PROPOSED OPERATING RULES FOR A MINIATURE RAILWAY SINGLE TRACK MANUAL BLOCK SIGNAL SYSTEM

TO PROVIDE FOR AN IMPROVED SPIRIT OF COMPLIANCE WITH FEDERAL RAILROAD ADMINISTRATION RULES FOR SIGNAL SYSTEM ASPECTS AND INDICATIONS

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Excerpts from FRA Part 236.

236.23 Aspects and indications.

(a) Aspects shall be shown by the position of semaphore blades, color of lights, position of lights, flashing of lights, or any combination thereof. They may be qualified by marker plate, number plate, letter plate, marker light, shape and color of semaphore blades or any combination thereof, subject to the following conditions:

(a1) Night aspects of roadway signals, except qualifying appurtenances, shall be shown by lights; day aspects by lights or semaphore arms. A single white light shall not be used.

(a2) Reflector lenses or buttons or other devices which depend for visibility upon reflected light from an external source shall not be used hereafter in night aspects, except qualifying appurtenances.

(b) The aspects of cab signals shall be shown by lights or by illuminated letters or numbers.

(c) Each aspect displayed by a signal shall be identified by a name and shall indicate action to be taken. Only one name and indication shall apply to those aspects indicating the same action to be taken; the same aspect shall not be used with any other name and indication.

Excerpts from FRA Part 236 continued.

(d) The fundamental indications of signal aspects shall conform to the following:

(d1) A red light, a series of horizontal lights or a semaphore blade in a horizontal position shall be used to indicate stop.

(d2) A yellow light, a lunar light, or a series of lights or a semaphore blade in the upper or lower quadrant at an angle of approximately 45 degrees to the vertical, shall be used to indicate that speed is to be restricted and stop may be required.

(d3) A green light, a series of vertical lights, or a semaphore blade in a vertical position in the upper quadrant or 60° or 90° in the lower quadrant shall be used to indicate proceed at authorized speed.

(e) The names, indications, and aspects of roadway and cab signals shall be defined in the carrier's Operating Rule Book or Special Instructions. Modifications shall be filed with the FRA within thirty days after such modifications become effective.

(f) The absence of a qualifying appurtenance, the failure of a lamp in a light signal, or a false restrictive position of an arm of a semaphore signal shall not cause the display of a less restrictive aspect than intended.

PROPOSED OPERATING RULES FOR A MINIATURE RAILWAY SINGLE TRACK MANUAL BLOCK SIGNAL SYSTEM

The miniature railway signal system (MRSS) hereafter presented may be considered a block occupancy indication signal system and as such the various aspects displayed by the signals would convey an indication of occupancy status of a respective block and from a frame of reference of a train desiring to enter the block would include the following:

1. Block not occupied.
2. Block occupied with a train in the same direction.
3. Block occupied with a train in the opposing direction.

Any of the aforesaid when considered as being the indication conveyed by a given signal aspect displayed does not comply with the first sentence of FRA Part 236.23(c) that reads, "Each aspect displayed by a signal shall be identified by a name and shall indicate action to be taken," in that the wording of the previous 1, 2 and 3 do not indicate an action to be taken by a train crew member upon viewing a given aspect being displayed by the signal.

The purpose for developing the following MRSS rules was to bring them in to close compliance with FRA Part 236.23 in general and in particular in full compliance with the first sentence of FRA Part 236.23(c).

An intentional design element of the following MRSS (first witnessed by the author in operation, circa 1990, on the Pittsburgh, Akron & Western miniature railroad located on the estate of the late CBF Ensworth Jr) was that of its simplicity in component procurement, equipment construction and therefore future maintenance requirements.

As a result of the aforesaid, one operational function of the MRSS is that in one circumstance when an aspect is displayed by a signal and then is changed to a different aspect displayed by the same signal, the aforesaid change in aspect is recognized as conveying an indication and assigned an indication description. The foregoing circumstance is not provided for in FRA Part 236.23, although the following MRSS rules have been especially developed based on the manner, style or "spirit" of provisions of FRA Part 236.23(c).

