanut policy proposals related to changes in legislation and administrative provisions of current law. Progress was made on the compilation and analysis of survey data on the capacity of the fats and oils refining industry. A 100-percent enumeration of the refining industry was completed and the data analyzed to determine the total and regional capacity of the oil refining industry. This work resulted in the publication of a special article in the Fats and Oils Situation. Data tables on energy used by type of energy, by month, and by State for the 1974 soybean, peanut, and flaxseed crops were prepared.

**REFERENCES:**

Storage Utilization in a Deficit Region Boutwell, A; Kenyon, E, Southern Journal of Agricultural Economics, V5, N1, pp 233-237, July 1973

Grain Storage in the Deficit South Atlantic Region Kenyon, E; Boutwell, A, VPI and State University, Research Division, Bull N90, 69 pp, May 1974

Cost of Producing Soybeans in the US, 1974 Walter, AS, Economic Res Service, FOS-281 pp 34-40, Feb. 1976

Costs of Production for Soybeans, Peanuts and Flaxseed for 1974, 75 and 76, Walter, AS; Garst, GD, Economic Res Service, Bulletin 106 pp 28-31, Apr. 1976

**PERFORMING AGENCY:** Economic Research Service

**INVESTIGATOR:** Boutwell, WA

**SPONSORING AGENCY:** Department of Agriculture, CE-07-064-11-00

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** July 1974 **COMPLETION DATE:** July 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS 0041590)

22 135001

**ALTERNATIVE SYSTEMS FOR TRANSPORTING AGRICULTURAL OUTPUTS TO MARKET AND INPUTS TO PRODUCTION AREAS**

**OBJECTIVE:** Determine the optimal transportation systems and facilities for transporting grain and fertilizer to maximize producer income. **APPROACH:** Estimate demand for transportation; estimate costs of alternative modes and handling facilities; estimate optimal transportation modes, system and location and types of facilities. **PROGRESS REPORT:** Optimal solutions for the grain and fertilizer distribution and transportation systems for the entire state of Iowa have been obtained. These solutions have been used to compute benefit cost ratios for upgrading 71 branch rail lines in Iowa. An analysis of the impact of rail abandonment on communities and elevators, the optimal sizes of rail shipments of grain to export and the optimal locations of facilities to load the unit trains of grain has been made.

**REFERENCES:**

An Economics Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, National Technical Info Service; U.S. Department of Commerce, Mar. 1976, PB-251978/AS

The Economics of Upgrading 71 Branch Rail Lines in Iowa Baumel, CP, American Journal of Agricultural Economics, Volume 59, No. 1, Feb. 1977

Executive Summary-An Economic Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, Federal Railroad Administration; U.S. Dept of Transportation, Mar. 1976

Toward Optimizing the Rail Transportation and Distribution System, Baumel, CP, Proc Nat'l Symp on Transp for Agri & Rural America Nov 76

PERFORMING AGENCY: Iowa State University, Ames, Agricultural Experiment Station

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Iowa Cooperative State Research Service, 0065178 IOW02016

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: July 1974 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS 0065178)

### 22 138363

#### NEW AND IMPROVED SYSTEMS TO HANDLE PEANUTS AT COMMERCIAL STORAGES

Develop new or improved systems to handle peanuts as they are received, dried, stored, graded, shelled, bagged, and shipped. Presently used systems of handling peanuts will be evaluated for efficiency and cost. Where needed new or improved facility layouts, handling or flow processes, bagging and bulk handling, and sampling methods and equipment will be developed to reduce marketing cost and maintain quality as peanuts move through marketing channels. Peanuts packed in vacuum or vacuum with gas backflush environments showed no significant change in moisture content or grade after 12 months' storage at ambient temperature. Quality deterioration was more pronounced in the nitrogen atmosphere. All types of packaging materials used were effective barriers to contamination and insects. High vacuum sometimes caused pin hole punctures when packages were handled roughly in shipping tests. Palletizing or using lower vacuum eliminated problem. Packaged seed peanuts showed no significant change in moisture, split kernel or bald kernel content through 6 months of storage. Germination dropped approximately 6% with controls averaging 2 points lower. No significant difference in germination when seed treated before storage. Packaging cost estimated at 1.75 cents/lb in 50-pound package.

#### REFERENCES:

Dimensional Changes in Peanut Pods, Kernels, and Hulls as Moisture is Removed During Curing, Slay, WO, J Amer Peanut Res and Educ Assoc., 1974

Damage to Peanuts from Free Fall Impact Slay, WO, J Amer Peanut Res and Educ Assoc., 1975

PERFORMING AGENCY: Agricultural Research Service, Department of Agriculture, 7704-15700-007

INVESTIGATOR: Slay, WO

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1974 COMPLETION DATE: Nov. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041935)

### 22 138368

#### IMPROVED HANDLING AND DISTRIBUTION METHODS FOR DOMESTIC MARKETING OF FRUITS AND VEGETABLES

Find more efficient and effective ways of handling and distributing perishable products from Florida to domestic markets and determine their effects on market quality and consumer preferences. Test and evaluate improved handling methods under simulated and commercial environmental conditions. Develop and test methods for filling, handling, and transporting bulk pallet bins bagged or bulk citrus. Develop and test pallets and/or slipsheets for unitized handling of citrus peppers, and celery from production areas to retail warehouses. Explore possibilities for developing methods whereby railcars can be used more effectively in transporting citrus and winter vegetables from Florida production area. Initiate shipping test to assess the feasibility and comparatively evaluate handling poly bagged (5#, 8#) grapefruit in bulk bins boxes with conventional bagmaster boxes. A test shipment of two fiberboard bulk bins with bagged grapefruit was completed from Florida to New Jersey, and the two handling methods comparatively evaluated. This bin is a two-piece telescope design measuring 48 x 40 x 31 in. It will hold 200, 5-lb bags of grapefruit. This concept will permit filling the bin at a packinghouse and delivery to the merchandizing area of a supermarket, where the top portion is removed and the bagged fruit is exposed for consumers. The initial shipment was successful and future test shipments are planned.

PERFORMING AGENCY: Department of Agriculture, Horticultural Research Laboratory, 7606-15840-004

INVESTIGATOR: Miller, WR Hatton, TT

SPONSORING AGENCY: Department of Agriculture, Cooperative State Re-

search Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Nov. 1975 COMPLETION DATE: Nov. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0042873)

### 22 138375

#### IMPROVED PACKAGING, HANDLING, AND TRANSPORT OF WESTERN FRUITS AND VEGETABLES

Improve efficiency of packaging palletization, handling, and transport of western fruits and vegetables to reduce marketing costs and maintain product quality. New packages and methods of palletizing or unitizing these packages will be developed for efficient handling, transport, and marketing of fruits and vegetables. Research will determine package strength, will relate design and loading patterns to cooling rates and transit temperatures, and will correlate packaging, handling, and transport systems to maintenance of product quality. Research will include studies on new packaging and handling systems compatible with mechanical produce and with efficient use of transport vehicles. PROGRESS REPORT: Lettuce: A new carton with outside dimensions of 20-3/4 x 11-1/4 x 16 inches has been developed, which can be unitized on inexpensive slip sheets and mechanically loaded in rail cars and trucks. Stone Fruits: Fruit packed in a new foam tray usable in conjunction with metric-sized boxes sustained less damage in transit than fruit packed in currently used plastic trays and shipping containers. Lettuce: Transit temperature of lettuce packed in 500 lbs. bulk bins are satisfactory. Unitized loads of lettuce result in less product damage on arrival at market. Less labor and time is required to load and unload unitized lettuce compared to conventional hand methods.

#### REFERENCES:

Unitized Handling of Western Iceberg Lettuce Hinds, RH; Hirsch, RT, Intl Conf Handling Perishable Agr Commodities, Mich., Proceedings (27th) pp 130-33, 1975

A Mechanical Handling System for Lettuce--Can It be Done?, Hirsch, RT; Hinds, RH, Produce Marketing Assoc. Yearbook, 3 pp, 1975

Packing and Shipping Mechanically-Harvested Lettuce Hirsch, RT; Rij, RE, US Dept of Agriculture, Res Report 1049, 7 pp, 1976

Current Practices & Trends in Marketing Western Iceberg Lettuce in Relation to Other Produce, Rij, RE; Hinds, RH; Hirsch, RT; Harris, CM, US Dept of Agriculture, Res Report 1052, 9 pp, 1976

Temperature Requirements for Shipping California Green Peppers, Lipton, WJ, Produce Marketing Assoc. Yearbook, 3 pp, 1975

PERFORMING AGENCY: Agricultural Research Service, Department of Agriculture, 5202-15840-001

INVESTIGATOR: Hirsch, RT Rij, RE

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1969 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0020846)

### 22 138378

#### ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEMS

OBJECTIVES: Indicate ways to increase the economic efficiency of grain marketing, transporting and processing following dramatic changes since 1972 in marketing institutions, operational structure and policies related to industry. Evaluate the impact of alternative transportation rate structures on the organization of the grain industry. Examine alternative national grain inventory policies and their effects on market organization and performance. Based on results develop a set of recommendations for improving efficiency and/or reducing costs of inter-and intra-regional marketing of grain. APPROACH: Georgia will participate in the work of four objectives as outlined in the regional project statement. The work will include a survey of grain farms serving the Southern region to determine changes in marketing functions related to movement and storage of grain; the development of grain transfer costs for alternative modes of transportation; an analysis of grain inventory policies on storage and transportation needs; and recommendations from data obtained to guide grain firms on needed marketing facility investments under alternative situations. PROGRESS REPORT: Estimated costs of handling grain for various firm sizes in Georgia. Initial estimates of grain utilization by grain and class of livestock

for several years in Georgia. Have begun revising an LP model of grain flows for the state of Georgia. This and related work has been done in cooperation with regional project SM-42. Presented seminar and several talks to civic groups on grain situation and foreign trade.

**REFERENCES:**

75 Corn Crop Uncertain Bateman, WL, Farmers and Consumers Market Bulletin, Vol. 61 No. 4, Jan. 1975

**PERFORMING AGENCY:** Georgia Agricultural Experiment Station, Agricultural Economics Department, GEO01185

**INVESTIGATOR:** Anderson, RF Huang, CL

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1977 **START DATE:** July 1974 **COMPLETION DATE:** Sept. 1981

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0065175)

**22 138390**

**IMPROVING RELATIVE HUMIDITY LEVELS AND CONTROL IN REEFER VAN TRAILERS AND CONTAINERS**

The aim of the project is to determine prevalent relative humidity levels and control in conventional equipment; develop methods/systems to optimize the RH levels and control. The approach will be to: measure and record relative humidity levels in a statistically valid sample of reefer van cargo spaces, loaded and unloaded; evaluate data; define the prevalent functional level and control parameters; postulate the causes for deviation from the optimum levels; hypothesize the methods/systems required to optimize the levels and control; empirically test the hypothesis on prototype equipment; report the results and recommend methods/systems. An empty 35-foot van container was evaluated for air exchange. A known concentration of ethylene (C<sub>2</sub>H<sub>4</sub>) was used as an indicator. The van container had a track at the rear door so that a plastic curtain could be installed, thereby making the unit air-tight. Results with curtain in place and all 4 floor drains open showed 0.8 ppm C<sub>2</sub>H<sub>4</sub> air dilution after 1 hour. With floor drains open, and two 4-in. atmosphere vents open (1 front left and 1 on right rear side), the air dilution was 2.2 ppm C<sub>2</sub>H<sub>4</sub>/hour. With vents and drain plugs open, plus an air-exchange system on the refrigeration system, the air dilution rate was 2.3 ppm C<sub>2</sub>H<sub>4</sub>/hour. The van container was loaded with 920 4/5-bushel export cartons packed with styrofoam balls, plus 2 diphenyl pads (top and bottom of each carton); cartons were stacked on slipsheets in a chimney stack, 9 per layer, 6 high plus 1 floating on each side. Results indicated that the styrofoam balls absorbed C<sub>2</sub>H<sub>4</sub>, and after 24 hours the styrofoam balls still retained a portion of C<sub>2</sub>H<sub>4</sub>. Preliminary observations indicated a 70% relative humidity level at 20.C.

**PERFORMING AGENCY:** Department of Agriculture, Horticultural Research Laboratory, ARS 7606

**INVESTIGATOR:** Goddard, WF

**SPONSORING AGENCY:** Department of Agriculture, 7606-15840-002

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** June 1975 **COMPLETION DATE:** June 1978

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS 0042497), Smithsonian Science Information Exchange (GU 42497 1)

**22 138400**

**REDUCING PHYSICAL AND QUALITY LOSSES OF WHOLE SOYBEANS IN TRANSPORTATION AND HANDLING**

The objective is to reduce physical and quality losses, handling and transportation costs for seed, food and processing grade soybeans shipped to domestic and world markets. The type, extent, and causes of physical losses and damage and quality deterioration in the whole beans in the various handling, processing, and transport modes will be identified by shipping and handling surveys and experiments. Alternative handling techniques and improvements in transport and handling equipment and transport and storage environments which may reduce such losses will be identified and developed. This will include single mode and multi-modal transport by truck, railroad, van containers, and barge-ship-barge shipments. These innovations will be evaluated in shipping and handling experiments to develop cost and performance data and appropriate recommendations for improving the handling and transport of the products.

