

Signal & Train Control Compliance Manual

Part 233 Signal Reporting Requirements

Part 234 Grade Crossing Signal System Safety

Part 235 Instructions Governing Applications for Approval of a Discontinuance or Material Modification of a Signal System or Relief from the Requirements of Part 236

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PART 233 - SIGNAL SYSTEM REPORTING REQUIREMENTS

§ 233.1 Scope.

This section identifies the systems, methods, and appliances that are subject to the reporting requirements.

Application:

This rule subjects automatic block signal systems, traffic control systems, interlockings, automatic train stop, train control, and cab signal systems or other similar appliances, methods, and systems to the reporting requirements of this part. An automatic block signal system is a block signal system wherein the use of each block is governed by an automatic block signal, cab signal, or both.

A traffic control system is a block-signal system under which train movements are authorized by block signals or cab signals whose indications supersede the superiority of trains for both opposing and following movements on the same track.

A nonautomatic block signal system is a term used to denote any method of maintaining an interval of space between trains as distinguished from an automatic block signal system, a traffic control system, an automatic cab signal system without roadway signals, or time interval system.

An automatic train stop system is a system so arranged that its operation will automatically result in the application of the brakes until the train has been brought to a stop.

An automatic train control system is a system so arranged that its operation will automatically result in the following:

- (a) A full service application of the brakes which will continue either until the train is brought to a stop, or under control of the engineman, its speed is reduced to a predetermined rate.
- (b) When operating under a speed restriction, application of the brakes when the speed of the train exceeds the predetermined rate and which will continue until the speed is reduced to that rate.

Automatic train control systems includes those systems referred to as speed control systems.

An automatic cab signal system is a system which provides for the automatic operation of the following:

- (a) Cab signal, a signal located in engineer's compartment or cab, indicating a condition affecting the movement of a train and used in conjunction with interlocking signals and in conjunction with or in lieu of block signals, and
- (b) Cab indicator, a device located in the cab which indicates a condition or a change of condition of one or more elements of the system.

§ 233.3 Application.

This section makes this part applicable to each common carrier by rail subject to the Signal Inspection Act, 49 U.S.C.26.

Application:

Applies to each railroad that is part of the general rail system engaged in interstate commerce. Does not apply to rapid transit system or privately-owned system not transporting interstate commerce.

Does not apply to automatic classification yards or to highway-rail grade crossing warning devices.

§ 233.5 Accidents resulting from signal failure.

This section requires each carrier to report by toll-free telephone number 800-424-0201 within 24- hours of each accident/incident resulting from a false proceed signal indication or failure.

Application:

A false proceed signal indication or a false proceed failure is the failure of an appliance, device, method, or system to function or indicate as required by the RS&I that results in either a more favorable aspect than intended or a condition that is hazardous to the movement of a train.

CLASSIFICATION OF DEFECTS

233 0005 01 Accident/incident resulting from or involving failure of appliance, device, method, or system to function or indicate as intended, not reported to FRA within 24 hours after accident/incident

§ 233.7 Signal failure reports.

This section requires each carrier to report within 15 days each false proceed signal indication or failure.

Application:

A false proceed signal indication or a false proceed failure is the failure of an appliance, device, method or system to function or indicate as required by the RS&I that results in either a more favorable signal aspect than intended or a condition that is hazardous to the movement of a train.

This rule requires that each false proceed failure, including those resulting in an accident/incident, to be reported to FRA within 15 days on Form FRA F6180-14 in accordance with the instructions contained on the form.

CLASSIFICATION OF DEFECTS

233 0007 01 Report of failure of appliance, device, method, or system to indicate or function as intended not made on prescribed form within fifteen (15) days.

§ 233.9 Reports.

This section requires each carrier to file a "Signal System Five-year Report" not later than April 1, 1997 and every 5 years thereafter.

Application:

The intent of this rule is to require a five-year report of signal systems and methods of train operation no later than April 1 of every five years, beginning with the year 1997. The report is required to be filed on a form to be provided by FRA in accordance with the instructions on back of the form.

CLASSIFICATION OF DEFECTS

- 233 0009 01 Five-year signal system status report not filed prior to April 1.
- 233 0009 02 Five-year signal system status report not correct.

§ 233.11 Civil penalty.

This section prescribes a civil penalty for failure to file reports as required by this part.

Application:

This rule establishes that a carrier is liable for maximum penalty of \$2,500 for each offense or failure to file reports as required. Each day a failure or refusal to file continues is a separate offense.

§ 233.13 Criminal penalty.

This section prescribes a criminal penalty for filing a false report or other document required by this part.

Application:

The rule subjects any person, who knowingly and willfully makes, causes to be made or participates in the making of a false entry in an accident report, false proceed report or annual report required by this part to a fine of \$5,000 and/or two (2) years imprisonment.

HANDLING OF FALSE PROCEED SIGNAL REPORTS

In order to expedite the notification and investigation of false proceed failures, carriers have been instructed to submit false proceed reports directly to the regional offices.

Upon receipt of a false proceed report, the S&TC Specialist shall determine if the failure occurred within the region. If not, he or she should immediately furnish a copy of the report to the director of the region in which the failure occurred.

Failures reported by carriers that were caused by deposits on rails; defective relays, interlockings, or similar devices; broken or defective apparatus; equipment out of adjustment; errors in circuit design; circuits crossed or grounded; or cause undetermined, should be investigated. The S&TC Specialist in the region where the failure occurred shall determine the degree of any investigation. In addition, he or she shall determine if an investigation is warranted of all other such failures.

A narrative report of each false proceed investigation shall be filed. The narrative report should contain the following information:

- (1) First paragraph:

Date, time, and location of failure or alleged failure.

- (2) Second paragraph:

Type of system, technical description of the system, method of train operation, and maximum authorized speed.

- (3) Third paragraph:

Type, direction, and consist of train which observed false proceed signal failure.

(4) Fourth paragraph:

Signal number, aspect displayed, device that failed, cause of failure, show how the failure contributed to the false proceed signal indication or hazardous condition.

(5) Fifth paragraph:

What carrier action was taken and when.

(6) Sixth paragraph:

What action was taken by the inspector and when.

(7) Seventh paragraph:

State here when it is determined a false proceed failure did not occur.

