



IIT Research Institute  
10 West 35th Street  
Chicago, Illinois 60616-3799

312/567-4000

May 6, 1993

Federal Railroad Administration  
U.S. Department of Transportation  
400 Seventh Street S.W.  
Washington D.C. 20590

Attention: Mr. Garold R. Thomas  
Contracting Officer's Technical Representative

Subject: Delivery of Technical Note Supplement to the Draft Final  
Overview and Summary Report on Dispatchers

Reference: Task Order No. 5, IITRI, Project V06202  
FRA Contract DTFR53-90-C-00042

Dear Mr. Thomas:

Enclosed are five (5) copies of a Technical Note which is offered as a supplement to the Draft Final Overview and Summary Report on the referenced task order. The note contains observations on potential improvements to the readability of railroad operating rules.

Very truly yours,

John A. Granath  
Senior Engineering Advisor  
Transport Technology

JAG/wj  
Encl.

cc: W. Askren, UES  
M. Cooper/D. Klaus/J. Aronson, URC  
M. Johnson/C. Radgowski, IITRI  
B. Ash, IITRI Contracts  
J. Henry  
F. Bryan

**READABILITY OF RAILROAD  
OPERATING RULES:  
SOME OBSERVATIONS**

**TECHNICAL NOTE NO. 1**

**Submitted to:  
Federal Railroad Administration  
400 Seventh Street, S.W.  
Washington, D.C. 20590**

**Submitted by:  
IIT Research Institute  
10 West 35th Street  
Chicago, IL 60616**

**April 1993**

## FOREWORD

This technical note is submitted as a supplement to the Overview and Summary Final Report on the Dispatcher/Dispatch Center Evaluation-Study Design project, Task Order No. 5, Contract DTFR53-90-C-00042, Technical Support to Railroad Research. One of six human factors topics investigated under the task order has to do with readability of railroad operating rules.

Dr. James Henry of George Mason University, Virginia was retained as a consultant to the project on the subject of readability of rules. He had recently worked with Conrail on revision of the NORAC rules.

During the Dispatcher/Dispatch Center project, Dr. Henry provided background material on readability, issues, concepts, and a bibliography. At IITRI's request he also prepared two reports, one on "factors to be considered" in readability, specifically of railroad operating rules books, and another on a comparison across several rule books of one example rule.

Because of the universal subject matter, readability of railroad operating rules, the IITRI project leader sought some examples of the kind of work that might be done in such a study. This goes beyond the design of a study and into the doing of it, although to a limited extent and from one point of view. Henry produced a report in response to each of the IITRI requests. Copies of these reports as received in November 1992 make up the body of this technical note.

Although the reports may be too specific and detailed to be included in a study design document, we believe they provide valuable insights based on experience that should be part of the project record.

Respectfully submitted,

John A. Granath  
Senior Engineering Advisor  
Transport Technology

**PART ONE**

**FEATURES OF RULES MANUALS**

**BY J. HENRY**

# FEATURES OF RULES MANUALS

## PHYSICAL PROPERTIES

### Manual Forms

Most manuals (General Code, NORAC, Norfolk Southern) appear as loose-leaf in ring binders, with plastic covers. Most are pocket size (averaging 5" x 8"). CSX's Operating Procedures Manual, which contains not only Operating Rules but also Safety Rules, Hazmat Rules, and others, appears in a notebook format. The Operating Rules in this Manual appear in two-column format on 8 1/2" x 11" sheets, an enlargement of the smaller pocket edition that uses the common one-column format.

### Issues to Consider in Revision

Historically the Operating Rules have appeared in pocket form so that employees could carry them on the job. For the craft of Train Dispatchers it would seem that the pocket size is not necessary. An advantage of the notebook size manual is that each page includes more rules, in larger typeface than in the pocket size. The NTDSA notes the many manuals that dispatchers at Jacksonville must consult, and this notebook format also serves the purpose of combining them all in the same notebook. (However, the page size would also allow printing in one column, with more characters per line, which would enhance readability. See Typeface and Point, below.)

None of the manuals studied include tabs, color-coding, or other similar features that facilitate quick reference. Such features have become increasingly popular in manual design.

Because train dispatchers work at stations that are (or can be) computer-equipped, one must consider the possibility of presenting the Operating Rules not in hard copy but on-line. In this case, screens would have to be designed for optimal readability, just as are the pages of a printed text. The guidelines for readability for on-screen text differ slightly from those for printed text. Computer technology such as Hypertext, moreover, offers cross-referencing and sequencing capabilities that printed text cannot offer.

## DOCUMENT DESIGN

### Page Layouts

Page layouts follow one scheme: one-column text is justified left and right, printed in black on white paper. Certain

manuals include headings that are wholly integrated into the blocks of texts, other manuals (e.g. NORAC) separate headings from the blocks of text. Most layouts place rule numbers within this block as well, but here again the NORAC manual is an exception, rule numbers set apart in the margins. (Certain member railroads of NORAC have integrated the numbers into the text blocks.) Subsections of rules (usually designated as "(a)" or "(1)," etc.,) are generally indented, setting these subsections apart visually.

#### Issues to Consider in Revision

Page layout contributes to readability (Felker et al.; Davenport and Smith). Revisers of Operating Manuals should seek a layout that makes use of White Space (see below) to enhance readability. Certain research also shows that text that is ragged right is easier to read than text that is justified right (Gregory and Poulton), since the reader can more easily proceed in reading from line to line.

#### **Use of Graphics**

The Operating Manuals studied use very few graphics or illustrations, with the exception of the Signal Rules. Most manuals present the Signal Rules in color, since the aspects are often determined in part by color of the signal. The General Code does not do this, referring the reader instead to the Timetable for the signal rules. The General Code does include a facsimile of a Track Bulletin Form, and the NORAC manual includes a facsimile of a Form D. The Norfolk Southern also includes a one-page illustration of signs.

Manuals also occasionally use tables for presentation of material that is somewhat redundant in topic but with slight variations in form. For example, horn signals are often presented in tabular form, the number of signals represented by a corresponding number of "o"s in one column, with the indication listed next to that entry in a separate column.

The CSX manual occasionally presents more complex rules in table form. For example, in the Movement of Trains sections, the rules for movement when rule 707 is in effect are presented in a table with three headings: "If you," "and you," "Requirements." Various conditions are broken down and presented entry by entry, so that the user can read across the table to determine appropriate action. The CSX manual presents another variation of such tabular presentation in the Flag Protection Rules.

#### Issues to Consider in Revision

Document design specialists recommend using graphics to

The General Code provides a head for each rule. This head is placed adjacent to the rule number, is followed by a colon, and is incorporated into the block of text. Subsections of rules have no heads.

The CSX manual presents a hybrid. Major sections have heads, certain individual rules have heads, and certain subsections of rules have subheads. But by and large, the individual rules in this manual and their subsections do not have heads.

The NORAC manual uses heads and subheads consistently throughout. Section headings are set in bold and all caps, rule headings are set in bold and lower case, and subheadings appear in bold and lower case, indented.

#### Issues to Consider in Revision

Research in readability underscores the overwhelming power of headings in improving readers' comprehension of text (Ausubel, 1960; Flower et al.). In particular, headings perform the following vital functions:

1. Headings reflect the overall organization of the manual.
2. Headings can be keyed to a table of contents and index to aid the reader in quickly locating a specific rule.
3. Headings inform the reader of a rule's central focus, which is then elaborated in the text that follows. This function in particular builds upon the "Scenario Principle" posited by Flower et al. These researchers discovered that readers interpreting certain kinds of documents construct a scenario in their minds as they read. Headings "set the stage" for this scenario.

Revisers of Operating Rules manuals should use headings to enhance both readability and usability of the manuals.

#### **Numbering of Rules, Numbering of Pages**

In virtually every manual studied, rules are numbered in Arabic numerals progressively from "1." Most manuals integrate a decimal jump when a new section begins. For example, the General Code's section on Movement of Trains

and Engines begins with rule 80 and ends with rule 153. The next section, Block System Rules, begins with rule 227.

Typically, as rules require qualification a new rule is inserted with the same number designation of the original rule and a letter added to the qualifying section. For example, in the General Code 109 is headed "Inspection Passing Trains" (sic), 109A is headed "Train Inspection," 109B "Inspection Other Movements" (sic), and 109C "Trackside Detectors."

Tradition plays a role in this numbering. Rules specialists are accustomed to specific rules being designated by specific numbers, and recall these rules by number.

Invariably, pages are numbered in similar fashion, beginning with "1" and proceeding through the manual. As new rules are added and sections expanded, page numbers are updated-- but only upon new printings. The Norfolk Southern manual has apparently not been reprinted in its entirety for some time, and revised pages are designated by decimal points (e.g. 58.1, 58.2, etc.) with a note of the revision date on each page.

This page numbering system occasionally results in blank pages in the middle of the manual. As newly inserted pages are integrated into the ordering of the old pages, the new text might end on a right-hand page, to be followed by old text which also begins on the right-hand page. The flip side of the last page of the new text must therefore remain blank. Operating Rules manuals invariably state "This page intentionally left blank," so that users will be sure that they are not missing a page or encountering a misprint.

#### Issues to Consider in Revision

If Operating Rules manuals maintain the arabic ordinal numbering system, using letters to designate new rules appended to previous rules seems the most expedient solution. Such designation is somewhat unwieldy, since it breaks the number flow. An alternative would be to number rules in multiple-decimal fashion, designating main rules as usual, but using decimals rather than letters to designate those rules that added. In the example above from the General Code, "Inspecting Trains" could be designated as "109," with its appended sections numbered "109.1, 109.2," etc. However, while this system provides a more logical numerical flow, it can become quite heavy and infuse a certain bureaucratic quality, which might prove counter-productive in engaging the reader.



As for the rules that have maintained their traditional numbers in the midst of renumbering, readability guidelines argue against such maintenance. The reader balks at the logical gap that occurs when rule numbers skip for no immediately apparent reason.

Page numbering will continue to be a problem for hard copy for the same reasons. Only when new editions appear can pages be renumbered. If Operating manuals eventually appear on-screen, page numbering will present no problem, even if the quandary of rule numbering persists.

### Use of White Space

Most often, Operating Rules manuals present white space merely as the space "left over" between sections of text. A sample page from the General Code, for example, presents blocks of text justified left and right, with one line of space between each paragraph, three-character indentations at the beginning of each paragraph, and rule heads that merge with text (p.78). Manuals occasionally indent subsections, using bullets (e.g. p. 49 of the Norfolk Southern). The CSX manual uses white space more actively, providing lines of white space between subsections and using white space occasionally in the construction of tables, as noted above. The NORAC manual uses white space even more actively, providing an entire line of white space to surround conjunctions such as "and" or "or" to underscore the function of these words in the meaning of a rule.