An additional operational function brought about due to the intentional simplicity of design of the MRSS is the use of the aspect of a yellow signal to also convey the indication stop. Although the foregoing does not comply with FRA Part 236.23(d2), the non-compliance is considered by the author to be an acceptable variation from FRA rules given that train crew personnel authorized to operate the following MRSS are to be made fully aware of the signal aspect and indication rules that apply to the MRSS.

The intent of affixing to the mast the "MBS SIGNAL" letter plate (that is also part of the aspect displayed by the signal) is to reinforce to train crew personnel the fact that the following MBS rules apply to the signal in view.

DEFINITIONS

APPROACH SWITCH - A track side electrical switch that the engineer operates in order to change the aspect of a signal to that which conveys a "Proceed" indication.

BLOCK - A length of track of defined limits, the use of which is governed by block signals.

BLOCK RELEASE SWITCH - A track side electrical switch that the engineer operates to release a signal system when leaving a block.

BLOCK SIGNAL - A fixed signal that governs trains entering and using a block or provides for the proper spacing of trains.

MAIN TRACK - A track, other than an auxiliary track, extending through yards and between stations which must not be occupied without authority or protection.

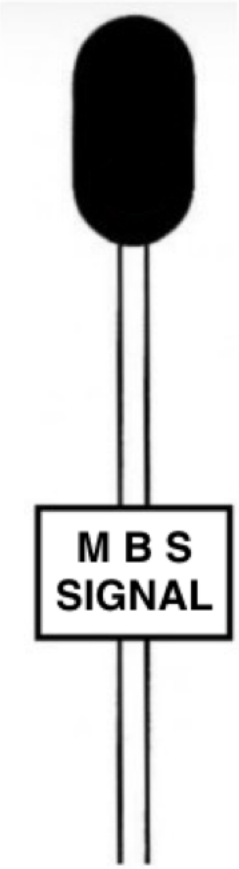
MANUAL BLOCK SIGNAL SYSTEM - A block or a series of consecutive blocks, governed by block signals operated manually by block operators or train crew members. A manual block system may also include automatic functions actuated by a train, or engine, or by certain conditions affecting the use of a block.

MBS - Abbreviation for Manual Block Signal System.

SIGNAL ASPECT - The appearance of a fixed signal conveying an indication as viewed from the direction of an approaching train.

SIGNAL INDICATION - The information conveyed by the by the aspect of a signal.

SINGLE TRACK - A main track upon which trains are operated in both directions.



Rule MBS 1.

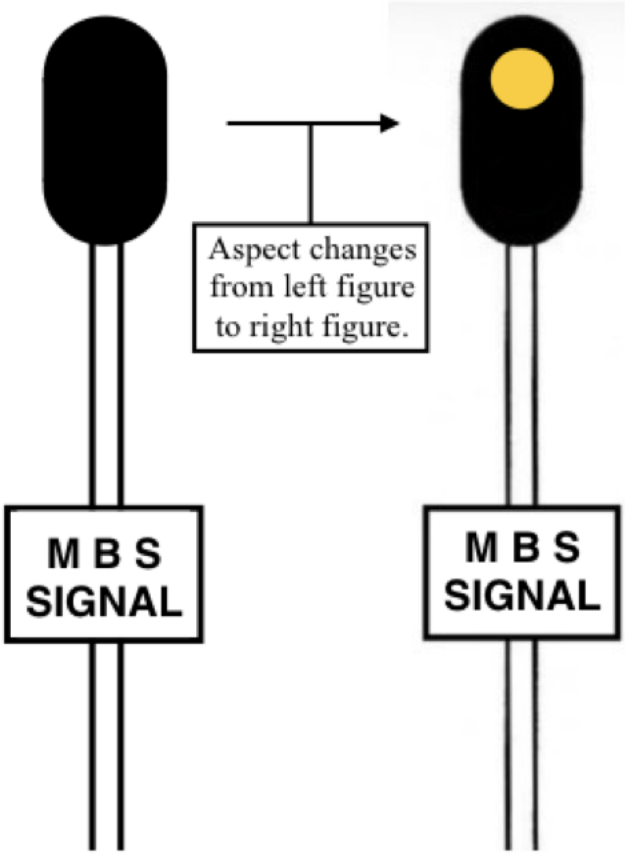
Aspect: Dark signal with “MBS SIGNAL” letter plate.