Use additional paragraphs for other pertinent information that may be developed.

After the fifteenth of each month, the S&TC Specialist should prepare a summary report of the false proceed signal failures reported by carriers headquartered in his or her region. The summary report, the original of each false proceed report, Form FRA F 6180-14, and memorandum reports of failures investigated shall be forwarded to the Staff Director, Signal and Train Control Division, RRS-13, in Washington, DC.

PART 234 - GRADE CROSSING SIGNAL SYSTEM SAFETY

Compliance Policy

The purpose of these regulations is to provide for the safety of users of highway-rail grade crossings, including motor vehicle occupants, non-motorized vehicle users, and pedestrians. It is the policy of the Federal Railroad Administration to promote voluntary compliance with these minimum safety standards. Civil penalty sanctions may be employed as necessary to secure compliance, if voluntary compliance is not forthcoming.

In determining whether use of civil penalty sanctions is necessary, the inspector will take into consideration whether the railroad has installed and maintained the installation in a manner likely to provide for its proper functioning in the interval between required inspections and tests. The inspector shall also take into account the harsh environment in which the installation is required to function. Civil penalty sanctions should not be recommended for conditions that the railroad could not have prevented through use of due diligence, provided those conditions occurred subsequent to a previous inspection or test of the system.

Conditions that arise through no fault on the part of the railroad include, for example --

- o Gate arm breakage.
- o Lamp outage or damage to flashing light units due to mechanical damage.
- o Gate arm light not securely fastened to gate arm, due to mechanical damage.

In other cases, normal operation of the system may result in occasional component failure or lack of adjustment that is not predictable or reasonably preventable, for example --

- o Lamp outage due to normal burn out of filament, where outages represent failure at an expected rate due to expired service life.
- o Switch circuit controller connection loose at time of quarterly inspection.
- o Insulation in insulated joint in bad condition at time of quarterly inspection.
- o Switch circuit controller not securely fastened in place at time of quarterly inspection.

In summary, certain component failures may occur as a result of vandalism, inadvertent contact with the installation by motor vehicles, or lack of proper maintenance. In individual cases such as those cited above, the inspector should record a defect and the railroad will be expected to promptly remedy the condition as required by Section 234.207.

While certain conditions may seem minor in nature when viewed individually, any failure to correct could result in an activation failure, partial activation, or false activation. Accordingly, should the inspector encounter a pattern involving any such condition, indicating lack of proper inspection or maintenance, civil penalties should be employed as necessary. (See 49 CFR Part 209, Appendix A).

Subpart A - General

§ 234.1 Scope.

This part imposes minimum maintenance, inspection, and testing standards for highway-rail grade crossing warning systems. This part also prescribes standards for the reporting of failures of such systems and prescribes minimum actions railroads must take when such warning systems malfunction.

This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

§ 234.3 Application.

The following examples address specific types of rail operations and whether this rule applies to that operation:

(1) Rail freight operations - This part applies to all freight railroads which are part of the general railroad system of transportation. FRA's regulations generally exclude railroads whose entire operations are confined to an industrial installation, i.e., "plant railroads" such as those in steel mills that do not go beyond the plant's boundaries. However, even where a railroad operates outside of the general system, other railroads that are part of that system may have occasion to enter the first railroad's property. In that case the plant railroad would have to meet FRA's highway-rail grade crossing warning system standards if a general system railroad operated over the grade crossing. These regulations do not apply to a freight carrying railroad (and the highway-rail grade crossings over which it operates) which is not part of the general railroad system of transportation. Both public and private crossings that general system railroads operate over are covered by this part.

(2) Rail rapid transit - This part does not apply to rail rapid transit operations conducted over track that is used exclusively for that purpose and that is not part of the general railroad system of transportation. (Note: See FRA/FTA Shared Corridor Policy (Federal Register Volume 65, No. 132, July 10, 2000 for further information)).

(3) Rail passenger operations - This part does apply to passenger railroad operations if any of the following exists on the line of railroad: (a) a public highway-rail grade crossing that is in use; (b) an at grade rail crossing that is in use; (c) a bridge over a public road or waters used for commercial navigation; (d) or its operations are within 30 feet of those of any other railroad. If any of these conditions exist, all highway-rail grade crossings over which the railroad operates, both public and private crossings, are subject to this rule. It is important to note that the fact that a passenger railroad is not connected to the general railroad system does not in itself affect a railroad's duty to comply with this part. An analysis must be made as to the presence of the above mentioned factors.

When a manually operated highway-rail grade crossing active warning system contains components covered by this part, those components shall comply with the applicable rule requirements.

[\(Reference Technical Bulletin S-96-06\)](#)

§ 234.4 Preemptive effect.

Under 49 U.S.C. 20106 (formerly § 205 of the Federal Railroad Safety Act of 1970 (45 U.S.C. 434)), issuance of these regulations preempts any State law, rule, regulation, order, or standard covering the same subject matter, except a provision directed at an essentially local safety hazard that is consistent with this part and that does not impose an undue burden on interstate commerce.

§ 234.5 Definitions.

Activation Failure:

An activation failure is the failure of an active highway-rail grade crossing warning system to indicate the approach of a train at least 20 seconds prior to the train's arrival at the crossing, or to indicate the presence of a train occupying the crossing, unless the crossing is provided with an alternative means of active warning to highway users of approaching trains. (This failure indicates to the motorist that it is safe to proceed across the railroad tracks when, in fact, it is not safe to do so.)

A grade crossing warning system does not indicate the approach of a train within the meaning of this paragraph if:

(1) more than 50 percent of the flashing lights (not gate arm lights) on any approach lane to the crossing are not functioning as intended, or

(2) in the case of an approach lane for which two or more pairs of flashing lights are provided, there is not at least one flashing light pair operating as intended.

Back lights on the far side of the crossing are not considered in making these determinations.

It shall not be deemed an activation failure if alternative means, as set forth in Section 234.105, are used to provide warning to highway users approaching the crossing where an active warning system is inoperative.

Appropriately Equipped Flagger:

A person other than a train crewmember who is equipped with a vest, shirt, or jacket of a color appropriate for daytime flagging such as orange, yellow, strong yellow green or fluorescent versions of these colors or other generally accepted high visibility colors. For nighttime flagging, similar outside garments shall be retro reflective. Acceptable hand signal devices for daytime flagging include "STOP/SLOW" paddles or red flags. For nighttime flagging, a flashlight, lantern, or other lighted signal shall be used.