### Issues to Consider in Revision

Though research is scant (Smith and McCombs, 1971; Southard, 1988), it does support the notion that judicious use of white space enhances readability of rules. White space can be used to underscore a critical component of a rule that might otherwise be overlooked, as in the NORAC manual. White space also provides readers with moments to pause and take stock of meaning before moving on to new content (Henry). Finally, white space can allow writers to break down long blocks of text into smaller blocks that are less forbidding to the reader.

## TEXT

### Overall Organization

Manuals frequently open with a statement about revisions, the edition date, and reference to the railroads using that

manual. Older manuals follow these introductory pages with an index, usually a one-page alphabetical listing of terms. In none of the older manuals does a table of contents appear.

Then come the Definitions, General Rules, and the rest of the major sections. These sections usually have headings that mark them as distinct sections, and, as noted above, a jump in rule numbering that might suggest a new section of text.

It is worth note that all Rules Manuals, by federal mandate, will address six areas in particular: Yard Limits, Flagging, Tampering, Hump Rules (if the railroad has a Hump Yard), Blue Signals, and Radio Rules. The ways in which these mandated areas are integrated into other sections varies from manual to manual.

Typically, the older manuals end with the last major section, the index that one would expect at the end of the manual having been placed near the front.

CSX's 1991 edition opens with a detailed four-page table of contents, with sections and major rules designated. These major rules are given names in this table of contents, even though these names do not appear in the text itself. This manual is composed of sixteen sections, the topic of each section in most cases implied by the name of the first rule in the section. (The sections themselves are not named.) Within the body of the manual each section has a separate table of contents. This manual has no index.

NORAC'S 1992 edition also includes a table of contents, though not as detailed as that of CSX. This one-page table of contents lists only major sections (each of which has a name). Within the body, sections do not have individual tables of contents. This manual concludes with a detailed 12-page index that lists section headings in bold and all rules by name within each section. Certain key terms are also indexed, at times referring the reader to several pages.

#### Issues to Consider in Revision

Revisers of Operating Rules manuals will certainly want to take advantage of certain features of text organization that enhance readability. Tables of Contents should certainly appear (Felker and Rose), since these tables not only allow the reader to locate specific sections or rules but also help the reader glean the overall structure of the text. Gleaning this overall structure can not only enhance readability at

the rule level but also contribute to a reader's understanding of the links between different aspects of operating rules.

Given the amount of information that a train dispatcher must process and at times the complexity of factors contributing to operating decisions, the Operating Rules manuals should facilitate easy and quick reference use as much as possible. A detailed index such as that of the 1992 NORAC edition is one way to enhance such reference use: the busy train dispatcher can locate a rule (or rules) immediately by rule name or topic and go directly to the page number, without having to leaf through sections or pages.

If the Operating Rules appear on-line, this referencing feature could be enhanced even further, providing the manual user with a "search" function that would allow locating a rule by topic instantly.

#### **Organization within Sections**

Sections are ordered rule by rule. Generally, rules treating the same topic appear one after another. (As noted in "Rule Numbering" above, this ordering often results in new rules designated by both number and letter so that they might follow existing rules which they modify, e.g. a new rule labeled 104A so that it might appear next to 104.)

Individual rules are frequently broken down into subsections, designated by letters, numbers, and occasionally subheads (General Code, NORAC).

The 1992 NORAC manual also includes short introductions to each section, providing an overview of the rules in that section.

#### **Issues to Consider in Revision**

In the revision of manuals, writers and researchers will want to scrutinize sections for logical ordering. Rules that present general principles for a section should logically appear before those rules presenting situation-specific rules. Likewise, ordering within each rule should proceed logically as a reflection of the procedure being explained or the possible alternatives in operations and the implications of these alternatives. Text should be organized to aid the reader in constructing a scenario (Flower et al.) while reading.

To enhance this construction of a scenario in the

reader's mind, revisers might want to compose short overviews to sections in the manner of the NORAC '92 edition. These overviews set the stage for scenarios, providing the reader with an initial contextualization for rules within any one section. If properly conceptualized, these overviews not only orient initial reading but also serve as statement of the central focus of a section, a feature that might prove beneficial to the dispatcher who encounters a situation that does not appear to be covered in a specific rule.

### **Structuring and Sequencing of Paragraphs**

Paragraphs are structured for the most part to treat one topic. Often this topic can be quite complex, presenting many contingent points. For example, the fourth paragraph of rule 99 in the Norfolk Southern manual treats a train stopped on a main track where protection against following trains is required. This paragraph presents first this situation, then sets forth the initial required action of a crew member, then mentions possible contingencies in an "If...then" construction with requisite action, then concludes with the final "scene" in this whole set of actions.

Other manuals attempt to take such complex paragraphs and break them down into smaller paragraphs. Lists are often used to accomplish this breakdown (NORAC, General Code, CSX), as are subheads (NORAC). Exceptions are also frequently presented in a separate paragraph.

### **Issues to Consider in Revision**

Revisers might conduct an analysis of their Operating Rules to determine the different kinds of information that paragraphs contain. That is, analysis might produce a dozen or so different kinds of information (e.g., exceptions, "If...then" clauses, "When...then" clauses, lists that present alternatives, lists that present separate conditions that must all be met, etc.). From this analysis, revisers could standardize paragraph form, setting up conventions that would aid readers by consistently presenting certain kinds of content in the same form.

### **Voice, Mood, Person**

Nearly all the prose in the manuals surveyed appears in the third person, indicative mood. For example: "An employee going out to provide flag protection must have at least 2 torpedoes and 3 fuses in addition to a red flag by day and

a white light at night" (Norfolk Southern, p.45). This is a common person and mood for expository prose. This form can lend itself to excessive use of the passive voice, however, since neither the writer nor the person addressed appear in the text. For example: "When there is a conflicting movement, if such movement has been stopped and crew advised of move to be made, authority may be granted to proceed" (General Code, p.65).

Notice that this last sentence does not inform the reader of who has stopped movement, who has advised the crew, and who grants authority. When prose can be formulated in the active voice (which is not always possible and not always desirable) the sentence not only conveys more information concerning agency but also becomes more readable, by providing the reader with actors in a scene.

#### Issues to Consider in Revision

Research on readability supports the use of the second person imperative mood in certain kinds of documents (Flower et al.). The theory behind this is that speaking directly to the reader in the active voice engages the reader more effectively. The second person imperative is usually more concise as well, since the subject of the sentence is an understood "you," and the verbal constructions employ helping verbs more frequently. (For example, compare "grant authority to proceed,"[active voice] with "authority may be granted to proceed."[passive voice])

The second person imperative may not always be possible in Operating Rules manuals, since many rules consist of setting up a representative case without designating specific actors, constructing the rule speaks to several different readers simultaneously (and thus rendering the second person inappropriate). On the other hand, sections of rules that set forth specific and sequential actions might first posit the possible actors and then list actions in imperative form.

Revisers will want to study the person, mood, and voice of their current rules to render them more specific whenever possible, and to cut down on excess verbiage.

#### **Syntax**

With the broadening of readability research to address sentence and discourse complexity has come a focus on syntax as it influences ease of reading. Sentence elements such as

word order, number and kinds of subordinate clauses within a given sentence, and the presence of "markers" such as articles and pronouns all play a role in making prose more readable. Otherwise stated, a text may be grammatically sound yet syntactically unsound--as far as readability is concerned.

Operating Rules manuals frequently are unsound syntactically: long sentences are difficult enough in and of themselves, and this difficulty is frequently further compounded by complex embedded clauses, opening adverbial phrases, omitted articles, and the like. The ways in which these elements play a role in readability are discussed below.

### **Sentence Length**

Many of the manuals studied include sentences that are excessively long. For example, rule 90 in the General Code, "Calling Attention to Restriction," appears as follows:

"When a train approaches a point where it is restricted by the limits of authority or in any manner by track warrant or track bulletin, the conductor must call attention of engineer to the restriction when practicable, after passing the last station, but not less than 2 miles from point of restriction."

### **Issues to Consider in Revision**

Though readability indexes founded solely upon sentence length and polysyllable counts have been replaced by more refined estimations of readability (Selzer 1983), excessively long sentences must be analyzed for formatting and structure.

The 52-word sentence cited above is presented in block paragraph format, and might be rendered more readable if presented in list form.

Rules revisers will also want to analyze rules for structure. In rule 90 above, reformatting might also be carried out in conjunction with restructuring to construct a simpler structure. See the following discussion.

### **Sentence Complexity**

The 52-word sentence cited above is structured as follows: first a subordinate clause sets a scene with alternative salient features in prepositional phrases ("When a train approaches a point where it is restricted by the limits of authority or in any manner by track warrant or track

bulletin"), followed by an independent clause presenting main action that is slightly qualified ("the conductor must call attention of engineer to the restriction when practicable"), followed by an adverb introducing a participial phrase modifying the time element of the scene ("after passing the last station,"), coordinated with a noun clause modifying the spatial element of the scene ("but not less than 2 miles from point of restriction.").

### Issues to Consider in Revision

This sentence is difficult to read not simply because it is long, but because its structure is complex. Rules revisers will want to construct sentences that are less complex. When opening phrases or clauses precede the subject, these phrases and clauses should be succinct. When clauses or phrases modify the conditions set forth in the main clause, they can be presented in list form to improve readability.

Subordinate clauses are frequent in English, but rules revisers will want to consider them carefully. Research suggests that if subordinate clauses are kept to a minimum within any one sentence, readability is enhanced. Sentences with two subordinate clauses are more difficult to understand than sentences with only one (Forster, 1970; Forster and Ryder, 1971). Likewise, sentences with many words or phrases between the subject and verb are difficult for readers to remember (Martin and Roberts, 1966; Martin, Roberts, and Collins, 1968).

### **Sentence Order**

The most common sentence order in English is S-V-O (Subject-Verb-Object), or S-V-C (Subject-Verb-Complement).

A frequent variation on this common ordering is a sentence that opens with an adverbial phrase or clause. Operating Rules manuals use this variation extremely often, because so many rules set forth a scenario with requisite action. Very often the adverbial opening begins with "When . . ." followed by initial conditions that set the scene of the rule. Rule #90 from the General Code cited above is ordered in this way. A scan of most rulebooks, moreover, will reveal this recurrent ordering. (Pages 44 and 45 of the Norfolk Southern rules, for example, shows six of the eight sentences that open paragraphs in this order.)

