
**Recommended Functional/Operating Guidelines for Automatic Block Signal
Circuits and Systems**
Revised 2025 (4 Pages)

A. Purpose

This Manual Part recommends functional/operating guidelines for automatic block signal circuits and systems. This instruction is not applicable to so-called distant or approach signals outside of a system.

B. General

1. Signals shall conform to Manual Part 2.1.1 Recommended Guidelines for the Application of Fixed Signals.
2. Track circuits shall conform to Communications & Signals Manual Section 8 Track Circuits.
3. Spring switch signaling shall conform to Manual Part 2.2.5 Recommended Functional/Operating Guidelines for Signal Protection at Spring Switches.
4. Whenever these terms are used in this Manual Part, the following shall apply:
 - a. Relay - Equal to any solid-state device which performs the same function.
 - b. One side of circuit - single break either positive or negative wire.
 - c. Both sides of circuit - break both positive and negative wires (double break).
5. Control circuits for home signal aspects with indications more favorable than Proceed at Restricted Speed shall be controlled automatically by track circuits extending through the entire block.
6. The battery or power supply for each signal control relay circuit, where an open-wire circuit or a common return circuit is used, shall be located at the end of the circuit farthest from the relay.
7. One side of the circuit controlling the lamps or LEDs of a light type signal shall be controlled through the neutral contacts of the "H" relay or equivalent. The lamp circuit of the Proceed aspect shall, in addition, be controlled through the "D" relay or equivalent contact of the polar "HD" relay.
8. Both sides of local operating circuit of a search-light type signal mechanism shall be controlled through contacts of the "H", "D", or "HD" relay, or equivalent solid state devices.

9. The circuit shall be so designed that:
 - a. The failure of any part of the circuit controlling the aspect intended to be displayed shall not cause the signal to display a more favorable aspect.
 - b. The failure of a lamp or LED in a light signal shall not cause the signal to display a more favorable aspect than intended.
10. Both sides of the home relay circuit shall be controlled through a switch circuit controller repeating relay connected to each switch, main track derail, and independently operated fouling point derail, when the fouling point derail is so equipped in the block. Exceptions are when:
 - a. The home relay is in the same signal enclosure as the switch repeating relay where single break may be used.
 - b. The track circuit is de-energized by the switch circuit controller.
11. When alternating current circuitry is used to control signal circuits, via line wire or the track, the frequency shall be selected to minimize interference or coupling with other adjacent circuits. Additional security such as coding may be desirable.

When audio frequency overlay circuitry is used to control signal circuits, the frequency shall be selected to minimize interference or coupling with other adjacent circuits. Additional security such as coding or modulation shall be provided for vital applications.
12. When signal control circuits are used in conjunction with a cab signal and/or train control system, the code form and frequency of track circuits shall be compatible with such system.
13. Any circuit used to transmit a signal control shall be selected as follows:
 - a. Where searchlight type signals are used, the circuit shall be selected through contacts connected with the signal operating mechanism or over relays which repeat the position of these contacts.
 - b. Where light type signals are used, the selecting circuits shall be selected through contacts in the same relays that control the lamps, or LEDs, or repeaters of them.
14. All control circuits, the functioning of which affects safety of train operation, shall be designed on the closed circuit principle, except circuits from automatic train stop systems.

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15. Each signal governing train movements into a block shall be controlled to display its most restrictive aspect when any of the following conditions exist:
 - a. Train, engine or car is in the block.
 - b. Points of a switch are not closed in correct position.
 - c. Independently operated fouling point derail equipped with switch circuit controller is not in derailing position.
 - d. Track relay is in de-energized position; or a device which functions as a track relay is in its most restrictive state; or when the signal control circuit is opened or de-energized.
 - e. Main track derail is in derailing position.
 - f. Detection of a failed vital function within the block, as required by the particular application.
 16. If an electric lock is used on a hand throw switch, it shall be controlled to prevent the switch from being unlocked unless the signals governing movements over the switch display the most restrictive aspect. Time or approach locking shall be provided.
 17. At hand-operated crossover between tracks, protection shall be provided to cause signals governing movements over either switch to display the most restrictive aspect when any of the following conditions exist:
 - a. Where protection is provided by one or more track circuits and switch circuit controllers, and either switch is open or the crossover is occupied by a train, engine or car in such a manner as to foul the main track.
 - b. Where facing point locks with a single lever are provided and either switch is unlocked.
 - c. Where the switches are electrically locked, after the unlock is requested and before the electric locking release, and if time is provided for release of lock, as soon as time starts to run.

Note: Protection shall be provided by one of the following:

- (1) An arrangement of one or more track circuits and switch circuit controllers.
- (2) Facing point locks on both switches of the crossover, with both locks operated by a single lever.

(3) Electric locking of the switches of the crossover.

18. On track signaled for movements in both directions, a train shall cause one or more opposing signals immediately ahead of it to display the most restrictive aspect, the indication of which shall be not more favorable than Proceed at Restricted Speed.

Signals shall be so arranged and controlled that if opposing trains can simultaneously pass signals displaying proceed aspects and the next signal in advance of each such signal then displays an aspect requiring a stop, or its most restrictive aspect, the distance between opposing signals displaying such aspects shall be not less than the aggregate of the stopping distances for movements in each direction.

Where such opposing signals are spaced stopping distance apart for movements in one direction only, signals arranged to display restrictive aspects shall be provided in approach to at least one of the signals. Where such opposing signals are spaced less than stopping distance apart for movements in one direction, signals arranged to display restrictive aspects shall be provided in approach to both signals.

In absolute permissive block signaling, when a train passes a head block signal, it shall cause the opposing head block signal to display an aspect with an indication not more favorable than stop.

19. Signal control and electric locking circuits shall not be selected through the contacts of instruments designed primarily for indicating or annunciating purposes in which an indicating element attached to the armature is arranged so that it can cause improper operation of the armature. Signal control and electric locking circuits are required to be selected through contacts of vital relays.
20. Contacts of non-vital relays shall not be used where failure of contacts, relay, or connections could cause bypass or elimination of vital safety checks.
21. External relay snubbing devices shall not be used where failure or ineffectiveness could result in an unsafe condition.
22. Diodes shall not be used for purposes, such as blocking, where failure or ineffectiveness could result in an unsafe condition.
23. Diodes shall not be used in control circuits, line or otherwise, where the potential exists that the rectification of undesired ac signals, present through contact or induced interference, could create sufficient energy to result in an unsafe condition.