**PERFORMING AGENCY:** Agricultural Research Service, Agricultural Marketing Research Institute, ARS 1104

**INVESTIGATOR:** Nicholas, CJ Bailey, WA

**SPONSORING AGENCY:** Department of Agriculture, 1104-15881-004

**STATUS:** Active **NOTICE DATE:** Feb. 1977 **START DATE:** Apr. 1976 **COMPLETION DATE:** Apr. 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS 0043052)

**22 138481**

**RAIL WHEAT TRANSPORT EFFICIENCY STUDY**

To enhance and improve the physical efficiency of the marketing/transportation distribution system for grains in the hard winter wheat belt moving to domestic or export points, recognizing and utilizing the inherent advantages of rail transportation. Physical distribution study of alternative marketing/transportation systems.

**PERFORMING AGENCY:** Texas A&M University, Texas Transportation Institute

**INVESTIGATOR:** Richards, HA Tel (713) 845-3321

**SPONSORING AGENCY:** Federal Railroad Administration

**RESPONSIBLE INDIVIDUAL:** Hardesty, F Tel (202) 426-9682 Boone, JW

Contract DOT-FR-65104

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Apr. 1976 **COMPLETION DATE:** Mar. 1979 **TOTAL FUNDS:** \$630,000

**ACKNOWLEDGMENT:** FRA, TRAIS

**22 153666**

**LASH AND OTHER INTERMODAL SERVICES IN THE PACIFIC NORTHWEST EXPORT DISTRIBUTION SYSTEM**

Identify potential economies that could be obtained from movement of agricultural and forest products from the Pacific Northwest via the Columbia-Snake navigation system into overseas markets by recently innovated intermodal transportation systems such as LASH, standard intermodal containers, and ocean-going barges. Identify products that would lend themselves to movement from the Pacific Northwest into foreign markets via the above transportations system and determine least cost routes and modes of moving these products.

**REFERENCES:**

The Relationship Between International Trade and Transportation: Theory and Developments, Jones, JR, Nat Symp on Transp for Agriculture and Rural Amer, Paper, Nov. 1976

**PERFORMING AGENCY:** Idaho University, Moscow, Department of Agricultural Economics, CSRS IDA

**INVESTIGATOR:** Jones, JR

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service, IDA00719

Contract 616-15-85

**STATUS:** Active **NOTICE DATE:** Feb. 1978 **START DATE:** Apr. 1976 **COMPLETION DATE:** Sept. 1980

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0070665)

**22 153674**

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage, and distribution system. Historical data on production and utilization of agricultural products and inputs will be projected to 1985 and 1990, as a means of developing spatial and temporal patterns of transportation. A time-staged transshipment model will be used to identify least cost organization of the agricultural industries and the effect of changes in transport requirements, as a basis for evaluating effects of alternative public and private decisions. Data on acreage, yield, and production of grain by county is being collected in preparation for projection to 1990 and 2000. Livestock classes are being defined and sources identified for similar projection. Data collection is being coordinated with project 05-348.

**PERFORMING AGENCY:** Illinois University, Urbana, Department of Agricultural Economics, CSRS ILLU

**INVESTIGATOR:** Hill, LD Tel (217) 333-2455 Hoffman, L

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service, ILLU-05-0344

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** July 1975 **COMPLETION DATE:** June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070435)

22 153703

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION**

Estimate rural freight transportation requirements to 1985 and 1990. Estimate the optimal rural freight transportation, storage and distribution system. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. Develop models, collect data and project spatial and temporal qualities of agricultural inputs and outputs to be transported. Develop models, collect data, and estimate optimal configuration of rural freight flows and number, size and location of processing and distribution facilities. Develop models, collect data and estimate impact of state and national transportation regulation on the rural transportation system. Initiated work to project the demand for agricultural transportation in Iowa to 1985 and 2000. Will project quantities of grain and fertilizer by counties. Inventoried state transportation regulations.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, CSRS IOW

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, IOWO2173

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070220)

22 153718

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

Estimate rural freight transportation requirements to 1985 and 1990, estimate the optimal rural freight transportation, storage and distribution system, evaluate the economic effects of alternate railroad ownership and financial policies. Develop models for estimates of agricultural output and input usage by state to 1985-1990. Collect historical data on agricultural production and input usage of commodities. Project spatial and temporal pattern of outputs and inputs to be transported. Develop or modify a time staged transshipment model of spatial and equilibrium using supply and demand estimates, shortage, processing and distribution costs and transportation costs and rates. Cost and rate data will be collected. Estimate the optimal configuration of rural model and intermodal freight flows. Measure social and economic costs and benefits of alternate rural transportation networks on rural communities. Inventory and describe existing ownership pattern. Estimate cost of governmental and private purchase and upgrading cost of rail lines. Use case studies to compare low volume rail line cost revenues, service, and operating characteristics under state ownership and operation alternatives. Evaluate the costs and benefits of ownership alternatives and abandonment of railroad lines. A research planning meeting was held in October to discuss jointly plans for developing an analytical model for regional analysis. Satisfactory progress was made in designating a macro model to be used for regional analysis and a micro model for use in analysis of specific problems. Plans for uniform collection of historical data on agricultural production and input usage in the region and procedures for estimating production and usage in 1985 and 1990 have been completed.

PERFORMING AGENCY: Kansas State University, Department of Agricultural Economics, CSRS KAN

INVESTIGATOR: Sorenson, LO

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, KAN00966

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070301)

22 156972

**POTENTIAL IMPACTS OF CONTAINERIZATION AND INTERMODAL MOVEMENTS OF AGRICULTURAL COMMODITIES AND PRODUCTS**

This study will evaluate the potential for and assess the economic impact on shippers, carriers, and receivers resulting from increased use of containeriza-

tion and intermodal movements of agricultural commodities and product inputs. APPROACH: This is a basic line study directed to one area of the abandonment question (i.e. alternatives for meeting increasing freight transportation needs of rural areas). The information developed in this effort will furnish guidelines to decision makers relating to available alternatives for moving inbound and outbound freight in rural areas confronted with rail abandonment. Primary emphasis of this study will be devoted to those rural communities currently receiving rail service on light density on branch lines in Texas and will focus on potential alternatives available to users in rural areas and the benefits and costs of implementing container and intermodal plans.

PERFORMING AGENCY: Texas A&M University, Agricultural Experiment Station, Tex-616-15-90

INVESTIGATOR: Lamkin, JT Owensby, RM

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

Contract 616-15-90

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070488)

22 157092

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

To estimate the optimal rural freight transportation, storage and distribution system. Evaluate the economic effects of alternative railroad ownership and financial policies. Evaluate the economic effects of alternative federal, state and local government policies on carriers, shippers, receivers and rural communities. An extensive review will be made of new agricultural transportation techniques of operation, costs, rates, routes and policies from transportation firms and government agencies. Additional data will be obtained by interview of freight managers and policy decision makers. Specific field study will be completed on transportation problems in Wisconsin.

PERFORMING AGENCY: Wisconsin University, Madison, Department of Meat and Animal Science, CSRS WIS

INVESTIGATOR: Vilstrup, RH

SPONSORING AGENCY: Department of Agriculture, WIS02268

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071499)

22 179657

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Examine the interrelationships of geographic and seasonal pricing patterns and ascertain the effect of pricing patterns on structure. Seasonal and geographic price patterns will be analyzed to determine the factors causing changes in patterns over time. The current pricing patterns will be compared with programming results to determine those patterns consistent with least cost adjustments. Plans have been made to find reliable cost data, by area, for grain handling firms for use in linear programming models developed in SM-42. Survey of grain handling firms will be made in 1978 to obtain data on flows and structure for 1977. The questionnaire will have to be developed such that the data fit the needs of the linear programming models mentioned.

PERFORMING AGENCY: Tennessee University, Knoxville, Department of Agricultural Economics and Rural Sociology, TEN00486

INVESTIGATOR: Sappington, CB

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071728)

22 179658

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase economic efficiency of grain marketing, transporting, and processing following recent changes in marketing institutions, operational structures and policies. Evaluate impact of alternative transportation rate structures on the organization of the grain industry. Based on results of objectives A-D, develop set of recommendations improving grain marketing efficiency. A survey will be used to ascertain recent changes in marketing firms, functions and structure. Analytical models will be used to estimate the impact on marketing structure of selected changes in costs and national policies. Considerable emphasis will be placed on the effects of changes in transportation rates. From the results of the various analyses to be made, recommendations will be made to improve marketing efficiency.

PERFORMING AGENCY: Mississippi State University, Department of Agricultural Economics, MIS-4806

INVESTIGATOR: Phillips, TD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071805)

22 179659

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase economic efficiency in grain marketing. Evaluate impact of alternative transportation rates on grain industry. Examine interrelationships of geographic and seasonal pricing patterns and ascertain their effects on structure. Examine alternative national grain inventory policies and their effects on market organization and performance. Sample of grain firms in South will be surveyed by use of questionnaire to provide information on changes in and structure of the grain industry. Analysis of data will provide a measure of market performance. Grain transfer costs will be estimated from alternative transportation rate structures and based on rates, optimal location for grain facilities will be determined. Representative seasonal and geographic grain prices will be obtained from secondary sources to determine price patterns. These will be compared with price patterns from earlier research. Programming will be used to study grain industry adjustments and price patterns to facilitate least cost adjustments. Alternative national grain inventory policies will be analyzed from standpoint of estimated potential impact on transportation needs, market organization, existing facilities, price stabilization and costs.

PERFORMING AGENCY: Auburn University, Agricultural Experiment Station, ALA00648

INVESTIGATOR: Stallings, JL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071807)

22 179660

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase the economic efficiency of grain marketing, transporting, and processing following dramatic changes since 1970 in marketing institutions, operational structure and policies related to industry and evaluate the impact of alternative transportation rate structures on the organization of the grain industry. A questionnaire will be developed for a survey of a sample of grain firms serving the southern region and other markets to determine changes in marketing firms and marketing functions and information on movement and storage of grain. These data will be analyzed to measure market performance. Grain transfer costs will be estimated by modes and changes in access to modes to ascertain optimal location and structure of facilities from alternative rate structures.

PERFORMING AGENCY: Kentucky University, Department of Agricultural Economics, KY00050

INVESTIGATOR: Shuffett, DM

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071952)

22 179661

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase the economic efficiency of grain marketing, transporting and processing, following dramatic changes since 1972, in marketing institutions, operational structure and policies related to industry. Based on results of Objectives A, B, C, and D, develop a set of recommendations for improving efficiency and/or reducing costs of inter-and intra-regional marketing of grain. Program results will be used to estimate the impact on market structure of increasing costs, institutional barriers and national policies related to the grain industry. Empirical data from Objectives A through D will be used to develop guidelines firms can use in regard to operations in future facility investment for alternative market conditions and for considering national inventory policies. A survey of capacity and utilization of on-farm and commercial storage facilities has been completed. This will provide data on location and volume for use in drawing a representative sample for the up-coming intensive survey.

PERFORMING AGENCY: Arkansas University, Fayetteville, Department of Agricultural Economics and Rural Sociology, ARK00890

INVESTIGATOR: Morrison, WR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072047)

22 179662

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase the economic efficiency of grain marketing, transporting, and processing following dramatic changes since 1972 in marketing institutions; evaluate the impact of alternative transportation rate structures on the organization of the grain industry; examine the interrelationships of geographic and seasonal pricing patterns and ascertain the effect of pricing patterns on structure. Examine alternative national grain inventory policies and their effects on market organization and performance; based on results of objectives A, B, C, & D, develop a set of recommendations for improving efficiency and/or reducing costs of inter and intra regional marketing of grain. Obtain data by questionnaire from a sample of grain firms in Ohio; compare and analyze data for changes since the base period 1971; gather and analyze data on inter regional transport costs; gather and analyze data on inter regional differences in grain prices; reserve policy will be examined from two points of view, and a price stabilization tool and as a world food reserve; optimizing models will be developed in conjunction with the SM-42 macro model; improve and further develop SM-42 macro model to assist in analysis of data from first four objectives; develop minimal cost industry solutions based on firm, transportation and storage analysis.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO00596

INVESTIGATOR: Sharp, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072094)

22 179663

**ALTERNATIVE STRUCTURES FOR INCREASING EFFICIENCY IN INTER-AND INTRA-REGIONAL GRAIN MARKETING SYSTEM**

Indicate ways to increase the economic efficiency of grain marketing, transporting and processing following dramatic changes since 1972 in marketing institutions, operational structure and policies related to industry. Evaluate the impact of alternative transportation rate structures on the organization of the grain industry. Based on results develop a set of recommendations for improving efficiency and/or reducing costs of inter-and intra-regional marketing of grain. A survey of firms will be conducted to provide a description of the grain marketing industry in the mid-seventies and data for determining changes that have occurred in marketing firms, marketing functions and market structure. Transfer costs will be estimated for alternative transportation rate structures. This analysis will include intermodal rate comparisons such as relative rates between modes and changes in access to different modes of transport to ascertain the optimal location and structure of grain storage and processing facilities resulting from alternative rate structures. A quantitative model will be used to estimate the impact that changes in the transportation system will have on grain marketing. A set of recommendations will be developed for improved decisions relative to future facility investment under alternative market conditions and policies. Research planning and development of an activity timetable has been coordinated among the committee members. The basic linear programming model has received some additional attention. Data collection for projecting grain production for 1990 and 2000 has been started and is being coordinated with similar data needs for project 05-344.