### Issues to Consider in Revision

Because this ordering is so frequent in Operating Rules

manuals, revisers might want to inspect their rule books for rules in this ordering and establish guidelines for consistent treatment of opening clauses as well as possibilities for lists. Note that this construction includes "If . . . then," ordering as well, another frequent ordering found in Operating Rules manuals.

### Phrases in Series

Many rules are presented in long sentences containing several phrases in series. Especially among Operating Rules manuals that consistently present rules in block paragraphs with little white space, these long phrases in a series are difficult for the reader to keep track of. Readability is further hampered when these phrases present actions or alternative actions. An example is taken from the General Code, #312, (2), Exception (b):

When manual interlocking is operated by a crew member and signal cannot be cleared, train may proceed when it is known there are no conflicting movements, flagman has preceded the train, examined the track for defects, determined the route is properly lined and protection is afforded on conflicting routes.

The reader of this rule must sort through the serial phrases that complete the rule, attempting to construct a mental scenario out of phrases that relay different actions that must be taken in serial order.

### Issues to Consider in Revision

Rules revisers can render such rules much more readable by presenting series of phrases in lists. If the actions that the lists set forth are to be carried out in a specified order, moreover, the phrases can be ordered by number.

### Whiz Deletions

In the rule just cited, the relative pronoun "that" has been omitted after "determined" before the phrase "the route is properly lined." The reader is momentarily confronted with figuring out that the flagman has not determined a route but rather has determined that the route is properly lined.

### Issues to Consider in Revision

Rules revisers should scrutinize wording for whiz-deletions, inserting these helpful markers to aid the reader as he or she reads (Charrow and Charrow).



## Conjunctions

Using Rule #312 from the General Code once again for illustration, notice the two different uses of the conjunction "and" amidst the series of phrases. "And" is used first to join two independent clauses: "When manual interlocking is operated by a crew member and signal cannot be cleared . . . ." Later in the sentence "and" is used to introduce the last phrase in the series: "determined the route is properly lined and protection is afforded on conflicting routes." Readers scan ahead and return to glean the different ways in which conjunctions are being used. To aid them in this gleaning, rules revisers can use formatting and lists. For example, if rule 312 were presented in list form with the last "and" set apart between items on the list, the use of the "and" as linking the series would be immediately apparent to the reader. (Henry)

### Issues to Consider in Revision

Rules revisers might take inventory of coordinate conjunctions, searching for cases when reading can be facilitated by setting those conjunctions in a format that makes their usage immediately apparent.

## Articles

Operating Rules manuals frequently omit articles before nouns. This practice has been widespread in technical writing in general as an effort towards concision, but studies in readability indicate that omitting these articles actually hinders comprehension (Fodor, Bever, and Garrett). In standard English articles function to let readers know that the nouns they precede are definite or indefinite, or in some cases abstract or concrete.

An illustrative example is taken from the interlocking rules of the Kansas City Southern Lines, rule # 344:

If signal does not change its indication at expiration  
of time release interval . . .

The reader balks at "signal," and again at "expiration," since each of these nouns has been stripped of the definite article "the." Such syntax also represents a shift away from the rules for spoken language, rendering this wording removed from everyday discourse.

### Issues to Consider in Revision

Rules manual revisers will want to comb rule manuals for

such omissions. Replacing articles represents only minimal lengthening of text, and the readability of texts improves greatly for this small adjustment.

## GENRE TYPOLOGY

In conceptualizing full-scale revision of Operating Rules manuals, revisers might want to consider what these manuals seem to represent as a "genre." That is, Operating Rules manuals, like short stories or poems, constitute a type of text to which readers bring certain expectations. Just as other genres have evolved over the years, so might one attempt to project the possible evolution of Operating Rules manuals.

In particular, one might attempt to characterize the kind of reader that these texts currently imply, compare that reader with the readers who will use the manuals in the future, and then imagine ways in which the "reader in the text" can be altered to coincide more successfully with those real readers.

For example, in earlier days the railroad employee was subject to extensive control by the employer, which is reflected by the "reader in the text" one sees in the General Rules from any old Operating Rules manual. This reader is gone now, replaced by a reader who is subject to different kinds of professional constraints born of our times. (Rule G of the General Rules reflects this new reader.)

One might broaden this analysis to entire manuals, which cast the reader as someone who must have an intermediary who interprets the rules--as is the case in training and in rules classes. Should the Operating Rules manuals of the future become a genre that is accessible to employees on their own? If so, then the speaker in the text must become one who is less windy and less elliptical in expression, who addresses the reader in sentences rather than paragraphs, and who breaks down complex operations into straightforward steps--the way we would break them down when actually explaining them to a listener.

Such a shift in the persona of this "speaker in the text" would entail some substantive revision in the syntactical formulation of rules. Notable in this revision would be an unrelenting attempt to convert abstract and general commentary to concrete and specific commentary. As noted in the document "Blue Signal Rules: Different Treatments in Five Operating Rules Manuals," the Code of Federal

Regulations frequently formulates rules in very general terms, perhaps in an effort to allow individual railroads to tailor rules to their specific needs and specific physical characteristics. But when Operating Rules manuals fail to convert these rules to concrete and specific scenes whenever possible, these manuals fall short of a "speaker in the text" who addresses the reader in straightforward, explicit, understandable terms.

#### WORKS CITED

Anderson, R.C. "Concretization and Sentence Learning." Journal of Educational Psychology 66 (1974): 179-183.

Ausubel, D.P. "The Use of Advance Organizers in the Learning and Retention of Meaningful Verbal Material." Journal of Educational Psychology 51 (1960): 267-272.

Charrow, R.P., and V.R. Charrow. "Making Legal Language Understandable: A Psycholinguistic Study of Jury Instructions." Columbia Law Review 79 (1979): 1306-1374.

Coleman, E.B. "Improving Comprehensibility by Shortening Sentences." Journal of Applied Psychology 46 (1962): 131-134.

Coleman, E.B. "The Comprehensibility of Several Grammatical Transformations." Journal of Applied Psychology 48 (1964): 186-190.

Davenport, J.S., and S.A. Smith. "Effects of Hyphenation, Justification, and Typesize on Readability." Journalism Quarterly 42 (1963): 382-388.

Felker, D.B., and A.M. Rose. The Evaluation of a Public Document: The Case of FCC's Marine Radio Rules for Recreational Boaters. (Document Design Project Technical Report No. 11. Washington: American Institutes for Research, 1981.

Felker, D.B., F. Pickering, V.R. Charrow, V.M. Holland, and J.C. Redish. Guidelines for Document Designers. Washington: American Institutes for Research, 1981.

Flower, L., J.R. Hayes, and H. Swarts. "Revising Functional Documents: The Scenario Principle." New Essays in Technical and Scientific Communication. Ed. Paul V. Anderson, R. John Brockman, and Carolyn R. Miller. Farmingdale, NY: Baywood, 1983. 41-58.

Fodor, J.A., T.G. Bever, and M.F. Garrett. The Psychology of

Language: An Introduction to Psycholinguistics and Generative Grammar. New York: McGraw-Hill, 1974.

Forster, K.I. "Visual Perception of Rapidly Presented Word Sequences of Varying Complexity." Perception and Psychophysics 8 (1970): 215-221.

Forster, K.I., and L.A. Ryder. "Perceiving the Structure and Meaning of Sentences." Journal of Verbal Learning and Verbal Behavior 10 (1971): 285-296.

Gibson, E.J., C. Bishop, W. Schiff, and J. Smith. "Comparison of Meaningfulness and Pronouncability as Grouping Principles in the Perception and Retention of Verbal Material." Journal of Experimental Psychology 67 (1964): 173-182.

Gregory, M., and E.C. Poulton. "Even Versus Uneven Right-hand Margins and the Rate of Comprehension in Reading." Ergonomics 13 (1970): 427-434.

Harris, R.A. "Linguistics, Technical Writing, and Generalized Phrase Structure Grammar." Journal of Technical Writing and Communication 18.3(1988): 227-240.

Henry, J. "Simplifying Operating Rules: A New Approach." Proceedings, 1990 Technical Conference of the International Association of Railway Operating Officers, Inc.

Hornung, A. "Readable Writing: The Role of Cohesion and Redundancy." Journal of Advanced Composition 11 (Winter, 1991): 135-146.

Johnson-Laird, P.N. "The Choice of the Passive Voice in a Communicative Task." British Journal of Psychology 59 (1968): 7-15.

Martin, E., and K.H. Roberts. "Grammatical Factors in Sentence Retention." Journal of Verbal Learning and Verbal Behavior 5 (1966): 211-218.

Martin, E., K.H. Roberts, and A.M. Collins. "Short-term Memory for Sentences." Journal of Verbal Learning and Verbal Behavior 7 (1968): 560-566.

Mirel, B. "Cognitive Processing, Text Linguistics and Documentation Writing." Journal of Technical Writing and Communication 18:2 (1988): 111-133.

Reicher, G.M. "Perceptual Recognition as a Function of Meaningfulness of Stimulus Material." Journal of Experimental Psychology 81 (1969): 275-280.

Selzer, J. "Certain Cohesion Elements and the Readability of Technical Paragraphs." Journal of Technical Writing and Communication 12.4(1982): 285-300.

Selzer, J. "What Constitutes a 'Readable' Style?" New Essays in Technical and Scientific Communication. Ed. Paul V. Anderson, R. John Brockman, and Carolyn R. Miller. Farmingdale, NY: Baywood, 1983. 71-89.

Sherman, M. "Adjectival Negation and the Comprehension of Multiple Negated Sentences." Journal of Verbal Learning and Learning Behavior 15 (1976): 143-157.

Shuy, R.W., and D.L. Larkin. "Linguistic Considerations in the Simplification/Clarification of Insurance Policy Language." Discourse Processes 1 (1978): 305-321.

Sjogren, D., and W. Timpson. "Frameworks for Comprehending Discourse: A Replication Study." American Educational Research Journal 16 (1979): 341-346.

Smith, J.M., and M.E. McCombs. "Research in Brief: The Graphics of Prose." Visible Language 5 (1971): 365-369.

Southard, S. "Practical Considerations in Formatting Manuals." Technical Communication (1988, 3rd quarter): 173-178.

Tinker, M.A., and D.G. Patterson. "Influence of Simultaneous Variation in Size of Type, Width of Line, and Leading for Newspaper Type." Journal of Applied Psychology 47 (1963): 380-382.

Williams, J. "Defining Complexity." College English 40:6 (February, 1979): 595-609.