Inasmuch as Part VI of the Federal Highway Administrations's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) addresses standards and guides for flaggers and flagging equipment for highway traffic control, FRA recommends that railroads be aware of the standards and follow them to the greatest extent possible. Copies of the latest MUTCD provisions regarding flagging will be available from FRA, as well as FHWA, as changes are made in this area.

Credible report of system malfunction:

Specific information regarding a malfunction at an identified highway-rail grade crossing, supplied by a railroad employee, law enforcement officer, highway traffic official, or other employee of a public agency acting in an official capacity.

False Activation:

The activation of a highway-rail grade crossing warning system caused by a condition that requires correction or repair of the grade crossing warning system. (This failure indicates to the highway user that it is not safe to cross the railroad tracks when, in fact, it is safe to do so.)

Highway-rail grade crossing:

A location where a public highway, road, street, or private roadway, including associated sidewalks and pathways, crosses one or more railroad tracks at grade.

Partial Activation:

The activation of a highway-rail grade crossing warning system indicating the approach of a train, however, the full intended warning is not provided due to one of the following conditions:

(1) at non-gated crossings equipped with one pair of lights designed to flash alternately, one of the two lights does not operate properly (and approaching motorists can not clearly see flashing back lights from the warning lights on the other side of the crossing);

(2) at gated crossings, the gate arm is not in a horizontal position; or

(3) at gated crossings, any portion of a gate arm is missing if that portion normally had a gate arm flashing light attached.

Train:

One or more locomotives, with or without cars.

Warning System Malfunction:

An activation failure, a partial activation, or a false activation of a highway-rail grade crossing warning system.

Subpart B - Reports

§ 234.7 Accidents involving grade crossing signal failure.

This section requires each railroad to report each accident/incident (as defined in Section 225.5(b)(1) involving highway-rail grade crossing warning system activation failure, by toll free telephone number 800-424-0201, within 24 hours. This telephone report is not a substitute for other required written reports as appropriate.

Application:

An accident/incident, as defined in Section 225.5(b)(1), is an impact between on-track railroad equipment and an automobile, bus, truck, motorcycle, bicycle, farm vehicle, or pedestrian. When an accident/incident occurs, involving an activation failure of an active highway-rail grade crossing warning system, the telephone report must be made.

It shall not constitute an activation failure if on-track railroad equipment is not designed, equipped, and relied upon to activate such highway-rail grade crossing warning system.

An activation failure is as defined in Section 234.5.

CLASSIFICATION OF DEFECTS

234 0007 01 Impact involving a highway-rail grade crossing warning system activation failure not reported to National Response Center by telephone within 24 hours after occurrence.

234 0007 02 Telephone report not complete.

§ 234.9 Grade crossing signal system failure reports.

This section requires each railroad to report within 15 days each activation failure of an active highway-rail grade crossing warning system.

Application:

This section requires that each activation failure, including those resulting in an accident/incident (as defined in Section 225.5(b)(1), be reported to FRA within 15 days on Form FRA F6180.83 in accordance with the instructions contained on the form. The completed form shall be submitted to the FRA Regional Administrator of the region in which the railroad is headquartered.

An activation failure is as defined in Section 234.5.

It shall not constitute an activation failure if on-track railroad equipment is not designed, equipped, and relied upon to activate the highway-rail grade crossing warning system.

CLASSIFICATION OF DEFECTS

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| 234 | 0009 | 01 | Report of activation failure not submitted on prescribed form within 15 days. |
| 234 | 0009 | 02 | Report of activation failure incorrect or incomplete. |

Subpart C – Response to Reports of Warning System Malfunction

§ 234.101 Employee notification rules.

This section requires that each railroad issue rules requiring that its employees report malfunctions of highway-rail grade crossing warning systems to a designated railroad employee or employees, and that such reports shall be made by the quickest means of communications available.

Application:

The intent of this section is that each railroad issue to its employees rules that require its employees to report by the quickest means available, any activation failure, partial activation or false activation of a highway-rail grade crossing warning system. The railroad must designate a person or persons to whom all such reports must be made. The railroad may do so by inserting the information in their timetable, special instructions, general orders, etc.

CLASSIFICATION OF DEFECTS

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| 234 | 0101 | 01 | Rules not issued requiring railroad employees to report any malfunction of highway-rail grade crossing warning system to designated persons by quickest means available. |
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§ 234.103 Timely response to report of malfunction.

This section requires that once a credible report of a malfunction of a highway-rail grade crossing warning system has been received, the railroad having maintenance responsibility for the warning system shall promptly investigate the report. Further, if such malfunction is found to be caused by a faulty component, such component shall be adjusted, repaired, or replaced without undue delay, as required by Section 234.207.

A credible report of a highway-rail grade crossing warning system malfunction is defined in Section 234.5 as a report from a railroad employee, law enforcement officer, highway traffic official, or other employee of a public agency acting in an official capacity.

This section also requires that the railroad provide alternative means of warning highway traffic and railroad employees in accordance with Sections 234.105, 234.106 or 234.107, until such malfunction has been investigated and repair or correction of the warning system is completed, or the system is discontinued or dismantled.

This section specifies that nothing in these regulations forces a railroad to continually repair a warning system that, under state law, may be retired. However, a railroad must still comply with this Subpart during retirement proceedings. This section requires that until repair, correction, discontinuance, or dismantling of the system is completed, the railroad must comply with this part.

Application:

Each railroad must take prompt action to investigate any credible report of a malfunctioning highway-rail grade crossing warning system, and each malfunction shall be corrected without undue delay. This section does not require a railroad to continue to repair and maintain a highway-rail grade crossing warning system that might otherwise be discontinued under state laws. The railroad may elect to discontinue and disassemble the warning system, but until the warning system is physically removed, the railroad shall provide alternative means of warning the highway users and railroad employees.

CLASSIFICATION OF DEFECTS

234 0103 01 Credible report of highway-rail grade crossing warning system malfunction not promptly investigated.

234 0103 02 Action not taken to provide alternative means of warning highway users and railroad employees until repairs or correction of warning system is completed.

§ 234.105 Activation failure.