PERFORMING AGENCY: Illinois University, Urbana, Department of Agricultural Economics, ILLU-05-0348

INVESTIGATOR: Hill, LD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072621)

22 179668

**GRAIN PRODUCER'S MARKETING STRATEGIES FOR MEETING RAPIDLY CHANGING CONDITIONS IN SOUTH DAKOTA**

Analyze selected marketing conditions including "Basis" (cash-futures) relationships, changing markets, transportation and marketing costs for wheat, corn and soybeans at the country level in SD. Determine alternative grain marketing strategies for grain producers to meet rapidly changing marketing conditions and "Basis" trends as noted above. Prices (cash and futures) for wheat, corn and soybeans will be assembled and analyzed for changes since 1972 in the basis relationship in forward pricing of grains and in the storage hedge. The basis history for locations without rail transportation will be compared to those with rail service to determine any differences. The findings from Approaches 1 and 2 will be used to propose marketing strategies for producers of grain.

PERFORMING AGENCY: South Dakota State University, Department of Economics, SD00792

INVESTIGATOR: Sogn, AB

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073070)

22 179669

**ADEQUACY AND COST EFFECTIVENESS OF BULK COMMODITY TRANSPORTATION SYSTEMS**

Determine the adequacy of the transportation system for out-bound shipments of grains, soybeans and soybean products and for obtaining and distributing agricultural inputs such as fertilizer and fuel. Investigate potential shifts in marketing patterns or sources of production inputs due to changes in transportation costs, government regulations and transportation facilities, terminals and ports. Recommend appropriate policy and investment changes from the private and public sectors. Determine by

county the quantities of bulk commodities to be transported in 1980 and 1985. Determine by commodity seasonal transportation and storage requirements. Determine existing on and off-farm storage capacity. Identify bottlenecks in the transportation system via a series of model solutions or simulations representing different levels of commodity movements and transportation capacity. Develop policy and investment recommendations. The first commodities to be considered will be corn, soybeans and soybean products. Wheat and other small grains, fertilizers and fuels will be considered subsequently. Key logistical factors will be investigated and assessed.

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, MIN-14-045

INVESTIGATOR: Dahl, RP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Oct. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0075095)

22 179670

**ECONOMIC FACTORS AFFECTING NORTHEAST MARKETS FOR LOCAL FRUITS AND VEGETABLES**

Determine the economic impact of changing energy utilization patterns on the Northeast fruit and vegetable industry. The distribution of Maine potatoes will be analyzed to quantify the effect of current and alternative marketing patterns on energy utilization. Initially the current product flow to various points in the Northeast will be determined. Also, a representative energy input per unit for highway and rail transport will be developed through a mathematical programming approach the cost of distribution--energy utilization tradeoff will be determined for alternative marketing patterns.

PERFORMING AGENCY: Maine University, Department of Agricultural and Resource Economics, ME08220

INVESTIGATOR: Kezis, AS

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0074775)

22 179674

**GUIDELINES FOR RURAL AND COMMUNITY DEVELOPMENT IN ECONOMIC REGIONS OF MINNESOTA**

Describe the interrelationships among the various sectors of the regional economics in western and southwestern Minnesota's agricultural economies. Develop an understanding of the changes that have taken place in these economies and predict the impact on the regions' incomes and employment of changes that may occur as a result of policy decisions on resource use. Input-output, linear programming and simulation models will be used to describe flows or transactions among sectors, multipliers coefficients and the systems. Both primary and secondary data sources will be used.

REFERENCES:

Grain Trucking in Minnesota--What it Costs in Region 6E Easter, KW; Nevins, RJ, Minnesota Agricultural Economics, No. 569 6 pp, July 1975

Short Hauls Pay Best Returns to Truckers Transporting Grains Easter, KW; Nevins, RJ, Grain Age, Volume 16, No. 10 pp 8-11, Oct. 1975

Bulk Commodity Transportation in the Upper Mississippi River Valley, Fruin, J; Young, W; Easter, KW; Jensen, H, Report to Corps of Engr 252 pp, 7507

PERFORMING AGENCY: Minnesota University, St Paul, Department of Agricultural and Applied Economics, MIN-14-084

INVESTIGATOR: Eastern, KW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0064438)



22 179676

**BIOLOGICAL AND ENVIRONMENTAL STORAGE AND TRANSPORTATION PARAMETERS THAT AFFECT GRAIN MARKETABILITY**

Determine losses due to insect and microbial activity throughout the grain marketing system. Make economic analyses of physical losses, reduction in quality, and increased storage and transportation costs occurring in storage and transit as a result of identified biological activity. Reduce damage and contamination by these pests by developing control measures (chemical pesticides and generated low oxygen atmospheres). Estimate costs of control measures. Identify pest populations (insects and microbial) by monitoring commodities in transit from farm to export and by examining selected subplot samples of wheat and corn from export terminals. Characterize grain by density, composition, points of origin, and commodity grade factors. Relate these data to type of commodity, environmental factors before and during transit, prior invasion by fungi and insects, type of storage, transportation mode, and time periods in storage and transit. Develop chemical and inert atmosphere treatments for the disinfestation and storage maintenance of cereal grains in storage and transit. Determine effects of the treatment on quality factors and establish cost data. Studies to determine the extent of quality loss in wheat attributable to biological activity between origin and export destination were established. Two grain cooperatives, Far-Mar-Co, Inc. and Union Equity Coop. are providing storage facilities at the country elevator, inland terminal, and port terminal locations and cooperating in handling procedures to preserve identity of the grain lots under study. An interagency study was developed with the Federal Grain Inspection Service and the Agricultural Marketing Service to obtain information relative to insect and fungal populations and possible sources of infestation in wheat and corn exports. Pest populations in subplot samples obtained throughout the export system are being characterized by density, composition, port location, and date of shipment.

PERFORMING AGENCY: Agricultural Research Service, Grain Marketing Research Center, 3420-20620-006

INVESTIGATOR: Storey, CL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1976 COMPLETION DATE: Nov. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043120)

22 179677

**INFORMATION FOR ORDERLY CHANGE IN THE FEED AND GRAIN INDUSTRY**

Develop an efficient grain marketing structure for small area of Indiana that can be applied state wide. Evaluate effects of DOT railway abandonment on grain terminals location and elevator structure. Analyze information on number, size, and condition of grain and feed facilities. Develop criteria for efficient structure and flow pattern for industry. Evaluate number and location of subterminals by computer program. A research project was completed entitled, "An Evaluation of Subterminal Elevator Location in a Selected Indiana Region". The study focused on determining the number and location of subterminal elevators needed to efficiently market grain within a 16 county area of heavy grain production. With high export projections, nine subterminals were optimum. These facilities resulted in a savings to the area of over four million dollars in terms of decreased grain handling cost when compared to the cost of marketing the grain with no subterminals in operation. With low export assumptions, seven subterminals were optimum. If grain exports were to weaken, then careful evaluations of sites on the perimeter of the area should be considered before making the large investment needed for a subterminal elevator.

PERFORMING AGENCY: Purdue University, Department of Agricultural Economics, IND045040

INVESTIGATOR: Uhrig, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1969 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0032426)

22 179680

**EVALUATION OF PUBLIC TRANSPORTATION POLICIES AFFECTING AGRICULTURE**

Assess on a regular basis the economic performance of the general-purpose transportation system for agriculture and the effect on efficiency and equity of proposed adjustments in services and rates. Project short and long-run needs for transportation services by agriculture and evaluate resource allocation processes in the privately operated transportation system. Determine capacity, growth, economies of size and other factors about for-hire livestock truckers and trucking. Measure modal and cross-modal elasticities for transport demand by agricultural shippers for basic information for use in policy analyses. Develop weighted aggregative indexes of railroad weights for specific commodity groups food commodities combined and all commodities combined. Use surveys and other appropriate techniques to obtain primary data as required to carry out specified research. For-hire livestock truckers were found to be principally small but quite stable businesses. Utilization of equipment was high, and rates charged were highly correlated with distance and size of truck. Little basis was found for believing that economic regulation at the interstate level would improve trucking performance. Analysis of a transshipment model of a corn-soybean producing area showed that adverse impacts from rail line abandonment are not likely to be uniformly borne. Certain local marketing firms were shown to lose substantial volumes of patronage by farmers, even though the total marketing costs for the area increased by only 0.1 percent in response to abandonments. The application of waterway user charges sufficient to cover Federal expenditures on waterways were estimated to cause a two-percent increase in marketing costs. Data were assembled for analysis of the cost of operating refrigerated trucks for hauling produce. Also, a survey of truck brokers to determine their role in exempt trucking was performed, and a number of rate, service and other proposals for change in transportation were analyzed for their impacts on agriculture.

PERFORMING AGENCY: Michigan State University, East Lansing, Transportation Economics Division, NEA-14-125-26-01-X

INVESTIGATOR: Schaffer, JD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0043553)

22 179681

**APPRAISAL OF THE CAPABILITY OF THE TRANSPORTATION SYSTEM TO MEET NEEDS OF AGRICULTURE AND RURAL AREA**

Appraise the effectiveness of the rural transportation system to meet incurred demand for services and the capacity of the transportation system to economically move inputs under a policy of full production. Quantify effects of sharply increased exports on farm product storage and transportation facilities and identify long-run structural problems affecting the capability of the transportation system to serve rural areas. Utilize secondary data sources and interview local, state and Federal officials to obtain an assessment of the capability of the transportation system to meet agriculture's need. Models and other appropriate analytical tools are basic to making systematic appraisal of the data upon which to draw conclusions. Methods and data used in other parts of Economic Research Service to assess outlook and situation for frequent reporting were reviewed and adopted for applicability to agricultural transportation. Periodic reports on supply, demand and price situation for agricultural transportation were released during period covered. Simulation of the flow of grain into export through Gulf and West Coast ports showed adequate capacity for further increases in exports. Congestion and delays associated with large increments in assumed exports were eased by either operating more hours per day or by investment in new facilities. Truck and rail transportation costs for food were 12 percent higher in 1975 than in 1974, due mostly to higher rates for domestic movements. However, ocean freight rates for grains were substantially lower in 1975. These lower rates reflected the increased capacity of the world's merchant fleet and the recession. Governmental spending (1967 dollars) on rural road construction and maintenance decreased substantially over the period 1970 to 1975. Stable fuel tax rates, rapid escalation of construction costs, and early completion of rural portions of the Interstate Highway System was identified as factors contributing to the trends.

REFERENCES:

Marketing and Transportation Reinsel, EI, Economic Research Service

Agr. Outl., AO-1 pp 12-13, July 1975

Marketing and Transportation Reinsel, EI, Economic Research Service

Agr. Outl., AO-2 p 13, Aug. 1975

Marketing and Transportation Pollock, DD, Economic Research Service

Agr. Outl., AO-3 pp 5-6, Sept. 1975

Marketing and Transportation Reinsel, E; Hammond, J, Economic

Research Service Agr. Outl., AO-4 pp 10-11, Oct. 1975

Transportation Pollock, DD, Economic Research Service Agr. Outl., AO-5 pp 12-13, Nov. 1975

PERFORMING AGENCY: Department of Agriculture, Transportation Economics Division, NEA-14-126-11-00

INVESTIGATOR: Reinsel, EI

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1974 COMPLETION DATE: July 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0041661)

#### 22 179682

##### TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER THROUGH DEEPWATER PORTS

To inventory the capacity of plants transloading grain and dry bulk fertilizer and the rail and barge facilities serving them at deepwater ports on the Mississippi River, identify bottlenecks in this intermodal configuration and obtain data on investment costs for expansion of various components of these facilities, project the configuration of transportation and plants needed to handle the volume of grain and dry bulk fertilizer expected to move through this configuration by 1985 and added investments required for it. Data on current capacity and the cost of expanding its various components will be obtained from a survey of personnel of all grain elevators, fertilizers, and railroad companies operating at deepwater ports on the Mississippi River. Appropriate sampling of records and other procedures may be used in developing some of the details needed however. Working closely with Iowa State University in a concurrent study these data will be used to develop a time staged transshipment model to estimate optimal grain, fertilizer, and transportation facilities needed in deepwater ports on the Mississippi River to handle the business projected for 1985. A list of grain export facilities and of facilities for manufacturing and transferring fertilizer material at deepwater ports on the Mississippi River has been compiled from preliminary contacts with some of them. A list of transportation companies serving these facilities is also being compiled. A file of literature on the subject has been assembled and reviewed. With this background, a checklist of survey data required for the study is being developed.