Wright, D., and F. Reid. "Written Information: Some Alternatives to Prose for Expressing the Outcomes of Complex Contingencies." Journal of Applied Psychology 57 (1973): 160-166.

Wright, P. "Feeding the Information-Eaters: Suggestions for Integrating Pure and Applied Research in Language Comprehension." Instructional Science 7 (1978): 249-312.

**PART TWO**

**BLUE SIGNAL RULES**

**DIFFERENT TREATMENTS IN FIVE  
OPERATING RULES MANUALS**

**BY J. HENRY**

**TABLE OF CONTENTS**

**PART TWO - BLUE SIGNAL RULES: DIFFERENT TREATMENTS  
IN FIVE OPERATING RULES MANUALS**

<b><u>SECTION</u></b>	<b><u>PAGE NO.</u></b>
Code of Federal Regulations	1
CSX	2
NORAC	3
General Code	4
Kansas City Southern Lines	4
Illinois Central	5

# BLUE SIGNAL RULES

## DIFFERENT TREATMENTS IN FIVE OPERATING RULES MANUALS

To demonstrate ways in which the Features of Rules Manuals vary across different Manuals, the following analysis compares the Blue Signal Rules in five selected manuals. The manuals are as follows: CSX, NORAC, General Code, Kansas City Southern Lines, and the Illinois Central. These manuals were selected to represent both widely used manuals and those manuals with more restricted use. Taken together these five manuals display a majority of the features discussed in the Features of Rules Manuals Document.

As a basis for comparison, the Blue Signal Rules as presented in the Code of Federal Regulations are first analyzed. This analysis provides a backdrop for the comparisons that follow, since manuals must comply with the content of the Blue Signal Rules as set forth in the CFR. Each manual's Blue Signal Rules appear in the appendix to this document, and the reader is frequently referred to this appendix during the discussion of different manuals.

### Code of Federal Regulations

The Code presents the Blue Signal Protection of Workmen as Subpart B of the Railroad Operating Rules. This Subpart includes 6 sections, each of which is designated by paragraph # (e.g., 218.21) and heading. The six headings are as follows: Scope, Blue signal display, Workmen on a main track, Workmen on track other than main track, Alternate methods of protection, and Remotely controlled switches.

Within each section, no subheads are used. Rules are presented paragraph by paragraph, which are either lettered or numbered. Paragraphs appear in block form. Lists are not used, except to the extent that paragraphs occasionally are numbered, suggesting lists. White space is incidental rather than integral to document design.

Most of the Blue Signal Rules are formulated in the passive voice, emphasizing the objects of verbs rather than the subjects. For example, 218.25 (Workmen on a main track) opens with the topic: "When workmen are on, under, or between rolling equipment on a main track: . . . ." Actions to be taken when this condition prevails are then presented in the passive voice: "(a) A blue signal must be displayed at each end of the rolling equipment and . . . ." It is noteworthy that the passive voice might be desirable in this context, since the focus of the rule is blue signal protection. But treatments vary, as will be seen below, leading to occasional formulation in the active voice and in some instances even in the imperative mood.



The Code reads well as far as certain "micro" sentence features go. For example, articles and pronouns are always included, helping the reader distinguish abstract class nouns from concrete nouns. But as for the level of concreteness, the Code remains quite general. In discussing emergency repair work, for example, the code states that "when emergency repair work is to be done. . . and blue signals are unavailable . . . effective measures must be taken to protect the workmen making the repairs." Perhaps because the Code serves as base text for railroads which then set forth their own versions according to local practice, this level of generality is necessary. But it gets carried over into Operating Rules Manuals quite often categorically, undermining readability.

The Code includes some very long sentences. For example, 218.29 (4) is 112 words long--very difficult to read when sentence length is considered a factor. Moreover, this sentence is also quite complex, opening with an "If" clause then moving into an (understood) "then" clause, followed by a construction in the future tense that is then qualified by two successive clauses, each introduced by "when." (See p. 101 of the CFR.)

Both sentence length and sentence complexity undermine readability in the above paragraph. This paragraph is quite representative of much prose in the CFR.

### CSX

The CSX manual uses headings and white space amply. After an introductory section that sets forth the Scope as stipulated in the CFR as well as a note about particular local usage, a section is dedicated to Definitions, each term presented in boldface.

Then the rule per se begins with the heading Blue Signal Display. This rule is broken down into four subsections: A. WORKMEN ON A MAIN TRACK, B. WORKMEN ON A TRACK OTHER THAN A MAIN TRACK, C. ALTERNATE METHODS OF PROTECTION, and D. REMOTELY CONTROLLED SWITCHES. These headings essentially repeat the headings of the CFR.

Section C is much longer than the other sections, and includes four subheadings. In the first subsection, "Locomotive Servicing Track Area," appears the rule corresponding to rule 218.29 (4) cited above in the CFR. This rule, 26.C.1.(d) has been reduced to 108 words in this version, but is still a near-verbatim presentation. The same complexity remains, rendered further complex by an internal cross-reference to another paragraph. (See p. 12 of the CSX manual.)

Paragraphs are frequently numbered or lettered in the CSX manual, at times to enhance readability as well as referencing. (This manual includes a detailed four-page table of contents, but no index.)

Most of the rules in the CSX manual appear in the same passive voice as that of the CFR. The rule setting forth procedures for emergency repair work when no blue signal is available, for example, is a verbatim version from the CFR (See p. 12 of the CSX manual).

As in the CFR, "micro" sentence features are sound, articles and pronouns regularly used to guide the reader.

### NORAC

Like the CSX manual, the NORAC manual uses white space as an active component of document design. This manual also uses headings and subheadings to guide readers through the text. "Micro" sentence features such as articles and pronouns appear regularly.

In overall organization, the NORAC manual differs radically from the CFR and CSX manual (and from the others manuals reviewed), as evidenced by the headings: a. Restrictions, b. Responsibilities of Workmen, c. Responsibilities of Employee Controlling Remotely Controlled Switches, d. Blue Signal Unavailable, and e. Markers. Rather than use "main track" and "other than main track" as central sections, the NORAC manual uses "Responsibilities of Workmen," then includes the subheadings "If the equipment is on a track other than a main track or controlled siding: . . ." and "If the equipment is on a main track or controlled siding: . . ." This organization condenses the rule, since much information in the "other than main track" section of the CFR is repeated in the "main track" section. This organizational scheme also makes use of two "Exception" sections, one under Restrictions and one in the Responsibilities section.

Generally speaking, sentences are shorter and less complex in the NORAC manual than in the CFR or the CSX manual. NORAC's version of the derail rule previously cited (CFR: 218.29 (4); CSX: 26.C. 1.(d)) presents this rule in two sentences rather than one. The second sentence is still 74 words long, but it does make use of a colon in mid-sentence to render the sentence more readable (See 16.b.2, Exception, on p.25 of the NORAC manual).

The NORAC manual presents the clause pertaining to a Blue Signal being unavailable at the time of emergency repair work as a separate section, complete with heading. This departure from standard treatment is taken further in the voice and mood of this passage. The NORAC rule (16.d) is constructed in the active voice, designating the Engineer as the one who must take action. Moreover, the generality "effective measures must be taken" has been converted into a more concrete statement, setting forth specific measures that the Engineer must take. And since the

Engineer is being addressed, instructions to this employee appear in the imperative mood. (See p. 26-27 of the NORAC manual).

### General Code

The General Code first presents the "Scope" section taken from the CFR, then presents a lengthy list of Definitions, similar to those of the CSX manual. Each term in the Definitions is set in boldface, and the definition for Workmen includes a lengthy note that applies to local conditions. (See p. 24 of the General Code.)

The Blue Signal Rule per se then follows, divided into seven sections which are designated by number, with no headings. Section #2 is broken down into two subsections--ON A MAIN TRACK (which is only one sentence long) and ON OTHER THAN MAIN TRACK (which is broken down into subsections (a), (b), and (c) and which is several paragraphs long). Sections 6 and 7 also include lettered subsections.

The General Code's treatment of the "derail" passage discussed for the other manuals departs from the treatment seen elsewhere. Although the General Code sets forth this long and complex sentence as just one sentence (26(2)(b)), it breaks it down into list form, setting forth the alternative distances for derail placement as separate bullets. (See p. 27 of the General Code.)

In matters of voice and mood, the General Code most resembles the CFR and the CSX manual. The passive voice is used extensively and the imperative mood is never used. The clause addressing emergency repair work when no blue signal is available, for example, is taken verbatim from the CFR. (See p. 28)

"Micro" features at the sentence level are sound, articles and pronouns appearing where expected to guide the reader. Of note are occasional constructions that depart from syntax used in other manuals, such as in the expression "it need not be lighted" (p. 25).

### Kansas City Southern Lines

This manual opens with the Scope paragraph taken from the CFR, then presents the rest of the rule in four subsections--26(a) [no heading], 26(b) Engine Servicing Facilities, 26(c) Car Shop or Repair Track Protection, and 26(d) Hump Yard Tracks & Tracks with Remotely Controlled Switches. 26(a) presents procedures on any track, so that (b), (c), and (d) then present alternative procedures according to location. Note that headings here depart

from those used in the other manuals: rather than stick with the general "main track" vs. "other than main track," this manual stipulates specific locations.

Passages appear in block paragraphs for the most part, with certain subsections occasionally numbered. A list is used only once--to present the items on the written record of the control operator in 26(d). (See p. 33 of the Kansas City Southern Lines manual.)

White space is never used actively, nor are subheads used in this manual. The passive voice is used for the most part, with some notable exceptions in which actors are stipulated and a clause cast in the active voice. For example, the second paragraph of 26(d) begins, "The control operator may not remove the locking device unless he has been informed . . . ."

Sentences are often long and complex. The clause addressing derails (discussed for the other manuals) in this case is only 51 words long, but omits some of the information included in the other manuals: no reference to speed appears. This passage, moreover, is marred by grammatical error that hinders readability. (See 26(a)(2), p. 31 of the Kansas City Southern Lines Manual.)

This manual does at times formulate passages in more concrete terms than do other manuals. The clause addressing emergency repairs when no blue signal is available (see 26(a)(2)) stipulates specific action to be taken, rather than stating simply that "effective measures must be taken," as the clause is so often reproduced from the CFR.

### Illinois Central

The Blue Signal Rule in this manual opens with four definitions, each set in boldface. Then comes the "Scope" clause set forth as (1), followed by 11 other sections. There are no headings or subheadings, and most sections appear as only one paragraph, preceded by a number. Section 10 alone includes lettered subsections, and it is worth note that two of these subsections include bulleted lists. (See p. 13 and 14 of the Illinois Central manual.)