This section requires that a railroad having maintenance responsibility for a warning system take prompt action to provide alternative means of warning highway users and railroad employees at a specific crossing where a credible report of a system malfunction involving an activation failure has been received. This section further requires specific actions to be followed to provide that alternative warning.

Application:

When a railroad receives a credible report of a system malfunction involving an activation failure, it is required to take prompt action to notify train crews, and other railroads operating over such crossing, prior to the next train operation over the crossing. Further, the railroad is also required to notify the law enforcement agency having jurisdiction over such crossing, or the railroad police who are capable of responding to control vehicular traffic at the crossing. Finally, the railroad must take action to assure that its employees or a law enforcement agency provide the required alternative means of warning for highway users at the crossing.

A credible report of a highway-rail grade crossing warning system malfunction is defined in Section 234.5 as a report from a railroad employee, law enforcement officer, highway traffic official, or other employee of a public agency acting in an official capacity.

At crossings where it has been determined that the warning system is not functioning as intended, Section 234.207's requirement for adjustment, repair, or replacement without undue delay applies.

When the alternative warning consists of at least one uniformed law enforcement officer, one uniformed railroad police officer, or an appropriately equipped flagger for each direction of highway traffic at the crossing, trains may proceed over the crossing at normal speed. If an appropriately equipped flagger provides the alternative means of warning but there is less than one flagger for each direction of highway traffic available at the crossing, trains must not exceed 15 mph until the locomotive has passed over the crossing. If there is no appropriately equipped flagger, uniformed law enforcement officer, or uniformed railroad police officer to provide alternative warning, each train must stop and a member of the train crew must dismount the locomotive and flag highway traffic to a stop before the train occupies the crossing.

This section also requires that the locomotive audible warning device be activated in accordance with railroad rules when approaching a crossing where an activation failure has occurred. The reference to railroad rules has to do with the manner in which the horn is sounded. This section preempts any State or local "whistle bans" with respect to use of the horn under the circumstances addressed in the section.

CLASSIFICATION OF DEFECTS

- 234 0105 01 Train crew or other railroads operating over crossing not notified of activation failure prior to arrival of train at crossing.
- 234 0105 02 Law enforcement agency having jurisdiction or railroad police not promptly notified of activation failure.
- 234 0105 03 Alternate means of actively warning highway users not provided at crossing where credible report indicates activation failure has occurred.
- 234 0105 04 Train passed over crossing at normal speed without alternate means of warning being provided by the required number of appropriately equipped flaggers, uniformed law enforcement officer, or uniformed railroad police officer.
- 234 0105 05 Train passed over crossing at a speed of more than 15 mph with alternate means of warning not being provided by at least one appropriately equipped flagger for each direction of highway traffic.
- 234 0105 06 Flagger not equipped with required vest, shirt, or jacket.
- 234 0105 07 Flagger not equipped with required flagging equipment.
- 234 0105 08 Train failed to stop at crossing when the required alternate means of warning was not provided.
- 234 0105 09 After train stopped, crewmember failed to get off train and flag highway traffic to a stop when the required alternate means of warning was not provided.
- 234 0105 10 Locomotive audible warning device not sounded in accordance with the railroad's rules as train approached crossing where activation failure has been identified by a credible report.

§ 234.106 Partial activation.

This section requires that a railroad having maintenance responsibility for a warning system take prompt action to provide alternative means of warning highway users and railroad employees at a specific crossing where a credible report of a system malfunction involving a partial activation has been received. This section further requires that specific actions be followed to provide that alternative warning.

Application:

When a railroad receives a credible report of a system malfunction involving a partial activation, it is required to take prompt action to notify train crews and other railroads operating over such crossing prior to the next train operation over the crossing. Further, the railroad is also required to notify the law enforcement agency having jurisdiction over such crossing, or the railroad police who are capable of responding to control vehicular traffic at the crossing. Finally, the railroad must take action to assure that its employees or a law enforcement agency provide the required alternative means of warning for highway users at the crossing.

A credible report of a highway-rail grade crossing warning system malfunction is defined in Section 234.5 as a report from a railroad employee, law enforcement officer, highway traffic official, or other employee of a public agency acting in an official capacity.

When the alternative warning that is provided consists of at least one uniformed law enforcement officer, or one uniformed railroad police officer, or an appropriately equipped flagger for each direction of highway

traffic at the crossing, trains may proceed over the crossing at normal speed. If there is not an appropriately equipped flagger for each direction of highway traffic or at least one uniformed law enforcement officer or uniformed railroad police officer at the crossing, each train may proceed with caution through the crossing at a speed not exceeding 15 mph. A train may proceed at normal speed after its locomotive has passed over the crossing. Where a shoving movement is involved, a crewmember must be on the ground to flag the train through the crossing.

In lieu of complying with the alternative warning requirements listed above, a railroad may temporarily take the warning system out of service if the railroad complies with all requirements of Section 234.105, "Activation failure".

At crossings where it has been determined that the warning system is not functioning as intended, Section 234.207's requirement for adjustment, repair, or replacement without undue delay applies.

This section also requires that the locomotive audible warning device be activated in accordance with railroad rules when approaching a crossing where a partial activation has been reported. The reference to railroad rules has to do with the manner in which the horn is sounded. This section preempts any State or local "whistle bans" with respect to use of the horn under the circumstances addressed in the section.

CLASSIFICATION OF DEFECTS

- 234 0106 01 Train crew or other railroads operating over crossing not notified of partial activation prior to arrival of train at crossing.
- 234 0106 02 Law enforcement agency having jurisdiction or railroad police not promptly notified of partial activation.
- 234 0106 03 Alternate means of actively warning highway users not provided at crossing where credible report indicates partial activation has occurred.
- 234 0106 04 Train passed over crossing at a speed exceeding 15 mph without alternate means of warning being provided by the required number of appropriately equipped flaggers, uniformed law enforcement officers, or uniformed railroad police officers.
- 234 0106 05 Crewmember not on the ground at the crossing to flag train through the crossing in a shoving movement.
- 234 0106 06 Flagger not equipped with required vest, shirt, or jacket.
- 234 0106 07 Flagger not equipped with required flagging equipment.
- 234 0106 08 Warning system taken out of service without complying with the requirements of Section 234.105.
- 234 0106 09 Locomotive audible warning device not sounded in accordance with the railroad's rules as train approached crossing where partial activation has been identified by a credible report.