See also RRIS 22A 179683 and 20A 179671.

PERFORMING AGENCY: Louisiana State University, Baton Rouge, Department of Agricultural Economics and Agribusiness, LAB01824

INVESTIGATOR: Traylor, HD

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070539)

#### 22 179683

##### TRANSPORTATION AND DISTRIBUTION SYSTEMS FOR MOVING GRAIN AND FERTILIZER THROUGH DEEPWATER PORTS

Project quantities of grain and dry fertilizer to move through deepwater ports on the Mississippi River by 1980. Estimate structural adjustments needed in receiving, loadout and storage facilities to minimize cost of handling and transporting projected quantities at deepwater Mississippi Rivers ports. Estimate structural adjustments required in rail facilities at deepwater Mississippi River ports. Modify existing models, collect data and project 1980 quantities. Modify transshipment model and port simulation models, collect data and estimate required structural adjustments in grain and fertilizer facilities, and in railroad facilities at deepwater Mississippi River ports. 1. In process of developing model to estimate the quantity of grain and fertilizer moving through deepwater Mississippi River ports. 2. Collecting data on grain production, local livestock and grain processing

capacity by crop reporting district in states which have shipped grains to deepwater Mississippi River ports.

See also RRIS 22A 179682 and 20A 179671.

PERFORMING AGENCY: Iowa State University, Ames, Department of Economics, IOW02177

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070487)

#### 22 179684

##### PLANNING RURAL TRANSPORTATION SYSTEMS

Identify basic rural transportation market characteristics related to production and demand of transport services for the grain and soybean, fertilizer, feed and rural manufacturing and retail industries. Analyze sensitivity of grain, fertilizer and feed flows and shipper choice of mode, to transportation price adjustments in Oklahoma. Construct and demonstrate strategies by which individual, agricultural and rural manufacturing and retail users of rail services can adjust to local rail line abandonments or service discontinuances; and construct and demonstrate a procedure for evaluating public and private group investments in rural road and railroad branch line facilities, in an intermodal context, for application to small regions. Market characteristics are determined by surveys, econometric analysis and investment analysis. C-D. Individual firm and regional planning models will be approached with mathematical programming techniques. 1. The role of the new McClellan-Kerr Navigational System in the Transportation of wheat from Oklahoma and Kansas was assessed. 2. Long run adjustment alternatives for grain elevators losing rail service were evaluated. 3. A computer information and analysis system for railroads in Oklahoma is nearly complete. The system is capable of estimating required subsidies for continuation of abandoned lines and the benefits to communities of this type of subsidy program. The system will be put into use by the Oklahoma Department of Transportation in composing the Oklahoma State Rail Plan. 4. Further conceptual developments have been undertaken on the measurement of community effects of rail line abandonments. 5. Public service bulletins relating to transportation problems and policy have been distributed to the public.

##### REFERENCES:

The Influence of Water Transportation on Wheat Movements from Oklahoma and Kansas, Johnson, MA; Mennem, GM, Oklahoma Current Farm Economics, Volume 49 No. 1

The Railroad Revitalization and Regulatory Reform Act of 1976: Implications for Oklahoma, Johnson, MA; Mennem, GM, Oklahoma State University, Current Report No. 824

Barge Shipment of Wheat Through the Port of Catoosa Mennem, GM; Johnson, MA, Oklahoma State University, Current Report No. 427, May 1976

Sequential Line Approach to Evaluating Transportation Facility Adjustments, Johnson, MA, Southern Journal of Agricultural Economics, Volume 8 No. 1, July 1976

Railroad-Barge Competition in the Oklahoma-Kansas Wheat Transportation Market, Johnson, MA, Southern Journal of Agricultural Economics (Paper)

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01603

INVESTIGATOR: Johnson, MA

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: June 1975 COMPLETION DATE: June 1980

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0068185)

#### 22 179686

##### ALTERNATIVE RAIL RATES IN THE CORN SOYBEAN MARKETING SYSTEM

Evaluate alternative demand-sensitive rail rates on the corn, soybean marketing system. Compare impact of demand-sensitive rail rates with contract, annual volume and other types of rail rates on shippers, receivers

and carriers. Collect data on monthly distribution of grain receipts, shipments, mode of transport, and destinations. Compare impact of alternative demand-sensitive rail rates with other types of rail rates on timing and mode of shipment, producer, and shipper income, and on carrier car requirements.

**PERFORMING AGENCY:** Iowa State University, Ames, Department of Economics, IOW02226

**INVESTIGATOR:** Baumel, CP

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Apr. 1977 **COMPLETION DATE:** Aug. 1979

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0073201)

## 22 179690

### **INCREASING EFFICIENCY IN THE GRAIN HANDLING, STORAGE AND TRANSPORTATION SYSTEM SERVING THE SOUTH PLAINS**

Develop a detailed description of spatial and temporal grain flows and alternative mode freight rates. Determine least-cost grain distribution patterns and most efficient mode use for described grain flow. Estimate least-cost number, size and location of country elevators and feed mills to serve cattle feeding industry. Develop an interregional competition model of feed grain sector with emphasis on South Plains. Via personal interview and mail questionnaires of grain handlers, transportation companies and truck brokers existing grain flows and utilized mode freight rates estimated. These data entered into a spatial model to resolve least-cost distribution patterns and modes and then contrasted with actual distribution and utilized modes. Grain elevator, feed mill and transport cost functions and feed grain production data estimated and entered into model to optimize industry organization serving area cattle feeding industry. Spatial analysis of feed grain sector accomplished by estimation of regional demand and supply functions and transport costs which are data inputs for spatial equilibrium model. Because of no information on Texas' grain flows, a survey of Texas' grain handlers, cattle feedyards and feed manufacturers has been made. Texas Gulf ports are a major outlet for Texas' grain production. Approximately 73, 49 and 12 percent of Texas elevators' respective wheat, grain sorghum and corn shipments were to Texas Gulf ports. Texas cattle feedyards received 31 and 63 percent of elevators' respective grain sorghum and corn shipments. Nearly all feedgrain shipments to feedyards were via trucks. About two-thirds of the grain sorghum shipments to Texas Gulf ports were via trucks, while three-fourths of the State's wheat shipments to Gulf ports were by rail. Eight percent of Texas elevators' wheat shipments were to out-of-state elevators. Texas flour mills received 3 percent of Texas elevators' wheat shipments, while out-of-state flour mills received less than 1 percent of the elevators' shipments. On a state-wide basis, grain elevators received 59, 12 and 29 percent of their respective wheat receipts from Texas producers, other Texas elevators and out-of-state sources. About 88, 10 and 2 percent of elevators' grain sorghum receipts originated from producers, other Texas elevators and out-of-state sources, respectively. Texas' cattle feedyards received 11, 82 and 7 percent of their grain sorghum from producers, Texas elevators and out-of-state sources, respectively.

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A Cotton Ginning Problem Klingman, D; Randolph, P; Fuller, S, Operations Research, Volume 24 No. 4, July 1976

An Interzonal Trade Flow Model for the Texas Feed Grain Industry, Knudson, B, MS Thesis, Dec. 1976

**PERFORMING AGENCY:** Texas A&M University, Department of Agricultural Economics

**INVESTIGATOR:** Fuller, SW

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Mar. 1975 **COMPLETION DATE:** Mar. 1980

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0067558)

## 22 179693

### **ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS**

Evaluate alternative export market techniques and strategies with respect to the logistics and costs of marketing and transportation. Evaluate alternative inventory and export policies with respect to price stability and producer and consumer utility. Grain movement information will be collected from the railroad companies and the Statistical Reporting Service, U.S.D.A. Also the transportation costs of shipping grain by rail and truck-barge will be estimated. With these basic data, existing transportation models will be developed to identify least cost routings for wheat and barley from various origins in Montana to port facilities on the West Coast. The specific procedures include using historical data to estimate and project demand and supply imbalances in world grain trade, calculating the variability in supply and demand and surplus and deficits under alternative assumptions of world production and consumption; and developing models that will show the affect of alternative inventory policies on the size and variability of world grain surplus or deficits.

**PERFORMING AGENCY:** Montana State University, Bozeman, Department of Agricultural Economics, MONB0078

**INVESTIGATOR:** Cramer, GL

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Nov. 1976 **COMPLETION DATE:** Sept. 1981

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0071923)

## 22 179694

### **ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING SYSTEMS**

To evaluate alternative export marketing techniques and strategies with respect to: their effects on the structure of the domestic grain marketing firms, domestic price levels and regional price relationships, price responsiveness and uncertainty, regional exports and domestic rail rate differentials, the logistics and costs of marketing and transportation, market share and market power in world grain trade and economic incentives to producing and marketing firms. To evaluate alternative inventory and export policies with respect to: Marketing efficiency, price stability, producer and consumer utility, their effect on private and state trading systems, servicing the export markets and the effects of export embargoes on prices and market share. Information theory, models of demands and prices of product characteristics, grain users' attitudes toward product characteristics and grain samples will be used to study grades. Private and public grain prices and utilization will be estimated from information provided by recent studies on storage costs and demand characteristics. Econometric models of international production, consumption and trade will be constructed. Mathematical programming and queuing models will be used to study grain routing. A linear programming model that was previously developed and used for evaluation of rain grades was revised and improved. Construction of a model for forecasting U.S. grain production was initiated. Alternative methods of aggregating feed grain production were examined, i.e. weighting by feed values, weighting by relative prices and weighting by metric tons. All three methods of aggregation gave essentially the same absolute variation in production over the time period examined. In an effort to separate the affect of weather variability of yields from other factors, several alternative regression models are being developed for 1950 through 1975. The weather affect on yields is measured as a residual. In the case of corn, non-weather variables explain about 92 percent of the total variability in yields over the 15 year period.

**PERFORMING AGENCY:** Iowa State University, Ames, Department of Economics

**INVESTIGATOR:** Ladd, GW

**SPONSORING AGENCY:** Department of Agriculture, Cooperative State Research Service

**STATUS:** Active **NOTICE DATE:** Aug. 1978 **START DATE:** Oct. 1976 **COMPLETION DATE:** Sept. 1981

**ACKNOWLEDGMENT:** Current Research Information Service (CRIS-0071725)

## 22 179695

### **ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING SYSTEMS**

Evaluate alternative export marketing techniques and strategies with respect to: Economic incentives to producing and marketing firms. Domestic price

levels for grain. Market share and market power in world grain trade. The logistics and costs of marketing and transportation. Price responsiveness and uncertainty. Compare grading procedures and other terms of contracts used in world trade. Identify the impact of the fair average quality method of grading on all sectors of delivered quality, value, and prices. Evaluate alternative marketing procedures such as identity preserved shipments, FOB, and CIF. Through interviews and secondary data, determine the volume being moved under these alternatives for major importing countries. Use existing spatial equilibrium and transportation models to identify least cost routings for grain from origin to port.

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, NEB-10-072

INVESTIGATOR: Turner, MS

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071857)

#### 22 179696

##### ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export strategies with respect to: Structure of domestic grain marketing firms, domestic price levels and regional price arrangements, regional exports and rail rate differentials, logistics and costs of marketing, economic incentives to producing and marketing firms. Evaluate alternative inventory and export policies with respect to: Price stability, producer and consumer utility, prices and market share. Project demand and supply imbalance in world grain trade. Develop models to measure the effect of inventory and trade policies on variability of world and U.S. grain surplus or deficit, trade patterns, and economic incentives at the producer level. Use existing spatial equilibrium models to identify least cost routings from origin to port. Plans were developed to start work on the following as Ohio's contribution: (a) Listing of all grain exporting facilities at ports; (b) Listing of all unit train facilities in U.S. originating grain for export; (c) Listing of all barge loading facilities originating grain for export.

PERFORMING AGENCY: Ohio State University, Department of Agricultural Economics and Rural Sociology, OHO000597

INVESTIGATOR: Sharp, JW

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071808)

#### 22 179697

##### ECONOMIC ANALYSIS OF U.S. GRAIN EXPORTING SYSTEMS

Evaluate alternative export marketing techniques and strategies with respect to: The logistics and costs of marketing and transportation; economic incentives to producing and marketing firms. Develop a model with which to analyze the effects of alternative marketing techniques of economic incentives and price level for grain at the producer level. Use existing spatial equilibrium and transportation models to identify least cost routings for grain from origin to port. Adapt mathematical programming models and queuing theory to reduce congestion and cost in rail yards serving grain ports.

PERFORMING AGENCY: Oklahoma State University, Department of Agricultural Economics, OKL01662

INVESTIGATOR: Oehrman, RL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Re-

search Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1977 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0073046)

#### 22 179698

##### ECONOMIC ANALYSES OF U.S. GRAIN EXPORTING

Evaluate alternative export marketing techniques and strategies with respect to: Market share and market power in World grain trade; the logistics and costs of marketing and transportation. Evaluate private versus state trading systems for grain with respect to relative market power between countries with different systems. Develop cost data--Use spatial equilibrium and transportation models. Evaluate identity preserved shipments through interviews and secondary data. Describes the marketing decisions and strategies of different marketing agencies in countries having different systems of marketing. Data will be obtained through interviews with government and private agencies in several countries. Describe domestic and foreign policies directly affecting grain export, volumes and prices in major grain exporting and importing countries.