Like the General Code, this manual sets forth the long "derail" clause in list form (26(10)(b)), and though grammatically the clause is cast as just one sentence, the bullets help break down the sentence for readability. Unfortunately the conjunctions that present an "either . . . or" situation are buried. More unfortunate is the fact that the last part of this clause is set forth as a bulleted item rather than as an independent element, which it is.

Though the document design of this manual makes for longer lines of text (and therefore shorter blocks of paragraphs on the page), sentences remain long and complex, for the most part. Section 12 represents one such complex sentence that could easily benefit from reformulation in two sentences and perhaps in list form.

The passive voice also dominates this manual for the most part. The ubiquitous "effective measures must be taken" phrase from the unavailability clause appears here as "appropriate measures must be taken."

"Micro" sentence features appear for the most part to be sound.

§ 218.9

(c) If the Administrator finds that waiver of compliance is in the public interest and is consistent with railroad safety, he may grant the waiver subject to any conditions he deems necessary. Notice of each waiver granted, including a statement of the reasons, therefore, is published in the FEDERAL REGISTER.

§ 218.9 Civil penalty.

Any person (including a railroad and any manager, supervisor, official, or other employee or agent of a railroad) who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least \$250 and not more than \$10,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$20,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See appendix A to this part for a statement of agency civil penalty policy.

[53 FR 28599, July 28, 1988, 53 FR 52928, Dec. 29, 1988]

§ 218.11 Filing, testing, and instruction.

The operating rules prescribed in this part, and any additional or more stringent requirements issued by a railroad in relation to the operating rules prescribed in this part, shall be subject to the provisions of part 217 of this chapter, Railroad Operating Rules: Filing, Testing, and Instruction.

Subpart B—Blue Signal Protection of Workmen

§ 218.21 Scope.

This subpart prescribes minimum requirements for the protection of railroad employees engaged in the inspection, testing, repair, and servicing of rolling equipment whose activities require them to work on, under, or between such equipment and subjects them to the danger of personal injury

49 CFR Ch. II (10-1-91 Edition)

posed by any movement of such equipment.

§ 218.23 Blue signal display.

(a) Blue Signals displayed in accordance with §§ 218.25, 218.27, or 218.29 signify that workmen are on, under, or between rolling equipment. When so displayed—

(1) The equipment may not be coupled to;

(2) The equipment may not be moved, except as provided for in § 218.29;

(3) Other rolling equipment may not be placed on the same track so as to reduce or block the view of a blue signal, except as provided for in § 218.29 (a), (b) and (c); and

(4) Rolling equipment may not pass a displayed blue signal.

(b) Blue Signals must be displayed in accordance with §§ 218.25, 218.27, or 218.29 by each craft or group of workmen prior to their going on, under, or between rolling equipment and may only be removed by the same craft or group that displayed them.

§ 218.25 Workmen on a main track.

When workmen are on, under, or between rolling equipment on a main track:

(a) A blue signal must be displayed at each end of the rolling equipment; and

(b) If the rolling equipment to be protected includes one or more locomotives, a blue signal must be attached to the controlling locomotive at a location where it is readily visible to the engineman or operator at the controls of that locomotive.

(c) When emergency repair work is to be done on, under, or between a locomotive or one or more cars coupled to a locomotive, and blue signals are not available, the engineman or operator must be notified and effective measures must be taken to protect the workmen making the repairs.

[44 FR 2175, Jan. 10, 1979, as amended at 48 FR 6123, Feb. 10, 1983]

Federal

§ 218.27 V  
main t

When v  
tween r  
other tha

(a) A b  
at or ne  
switch pr

(b) Eac  
providing  
the equip  
against  
locked w  
and

(c) Th  
workmer  
ator of a  
that wor  
been inf  
each rer  
viding ac  
equipme  
against  
locked a

(d) If  
blue sig  
in this  
with or  
switches  
lined ag  
crossove  
ment, a  
that pr  
equipme  
cordanc  
graphs  
tion.

(e) If  
protecte  
motives  
tached  
at a loc  
to the  
control

§ 218.29

Inste  
tection  
with §  
for blu

(a) W  
betwe  
motive

(1) A  
at or r  
trance

(2) E  
to or d  
lined

ment of such equip-

isplay.

splayed in accord-

218.27, or 218.29

n are on, under, or

ipment. When so

t may not be cou-

ent may not be

provided for in

quipment may not

me track so as to

e view of a blue

provided for in

(c); and

ment may not pass

al.

ust be displayed in

218.25, 218.27, or

or group of work-

ipping on, under, or

ipment and may

the same craft or

them.

a main track.

e on, under, or be-

ment on a main

must be displayed

rolling equipment;

equipment to be

one or more loco-

mal must be at-

rolling locomotive

it is readily visible

r operator at the

notive.

ncy repair work is

, or between a lo-

more cars coupled

l blue signals are

gineman or opera-

ed and effective

ken to protect the

repairs.

79, as amended at 48

§ 218.27 Workmen on track other than main track.

When workmen are on, under, or between rolling equipment on track other than main track—

(a) A blue signal must be displayed at or near each manually operated switch providing access to that track;

(b) Each manually operated switch providing access to the track on which the equipment is located must be lined against movement to that track and locked with an effective locking device; and

(c) The person in charge of the workmen must have notified the operator of any remotely controlled switch that work is to be performed and have been informed by the operator that each remotely controlled switch providing access to the track on which the equipment is located has been lined against movement to that track and locked as prescribed in § 218.30.

(d) If rolling equipment requiring blue signal protection as provided for in this section is on a track equipped with one or more crossovers, both switches of each crossover must be lined against movement through the crossover toward that rolling equipment, and the switch of each crossover that provides access to the rolling equipment must be protected in accordance with the provisions of paragraphs (a) and (b), or (c) of this section.

(e) If the rolling equipment to be protected includes one or more locomotives, a blue signal must be attached to the controlling locomotive at a location where it is readily visible to the engineman or operator at the controls of that locomotive.

§ 218.29 Alternate methods of protection.

Instead of providing blue signal protection for workmen in accordance with § 218.27, the following methods for blue signal protection may be used:

(a) When workmen are on, under, or between rolling equipment in a locomotive servicing track area:

(1) A blue signal must be displayed at or near each switch providing entrance to or departure from the area;

(2) Each switch providing entrance to or departure from the area must be lined against movement to the area

and locked with an effective locking device; and

(3) A blue signal must be attached to each controlling locomotive at a location where it is readily visible to the engineman or operator at the controls of that locomotive;

(4) If the speed within this area is restricted to not more than 5 miles per hour a derail, capable of restricting access to that portion of a track within the area on which the rolling equipment is located, will fulfill the requirements of a manually operated switch in compliance with paragraph (a)(2) of this section when positioned at least 50 feet from the end of the equipment to be protected by the blue signal, when locked in a derailing position with an effective locking device, and when a blue signal is displayed at the derail;

(5) A locomotive may be moved onto a locomotive servicing area track after the blue signal has been removed from the entrance switch to the area. However, the locomotive must be stopped short of coupling to another locomotive;

(6) A locomotive may be moved off of a locomotive servicing area track after the blue signal has been removed from the controlling locomotive to be moved and from the area departure switch;

(7) If operated by an authorized employee under the direction of the person in charge of the workmen, a locomotive protected by blue signals may be repositioned within this area after the blue signal has been removed from the locomotive to be repositioned and the workmen on the affected track have been notified of the movement; and

(8) Blue signal protection removed for the movement of locomotives as provided in paragraphs (a) (5) and (6) of this section must be restored immediately after the locomotive has cleared the switch.

(b) When workmen are on, under, or between rolling equipment in a car shop repair track area:

(1) A blue signal must be displayed at or near each switch providing entrance to or departure from the area; and



(2) Each switch providing entrance to or departure from the area must be lined against movement to the area and locked with an effective locking device;

(3) If the speed within this area is restricted to not more than 5 miles per hour, a derail capable of restricting access to that portion of a track within the area on which the rolling equipment is located will fulfill the requirements of a manually operated switch in compliance with paragraph (a)(2) of this section when positioned at least 50 feet from the end of the equipment to be protected by the blue signal, when locked in a derailing position with an effective locking device and when a blue signal is displayed at the derail;

(4) If operated by an authorized employee under the direction of the person in charge of the workmen, a car mover may be used to reposition rolling equipment within this area after workmen on the affected track have been notified of the movement.

(c) Except as provided in paragraphs (a) and (b) of this section, when workmen are on, under, or between rolling equipment on any track, other than a main track:

(1) A derail capable of restricting access to that portion of the track on which such equipment is located, will fulfill the requirements of a manually operated switch when positioned no less than 150 feet from the end so such equipment; and

(2) Each derail must be locked in a derailing position with an effective locking device and a blue signal must be displayed at each derail.

(d) When emergency repair work is to be done on, under, or between a locomotive or one or more cars coupled to a locomotive, and blue signals are not available, the engineman or operator at the controls of that locomotive must be notified and effective measures must be taken to protect the workmen making the repairs.

[44 FR 2175, Jan. 10, 1979, as amended at 48 FR 6123, Feb. 10, 1983]

§ 218.30 Remotely controlled switches.

(a) After the operator of the remotely controlled switches has received the notification required by § 218.27(c), he

must line each remotely controlled switch against movement to that track and apply an effective locking device to the lever, button, or other device controlling the switch before he may inform the employee in charge of the workmen that protection has been provided.

(b) The operator may not remove the locking device unless he has been informed by the person in charge of the workmen that it is safe to do so.

(c) The operator must maintain for 15 days a written record of each notification which contains the following information:

(1) The name and craft of the employee in charge who provided the notification;

(2) The number or other designation of the track involved;

(3) The date and time the operator notified the employee in charge that protection had been provided in accordance with paragraph (a) of this section; and

(4) The date and time the operator was informed that the work had been completed, and the name and craft of the employee in charge who provided this information.

[44 FR 2175, Jan. 10, 1979, as amended at 48 FR 6123, Feb. 10, 1983]

Subpart C—Protection of Trains and Locomotives

§ 218.31 Scope.

This subpart prescribes minimum operating rule requirements for the protection of railroad employees engaged in the operation of trains, locomotives and other rolling equipment.

[42 FR 5065, Jan. 27, 1977]

§ 218.35 Yard limits.

(a) After August 1, 1977, yard limits must be designated by—

(1) Yard limit signs, and

(2) Timetable, train orders, or special instructions.