§ 234.107 False activation.

This section requires that a railroad having maintenance responsibility for a warning system take prompt action to provide alternative means of warning highway users and railroad employees at a specific crossing where a credible report of a system malfunction involving a false activation has been received. This section further requires that specific actions be followed to provide that alternative warning.

Application:

When a railroad receives a credible report of a system malfunction involving a false activation, it is required to take prompt action to notify train crews and other railroads operating over such crossing prior to the next train operation over the crossing. Further, the railroad is also required to notify the law enforcement agency having jurisdiction over such crossing, or the railroad police who are capable of responding to control vehicular traffic at the crossing. Finally, the railroad must take action to assure that its employees or a law enforcement agency provide the required alternative means of warning for highway users at the crossing.

A credible report of a highway-rail grade crossing warning system malfunction is defined in Section 234.5 as a report from a railroad employee, law enforcement officer, highway traffic official, or other employee of a public agency acting in an official capacity.

When the alternative warning that is provided consists of at least one uniformed law enforcement officer, or one uniformed railroad police officer, or an appropriately equipped flagger for each direction of highway traffic at the crossing, trains may proceed over the crossing at normal speed. If there is not an appropriately equipped flagger for each direction of highway traffic or at least one uniformed law enforcement officer or uniformed railroad police officer at the crossing, each train may proceed with caution through the crossing at a speed not exceeding 15 mph. A train may proceed at normal speed after its locomotive has passed over the crossing. Where a shoving movement is involved, a crewmember must be on the ground to flag the train through the crossing.

In lieu of complying with the alternative warning requirements listed above, a railroad may temporarily take the warning system out of service if the railroad complies with all requirements of Section 234.105, "Activation failure".

At crossings where it has been determined that the warning system is not functioning as intended, Section 234.207's requirement for adjustment, repair, or replacement without undue delay applies. This section also requires that the locomotive audible warning device be activated in accordance with railroad rules when approaching a crossing where a false activation has been reported. The reference to railroad rules has to do with the manner in which the horn is sounded. This section preempts any State or local "whistle bans" with respect to use of the horn under the circumstances addressed in the section.

CLASSIFICATION OF DEFECTS

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| 234 | 0107 | 01 | Train crew or other railroads operating over crossing not notified of false activation prior to arrival of train at crossing. |
| 234 | 0107 | 02 | Law enforcement agency having jurisdiction or railroad police not promptly notified of false activation. |
| 234 | 0107 | 03 | Alternate means of actively warning highway users not provided at crossing where credible report indicates false activation has occurred. |
| 234 | 0107 | 04 | Train passed over crossing at a speed exceeding 15 mph without alternate means of warning being provided by the required number of appropriately equipped flaggers, uniformed law enforcement officers, or uniformed railroad police officers. |
| 234 | 0107 | 05 | Crewmember not on the ground at the crossing to flag train through the crossing in a shoving movement. |
| 234 | 0107 | 06 | Flagger not equipped with required vest, shirt, or jacket. |
| 234 | 0107 | 07 | Flagger not equipped with required flagging equipment. |

234 0107 08 Warning system taken out of service without complying with the requirements of Section 234.105.

234 0107 09 Locomotive audible warning device not sounded in accordance with the railroad's rules as train approached crossing where false activation has been identified by a credible report.

[\(Reference Technical Bulletin S-96-08\)](#)

§ 234.109 Recordkeeping.

This section requires the railroad to keep a record of each credible report of a warning system malfunction. This section specifies the information that is to be recorded, and that each record shall remain on file and available for inspection by the FRA for a period of at least one year from the date of the last railroad activity in connection with such report.

Application:

Each railroad is required to keep a record of each credible report of a highway-rail grade crossing warning system malfunction. Such record may be kept on a form provided by the railroad or electronically. Each record shall contain the following information: (1) Location of crossing (by highway name and DOT/AAR crossing inventory number); (2) Time and date that the railroad received the report; (3) Action taken by railroad to comply with Section 234.105, 234.106, or 234.107; and (4) Time and date of action taken to make final repair or correction. If the system is dismantled and removed instead of repaired, the date of removal should be recorded.

Each record of a credible report of a warning system malfunction shall be kept and made available for inspection by the FRA for one year from the last date of action taken on each report. Thus, if the warning system is repaired and put back in service, the record shall be kept for one year from the date of the last repair to reactivate the system. If the system is dismantled and removed, the record shall be kept for one year from the date of the removal. The records required by this section may be kept at division offices or at a central location somewhere on the railroad.

CLASSIFICATION OF DEFECTS

234 0109 01 Record not kept of credible report of malfunctioning highway-rail grade crossing warning system.

234 0109 02 Record of credible report of malfunctioning highway-rail grade crossing warning system incomplete.

234 0109 03 Record of credible report of malfunctioning highway-rail grade crossing warning system incorrect.

234 0109 04 Record of credible report of malfunctioning highway-rail grade crossing warning system not kept for at least one year after the last recorded activity in response to the report.

Subpart D – Maintenance, Inspection and Testing

§ 234.201 Location of plans.

Plans are necessary for the proper installation, inspection, maintenance, testing, and repair of highway-rail grade crossing warning systems. Such plans are required to be legible and correct.

Application:

Plans shall be kept at each highway-rail grade crossing warning system location.

Such plans shall include but are not limited to: Layout of track; warning devices installed; control circuitry; approach lengths; approach circuits; and standby power type and capacity.

Plans are required to be legible and correct. Plans that are torn, faded or consisting of more than one change in colored pencil are not considered to be legible and/or correct. Manufacturer's manuals are not required by this section.

CLASSIFICATION OF DEFECTS

234	0201	01	Plans not kept at crossing location.
234	0201	02	Plans not legible.
234	0201	03	Plans not correct.

§ 234.203 Control circuits.

This section requires that all control circuits that affect the safe operation of a highway-rail grade crossing warning system shall operate on the fail-safe principle.

Application:

Includes all train detection track circuits and control circuits through which a highway-rail grade crossing warning system is activated. Fail-safe principle requires that such circuits shall operate so that the failure of any part or component shall cause the warning system to activate.