Name: STOP AND OPERATE.

Indication: Stop before any part of train or engine passes the signal and fouling point, and, unless instructed otherwise, operate the approach switch.

Number plate affixed to mast has no significance except to provide identification of signal and its location.

Block status: Not occupied.



Rule MBS 2.

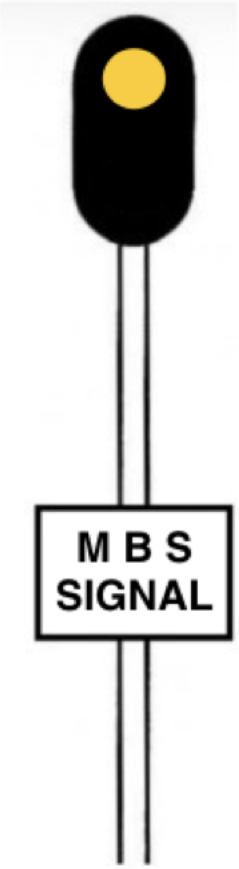
Aspect change: Dark signal with "MBS SIGNAL" letter plate changes to yellow signal with "MBS SIGNAL" letter plate.

Name: ENTER BLOCK.

Indication: Proceed into and through the block, and, unless instructed otherwise, be governed by manual block signal system rules and special instructions.

Number plate affixed to mast has no significance except to provide identification of signal and its location.

Block status: Not occupied although is about to be occupied by the train for which the approach switch was operated.



Rule MBS 3.

Aspect: Yellow signal with “MBS SIGNAL” letter plate.

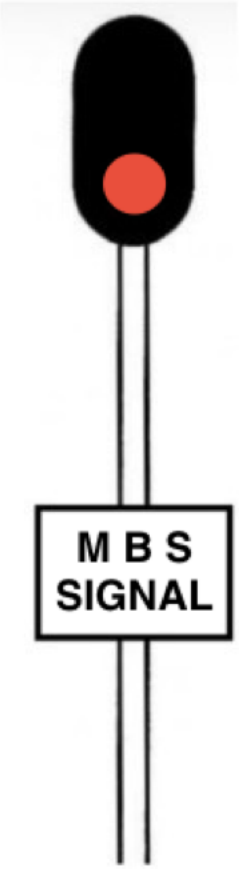
Name: STOP SIGNAL YELLOW LIGHT.

Indication: Stop before any part of train or engine passes the signal and fouling point.

Rule MBS 3 does not govern a train or engine when a member of the train or engine crew operated an approach switch that resulted in the signal aspect changing to display this aspect.

Number plate affixed to mast has no significance except to provide identification of signal and its location.

Block status: Occupied with a train in the same direction.



Rule MBS 4.

Aspect: Red signal with “MBS SIGNAL” letter plate.

Name: STOP SIGNAL.

Indication: Stop before any part of train or engine passes the signal and fouling point.

Number plate affixed to mast has no significance except to provide identification of signal and its location.

Block status: Occupied with a train in the opposing direction.

Following is a selection of additional miniature railway signal system rules that are related to the subject of this document.

GENERAL DESCRIPTION OF SIGNALS

Signal aspects are shown by the position of semaphore arms, color of lights, flashing of lights, position of lights, or any combination thereof. They may be qualified by number plate, letter plate, marker, shape and color of semaphore arms, or any combination thereof.

Day and night aspects for color light signals shall have the same colors as the night aspects of the semaphore signals.

Day and night aspects for position light signals shall have the same positions as the day aspects of the semaphore signals.

Block and interlocking signals, as far as practicable, are located to the right of, or over the track which they govern.

Where the semaphore is used, the governing arm is displayed to the right of the signal mast as viewed from an approaching train.

GENERAL SIGNAL RULES

250. Trains must comply with the indications of all signals which govern their movements. When visibility is restricted due to weather or other conditions trains must stop, if necessary, to determine indication of signals.

250(A). Unless otherwise provided, general, block and interlocking signal rules that refer to trains shall also apply to engines, movements and switching movements.