(b) After August 1, 1977, each railroad must have in effect an operating rule which complies with the requirements set forth below:

(1) The main tracks within yard limits may be used, clearing the time

an approach is due to where time to clear the trains, prot § 218.37. If tracks are system rule by § 218.37

(2) Trains nated class must move ehalf the r ceeding 20 track is kr signal indic

(3) With against the main track authorized order, yard official and restrictions § 218.35(b)(

(c) Each the operat paragraph or classes superiority yard limits [42 FR 5065,

§ 218.37 FR

(a) After road must rule which ments set

(1) Exce: (a)(2) of t shall be pr

(i) When main track maximum slow orde: flag protec on the san a crew me lighted fus exceed the

(ii) Whe main track maximum slow orde under circ be overtak ble for pr into cons: ture of sight dista



**20-B.** When a train is equipped with an ETD, the information displayed in the cab of the engine may be used in lieu of a visual observation.

**20-C.** If the marker light is found to be inoperative at a crew change point where repair facilities are not available and if it cannot be replaced, or if it becomes inoperative en route, the train may proceed to the next location where the marker light can be repaired or replaced.

**21.** Employees must observe passing trains for markers. If a marker is not displayed, an attempt must be made to notify the crew of the passing train. In the event that this cannot be done, the train dispatcher must be notified.

**21-A.** Inoperative marker lights must be reported to the train dispatcher or to the yardmaster.

### ENGINE NUMBER LIGHTS

**24.** Engine number lights must be illuminated only on the unit identifying the train.

### BLUE SIGNAL PROTECTION

**26.** This rule prescribes the requirements that must be followed for the protection of railroad workmen engaged in the inspection, testing, repair and servicing of rolling equipment whose activities require them to work on, under, or between such equipment and subjects them to the danger of personal injury posed by movement of this equipment

**Note:** Servicing does not include supplying cabooses, locomotives or passenger cars with items such as ice, drinking water, tools, sanitary supplies, stationery or flagging equipment.

Testing does not include visual observations made by an employee positioned inside or alongside a caboose, locomotive, or passenger car; or marker inspection made by Rule 20 when the rear of the train is on a main track and the employee making the inspection has personally **Contacted** the employee at the controls of the locomotive and has been assured by that employee that the train is and will remain secure against movement until the inspection has been completed.

### DEFINITIONS APPLYING TO BLUE SIGNAL PROTECTION

**Blue Signal:** A clearly distinguishable blue flag or blue light by day and blue light at night. When attached to the operating controls of a locomotive, it need not be lighted if the inside of the cab area of the locomotive is sufficiently lighted so as to make the blue signal clearly distinguishable.

**Workmen:** Railroad employees assigned to inspect, test, repair or service railroad rolling equipment, or their components including brake systems. Train and yard crews are excluded except when assigned to do such work on railroad rolling equipment that is not part of the train or yard movement they have been called to operate.

**Group Of Workmen:** Two or more workmen of the same or different crafts assigned to work together as a unit under a common authority and who are in communication with each other while the work is being done.

**Locomotive Servicing Track Area:** One or more tracks within an area in which the testing, servicing, repair, inspection, or rebuilding of locomotives is under the exclusive control of mechanical department personnel.

**Car Shop Repair Track Area:** One or more tracks within an area in which the testing, servicing, repair, inspection, or rebuilding of railroad rolling equipment is under the exclusive control of mechanical department personnel.

**Rolling Equipment:** Locomotives, railroad cars, and one or more locomotives coupled to one or more cars.

**Locomotive:** A self-propelled unit of equipment designed for moving other equipment in revenue service including a self-propelled unit designed to carry freight or passenger traffic, or both, and may consist of one or more units operated from a single control.

**Switch Providing Access:** A switch which if traversed by rolling equipment could permit that rolling equipment to couple to the equipment being protected.

**Effective Locking Device:** When used in relation to a manually operated switch or a derail means one which is:

Vandal resistant;

Tamper resistant; and

Capable of being locked and unlocked only by the class, craft or group of employees for whom the protection is being provided.

When used in relation to remotely controlled switch means a blocking device which will effectively prevent the lever or button controlling the switch from being operated.

### BLUE SIGNAL DISPLAY

Blue signals displayed in accordance with paragraphs A, B and C signify that workmen are on, under, or between rolling equipment. When so displayed:

The equipment must not be coupled to;

The equipment must not be moved, except as provided for in paragraph C;

Other rolling equipment must not be placed on the same track so as to reduce or block the view of a blue signal, except as provided for in paragraphs C(1), (2) and (3); and

Rolling equipment must not pass a blue signal.

Blue signals must be displayed in accordance with paragraphs, A, B and C by each craft or group of workmen prior to their going on, under, or between rolling equipment and must only be removed by the same craft or group that displayed them.

#### A. WORKMEN ON A MAIN TRACK

When workmen are on, under, or between rolling equipment on a main track:

1. A blue signal must be displayed at each end of the rolling equipment; and
2. If the rolling equipment to be protected includes one or more locomotives, a blue signal must be attached to the controlling locomotive at a location where it is readily visible to the engineer or operator at the controls of that locomotive.
3. When emergency repair work is to be done on, under, or between a locomotive or one or more cars coupled to a locomotive, and blue signals are not available, the engineer or operator must be notified and effective measures must be taken to protect the workmen making the repairs.

#### B. WORKMEN ON TRACK OTHER THAN MAIN TRACK

When workmen are on, under, or between rolling equipment on a track other than a main track:

1. A blue signal must be displayed at or near each manually operated switch providing access to that track;
2. Each manually operated switch providing access to the track on which the equipment is located must be lined against movement to that track and locked with an effective locking device; and
3. The person in charge of the workmen must have notified the operator of any remotely controlled switch that work is to be done and have been informed by the operator that each remotely controlled switch providing access to the track on which the equipment is located has been lined against movement to that track and locked as prescribed in paragraph D.
4. If rolling equipment requiring blue signal protection as provided for in this rule is on a track equipped with one or more crossovers, both switches of each crossover must be lined against movement through the crossover toward that rolling equipment and the switch of each crossover that provides coupling access to the rolling

equipment must be protected in accordance with subparagraphs (1) and (2), or (3), of this paragraph.

5. If the rolling equipment to be protected includes one or more locomotives, a blue signal must be attached to the controlling locomotive at a location where it is readily visible to the engineer or operator at the controls of that locomotive.

#### C. ALTERNATE METHODS OF PROTECTION

Instead of providing blue signal protection for workmen in accordance with paragraph B (Workmen on Track Other Than Main Track), the following methods for blue signal protection may be used:

1. **Locomotive Servicing Track Areas** - When workmen are on, under, or between rolling equipment in a locomotive servicing track area:
  - a) A blue signal must be displayed at or near each switch providing entrance to or departure from the area;
  - b) Each switch providing entrance to or departure from the area must be lined against movement to the area and locked with an effective locking device; and
  - c) A blue signal must be attached to each controlling locomotive at a location where it is readily visible to the engineer or operator at the controls of that locomotive;
  - d) If the speed within this area is restricted to not more than 5 miles per hour, a derail capable of restricting access to that portion of a track within the area on which the rolling equipment is located will fulfill the requirements of a manually operated switch in compliance with subparagraph (b) of this paragraph when positioned at least 50 feet from the end of the equipment to be protected by the blue signal, when locked in a derailing position with an effective locking device, and when a blue signal is displayed at the derail;
  - e) A locomotive may be moved onto a locomotive servicing area track after the blue signal has been removed from the entrance switch to the area. However, the locomotive must be stopped short of coupling to another locomotive;
  - f) A locomotive may be moved off a locomotive servicing area track after the blue signal has been removed from the controlling locomotive to be moved and from the area departure switch;
  - g) If operated by an authorized employee under the direction of the person in charge of the workmen, a locomotive protected by blue signals may be repositioned within this area only after the blue signal has been removed from the locomotive to be repositioned and

the workmen on the affected track have been notified of the movement; and

- h) Blue signal protection removed for the movement of locomotives as provided in subparagraphs (e) and (f) of this paragraph must be restored immediately after the locomotive has cleared the switch.

**2. Car Shop Repair Track Areas -** When workmen are on, under, or between rolling equipment in a car shop repair track area:

- a) A blue signal must be displayed at or near each switch providing entrance to or departure from the area; and
- b) Each switch providing entrance to or departure from the area must be lined against movement to the area and locked with an effective locking device;
- c) If the speed within this area is restricted to not more than 5 miles per hour, a derail capable of restricting access to that portion of a track within the area on which the rolling equipment is located will fulfill the requirement of a manually operated switch in compliance with subparagraph (b) of this paragraph when positioned at least 50 feet from the end of the equipment to be protected by the blue signal, when locked in a derailing position with an effective locking device and when a blue signal is displayed at the derail;
- d) If operated by an authorized employee under the direction of the person in charge of the workmen, a car mover may be used to reposition rolling equipment within this area after workmen on the affected track have been notified of the movement.

**3. Tracks Other Than Main Tracks -** Except as provided in paragraphs C(1) and (2), when workmen are on, under, or between rolling equipment on any track, other than a main track:

- a) A derail capable of restricting access to that portion of the track on which such equipment is located, will fulfill the requirements of a manually operated switch when positioned no less than 150 feet from the end of such equipment; and
- b) Each derail must be locked in a derailing position with an effective locking device and a blue signal must be displayed at each derail.

**4. Emergency Repair Work -** When emergency repair work is to be done on, under, or between a locomotive or one or more cars coupled to a locomotive, and blue signals are not available, the engineer or operator at the controls of that locomotive must be notified and effective measures must be taken to protect the workmen making the repairs.

#### D. REMOTELY CONTROLLED SWITCHES

After the operator of the remotely controlled switches has received the notification required by paragraph B(3), the operator must line each remotely controlled switch against movement to that track and apply an effective locking device to the lever, button, or other device controlling the switch before he may inform the employee in charge of the workmen that protection has been provided.

The operator may not remove the locking device unless he has been informed by the person in charge of the workmen that it is safe to do so.

The operator must maintain for 15 days a written record of each notification which contains the following information:

1. The name and craft of the employee in charge who provided the notification;
2. The number or other designation of the track involved;
3. The date and time the operator notified the employee in charge that protection had been provided by the first paragraph of D; and
4. The date and time the operator was informed that the work had been completed, and the name and craft of the employee in charge who provided this information.

#### SIGNALS IMPERFECTLY DISPLAYED

27. A Signal imperfectly displayed, or the absence of a signal at a place where a signal is usually displayed, must be regarded as the most restrictive indication that can be conveyed by that signal.

The most restrictive indication that can be conveyed by an absolute signal is Stop. The most restrictive indication that can be conveyed by an intermediate signal is proceed at Restricted Speed.