A crossing warning system activated by means other than train detection track circuit may not comply with this section.

CLASSIFICATION OF DEFECTS

234	0203	01	Control circuit that affects the safe operation of a highway-rail grade crossing warning system does not operate on the fail-safe principle.
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§ 234.205 Operating Characteristics of Warning System Apparatus.

This section requires the operating characteristics of electro-magnetic, electronic, or electrical apparatus of each highway-rail grade crossing warning system be maintained in accordance with the limits within which it is designed to operate.

Application:

Sections 234.247 through 234.271 of this part address those devices so important to the safety of highway-rail grade crossing warning systems that periodic tests and/or inspections are required to determine that their operating characteristics remain acceptable.

Applies to all electromagnetic, electronic, or electrical devices used in, or associated with, highway-rail grade crossing warning systems.

Each railroad should have specifications setting forth the pick-up values, release values, working values, and condemning limits of these values for all electromagnetic, electronic, or electrical devices in use in highway-rail grade crossing warning systems on their property.

Some examples of deficient operating characteristics are:

- (a) pick-up value too high.
- (b) pick-up value too low.
- (c) release value too high.
- (d) release value too low.

Manufacturer specifications, or railroad standards compatible with manufacturer specifications, shall be used to determine the values.

Some examples of devices covered by this rule but not requiring specific periodic tests are:

- (a) electronic train detection devices.
- (b) hold clear devices in gate mechanisms.

CLASSIFICATION OF DEFECTS

234 0205 01 Pick-up value of electromagnetic device not in accordance with the limits within which it is designed to operate.

234 0205 02 Drop-away value of electromagnetic device not in accordance with the limits within which it is designed to operate.

234 0205 03 Working values of electromagnetic, electronic, or electrical device not in accordance with the limits within which the apparatus is designed to operate.

234 0205 04 Operating characteristics of other electromagnetic, electronic, or electrical device not within prescribed limits.

§ 234.207 Adjustment, repair, or replacement of component.

This section requires a railroad to determine the cause of an active highway-rail grade crossing warning system failure, malfunction, or defective condition affecting the proper operation and/or ability of the system to warn highway users of an approaching train; and perform necessary adjustment, repair, or replacement without undue delay. Until such corrective action is completed, the railroad shall take, when necessary, the appropriate actions as described in Sections 234.105, 234.106 or 234.107.

Application:

An active highway-rail grade crossing warning system failure, malfunction, or defective condition means any essential component of such a system failing to perform its intended function.

A railroad is required to take action to determine the cause of each failure, malfunction, or defective condition and complete necessary adjustment, repair, or replacement without undue delay.

Because of the great variety of factors involved with failure, malfunction, or defective conditions of warning systems, including the location of the crossing, frequency of train movements, type of corrective action needed, availability of personnel, and other competing emergency situations; it is not practical to establish specific time limits for remedial actions. FRA continues to believe that the requirements of this section, taken together with the alternative protective measures required under Sections 234.105,

234.106, and 234.107, will provide the needed measure of safety. Therefore; "without undue delay" shall mean in as timely a manner as possible.

However, because temporary measures involve heightened risk to persons manually controlling motor vehicle traffic; and other risks (e.g., miscommunication between flaggers at multiple-track crossings), it is important that grade crossing warning systems be restored to proper functioning. The urgency associated with this need is a product of rail traffic, motor vehicle traffic, the configuration of the crossing, and other factors. FRA will expect railroads to restore warning systems to proper functioning without delay that is undue in relation to these safety considerations and, in general, as soon as possible.

CLASSIFICATION OF DEFECTS

234 0207 01 No action taken to determine the cause of active warning system failure, malfunction, or defective condition affecting the proper operation and/or ability of the system to warn highway users of an approaching train.

234 0207 02 Component causing active warning system failure, malfunction, or defective condition affecting the proper operation and/or ability of the system to warn highway users of an approaching train, not adjusted without undue delay.

234 0207 03 Component causing active warning system failure, malfunction, or defective condition affecting the proper operation and/or ability of the system to warn highway users of an approaching train, not repaired without undue delay.

234 0207 04 Component causing active warning system failure, malfunction, or defective condition affecting the proper operation and/or ability of the system to warn highway users of an approaching train, not replaced without undue delay.

234 0207 05 Train operation not in compliance with the applicable section 234.105, 234.106, or 234.107 until corrective action is completed.

§ 234.209 Interference with normal functioning of system.

This section requires the railroad to provide for the safety of highway users and/or train traffic before interfering, in testing or otherwise, with the normal functioning of any highway-rail grade crossing warning system.

Application:

The intent of this section is to ensure that railroads maintain the integrity of crossing warning systems by prohibiting procedures or practices which defeat or nullify the normal function of such systems.

Interference is any condition that circumvents, hinders, impedes, or diminishes whatsoever the intended warning of a system, and may be accomplished by testing, installing, repairing, replacing, operating, or manipulating a warning system component used in detecting the presence of or displaying warning of a train, or in indicating the operation of the warning system. There is no difference between accidental or intentional interference with respect to the enforcement of this section.

Tests of crossing warning systems must not be conducted until it has been ascertained provisions have been made for the safety of highway users and no train movements will be affected.

Interference includes but is not limited to:

- (1) Trains, locomotives, or other railroad equipment left standing within the warning system's approach circuit, other than normal switching operations, where the system is not designed to accommodate those activities.
- (2) Not providing alternative methods of maintaining safety for highway users and/or train movements while testing or performing work on the warning system or on track and other railroad systems or structures which may affect the integrity of the warning system.
- (3) Physically restricting gate arm operation (e.g. tying up, or blocking up gate arms).

It shall not be considered interference if a train is standing within a warning system's approach circuit waiting for a signal indication or other authority for movement. It shall not be considered interference, when in the course of normal testing, a shunt placed on the rail causes adjacent crossing warning systems to be activated.

Using manual over-rides to activate or deactivate a crossing warning system is not considered interference, as long as proper warning is provided to highway users.

Activation of a warning system during a normal movement through a crossing by on-track vehicles is not considered interference with the warning system. Intermittent activations during a normal movement through a crossing by on-track vehicles is not considered interference with the warning system, provided that the railroad's operating rules or other instructions provide for warning of highway users at the crossing. In general, measures taken for the safety of highway users and train traffic should be consistent with those specified in Sections 234.105, 234.106, and 234.107 of this part.