PERFORMING AGENCY: Idaho University, Moscow, Department of Agricultural Economics, IDA00725

INVESTIGATOR: Jones, JR

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0071187)

#### 22 179699

##### ECONOMIC EFFECTS ON AGRICULTURE OF THE NORTHERNEASTERN RAILROAD SYSTEM

Determine rail tariff rates and associated service charges levied on agricultural transportation activities in New England under plans to reorganize the Northeastern railroad system; determine financial stability and profitability of regional agri-business and farms under projected rail service cost functions; identify, describe, and quantify economic response and potential structural shifts within the agricultural industries of the region; simulate aggregate farm production levels resulting from projected changes in input prices. Synthesize rail service cost functions from reorganizational guidelines using cost budgeting techniques. Secondary data and sampling surveys will be used to identify production coefficients of farms. Linear programming techniques will simulate microeconomic response of agri-firms to adjustments in transportation costs. Aggregated response parameters will be used to identify structural and production shifts. Conducted through literature review concerning methodological and data requirements of research. Outlines for survey questionnaires were developed to compile data on the technical coefficients of agricultural production. A review and analysis of the tariff and pricing strategies of rail reorganization is underway. Historical rail tariff data and transportation pricing programs on the movement of agricultural commodities into New England has been compiled.

PERFORMING AGENCY: Connecticut University, Storrs, Department of Agricultural Economics and Rural Sociology, CONS00475

INVESTIGATOR: Seaver, SK

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1976 COMPLETION DATE: Sept. 1978

ACKNOWLEDGMENT: Current Research Information Service (CRIS-007664)

23 058757

**METHODOLOGY FOR THE DESIGN OF URBAN TRANSPORTATION INTERFACE FACILITIES**

The purpose of this research is to: 1. develop a set of flexible criteria for the evaluation of alternative station designs, with emphasis on potential implementation constraints and operational efficiency, 2. develop a standard methodology for the design of the layout of urban transportation terminals, 3. apply the methodology developed to a real world situation as a test of the procedures developed, 4. disseminate this methodology to the transit user community for application. STATUS: During the first phase of the research, emphasis was placed on developing a general station design evaluation framework. Functional components of stations, including pedestrian movement facilities, line haul access areas, and communications facilities were identified. A set of generalized terminal evaluation criteria were adopted, and for each criterion, the viewpoint of the user, the special user, and the operator was examined. These criteria include: 1) Passenger Processing Performance; 2) Environmental Conditions; 3) Fiscal Considerations. The level of satisfaction of these criteria is evaluated through the use of an interest impact matrix. Both a cost-benefit (dollar) and subjective index are used in the ranking of design alternatives. A generalized framework for the use of the impact-interest assessment matrix has been advanced, several computer based planning and design methodologies were examined and included in the framework, and a user's guide has been completed. The methodology is now being tested in two types of applications: new transit station designs and renovation of existing transit facilities.

**REFERENCES:**

Criteria for Evaluating Alternative Transit Station Design Hoel, LA; Demetsky, MJ; Virkler, MR, Feb. 1976

Methodology for the Design of Urban Transportation Interface Facilities, Hoel, LA; Demetsky, MJ; Virkler, MR, Dec. 1976

Design of Transportation Interface Facilities: A Procedural Guide, Demetsky, MJ; Hoel, LA; Virkler, MR, July 1977

PERFORMING AGENCY: Virginia University, Department of Civil Engineering

INVESTIGATOR: Hoel, LA Demetsky, MJ

SPONSORING AGENCY: Department of Transportation, Office of University Research

RESPONSIBLE INDIVIDUAL: Paulhus, NG, Jr Tel 202-4264208

Contract DOT-OS-50233 (CS)

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Aug. 1975 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$126,000

ACKNOWLEDGMENT: TRAIS, OST

23 058815

**CONTINUED SUPPORT BY THE BART IMPACT ADVISORY COMMITTEE**

The BART Impact Program review effort to be conducted by the Advisory Committee is an extension of the provision of advice and assistance to the Departments during the implementation phase of the program. The Committee shall review and provide consultation in all areas of the program to determine what impacts occur, which are attributable to BART, why they occur, and how this information may best be used by the Bay Area as well as by other metropolitan areas contemplating construction of a rapid transit system.

PERFORMING AGENCY: National Academy of Engineering

SPONSORING AGENCY: Office of the Secretary of Transportation; Department of Housing and Urban Development

RESPONSIBLE INDIVIDUAL: Dye, I

Contract DOT-OS-60092

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Oct. 1973 TOTAL FUNDS: \$154,190

ACKNOWLEDGMENT: TRAIS

23 059246

**URBAN TRANSIT PLAN EVALUATION**

The objective is to compile and condense the materials and results of the transportation planning process in a city pertinent to an UMTA review of transportation system implementation plans. Further, UMTA is interested in determining the response of communities to the Transportation Improvements Programs (TIP) guidelines.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company

SPONSORING AGENCY: Transportation Systems Center, R6708

RESPONSIBLE INDIVIDUAL: Rubin, D Tel (617) 494-2160

Contract TSC-1253

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1976 TOTAL FUNDS: \$21,628

ACKNOWLEDGMENT: TRAIS (R6708)

23 059919

**STUDY OF LOGIT ANALYSIS OF RAPID TRANSIT ACCESS CHOICES**

The project will provide an Analysis of Rapid Transit Access Choices by the undertaking of six tasks: 1) Choose Test Sites considering origin-destination data base, representation of rail and bus rapid transit; 2) organize and finalize a data base by processing files for study sites, 3) utilize the task 2 data base to aid in the derivation of disaggregate behavioral models of rapid transit access mode choice behavior; 4) analyze task 3 models as an attempt to explain variations in model parameters; 5) evaluate the application of the logit models in rapid transit modeling and planning by considering issues other than transferability; 6) document the study as a comprehensive analysis of the rapid transit access planning manual as originally planned.

PERFORMING AGENCY: Virginia University

INVESTIGATOR: Demetsky, MJ Korf, J

SPONSORING AGENCY: Urban Mass Transportation Administration, VA-11-0005

RESPONSIBLE INDIVIDUAL: Levinsohn, D Tel (202) 426-9271

Grant VA-11-0005

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1976 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$98,976

ACKNOWLEDGMENT: TRAIS (VA-11-0005)

23 099391

**IMPROVED PASSENGER SERVICE PROGRAM**

Provide near and long-term technology to permit maximum effective use of the rail passenger systems. Provide technological data and advice to the Secretary of Transportation for use in his responsibility in connection with Amtrak. Provide support to Amtrak in developing new rail passenger equipment. Provide direct R&D support to Northeast Corridor Project. Formal coordination with Amtrak has been developed. Components on which R&D efforts are directed: Suspension support and guidance; signal, control and communications; braking/adhesion; energy management; propulsion; creature comforts; improved passenger train.

PERFORMING AGENCY: Federal Railroad Administration, Office of Passenger Systems Research and Development

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Mitchell, MB Tel 202-426-0966

STATUS: Active NOTICE DATE: Aug. 1975 START DATE: 1966

ACKNOWLEDGMENT: FRA

23 156666

**IMPROVEMENT OF NORTHEAST CORRIDOR RAIL PASSENGER SERVICE**

A continuing study of the state and federal roles in improving rail passenger service in the Northeast Corridor with particular emphasis upon the "Empire State Corridor" from New York City to Buffalo.

**REFERENCES:**

The Crisis in Rail Passenger Service in New York State: A Matter of Concern, New York State Senate Committee on Transportation, 1974

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1974

ACKNOWLEDGMENT: New York State Legislature

23 156668

**LIGHT RAIL TECHNOLOGY**

A study of the possible use of Light Rail in Nassau County: A Demonstration Project.

## REFERENCES:

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1977

ACKNOWLEDGMENT: New York State Legislature

23 170597

**RAIL PASSENGER SERVICE AND MARKETING COMMUNICATION**

The general research objective is to provide the overall design for evaluating alternative methods for communicating the features of the VIA services to specific market segments. A sample of 400-600 interviews is contemplated. Existing knowledge from other transportation studies will be consolidated, and a preliminary model of the communications process will be formulated based on these findings and those from related studies. Interviews will be held with designated individuals such as CN managers, advertising agency personnel, and government officials. A principal objective of these interviews will be to define the rationale for past communications programs, and to explore the range of possible alternatives. The overall design of a set of market tests for the Kingston area will be specified. These will be suitable for measuring the promise of selected appeals to selected market segments, using selected communications media. This research is intended to facilitate VIA management's subsequent evaluation of alternative communications strategies for rail services, by providing the designs of alternative tests for the Kingston market. The implementation of one or more of the tests may be the topic of future research.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport, 4.43.77

INVESTIGATOR: Turner, RE Tel (613) 547-2735 Arnold, SJ

SPONSORING AGENCY: VIA Rail Canada Limited

RESPONSIBLE INDIVIDUAL: Campbell, G

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1977 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$34,125

ACKNOWLEDGMENT: CIGGT

23 170626

**NORTHEAST CORRIDOR RAIL SERVICE IN NEW YORK STATE**

A continuing study of action needed to improve Northeast Corridor Rail Service in New York State, including improvements to the East River and other Tunnels, road bed improvements, and a possible link connecting Grand Central Station and Pennsylvania Station in New York City.

## REFERENCES:

1978 Winter Storm Operations of the Long Island Railroad 1978

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: May 1977

ACKNOWLEDGMENT: New York State Legislature

23 177691

**PERSONAL TRANSPORTATION MODES--AN ASSESSMENT OF USE, CHOICE, AND FUTURE PREFERENCES**

The objectives of the study are to: (1) evaluate the present and expected future individual preferences towards the automobile and other modes of transportation, (2) identify the factors that influence choice as reflected by current ownership or alternatives to ownership, and (3) identify use patterns of the automobile and other modes of transportation. The results of this

study will provide a better understanding of the factors that now influence public preferences for the automobile and alternative modes of transportation, and an assessment of how those factors might operate under future social and economic conditions. The results also will contribute to a comprehensive assessment of automobile transportation being carried out by the Office of Technology Assessment (OTA) of the U.S. Congress. The objective of the OTA program is to assess the social, environmental, and economic impacts of prospective changes in the characteristics and use of the automobile. The study will be national in scope and consist of six major tasks. The first two tasks concern choice and use characteristics of automobile and will be accomplished using existing data sources. The next two tasks address current preferences and future choices regarding the automobile and other modes under certain conditions and will involve survey research to acquire data representative of various groups of individuals in the nation. The fifth task will be an assessment of future use patterns, and the sixth will be a synthesis of future alternatives and will serve as the integrating activity for the entire study.

PERFORMING AGENCY: Cambridge Systematics Incorporated

INVESTIGATOR: Sherman, L

SPONSORING AGENCY: National Science Foundation, ERS77-06108

Grant

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: June 1977 COMPLETION DATE: May 1978 TOTAL FUNDS: \$243,072

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CT 445)

23 178058

**STUDY OF TRANSFER POLICIES AS THEY AFFECT PERFORMANCE OF AND DEMAND FOR PUBLIC TRANSPORTATION**

CRA is reviewing transfer policies as they are currently practiced on transit systems nationally and is preparing a summary of current practice and of the issues relevant to improved transfer policies. Guidelines will be provided for local transit agencies on improved transit transfers and recommendations will be produced for UMTA on the planning of new demonstrations of transit transfers.

## REFERENCES:

Study Design: Transfer Policies and Cost Charles River Associates; Prepared for TSC, Mar. 1978

PERFORMING AGENCY: Charles River Associates, Incorporated, 388.02

INVESTIGATOR: Brand, D Tel (617) 266-0500 Parody, T

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Heaton, C Tel (617) 494-2000

Contract DOT-TSC-1406

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1977 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$77,500

ACKNOWLEDGMENT: Charles River Associates, Incorporated

23 185231

**DEVELOP A DETAIL OUTLINE, FORMAT AND SCOPE OF A NATIONAL DESIGN PRACTICES MANUAL, PHASE I**

The objective of the National Design Practices Manual Project is to establish minimum criteria for design and safety of Urban Rail Transit Systems. This will allow evaluation of grant (capital funding) requests and development of cost effective design standards. Phase I consists of establishment of a detailed outline of subjects. Phase II consists of supporting a contractor who will develop and utilize source documents identified in Phase I to fill out the outline.

PERFORMING AGENCY: American Public Transit Association, 7216

INVESTIGATOR: Cihak, FJ Tel (202) 331-1100

SPONSORING AGENCY: Urban Mass Transportation Administration

Contract DOT-UT-80034

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1978 COMPLETION DATE: Feb. 1979 TOTAL FUNDS: \$298,613

ACKNOWLEDGMENT: American Public Transit Association

23 185243

**GUIDELINES FOR PREDICTION OF TRANSIT SYSTEM IMPACTS FOR ALTERNATIVES ANALYSIS**

The purpose of this project is to offer technical guidelines in the preparation of alternatives analyses for high capital transit projects. Issues to be considered include important measures of impacts: system patronage,

economic development, energy, environmental, aesthetic, social institutional, safety and security. It will also analyze community participation and impact evaluation formats.