#### Exceptions:

1. When the arms of a semaphore signal can be seen, they will govern;
2. When one colored light is displayed in the cluster of lights of a color position light signal, it will mean the same as two lights in the cluster; or
3. When one or more lower *units* of a color light signal aspect is dark, the aspect will be observed as though the lights that should be displayed were displaying red. This does not apply to Rule C-290(a).

The following conditions must be reported promptly to the train dispatcher: A signal imperfectly displayed; the absence of a signal at a place where a signal is usually displayed; the absence of a light or a white light displayed where a color light should be displayed.



3. Display a Blue Signal at each of the hand-operated switch and/or derail locations mentioned above.
4. Request and receive protection from the employee controlling any remotely controlled switches that provide access to the track. This procedure also applies to hump yard classification tracks where employees couple air hoses or adjust coupling devices.

**If the equipment is on a main track or controlled siding:**

1. Display a Blue Signal at each end of the equipment.
2. Attach a Blue Signal to the controlling engine(s) at a location where it will be clearly visible to an employee at the controls of that engine.

**c. Responsibilities of Employee Controlling Remotely Controlled Switches**

When requested to provide protection, the employee in charge of remotely controlled switches providing access to the track on which the equipment is located must line the switches against movement to the track and apply blocking devices. The employee must not remove the blocking devices until informed by the employee in charge of the workmen that the work has been completed. The employee controlling the switches must immediately make a written record on the prescribed form of the application and removal of the blocking device protection. This record must be retained for 15 days following the date of removal.

**d. Blue Signal Unavailable**

When emergency repair work is to be done on, under, or between engines and/or cars, and a Blue

Signal is not available, the Engineer must be notified. The Engineer must take three actions:

1. Apply the brakes.
2. Place the reverser lever in neutral position or the controller in off position.
3. Open the generator field and/or control switch where equipped.

The engineer must maintain this protection until notified by the employee who requested it that the protection is no longer required.

**e. Markers**

Blue Signal protection must be provided for workmen when they are:

1. Replacing, repositioning or repairing markers, and the rear of the train is on any track.
2. Inspecting markers by repositioning the activation switch or covering photoelectric cell and the rear of the train is on a track other than a main track or controlled siding.

**17. Protection of Occupied Camp Cars**

This rule prescribes the procedures for the protection of railroad employees when they are in the vicinity of camp cars parked for the purpose of housing them. This rule does not apply to camp cars while the cars are in a train.

**a. Restrictions**

Once an Occupied Camp Car Signal has been displayed, the following restrictions apply:

1. The camp cars must not be coupled to moved.
2. Equipment must not be placed on the same track in a manner that reduces or blocks the view of the signal.
3. Equipment must not pass the signal.

10/29/89

**19(B). ALTERNATIVE MARKERS:** A reflector, a red flag or a light fixture will be displayed at the rear of the train as the marker when:

- (1) A highly visible marker is not required;
- (2) A defective car must be placed at the rear for movement to a repair point;
- (3) The rear portion of the train is disabled and cannot be moved and a highly visible marker cannot be displayed on the rear of portion to be moved; or,
- (4) The highly visible marker becomes inoperative en route. The train may be moved to the next forward location where the highly visible marker can be repaired or replaced.

**24. ENGINE IDENTIFYING NUMBER:** Trains will be identified by engine number and direction when applicable.

When an engine of another company is used, it will be designated by the initials of the Company preceding the engine number. When an engine consists of more than one unit or when two or more engines are coupled, the number of one unit only will be illuminated and will be the identifying number. When practicable, the number of the leading unit must be used.

**25. SIGNS PROTECTING EQUIPMENT:** When a sign reading "STOP — TANK CAR CONNECTED", "STOP — MEN WORKING", "EMPLOYEES WORKING", "SERVICE CONNECTIONS" or similar warning signs are displayed on a track or car, the car must not be coupled to or moved. Other equipment must not be placed on the same track so as to block or reduce the view of the sign.

**26. BLUE SIGNAL PROTECTION OF WORKMEN:** This rule prescribes the requirements that must be followed for the protection of railroad workmen engaged in the inspection, testing, repair and servicing of rolling equipment whose

GCOR

A-9

activities require them to work on, under or between such equipment and subjects them to the danger of personal injury posed by movement of this equipment.

As used in this rule, the following definitions apply:

#### **Workmen**

Railroad employees assigned to inspect, test, repair or service railroad rolling equipment or their components, including brake systems. Train and yard crews are excluded, except when assigned to perform such work on railroad rolling equipment that is not part of the train or yard movement they are handling or will handle.

**NOTE:** "Servicing" does not include supplying cabooses, engines or passenger cars with items such as ice, drinking water, tools, sanitary supplies, stationery or flagging equipment.

"Testing" does not include visual observations made by an employee positioned on or alongside a caboose, engine or passenger car; or marker inspection made by repositioning the activation switch or covering the photoelectric cell when the rear of the train is on a main track. The employee making this inspection must personally contact the employee at the controls of the engine and be assured that the train is and will remain secure against movement until the inspection has been completed.

#### **Group of Workmen**

Two or more workmen of the same or different crafts assigned to work together as a unit under a common authority and who are in communication with each other while the work is being done.

#### **Rolling Equipment**

Engines, railroad cars, and one or more engines coupled to one or more cars.

#### **Blue Signal**

A clearly distinguishable blue flag or blue light by day and a blue light at night. The blue light may be displayed either steady or flashing.

When attached to the operating controls of an engine, it need not be lighted if the inside of the cab area of the engine is sufficiently lighted so as to make the blue signal clearly distinguishable.

#### **Effective Locking Device**

When used in relation to a manually operated switch or a derail, a lock used that can be locked or unlocked only by the craft or group of workmen applying the lock.

#### **Car Shop Repair Track Area**

One or more tracks, within an area in which the testing, servicing, repair, inspection or rebuilding of railroad rolling equipment is under the exclusive control of mechanical department personnel.

#### **Engine Servicing Track Area**

One or more tracks, within an area in which testing, servicing, repair, inspection or rebuilding of engines is under the exclusive control of mechanical department personnel.

#### **Switch Providing Direct Access**

A switch which if traversed by rolling equipment could permit that rolling equipment to couple to the equipment being protected.

(1) A blue signal signifies that workmen are on under or between rolling equipment and that the equipment must not be coupled to or moved except as provided in Items (6) and (7) of this rule.

Rolling equipment must not pass a blue signal on a track protected by that signal. Other rolling equipment must not be placed on the same track



so as to block or reduce the view of the blue signal except on designated engine servicing area tracks, car shop repair area tracks or when a derail is used to divide a track into separate working areas. When a blue signal is displayed at the entrance to a track, rolling equipment must not enter that track.

Blue signals must be displayed by, or remote control blue signals displayed for, each craft or group of workmen who are to work on, under or between rolling equipment. They may be removed only by the same craft or group of workmen that displayed them, or remote control display discontinued when requested by the craft or group of workmen under such protection.

When blue signal protection has been removed from one entrance of a double ended track or from either end of rolling equipment on a main track, that track is no longer under blue signal protection.

(2) When workmen are on, under or between rolling equipment and such work subjects them to the danger of personal injury posed by any movement of such equipment, protection must be provided as follows:

**ON A MAIN TRACK** — A blue signal must be displayed at each end of the rolling equipment.

**ON OTHER THAN MAIN TRACK** — One of the three following methods of protection or a combination thereof must be provided.

(a) Each manually operated switch providing direct access must be lined against movement to that track, secured by an effective locking device and a blue signal must be placed at or near each such switch. Facing point crossover switch must be lined against a crossover movement and secured by an effective locking device.

(b) A derail capable of restricting access to that portion of track where work will be performed must be locked in derailing position with an effective locking device, and:

— positioned at least 150 feet from the rolling equipment to be protected; or,

— positioned at least 50 feet from the end of rolling equipment on a designated engine servicing track or car shop repair track where speed is limited to 5 MPH.

A blue signal must be displayed at each derail.

(c) Where remote control switches provide direct access, the person in charge of the workmen must notify the employee in charge of such switches of the work to be performed and be informed by the employee in charge of switches that switches involved have been lined against movement to that track and devices controlling the switches have been secured.

The employee in charge of remote control switches must not remove the locking devices unless he has been informed by the person in charge of workmen that it is safe to do so.

The employee in charge of remote control switches must maintain for 15 days a written record of each notification which must contain the following information:

— Name and craft of the employee in charge requesting protection;

— The number or other designation of the track involved;

— Date and time person in charge of workmen notified that protection has been provided; and,



— Date, time, name and craft of the person in charge of workmen authorizing removal of the protection.

(3) In addition to protection required in Item (2) of this rule, when workmen are on, under or between an engine or rolling equipment coupled to an engine, a blue signal must be attached to the controlling engine at a location where it is readily visible to the engineer or employee at the controls of that engine.

(4) When emergency repair work is to be done on, under or between an engine or rolling equipment coupled to an engine, and a blue signal is not available, the engineer or employee at the controls of the engine must be notified and appropriate measures must be taken to protect the employee performing such work.

(5) Blue signal protection must be provided for workmen when:

(a) Replacing, repositioning or repairing a marker when rear of train is on any track; or,

(b) Inspecting a marker by repositioning the activation switch or covering the photoelectric cell when rear of train is on other than a main track.

(6) An engine must not enter a designated engine servicing area track under the exclusive control of mechanical forces unless blue signal protection governing entry is removed. The engine must stop short of coupling to another engine.

An engine must not leave engine servicing area track unless blue signal protection is removed from that engine and from the track in the direction of movement.

Blue signal protection removed from track for the movement of such engines must be restored immediately after the engine has entered or has cleared the area.

An engine protected by blue signals may be moved on a track within the engine servicing area when:

(a) Operated by an authorized employee under the direction of the employee in charge of workmen;

(b) After the blue signal has been removed from the controlling engine to be repositioned; and,

(c) Workmen have been warned of the movement.

(7) Rolling equipment protected by blue signals on car shop repair tracks may be repositioned with a car mover, when:

(a) Workmen have been warned of the movement; and,

(b) Operated by an authorized employee under the direction of the employee in charge of the workmen.

**27. IMPROPERLY DISPLAYED:** A signal improperly displayed, the absence of a fixed signal at a place where a signal is usually shown or absence of a flag or sign where required, must be regarded as the most restrictive indication that can be given by that signal, except that when semaphore arm, if any, is plainly seen, it will govern.

Improperly displayed signals or absence of fixed signals, flags or signs must be promptly reported to train dispatcher.