CLASSIFICATION OF DEFECTS

234 0209 01 Interference with normal functioning of warning system without taking measures to provide for the safety of highway users and train traffic.

§ 234.211 Security of warning system apparatus.

This section requires that all outdoor housings of highway-rail grade crossing warning system apparatus be kept locked, sealed, or secured against unauthorized entry.

Application:

This requirement includes warning system cases, light unit housings, gate mechanism housings, junction or terminal boxes, battery boxes, bell or audible warning devices, etc. Wrench locking or nut-locking with bell is acceptable.

CLASSIFICATION OF DEFECTS

234 0211 01 Warning system instrument case not secured against unauthorized entry.

234 0211 02 Other component housing not secured against unauthorized entry.

§ 234.213 Grounds.

This section requires that circuits which affect the proper functioning of a highway-rail grade crossing warning system are to be kept free of grounds equal to or in excess of 75 percent of the release value of any relay or electromagnetic device in the circuit. Track circuits, common return wires of grounded

common return single break circuits, and alternating current power distribution circuits grounded in the interest of safety are excluded.

Application:

Crossing control circuits designed to be ground free are required to be kept free of any ground having a current value equal to or in excess of 75 percent of the release value of any relay or electromagnetic device in the circuit. Electronic devices designed to be ground free shall be kept free of grounds having a value that affects the proper operation of the device. The railroad must take prompt action to correct a ground. There is no difference between an accidental ground and an intentional ground.

Extreme care shall be exercised when testing for grounds. Testing shall not be conducted while trains are approaching or passing, and the meter shall be watched at all times. If the meter indicates that a relay becomes energized, the meter shall be immediately disconnected. An unobserved meter shall never be left connected between a control circuit and ground.

Ground tests shall be performed at every instrument case or house inspected. The preliminary test shall be with a voltmeter connected from line or track arrestor ground to a track circuit which will prove the meter is operating and the integrity of the ground circuit.

AC power shall be interrupted during tests in order to check AC lighting circuits having DC standby.

CLASSIFICATION OF DEFECTS

234 0213 01 Circuit grounded sufficiently to permit flow of current equal to or in excess of 75 percent of the release value of relay or other electromagnetic device in circuit.

[\(Reference Technical Bulletin S-99-03\)](#)

§ 234.215 Standby power system.

This section requires railroads to provide a standby power source to operate the warning system for a reasonable length of time during a period of primary power interruption. The designated capacity shall be specified on the plans, as required by Section 234.201.

Application:

The intent of this section is that a railroad is required to install and properly maintain a standby power source in order to operate the system for a sufficient length of time during a primary power interruption.

The designated capacity specified on the plans shall include the number and ampere hour rating of batteries.

Determining the capacity of the standby power source will be at the discretion of each individual railroad. It is recommended that factors should be considered such as: the power demands of each particular location (taking into account urban or rural), the likelihood of discovery of the primary power outage (i.e. electronic notification devices, power-off indicators, employee discovery, etc.), the availability and proximity of maintenance employees, and the number of trains that are operated over the crossing.

THE FOLLOWING ARE SCENARIOS OF SEVERAL APPLICATIONS OF THIS SECTION:

(1) A primary power interruption unknown to and beyond the control of the railroad (e.g., blown fuses and opened circuit breakers at commercial power) and;

(a) During which the standby power source operated as designed, discovery of the power interruption was made and primary power was restored, or the standby power source became depleted but alternative warning was provided as required in Section 234.105; no violation is warranted.

(b) If discovery of the power interruption does not occur before the properly maintained standby power source becomes depleted and an activation failure does occur, no violation is warranted.

(c) If discovery of the power interruption occurs after depletion of standby power, and alternative warning or other power source is not promptly provided, a violation of Section 234.105 will normally be warranted.

(d) If the standby power source fails to operate to its designed capacity, a violation has occurred and consideration should be given to assessment of a civil penalty.

(2) A primary power interruption within control of the railroad (e.g., one caused by a defective condition of railroad power line wires, improper grounding, or power left manually interrupted) has occurred and;

(a) If discovery of the power interruption occurs and alternative warning is provided, other power source is provided, or power is restored, a violation is not warranted.

(b) It results in the standby power source becoming depleted and an activation failure occurs, a violation of this section is warranted.

CLASSIFICATION OF DEFECTS

234 0215 01 Standby power source not provided.

234 0215 02 Standby power source not of sufficient capacity to operate highway-rail grade crossing warning system during an interruption of the primary source of power.

234 0215 03 Standby power source not maintained to provide sufficient capacity to operate highway-rail grade crossing warning system during an interruption of the primary source of power.

§ 234.217 Flashing light unit.

This section requires that each flashing light unit be properly positioned and aligned, and be visible to a highway user approaching the crossing. Each flashing light unit shall be maintained to prevent dust and moisture from entering the interior of the unit. Roundels and reflectors shall be clean and in good condition. All light units shall flash alternately and the number of flashes per minute shall not be less than 35 nor more than 65.

Application:

The intent of this section, in part, is that at a minimum, flashing lights are expected to be visible to approaching highway users. Federal and State inspectors should normally defer to the judgement of the signal maintainer if that individual is acting consistent with established railroad policy or practice.

CLASSIFICATION OF DEFECTS

234 0217 01 Flashing light not visible to approaching highway user.

234 0217 02 Flashing light unit not maintained to prevent dust or moisture from entering the unit.

234 0217 03 Roundels or reflectors not maintained in good condition.

- | | | | |
|-----|------|----|---|
| 234 | 0217 | 04 | Flash rate less than 35 times per minute. |
| 234 | 0217 | 05 | Flash rate more than 65 times per minute. |
| 234 | 0217 | 06 | Flashing lights do not flash alternately. |

§ 234.219 Gate arm lights and light cables.

This section requires that each gate arm light be maintained in such condition to be properly visible to approaching highway users. It also requires that lights and light wire be secured to the gate arm.