251. When two or more trains are approaching a signal that jointly governs their movements, the trains must stop before the signal and fouling point, and a thorough understanding must be had between the train crews as to the sequence in which the trains will be governed by the signal.

252. If a train fails to stop before the fouling point of a signal displaying a "Stop" indication, the front of the train must immediately be provided flag protection as prescribed by Rule 99.

253. Personnel must inform themselves as to the location of signals where the fouling point will be passed before the signal reached.

254. After a train has passed a signal displaying a proceed indication, the indication of the next signal may change to "Stop", and members of the train crew must be on the alert to observe it.

BLOCK AND INTERLOCKING SIGNAL RULES

260. On portions of the railway, trains will be governed by the indications of block signals and interlocking signals, whose indications will supersede the superiority of trains and authority to proceed granted by time table, train order or special instruction, except train orders or special instructions pertaining to a specific block or interlocking signal.

261. Unless otherwise provided, the approach switch for a block or interlocking signal must not be operated, unless a train is authorized by time table, train order or special instruction to proceed, Rule 240X is displayed by the signal and it has been ascertained that no other movement will act on the signals indication.

261(A). When Rule 240X is displayed by a signal and it has been ascertained that no other movement will act on the signals indication, a regular train governed by the signal may operate an approach switch before its schedule leaving time.

263. Unless otherwise provided, where indicated by signs or when required by special instructions, the block release switch must be operated when a train is leaving a block.

265. Unless otherwise provided, if a train stops or reduces speed within a block and is delayed such that it cannot be clear of the block in not more twice the time it normally requires to traverse the full length of the block, flag protection must immediately be provided as prescribed by Rule 99 against opposing and following trains.

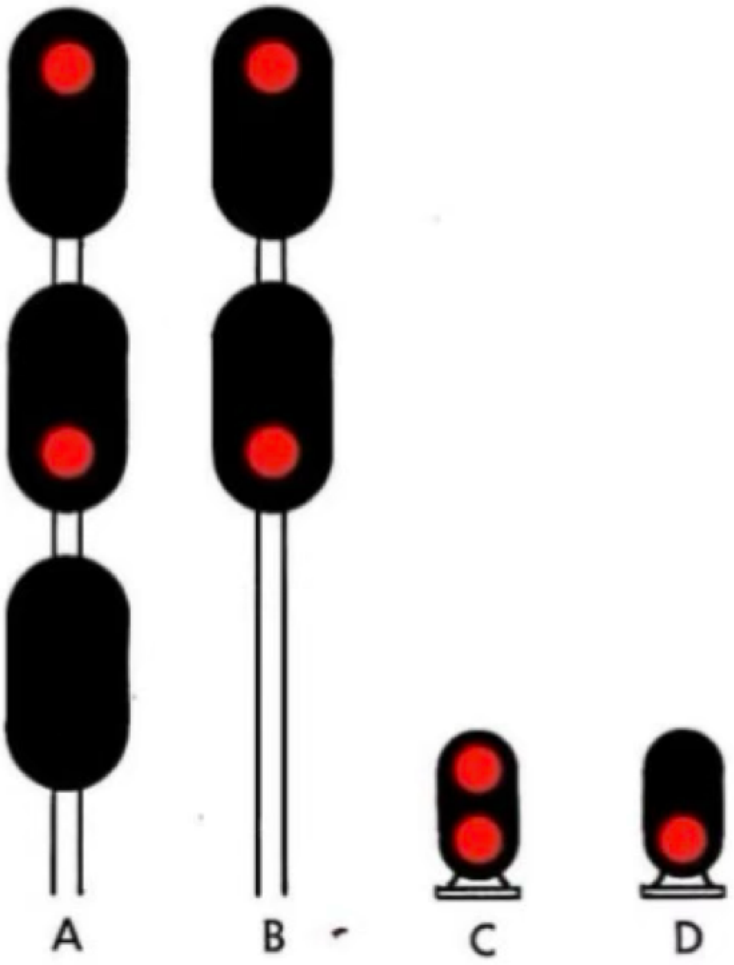
266. Unless otherwise provided, a reverse movement must not be made after proceeding on block or interlocking signal indications.