**29. ACKNOWLEDGE STOP SIGNAL:** When a signal, except fixed signal, is given to stop a train, it must be acknowledged. When flagged, the engineer must obtain a thorough explanation from the flagman before proceeding.

**34. OBSERVE AND CALL SIGNALS:** Crew members in control compartment of engine must be alert for and communicate to each other in a clear and audible manner, the name or aspect of

road rolling equipment, or their components, including brake systems. Train and yard crews are excluded, except when assigned to perform such work on railroad rolling equipment that is not part of the train or yard movement they have been called to operate.

**"Rolling Equipment"** means engines and railroad cars.

**"Blue Signal"** means a clearly distinguishable blue flag or blue light by day and a blue light by night; blue light may be displayed either steady or flashing.

**"Effective Locking Device"** when used in relation to a manually operated switch or derail means a lock which may be locked and unlocked only by the class or craft of employe applying that lock.

**26. Blue Signal.**—A blue signal indicates that workmen are on, under, or between rolling equipment, and that the equipment must not be coupled to or moved. Other equipment must not be placed on the same track so as to block or reduce the view of the blue signal, except on engine service tracks or when a derail is used to divide a track into separate working areas.

Blue signals must be displayed by each craft or group of workmen and may only be removed by the same craft or group that placed them.

**26(a).** Workmen may not work on, under or between rolling equipment on any track unless:

- (1) Each manually operated switch providing access to that track is lined against movement to that track, secured by an effective locking device, and a blue signal is placed at or near each manually operated switch; or
- (2) A derail capable of restricting access to that portion of a track on which such

equipment is located is placed at least 150 feet from the end of the rolling equipment, except will be 50 feet on engine servicing facilities, and locked with an effective locking device in the derailing position. A blue signal must be displayed at each derail.

Whenever one switch of a crossover is located beneath rolling equipment which is under blue signal protection the next switch of the crossover must be lined and locked against movement to that crossover. A blue signal need not be displayed at either crossover switch.

When workmen are working on, under or between an engine or rolling equipment coupled to an engine, a blue signal must be displayed on the controlling unit at a location where it is plainly visible to the engineer or operator at the controls of that engine.

When emergency repair work is to be done on, under or between the engine or cars coupled to an engine, and a blue signal is not available, the engineer must be notified by a member of the crew, and protection given those engaged in making the repairs. Engine or cars must not be moved, nor air brakes applied or released, until all employes are clear and the engineer so advised by the same employes.

**26(b). Engine Servicing Facilities.**—An engine may not be moved onto or off a designated engine servicing track under the exclusive control of mechanical forces unless the blue signal is first removed:

- (1) From the entrance switch to the service track, and the engine which is placed on the track is stopped short of coupling to another engine.
- (2) From the controlling unit to be moved and from the service track departure

switch, before the engine is removed from the track.

An engine protected by blue signals may be moved on a track within the designated engine servicing area under the exclusive control of mechanical forces, when operated by an authorized employee under the direction of the employee in charge of the workmen, after the blue signal has been removed from the controlling engine to be repositioned, and the workmen on the track have been notified of the movement.

**26(c). Car Shop or Repair Track Protection.**—A blue signal must be placed at the entrance switch to a repair track or a car shop when workmen are working on, under or between rolling equipment. Each manually operated switch providing access to the track must be lined against movement to the track and secured with an effective locking device.

Rolling equipment protected by blue signals on car shop or repair tracks which are under exclusive control of car department forces, may be repositioned with a car mover when operated by an authorized employee, under the direction of the employee in charge of the workmen, after the workmen on the track have been notified and are clear of the movement.

Rolling equipment must not be placed on repair tracks or in car shops until it is known that all employees are clear of the track on which the movement is to be made.

**26(d). Hump Yard Tracks & Tracks with Remotely Controlled Switches.** Workmen may not work on, under or between rolling equipment unless the person in charge of the workmen has notified the control operator of the remotely controlled switches of the work to be performed, and has been informed by the con-

rol operator that protection has been provided. Before the control operator of the remotely controlled switches informs the employe in charge of the work that protection has been provided, each remotely controlled switch providing access to the track must be lined against movement to that track, and locked by applying an effective blocking device to the lever, button or other device controlling the switch.

The control operator may not remove the locking device unless he has been informed by the person in charge of the workmen that it is safe to do so. The control operator must maintain for 30 days a written record of each notification which contains the following information:

The date and time he received notification of work to be performed;

The name and craft of the employe in charge who provided the notification;

The number or other designation of the track involved;

The date and time he notified the employe in charge that protection has been provided; and

The date and time he was informed that the work had been completed, and the name and craft of the employe in charge who provided this information.

Each manually operated switch providing access to that track must be protected per Rule 26(a).

**27. Imperfectly Displayed Signals.**—A signal imperfectly displayed, or the absence of a signal at a place where a signal is usually shown, must be regarded as the most restrictive indication that can be given by that signal, except that when the day indication is plainly seen it will govern.

A.V. →

KCS

A-14

5. When a portion of a train is disabled or derailed and a portable highly visible marker is not available, the remainder of a train may be moved to the next terminal without such a light. (See note.)

**NOTE:** When Exception 3, 4, or 5 exists, a red flag will be displayed on the rear of the last car to indicate the rear of the train.

19(a). It is the responsibility of the outbound crew at each crew change point to know the rear end marking device is in proper operating condition.

This shall be accomplished by visually observing that the device is functioning, or that the device will function by either (1) positioning the activation switch, or (2) covering the photoelectric cell, or (3) by observing the telemetry readout information in the cab of the controlling locomotive which demonstrates that the light is functioning.

This examination may be made by employees other than the train crew provided the results are communicated to the engineer of the outbound crew.

If the rear end marking device is found to be inoperative, a report must be made immediately to the train dispatcher.

22. On trains, the engine number must be illuminated on engines equipped with number lights. When an engine consists of more than one unit, the number of only one unit will be illuminated and will be the identifying number. When practical, the number of the leading unit must be used.

26. As used in this rule, the following definitions apply:

**WORKMEN** - Railroad employees assigned to inspect, test, repair, or service railroad rolling equipment or components, including brake systems. Train and yard crews are excluded, except when assigned to work on railroad rolling equipment that is not part of the train or yard movement they have been called to operate.

**ROLLING EQUIPMENT** - Engines, railroad cars, and combinations of one or more engines coupled to one or more cars.

**BLUE SIGNAL** - A clearly distinguishable blue flag or blue light day and a blue light by night.

**EFFECTIVE LOCKING DEVICE** - When used in relation to a manually operated switch or derail, a device that can be locked or unlocked only by the class or group of workmen applying the lock.

1) A blue signal indicates that workers are on, under, or between rolling equipment and that the equipment must not be moved or moved except as provided in Paragraphs 8 and 9 above. Other rolling equipment must not be placed on the same track so as to block or reduce the view of the blue signals, except on engine-servicing tracks or when a derail is used to divide a track into separate working areas.

2) When a blue signal is displayed at the entrance to a track, rolling equipment must not enter that track.

3) When workmen are on, under, or between an engine or rolling equipment coupled to an engine, a blue signal must be attached to the controlling unit in a location where it is readily visible to the engineman at the controls of the engine.

4) Blue signals must be displayed and effective locking devices must be applied by the appropriate class or group of workmen; they may be removed only by the same class or group.

5) If a blue signal is not available when emergency repair work is to be done on, under, or between an engine or rolling equipment coupled to an engine, the engineman or operator at the controls of the engine must be notified and appropriate measures must be taken to protect the employees making the repairs.

6) An engine must not enter an engine-servicing track until the blue signal protection governing entry has been removed. The engine must stop short of coupling to another engine.

7) An engine must not leave an engine-servicing track until the blue signal protection has been removed from that engine and from the track in the direction of movement.

8) On an engine-servicing track protected by blue signals and under exclusive control of mechanical forces, an engine may be repositioned under the direction of the employee in charge of the workmen after the blue signal has been removed from the controlling unit and the workmen on the track have been warned of the movement.

9) On a shop or repair track protected by blue signals, rolling equipment may be repositioned with a car mover, under the direction of the employee in charge of the workmen, after the workmen have been warned of the movement.

10) When workmen are on, under, or between rolling equipment on the track, one or more of the following forms of protection must be provided:

a) Each manually operated switch that provides access to the track must be lined against movement to that track and secured by an effective locking device. A blue signal must be placed at or near each switch.

b) A derail capable of restricting access to the portion of track where work will be performed must be locked into derailing position with an effective locking device and either:

- Positioned at least 150 feet from the rolling equipment to be protected, or
- Positioned at least 50 feet from the end of an engine or an engine-servicing track where speed is limited to 5 MPH.
- A blue signal must be displayed at each derail.

c) Where remote control switches provide access to that track, the person in charge of the workmen must arrange to have those switches protected by the person operating such switches. The person operating such switches must line each switch against movement to that track and secure the controls in that position maintaining this protection until notified by the person in charge of the workmen that it may be removed.

The switch operator must record the following:

- Date, time, and name and craft of the person requesting the protection
- Number or designation of the track involved
- Date and time when the operator provided the protection
- Date, time, and name and craft of the person authorizing removal of the protection
- These records must be kept for 15 days.

11) Whenever one switch of a crossover is located beneath rolling equipment that is under blue signal protection, the other switch of the crossover must be lined and locked against movement through that crossover. A blue signal need not be displayed at either crossover switch.

12) When a train service employee must couple an air hose or adjust a coupling device and that activity will place the employee between pieces of rolling equipment located on a bowl track, notification must be given to the operator of a remote control switch that provides access from the highest point of the hump to the track on which the rolling equipment is located.

Upon such notification, the operator of the remote-control switch shall line it against movement to the affected bowl track and shall apply a locking or blocking device to the control for the switch.

The operator shall then notify the employee that the requested protection has been provided and shall not remove the locking or blocking device until notified by the employee that protection is no longer required on that track.

27. A signal that is imperfectly displayed, or the absence of a signal at a place where one is usually displayed, must be regarded as the most restrictive indication that can be displayed by that signal and must be promptly reported to the dispatcher.

An exception may be made, when the day indication is plainly seen or when sufficient lights in a color position light signal or multiple color light signal are displayed to determine the indication of the signal, it will govern.

29. When any signal except a fixed signal is given to stop a train, it must be acknowledged as prescribed by Rule 14(g).

30. The engine bell must be rung when an engine is about to move except when part of a continuous switching movement. It must be rung while approaching and passing stations, over public grade crossings, and through tunnels.

31. The whistle must be sounded where required by rule or law.

The unnecessary use of either the whistle or bell is prohibited.