PERFORMING AGENCY: Charles River Associates, Incorporated, 422  
INVESTIGATOR: Dunbar, F Tel (617) 266-0500 Winston, B  
SPONSORING AGENCY: Transportation Systems Center  
RESPONSIBLE INDIVIDUAL: Spear, B Tel (617) 494-2276

Contract DOT-TSC-1572

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1978 COMPLETION DATE: Apr. 1979 TOTAL FUNDS: \$139,077

ACKNOWLEDGMENT: Charles River Associates, Incorporated

## 23 185244

### METHODS FOR IDENTIFICATION OF TRANSPORTATION ALTERNATIVES

Development of methods for identifying comprehensive set of alternatives to high capital transit investments for use by cities carrying out Alternatives Analyses (AA) for UMTA. The basic objective is to generate alternatives which are responsive to local and national goals while ensuring that a range of trade-offs among costs and various impact types are considered. Descriptors of the alternatives will be established for each phase of AA, and methods presented to ensure that the alternatives are operationally feasible. The descriptors will be determined to some extent by the concurrent work of other contractors concerning methodologies for estimating the costs and impacts of different alternatives.

PERFORMING AGENCY: Charles River Associates, Incorporated, 419

INVESTIGATOR: Kuzmyak, R Tel (617) 266-0500

SPONSORING AGENCY: Transportation Systems Center

RESPONSIBLE INDIVIDUAL: Bronitsky, L

Contract DOT-TSC-1565

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$104,333

ACKNOWLEDGMENT: Charles River Associates, Incorporated

## 23 188660

### HIGH SPEED RAIL PASSENGER SERVICE IN OHIO

A continuation of study of a statewide rail network with high speed trains connecting Cincinnati and Cleveland on a north-south corridor and Toledo and Youngstown on an east-west corridor. This phase will include engineering design, proposed routes, terminal location, costs of land acquisition and potential benefits of the system.

PERFORMING AGENCY: Dalton, Dalton, Newport

INVESTIGATOR: Lehr, M

SPONSORING AGENCY: Ohio Rail Transportation Authority

RESPONSIBLE INDIVIDUAL: Randall, M Tel (614) 466-5816 Butch, R

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: June 1980 TOTAL FUNDS: \$1,000,000

ACKNOWLEDGMENT: Ohio Rail Transportation Authority

24 082106

**IOWA RAILROAD STUDY**

The basic goal of this study is to evaluate the economic, social and environmental impacts of alternative rural rail transportation systems in Iowa. The primary focus of this study will be the role of rural branch rail lines.

**REFERENCES:**

An Economic Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, NTIS; Department of Commerce, Mar. 1976, PB-251978/AS

The Economics of Upgrading 71 Branch Rail Lines in Iowa Baumel, CP, American Journal of Agricultural Economics, Volume 59, N1, Feb. 1977

Executive Summary-An Economics Analysis of Upgrading Branch Rail Lines: A Study of 71 Lines in Iowa, Baumel, CP, Federal Railroad Administration; US DOT, Mar. 1978

Toward Optimizing the Rail Transportation and Distribution System, Baumel, CP, Proc Nat'l Symp on Transp for Agri & Rural America Nov 76

PERFORMING AGENCY: Iowa State University, Ames, 415-40-30-09-1929

INVESTIGATOR: Baumel, CP

SPONSORING AGENCY: Iowa State Highway Commission, RS-I-DOT-55045; Federal Railroad Administration, Department of Transportation

Contract DOT-FR-55045

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Oct. 1974 TOTAL FUNDS: \$257,000

ACKNOWLEDGMENT: Iowa State University, Ames

24 152647

**THE ASSESSMENT OF TECHNOLOGICAL CHANGE IN REGULATED INDUSTRIES**

The objective of this research project is to develop analytic methods for assessing the impact of regulation on technological change. The approach will be to estimate the impact of regulation on productivity through its impact on technological change by controlling for all major factors other than regulations that influence productivity. The research will compare the performance of selected U.S. and Canadian railroads to estimate the efficiency losses due to regulation in the U.S. The approach will be founded on the use of the Canadian railroads' record. By controlling for those factors other than regulation that affect productivity levels and rate of change, the differences in the Canadian and U.S. records can be attributed to differences in regulation. This research will employ several different methods for examining the impact of regulation on productivity in regulated industry. First, an index number approach will be used looking at aggregate time series data. Second, several econometric modeling techniques will be used, employing cross-section analysis of U.S. and Canadian railroads, time-series analysis of both nations' railroads and time series cross-section analysis to estimate the technological progress of the rail industry in the U.S. and in Canada.

PERFORMING AGENCY: Data Resources Incorporated

INVESTIGATOR: Christensen, LR

SPONSORING AGENCY: National Science Foundation, Division of Advanced Productivity Research and Technology, APR76-23556

STATUS: Active NOTICE DATE: Jan. 1977 START DATE: Sept. 1976 COMPLETION DATE: Feb. 1978 TOTAL FUNDS: \$137,900

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (GSQ 1697)

24 156651

**DEVELOPMENT OF A FREIGHT ROUTE COMPETITIVE TO CONRAIL**

An investigation of the establishment of a private rail system that would be competitive with CONRAIL in the Northeast in general and New York State in particular. This is a continuing study involving the Delaware and Hudson Railway.

**REFERENCES:**

Challenge and Decision for New York State: The Northeast Rail Crisis, New York State Senate Committee on Transportation, Jan. 1974

Abandoned Railroad Rights-of-Way New York State Senate Committee on Transportation, Mar. 1976

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518) 472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1974

ACKNOWLEDGMENT: New York State Legislature

24 159629

**FREIGHT CAR UTILIZATION RESEARCH PROGRAM-PHASE II, TASK 5. RAILROAD FREIGHT CAR DISTRIBUTION**

Evaluate the current effectiveness of railroad level car distribution systems. Investigate policies currently used by railroads in inventorying cars to surplus and deficit terminals. Develop an empty car supply forecasting procedure. Design, recommend, and test an improved railroad level car distribution system.

PERFORMING AGENCY: Association of American Railroads

SPONSORING AGENCY: Federal Railroad Administration; Association of American Railroads

RESPONSIBLE INDIVIDUAL: Shamberger, RC Tel (202) 426-2608 Wooden, DG Tel (202)293-5018

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: July 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$265,000

ACKNOWLEDGMENT: AAR

24 159650

**AMERICAN RAILWAY SYSTEM STUDY**

Under Section 901 of the Railroad Revitalization and Regulatory Act of 1976 the following tasks are being performed: (1) An examination of the current status and condition of the railroad freight industry; (2) Assessment of the effects of alternative rail corporate structures on the rail system; (3) Cost benefit analysis of electrifying high-density rail lines and improving them for high-speed passenger and freight operations; (4) Identification of rail economics that could result from improving local and terminal operations.

A preliminary report on this study effort was released in October 1978, entitled A Prospectus for Change in the Freight Railroad Industry.

PERFORMING AGENCY: Federal Railroad Administration, Office of Policy and Program Development

INVESTIGATOR: Boone, JW Tel (202)426-9682 Till, TA Tel (202) 426-0382

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Ditmeyer, SR Tel (202) 426-8254

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1977 COMPLETION DATE: May 1979

ACKNOWLEDGMENT: FRA

24 170612

**ANALYTICAL PROCEDURES FOR THE STUDY OF A MULTIMODAL TRANSPORTATION CORRIDOR FROM BRUNSWICK, GEORGIA TO KANSAS CITY, MISSOURI**

The research will formulate workable procedures for the analysis of transportation needs in a corridor from Brunswick, Ga. to Kansas City, Mo. defined as an area roughly 100 miles wide along the corridor. The project consists in several tasks as follows: identify legislative constraints on development, develop initial transportation guidelines, develop techniques for identifying economic development opportunities, develop measures for comparing alternatives mixes of transportation services, formulate analytical models, and develop a data library.

PERFORMING AGENCY: Georgia Institute of Technology, DOT-OS-60512

INVESTIGATOR: Jones, PS Sharp, G

SPONSORING AGENCY: Office of the Secretary of Transportation

RESPONSIBLE INDIVIDUAL: Nupp, B Tel (202) 426-4447

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Aug. 1976 COMPLETION DATE: 1980

ACKNOWLEDGMENT: OST

24 170627

**VALUATION OF RAILROAD RIGHTS OF WAY**

The study involves valuation of railroad rights of way, specifically properties transferred to Conrail under the Regional Rail Reorganization Act of 1973.



Results will be used to support the government's case in the special court which is hearing challenges brought by the trustees of Penn Central and other bankrupt railroads in the Northeast.

PERFORMING AGENCY: Beasley and Beasley, Incorporated

SPONSORING AGENCY: United States Railway Association

STATUS: Active NOTICE DATE: Feb. 1978 TOTAL FUNDS: \$130,275

ACKNOWLEDGMENT: United States Railway Association

## 24 179528

### ECONOMIC ANALYSIS PROGRAM

This program is the ongoing effort of the Office of Economics and Operations Policy involving: (1) Competitive status of the rail industry; (2) Analysis of the regulatory environment of the rail industry; (3) Commodity service involving perishable goods, coal transit efficiency, and wheat gathering analysis; (4) Freight car management including computerized freight car scheduling and freight car utilization research; (5) Labor/management relations involving experiments with work rules agreements, worker training, strike impact analysis, economic analysis of rail labor factors, and improvement in employee communications; (6) Economic analysis involving statistics and forecasting.

PERFORMING AGENCY: Federal Railroad Administration

SPONSORING AGENCY: Federal Railroad Administration

RESPONSIBLE INDIVIDUAL: Boone, JW Tel (202) 426-9682

STATUS: Active NOTICE DATE: Feb. 1979

ACKNOWLEDGMENT: FRA

## 24 179673

### IMPACTS OF ALTERNATIVE POLICIES ON EFFICIENCIES OF TRANSPORTING AGRICULTURAL AND FOREST PRODUCTS

Estimate characteristics of demand and supply for transportation of agricultural and forest products; evaluate transportation industry marketing efficiency performance under existing institutional policies; identify effects on efficiency of transportation industry of alternative institutional policies; identify policies improving efficiency of transportation for individual commodities, especially forest products. Develop supply and demand models incorporating quality of service characteristics and competitive market variables at both the aggregate and commodity market specific levels identifying elasticity and cross elasticities and test ability of alternative institutional policies to effect parameters of supply and demand; utilize data base on costs, revenues and demand to specify impacts of alternative policies; specify those commodities or markets whose characteristics of supply and demand for transportation are so specific that national policy alternatives do not yield efficiency increases with emphasis on forest products; evaluate alternative policies and make recommendations for local, state and national government levels.

PERFORMING AGENCY: Washington State University, Department of Agricultural Economics, WNP00379

INVESTIGATOR: Casavant, KL

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Apr. 1977 COMPLETION DATE: Apr. 1982

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0072790)

25 058753

**SCENARIOS FOR ALTERNATIVE ROLES OF THE FEDERAL GOVERNMENT IN TRANSPORTATION**

The research shall evaluate the economic effects of existing and prospective Federal policies governing intercity and international freight and passenger transportation enterprises in the economy of the United States. All modes of transportation shall be encompassed intermodal coordinative institutions, and Federal policies affecting domestic intercity transportation in all phases. Economic evaluation shall include the study of efficient resource allocation and distributional effects of alternative policies together with consideration of both partial and general equilibrium effects. The research shall be interdisciplinary in scope, drawing upon engineering, economic, statistics, law, and administration.

**REFERENCES:**

An Integrated Policy Model for the Surface Freight Transportation Industries, Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 76-12, Sept. 1976

Econometric Estimation of Cost Functions in the Transportation Industries, Spady, R; Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 76-12, Sept. 1976

Information Needs and Performance Measures Center for Transportation Studies, MIT, deNeufville, R; King, C, Report 76-15, Sept. 1976

The Rationale & Scope of Federal Transportation Policy Friedlaender, AF; Simpson, RW; Frankel, EG; deNeufville; Sloss, Center for Transportation Studies, MIT, Report No. 77-4, Mar. 1977

Hedonic Costs and Economics of Scale in the Regulated Trucking Industry, Friedlaender, AF, Center for Transportation Studies, MIT, Report No. 77-5, Jan. 1977

**PERFORMING AGENCY:** Massachusetts Institute of Technology, Center for Transportation Studies

**INVESTIGATOR:** Friedlaender, AF

**SPONSORING AGENCY:** Office of Systems Development and Technology, Department of Transportation

**RESPONSIBLE INDIVIDUAL:** Nupp, B Tel (202) 426-4447

Contract OS-50239 (FFP)

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Sept. 1975 **COMPLETION DATE:** Jan. 1979 **TOTAL FUNDS:** \$400,000

**ACKNOWLEDGMENT:** TRAIS

25 059207

**PROCEDURES FOR INSTITUTING SEPARATE ROUTES FOR DISTINCT RAIL SERVICE**

Determine the elements that constitute basic railroad transportation service, identify theoretical and specific terms of those services which should be included under the rubric of distinct services. This will require identification of the characteristics which make some services distinct and analysis of whether provision of those services results in incremental costs to the railroads. Formulate guidelines to be incorporated into the Commissions rules. Describe the regulatory and institutional barriers to initiation of such pricing procedures.