ADDITIONAL GENERAL RULES

704. Members of train crews must observe the indication displayed by block, interlocking, distant, train order and other signals that govern their movement, and keep a sharp lookout for signals displayed by other trains, and keep in mind the requirements of rules, time tables, train orders or special instructions affecting the movement of their train, and must call attention to or take necessary action to stop the train in event of any oversight or mistake.

The signal figures used for Rules MBS 1, 2, 3 and 4 were based on the following excerpt from the Chesapeake and Ohio Railway and Baltimore and Ohio Railroad rule book of April 27, 1969.

Rule 292.



NAME—STOP
INDICATION—STOP

A possible alternative to Rule MBS 1 if the miniature railway signal system is suitably designed.

Rule 240X.

Name: STOP AND OPERATE.

Indication: Stop before any part of train or engine passes the signal and fouling point, and operate the approach switch.

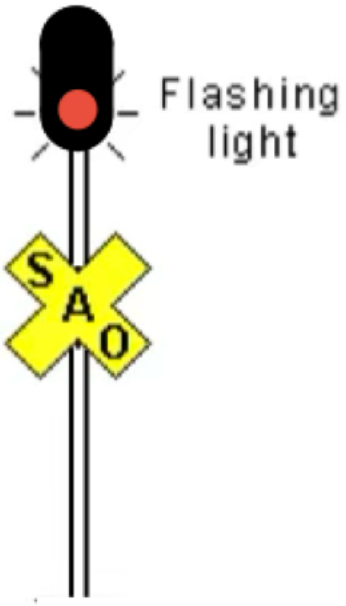
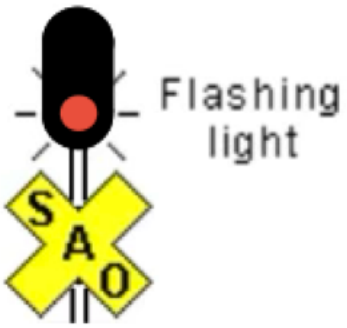
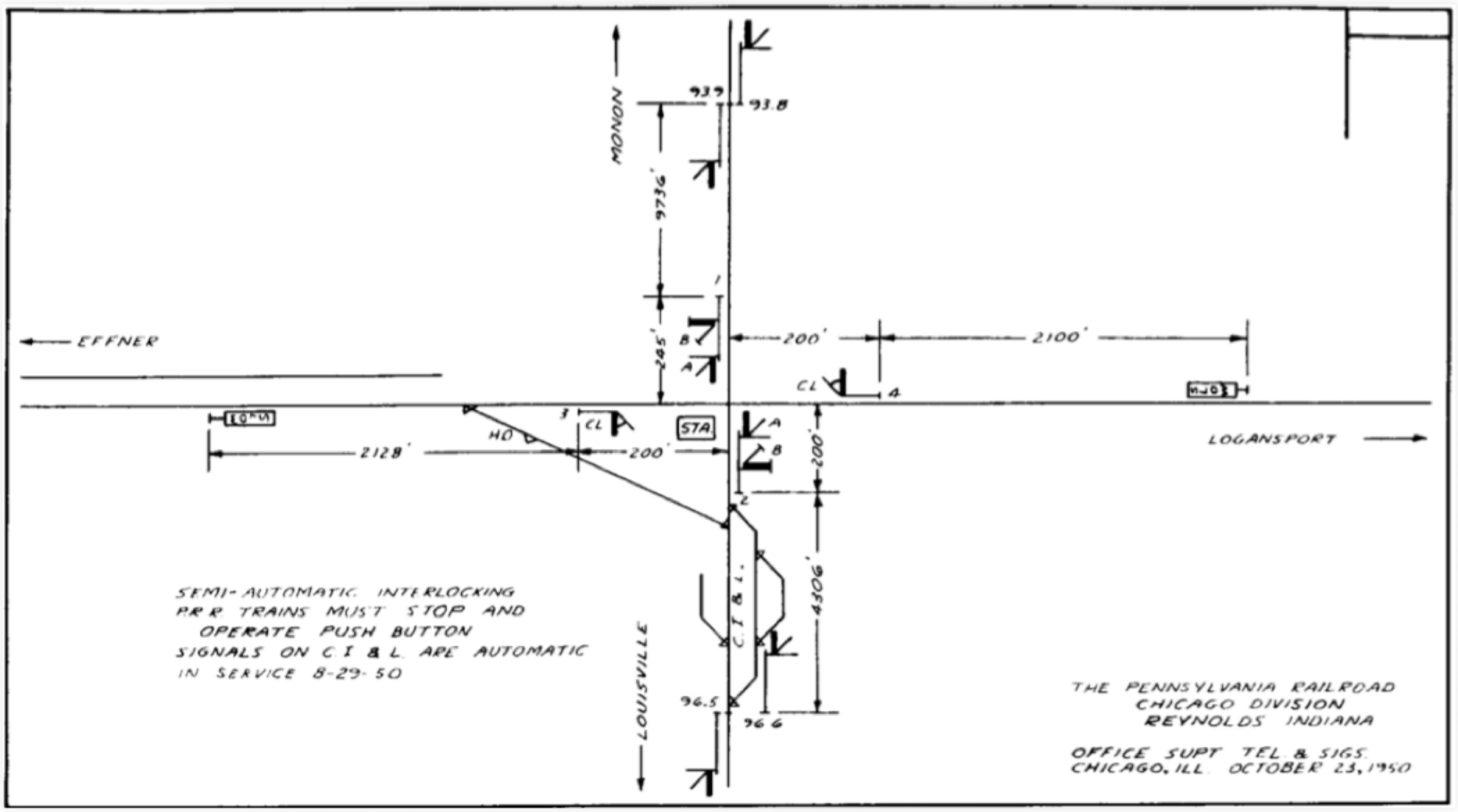


FIG. 1



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Rule 240X is used for the manual block signal system deployed on the Deerfield and Roundabout Railway.

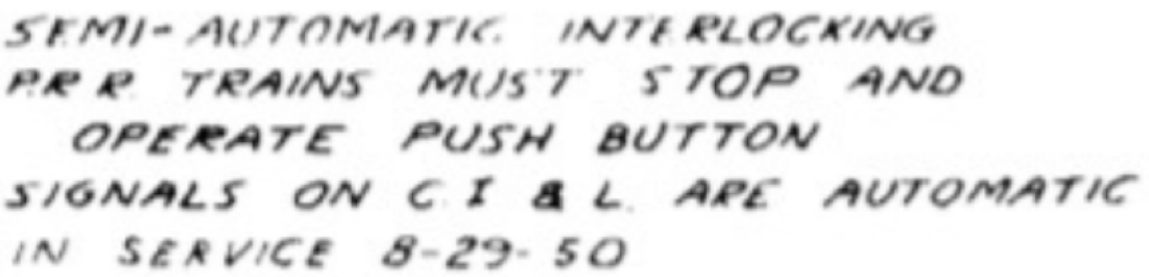


SEMI-AUTOMATIC INTERLOCKING
PRR TRAINS MUST STOP AND
OPERATE PUSH BUTTON
SIGNALS ON C I & L ARE AUTOMATIC
IN SERVICE 8-29-50

THE PENNSYLVANIA RAILROAD
CHICAGO DIVISION
REYNOLDS INDIANA

OFFICE SUPT TEL & SIGS.
CHICAGO, ILL. OCTOBER 23, 1950

Below shows enlargement of note at lower left on previously shown P.R.R. drawing showing "stop and operate" nomenclature that was also employed when developing the Deerfield and Roundabout Railway Transportation Rules.



The original use of the dark aspect on the Pittsburgh, Akron and Western miniature railroad and as used with Rule MBS 1 "Stop and Operate," follows best practices of railroad signaling in that the dark aspect by virtue of the application of Rule 27 is considered to convey a highly restrictive indication.

Typical circa 1945 standard code Rule 27, “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.”

For a miniature railway manual block signal system as previously presented, or similar in design thereto, the use of a green aspect instead of the dark aspect introduces an unnecessary confusing element to operating personnels fundamental understanding of railway signaling practices.

See PDF page 4 of this document and paragraph (d3).



THE LINE THAT
BUKER BUILT