**PERFORMING AGENCY:** Gellman Research Associates, Incorporated

**INVESTIGATOR:**

**SPONSORING AGENCY:** Office of Policy and International Affairs

**RESPONSIBLE INDIVIDUAL:** Bohan, FJ Tel 202-4264860

Contract DOT-OS-606167 (CPFF)

**STATUS:** Active **NOTICE DATE:** Feb. 1978 **START DATE:** Mar. 1976 **TOTAL FUNDS:** \$41,502

**ACKNOWLEDGMENT:** TRAIS

25 099365

**VALUE CAPTURE POLICY**

This research explores legal, financial and community design issues resulting from the introduction of mass transit station facilities in a community. Collectively termed "Value Captive", these efforts are becoming increasingly important in the evaluation of transit projects. First year efforts developed major concepts and defined and analyzed the critical issues in the 3 concern areas using Houston, Texas as an example city. Year two took Value Capture and applied it to proposed transit improvements in Los Angeles, Louisville, Kentucky and Chicago. Problems and opportunities for the application of Value Capture techniques by one or more types of public administrative agencies were identified. This included an examination and comparison of significant legal barriers, economic issues, investment opportunities, sources

and restrictions on funds, and potential community impacts related to hypothetical examples of transit stop related development. The research teams worked closely with the municipalities involved and the Urban Mass Transit Administration. **STATUS:** Results from the first year of research detailing the legal, financial and community implications of Value Capture have been published and widely distributed. Second year research has focused on three cities: Los Angeles, Louisville, and Chicago. In each case, prospects for applying Value Capture to proposed mass transit development have been thoroughly evaluated. It was found that there is significant potential for the beneficial application of Value Capture, although the most appropriate techniques for applying it are not the same in each city. In application situations in this work, potential fiscal returns were found to be widely varying depending upon the community under examination, Value Capture techniques used, and the legal basis for their application. In all, it may be summarized that Value Capture's potential success is closely related to the success of the mass transit system itself. Good transit planning will definitely support the success of Value Capture but not insure it.

Final Report, February 1979.

**REFERENCES:**

Value Capture Policy. 4 Vols. Introduction, Legal Element Financial Element, and Community Enhancement, DOT Publication, DOT-TST-75-85, Nov. 1974

Value Capture and Joint Development Applications Dec. 1975

How to Make Mass Transit Pay its own Fare Design and Environment Magazine, Apr. 1975

Value Capture Policy Planning Mag, Am Soc of Planning Officials, Apr. 1976

Joint Land Use and Transportation Development-Application of the Value Capture Concept, Transportation Research Board, NAS, Jan. 1975

Planning, Financing and Implementing Joint Development A National Transit Symposium, Miami, FL., Jan. 1975

**PERFORMING AGENCY:** Rice University, School of Architecture

**INVESTIGATOR:** Sharpe, CP

**SPONSORING AGENCY:** Office of the Secretary of Transportation

**RESPONSIBLE INDIVIDUAL:** Nupp, B

Contract DOT-OS-40007

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Dec. 1976 **TOTAL FUNDS:** \$175,000

**ACKNOWLEDGMENT:** DOT

25 128852

**PRODUCTIVITY IN TRANSPORTATION AND PIECEMEAL DEREGULATION OF THE INDUSTRY**

The position taken in this proposal is that technological and other changes have significantly altered the competitive situation in transportation. These changes raise the possibility of increasing productivity in transportation by returning to market forces at least partial responsibility for determining prices and outputs. Our specific area of interest is the exempt agricultural commodities. The research will provide useful results on the effects of extending these regulatory exemptions to railroads, including effects on energy consumption, car utilization, and other aspects of productivity. The research will examine the implications of deregulation on the future functioning of railroad rate bureaus and investigate the effects of user charges and subsidies on intermodal competition. A major benefit of the research will be a usable methodology for examining partial deregulation questions. The methodology will consist of a quantitative model of intermodal freight competition and a "users manual". The users' manual will consist of a series of model applications, representing the range of alternative regulatory instruments from direct regulation to subsidies and taxes. We will also publish the methodology and the results as articles in both professional and trade journals. Testimony will be presented to the appropriate committees of Congress.

**PERFORMING AGENCY:** Northwestern University, Evanston, Transportation Center, APR 75-16731

**INVESTIGATOR:** Moses, LN Tel (312) 492-7286

**SPONSORING AGENCY:** National Science Foundation, Division of Applied Research

**RESPONSIBLE INDIVIDUAL:** Rosenberg, L Tel (202) 634-1609

Contract APR-7516731

**STATUS:** Active **NOTICE DATE:** Feb. 1979 **START DATE:** Sept. 1975 **COMPLETION DATE:** May 1978 **TOTAL FUNDS:** \$110,000

**ACKNOWLEDGMENT:** Northwestern University, Evanston, Smithsonian Science Information Exchange (GSQ 1407)

25 129738

**URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES-TRANSPORTATION NEEDS ANALYSIS AND INFORMATION PACKAGE DEVELOPMENT**

Based on previous needs assessment work the Consortium will conduct an analysis of the transportation-related needs, attempting to determine those for which technological solutions have been developed and need only to be applied, and those for which research is necessary. Project specifications and technical information packages will then be assembled, based on these analyses. Manuals on bus priority systems and transportation for the handicapped and elderly are being developed. Needs data are also being revised and updated.

PERFORMING AGENCY: Public Technology, Incorporated

INVESTIGATOR: Burke, AC Tel (202) 452-7839

SPONSORING AGENCY: Office of Governmental Affairs, Department of Transportation; Federal Highway Administration; Urban Mass Transportation Administration

RESPONSIBLE INDIVIDUAL: Linhares, AB Tel 202-426-4208

Contract DOT-OS-60076

STATUS: Completed NOTICE DATE: Feb. 1979 START DATE: Jan. 1976 COMPLETION DATE: June 1978 TOTAL FUNDS: \$735,000

ACKNOWLEDGMENT: DOT

25 144359

**THE IMPACT OF REGULATION UPON TECHNICAL CHANGE IN THE RAILROAD INDUSTRY**

By examining the profitability of specific investments and innovations in Canada and the United States, the proposed research analyzes the role of the following factors upon technical change and innovation in the railroad industry: regulation, market structure, union work rules, competition, and the dispersion of economic activity. By choosing innovations in which all but one (or possibly two) of these factors are the same, and comparing the cost and demand structures associated with these innovations, it should be possible to isolate the impact of each of these factors upon technical change in the railroad industry. Innovations and investments that appear to meet these criteria include containerization, unit train, automatic coupling and braking systems, railroad operating and car management systems, centralized traffic control, automated humpyards, and investment in equipment and roadbed.

PERFORMING AGENCY: Massachusetts Institute of Technology, Center for Transportation Studies, 84329

INVESTIGATOR: Friedlaender, AF Tel (617) 253-3456

SPONSORING AGENCY: National Science Foundation, Office of Research &amp; Development Assessment, Room P705, PRA76-17394

7617394-PRA

STATUS: Active NOTICE DATE: Apr. 1977 START DATE: Sept. 1976 COMPLETION DATE: Aug. 1978 TOTAL FUNDS: \$164,900

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CD 351)

25 153574

**TRANSPORTATION SYSTEMS IN COLORADO: NEEDS ASSESSMENT AND ANALYSIS FOR COMPREHENSIVE STATE TRANSPORT**

To describe the components of the existing transportation sector in Colorado in a systematic framework. Identify goals for Colorado's transportation system and develop measures of performance on which to estimate the achievement of such goals. Identify areas of discrepancy between the existing system and the goals for the system. Develop a set of recommended actions to achieve congruence between the state goals and the transportation system.

PERFORMING AGENCY: Colorado State University, Fort Collins, Department of Economics, CSRS COL

INVESTIGATOR: Blood, D Wagner, W

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, COLO0189

STATUS: Active NOTICE DATE: Apr. 1977 START DATE: July 1976 COMPLETION DATE: June 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070684)

25 156620

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION, STORAGE AND DISTRIBUTION SYSTEMS**

This project will evaluate the economic effects of alternative federal, state and local government policies on shippers, carriers, receivers, and rural communities. The study will: develop an inventory of existing regulation in participating states and at the national level; Measure commodity flows into and out of case study areas in terms of commodity, origin, destination, mode, type of carriers, (regulated, exempt, and private) backhaul, service variables such as timeliness, reliability and damage incidence will be measured. Cost coefficients will be obtained and adapted to model carrier firms operating under simulated regulated and unregulated conditions as determined from survey findings. Comparison of costs and services under regulated vs. unregulated conditions will provide the basis for evaluating the merits of alternative regulatory policies. A model will be constructed which will describe rural transportation systems as they presently exist and as they would exist under alternative state and federal regulatory frameworks. The likely performance of the transportation systems will be estimated as a function of the inter-and intra-modal competitive environment. Work during the first two months of this projects' existence consisted entirely of planning the theoretical framework and empirical approach for the research. Literature review has been completed and alternative methodological approaches have been weighed and evaluated.

## REFERENCES:

Impact of Motor Carrier Deregulation on Agriculture, Rural Shippers and Receivers, Felton, JR; Anderson, DG, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-15 30 pp, 1976

The Inherent Structure, Behavior and Performance of Motor Freight Industry, Felton, JR, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-7 18 pp, 1976

Economics of Scale in Highway Freight Transport: A Review of the Studies, Felton, JR, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-8 21 pp

State Economic Regulation of Motor Carriage: Research Procedures on the Law and Its Interpretation, Hutsell, RC, Jr, Nebraska University, Lincoln, Dept of Agricultural Economics, Staff Paper 1976-12 9 pp, 1976

PERFORMING AGENCY: Nebraska University, Lincoln, Department of Agricultural Economics, CSRS NEB

SPONSORING AGENCY: Department of Agriculture, NEB-10-071

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Oct. 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070254)

25 156676

**RAIL BRANCH LINE SUBSIDIES AND REHABILITATION**

A study of the need for rehabilitation of rail branch lines and methods of subsidizing service on lines operating in the red.

## REFERENCES:

Transportation Priorities in New York State 1978

PERFORMING AGENCY: New York State Legislature, Senate Committee on Transportation

INVESTIGATOR: Mitchell, M Tel (578)472-3333 Zimmerman, JF

SPONSORING AGENCY: New York State Legislature, Senate Committee on Transportation

RESPONSIBLE INDIVIDUAL: Mitchell, M Tel (518)472-3333 Zimmerman, JF

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1973

ACKNOWLEDGMENT: New York State Legislature

25 156707

**EVALUATION OF ALTERNATIVE RURAL FREIGHT TRANSPORTATION STORAGE AND DISTRIBUTION SYSTEMS**

The project will evaluate the economic effects of alternative federal, state, and local government policies on carriers, shippers, receivers, and rural communities. An inventory of existing transportation regulatory and policies will be developed. Commodity flows into and out of the state will be summarized from secondary sources. Data on origin, destination, mode, back haul, seasonality and rates will be based on surveys in case study areas. The relationship between service and the competitive structure of the transportation industry will be estimated through a survey of shippers and receivers. Service variables such as timeliness, reliability, and damage

incidence will be measured. The likely performance of transportation systems will be estimated as a function of inter-and intra-modal competitive environment. A survey intended for country elevators has been prepared. It is designed to collect responses which can be used to test hypotheses regarding the quality of services provided by transportation firms, primarily railroads. The hypotheses center on the relative importance of various service variables to shippers and the extent that service varies by company, competition, and classification of the railroad bed (main or branch line).

PERFORMING AGENCY: North Dakota State University, Department of Agricultural Economics, CSRS ND  
 INVESTIGATOR: Cobia, DW  
 SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service, NDO1360

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: July 1976 COMPLETION DATE: Sept. 1981

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0070865)

#### 25 157601 DEVELOPMENT OF A POLICY SENSITIVE MODEL FOR FORECASTING FREIGHT DEMAND

To investigate and evaluate the application of disaggregate freight demand models in examining transportation policy alternatives. Using a mathematical model previously specified at Massachusetts Institute of Technology to investigate the adequacy of existing freight shipment data as the basis for model calibration. To calibrate and test such a model on alternative Federal intercity freight policy alternatives and the effects on modal shares, revenues, level of service and other factors.

##### REFERENCES:

Phase I Report. Development of a Policy Sensitive Model for Forecasting Freight Demand, Roberts, P; Terziev, M, July 1977

PERFORMING AGENCY: Massachusetts Institute of Technology, DOT-OS-70006

INVESTIGATOR: Roberts, PO Tel (617)253-1000

SPONSORING AGENCY: Department of Transportation, Office of Intermodal Studies

RESPONSIBLE INDIVIDUAL: Swerdloff, CN Office of the Secretary of Transportation Tel (202)426-4163

Contract DOT-OS-70006

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Jan. 1977 COMPLETION DATE: July 1979 TOTAL FUNDS: \$290,000

ACKNOWLEDGMENT: OST

#### 25 160045 FEDERAL POLICY IMPLICATIONS (FPI) PROJECT

The purpose of the Federal Policy Implications (FPI) Project is to respond to the interests of the Federal Government by bringing together the BART Impact Program (BIP) impact findings and their supporting data. BIP is a five-year study of the impacts of the BART system on travel conditions, economic activity, land use, public policies, and other aspects of life in the San Francisco Bay Area.

PERFORMING AGENCY: Voorhees (Alan M) and Associates, Incorporated

SPONSORING AGENCY: Office of Policy and International Affairs

RESPONSIBLE INDIVIDUAL: Grainger, GR Tel (202) 426-4168

Contract DOT-OS-70034 (CPFF)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1977 TOTAL FUNDS: \$78,650

ACKNOWLEDGMENT: TRAIS

#### 25 160468

**PUBLIC POLICY PROJECT OF THE BART IMPACT PROGRAM**  
 Direct measures of public policy formulation and implementation in the local governmental process permit an understanding of the significance of BART's impact, and are the basis for study of the contributing behavioral responses within the community and the governmental sectors. The project's concern with perception and response to these changes and the broad implications for local policymaking addresses the crucial issue of how the lives of people are affected by those identified BART impacts.

PERFORMING AGENCY: Metropolitan Transportation Commission

SPONSORING AGENCY: Office of the Secretary of Transportation

Contract DOT-OS-30176/208 (CC)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Jan. 1977 COMPLETION DATE: May 1978 TOTAL FUNDS: \$115,000

ACKNOWLEDGMENT: TRAIS

#### 25 179347

#### CONTINUATION OF MARYLAND'S OVERALL STATEWIDE ECONOMIC DEVELOPMENT PLANNING PROCESS

The grant represents a continuation of ARC support for an economic development process in the Maryland Department of Economic and Community Development since 1973 when ARC provided assistance to create an economic development planning staff. The process has evolved into one which: (1) identifies and selects specific projects for study, evaluation, and recommendation, (2) provides economic development planning assistance to counties and multi-county districts, (3) participates in multi-state economic development regional organizations, (4) participates in State inter-governmental programs of economic development significance, and (5) provides analytical support to the Maryland Department of Economic and Community Development's other divisions and the Office of the Secretary. SCOPE OF WORK: Work during the nine-month continuation period will focus mainly on specific projects of interest to the Tri-County area of western Maryland. 1. Tourism Development. This work will assist the Tri-County Council of Western Maryland prepare a regional action plan for the development of specific tourism projects, and assess the potential for a conference-recreation complex in western Maryland. Specifically, activities will include: a. An inventory of facilities and potential recreational projects; b. Liaison and participation with the TCCWM's Regional Tourism Committee and staff; c. Selection of projects based on priorities and their economic impact. 2. Rail Utilization. This work will build on the analyses of rail line utilization, operations, and service gaps that were developed under the current grant. Specifically, activities will include: a. The development of strategies to enhance the economic viability of rail lines serving western Maryland and to close gaps between present and potential volume. b. The development of a monitoring system to study the progress or deterioration of marginally profitable rail lines. c. The development of alternatives for abandoned rail rights-of-way. 3. Coal Industry. The revitalization of the coal industry will have an impact on western Maryland.

PERFORMING AGENCY: State Department of Economics and Development

SPONSORING AGENCY: Appalachian Regional Commission, MD-5101-77-C1-302-05

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Sept. 1978 TOTAL FUNDS: \$28,500

ACKNOWLEDGMENT: Smithsonian Science Information Exchange (CY 3)

#### 25 179675

#### AN ASSESSMENT OF THE ECONOMIC IMPACT OF USER CHARGES FOR INLAND WATERWAY TRANSPORTATION

Evaluate the impact of alternative user charges for inland waterways upon shipping costs and consumer prices. Evaluate administration costs and revenue potential of alternative user charges. Develop information on inland waterway cost-sharing. Develop an economic model of interregional competition which emphasizes the role of transportation costs. By changing freight rates, their impacts on transportation mode, shipping patterns, and prices will be identified.

PERFORMING AGENCY: Virginia Polytechnic Institute & State University, Department of Agricultural Economics, VA-0375868-1

INVESTIGATOR: Shabman, L

SPONSORING AGENCY: Department of Agriculture, Cooperative State Research Service

STATUS: Active NOTICE DATE: Aug. 1978 START DATE: Jan. 1978 COMPLETION DATE: Dec. 1979

ACKNOWLEDGMENT: Current Research Information Service (CRIS-0074345)

#### 25 185242

#### THE DEVELOPMENT OF DECISION CRITERIA FOR RAIL USAGE IN ARKANSAS

The objective of this study is to develop analytical procedures to allow consistency in applying decision criteria to railroad track abandonment requests. An approach will be developed to facilitate decisions on whether present and future public convenience and necessity permit discontinuance

or abandonment of railroad trackage. Developed methodology will weigh economic, social, fiscal, and environmental impacts of abandonment and provide decision-makers with objective criteria and systematic procedures for evaluating abandonment proposals.

PERFORMING AGENCY: Arkansas State University  
INVESTIGATOR: Kaminarides, J Tel (501) 972-3037  
SPONSORING AGENCY: Arkansas State Highway & Transportation Department; Federal Highway Administration  
STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Feb. 1978 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: \$29,651  
ACKNOWLEDGMENT: Arkansas State University

**25 188665**

## STATE RAIL PROGRAM EVALUATION

The project will evaluate the effectiveness of the Local Rail Service Assistance Program. The evaluation has three objectives: (1) to evaluate the effectiveness of the Program in meeting its objectives as established by Congress and as perceived by the State; (2) to identify problems and

recommend alternative solutions to improve Program effectiveness; and (3) to develop a continuing evaluation process to be used by FRA and States. Interviews are being conducted with key officials at the Federal, State and local levels, and with shipper and railroad executives to determine the objectives, policies and problems in implementing the Program as originally intended by the Congress and modified in subsequent legislation. Information will be compiled on the affect of the implementation of the Program on railroad financial conditions, program expenditures, State obligations, and community impacts.

PERFORMING AGENCY: Ernst and Ernst  
INVESTIGATOR: Tyndall, GR Tel (202) 862-6000 Taggart, RE Swartz, DJ Walker, N  
SPONSORING AGENCY: Department of Transportation; Federal Railroad Administration  
RESPONSIBLE INDIVIDUAL: Tusaie, W Tel (202) 426-1677

Contract DOT-FR-8211

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: Sept. 1978 COMPLETION DATE: Aug. 1979 TOTAL FUNDS: \$99,304  
ACKNOWLEDGMENT: Ernst and Ernst

26 058329

**RAILROAD RESEARCH INFORMATION SERVICE (RRIS)**

Aquisition, selection, storage, retrieval and dissemination of research information that is generated by and/or that is useful to administrators, researchers, and other specialists in the railroad and related fields of transportation research. To provide a central point for industry, academia, government and others to disseminate technical information to the interested railroad related community-at-large or research results as well as on-going research efforts in the interest of obtaining technology utilization in an efficient manner. To provide a service to the research community in maintaining a current awareness of technological and economic research findings and developments.

PERFORMING AGENCY: Transportation Research Board

INVESTIGATOR: Houser, FN Tel 202-389-6611

SPONSORING AGENCY: Federal Railroad Administration, Office of Research and Development

RESPONSIBLE INDIVIDUAL: Ahmed, N Tel 202-4260955

Contract DOT-FR-74193 (CC)

STATUS: Active NOTICE DATE: Feb. 1978 START DATE: Apr. 1977 COMPLETION DATE: Sept. 1979 TOTAL FUNDS: \$525,000

ACKNOWLEDGMENT: FRA

26 099429

**RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT, PHASE 4-LITERATURE REVIEW**

Background experience and literature in the various technical areas of interest under the Project are continually under review. A reference library has been established and maintained under this Phase.

See also RRIS 12A 081788.

PERFORMING AGENCY: Association of American Railroads Technical Center

SPONSORING AGENCY: Association of American Railroads; Railway Progress Institute

RESPONSIBLE INDIVIDUAL: Phillips, EA Tel (312) 567-3607

STATUS: Active NOTICE DATE: Feb. 1979 START DATE: 1970

ACKNOWLEDGMENT: AAR

# Source Index

This index serves not only as the reference for the publications and the corporate affiliations of authors of documents appearing in this *Bulletin* but also as the source for addresses of organizations that do not appear on page v. In general, if no address is listed after the name of an organization, the entry involves an author affiliation rather than a publication. Consequently, there are multiple listings for

many organizations, and all the document numbers should be checked. Some organizations have more than one office, and again there will be more than one listing of document numbers of possible interest. Each summary of ongoing research is indicated not only by the *A* in the document number but also by the use of italics for the entire number.

## A

**ABAM ENGINEERS, INCORPORATED** Tacoma, Washington  
11 176305, 11 186214

**ABT ASSOCIATES, INCORPORATED** 55 Wheeler Street; Cambridge, Massachusetts, 02138  
*15A 188644*

**ACADEMIC PRESS INCORPORATED, LIMITED** 111 Fifth Avenue; New York, New York, 10003  
11 184957

**ACCIDENT ANALYSIS AND PREVENTION** Pergamon Press, Incorporated; Maxwell House, Fairview Park; Elmsford, New York, 10523  
08 188314

**ACOUSTICAL SOCIETY OF AMERICA, JOURNAL OF** Acoustical Society of America; 335 East 45th Street; New York, New York, 10017  
09 184147

**AERONAUTICAL JOURNAL** Royal Aeronautical Society; 4 Hamilton Place; London W1V 0BQ, England  
23 180436, 23 183317

**AEROSPACE CORPORATION** Energy and Transportation Division; El Segundo, California, 90245  
16 180590

**AGBBIAN ASSOCIATES** 250 North Nash Street; El Segundo, California, 90245  
*00A 179344*

**AGRICULTURAL MARKETING RESEARCH INSTITUTE** Transportation and Packaging Research Laboratory; Building 006 BARC-W, Room 210; Beltsville, Maryland, 20705  
*03A 179688, 03A 179689*

**AGRICULTURAL RESEARCH SERVICE** Agricultural Marketing Research Institute; Beltsville, Maryland, 20705  
*22A 083506, 22A 083511, 22A 099639, 22A 138400*

**AGRICULTURAL RESEARCH SERVICE** Department of Agriculture; Beltsville Agricultural Research Center; Beltsville, Maryland, 20705  
*03A 148336*

**AGRICULTURAL RESEARCH SERVICE** Department of Agriculture; P.O. Box 110; Dawson, Georgia, 31742  
*22A 138363*

**AGRICULTURAL RESEARCH SERVICE** Department of Agriculture; P.O. Box 8143; Fresno, California, 93727  
*22A 138375*

**AGRICULTURAL RESEARCH SERVICE** Grain Marketing Research Center; 1515 College Avenue; Manhattan, Kansas  
*22A 179676*

**AGRICULTURAL RESEARCH SERVICE** Market Quality Laboratory; P.O. Box 112; Riverside, California, 92502  
*22A 099640*

**AGRICULTURAL RESEARCH SERVICE** Western Region Oregon-Washington Area; 3706 West Nob Hill Boulevard; Yakima, Washington, 98902

*22A 099624*

**AIRESEARCH MANUFACTURING COMPANY** 2525 West 190th Street; Torrance, California, 90509

*03A 136342, 04A 159663, 11A 059421, 11 179869, 11 180884*

**AIT-REVISTA** Asociacion de Investigacion del Transporte; Alberto Alcocer 38; Madrid, Spain

01 185348, 01 185349, 02 180292, 13 180293, 13 180294

**ALASKA UNIVERSITY, COLLEGE** College, Alaska, 99701  
*20A 055810*

**ALBERTA UNIVERSITY, CANADA** 89th Avenue and 114th Street; Edmonton, Alberta, Canada  
23 188344

**ALL-UNION LABOR RED BANNER RAILWAY RESEARCH INST** USSR Ministry of Railways; Moscow B-174, USSR  
00 185361, 01 185356, 04 182883, 04 182884, 13 182886

**ALLIED-GENERAL NUCLEAR SERVICES** Barnwell, South Carolina, 29812  
12 185619, 12 188640

**AMERICAN ASSN OF STATE HWY AND TRANSP OFFICIALS** 444 North Capitol Street, NW; Washington, D.C., 20001  
*00A 138477*

**AMERICAN CONCRETE INSTITUTE, JOURNAL OF** American Concrete Institute; P.O. Box 19150, Redford Station; Detroit, Michigan, 48219  
00 180329

**AMERICAN IRON AND STEEL INSTITUTE** 150 East 42nd Street; New York, New York, 10017  
*01A 099393*

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