Application:

This section applies to gate arm lights and light wires installed at active warning systems. Each gate arm light shall be visible to approaching highway users and pedestrians, if applicable. This section also requires that lights and light wires be securely fastened to each gate arm. The intent of this section is that lights and light wires shall be maintained in accordance with design specifications.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|---|
| 234 | 0219 | 01 | Gate arm light burned out or missing. |
| 234 | 0219 | 02 | Gate arm light unit defective, not visible, or missing. |
| 234 | 0219 | 03 | Light unit not securely fastened to gate arm. |
| 234 | 0219 | 04 | Gate arm light unit not maintained per design specifications. |
| 234 | 0219 | 05 | Light wires not securely fastened to gate arm. |

§ 234.221 Lamp Voltage.

This section requires that the voltage at each lamp shall be maintained at not less than 85 percent of the prescribed lamp rating.

Application:

See Section 234.253 for testing procedures for flashing light units. Gate arm lights are not subject to periodic testing requirements, however, if there is a question regarding gate arm light visibility (§234.219) a Federal or State inspector may request that voltage be verified by an appropriate test. When there is a need for gate arm lamp voltage to be verified, the voltage should normally be tested at the gate mechanism or suitable junction box. When the test is conducted with primary power removed, the lights should operate for not less than two minutes and not more than five minutes before lamp voltage readings are taken.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|---|
| 234 | 0221 | 01 | Lamp voltage on primary power less than 85 percent of prescribed lamp rating. |
| 234 | 0221 | 02 | Lamp voltage on standby power less than 85 percent of prescribed lamp rating. |

[\(Reference Technical Bulletin S-96-07\)](#)

§ 234.223 Gate Arm.

This section requires that each gate arm, when in the horizontal position, extend across each lane of approaching highway traffic and be maintained in a condition sufficient to be clearly viewed by approaching highway users. Each gate arm shall start its downward motion not less than 3 seconds after flashing lights begin to operate and assume the horizontal position at least 5 seconds before the arrival of any normal train movement through the crossing.

Application:

The required length of each gate arm is determined by the design length as indicated on the circuit plans. In the absence of a design length, the gate arm must extend across at least 90 percent of each lane of approaching highway traffic.

The "5 seconds" provision applies to the design and maintenance of warning systems to ensure the gates are horizontal for the normal operation of through trains. Switching movements that occupy grade crossings, or trains that stop short of grade crossings and then occupy such grade crossings after the warning system has timed out, must operate according to railroad operating rules or special instructions. When there is no conflicting highway traffic, such movements are not required to wait 5 seconds.

Trains operating over "island only" installations must operate in accordance with operating rules which ensure the gates are down and safety is provided for highway users.

As information, the MUTCD recommends that the gate arm will not be less than 3 feet 6 inches nor more than 4 feet 6 inches, measured from the crown of the highway surface, when the gate arm is in the full horizontal position. It further recommends that at a minimum, the gate arm shall be equipped with at least three red lights and when activated the gate arm light nearest the tip shall be illuminated continuously and the other two lights shall flash alternately in unison with the flashing light signals.

CLASSIFICATION OF DEFECTS

234	0223	01	Gate arm starts its downward motion less than 3 seconds after flashing lights begin to operate.
234	0223	02	Gate arm not in horizontal position at least 5 seconds (when required) prior to arrival of a train at the crossing.
234	0223	03	Gate arm does not extend across each lane of approaching highway traffic.
234	0223	04	Gate arm broken or missing.
234	0223	05	Gate arm not in horizontal position.
234	0223	06	Gate arm not maintained in a condition to be clearly viewed by approaching highway users.

§ 234.225 Activation of warning system.

This section requires that each highway-rail grade crossing warning system be maintained to activate in accordance with the design of the warning system, but in no event shall it provide less than 20 seconds warning time for the normal operation of through train movements before the crossing is occupied by rail traffic.

Application:

The "20 seconds" provision applies to the design and maintenance of warning systems to provide warning for the normal operation of through trains. Switching movements that occupy grade crossings, or trains that stop short of grade crossings and then occupy such grade crossings after the warning system has timed out, must operate according to railroad operating rules or special instructions. When there is no conflicting highway traffic, such movements are not required to wait 20 seconds.

Trains operating over "island only" installations must operate in accordance with operating rules which ensure the system is operating and safety is provided for highway users.

Rail traffic is considered to be equipment designed to activate the crossing warning system. A highway-rail grade crossing is considered to be occupied when rail traffic enters the highway-rail intersection.

Note: Defect 234.225.02 applies to instances where the system warning time differs significantly from the designed warning time.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|--|
| 234 | 0225 | 01 | Crossing warning system does not provide at least 20 seconds warning time. |
| 234 | 0225 | 02 | Crossing warning time not in accordance with the design of the warning system. |

§ 234.227 Train detection apparatus.

This section requires that train detection apparatus be maintained to detect a train, locomotive, or car which occupies any part of a train detection circuit, in accordance with the design of the warning system. It shall not be a violation if the presence of sand, rust, dirt, grease, or other foreign matter prevents effective shunting. When these conditions are known to exist, a railroad shall take appropriate action as required by Section 234.105.

Application:

For purposes of this section a train detection circuit is a dc, ac, or audio frequency track circuit, or a track circuit associated with a motion sensing device or constant warning time device that is used to detect the presence and/or motion of a train, locomotive, or car. For dc, ac, or audio frequency track circuits, the active portion of the train detection circuit includes all the trackage between the ends of the track circuit. For motion sensing device or constant warning time device, the active portion of the train detection circuit includes all the trackage between the crossing and the point where the device is designed to activate the warning system.

When crossing circuit plans show standby/backup train detection equipment installed at the crossing, such equipment shall be operational and function as intended.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|---|
| 234 | 0227 | 01 | Train detection apparatus does not detect a train, locomotive, or car occupying any part of the designed limits of the train detection circuit. |
| 234 | 0227 | 02 | Adequate measures to safeguard highway users and train operation not taken when it is known that a condition of sand, rust, dirt, grease, or other foreign matter exists that has prevented effective shunting of a track circuit when occupied by a train, locomotive, or car. |

§ 234.229 Shunting sensitivity.

This section requires that each highway-rail grade crossing train detection circuit shall detect the application of a 0.06 ohm resistance shunt when the shunt is connected across any part of the track rails of the train detection circuit.

Application:

Detection may or may not include activation of the warning system with a 0.06 ohm resistance shunt applied to the approach circuit(s). Detection shall include continuous activation of the warning system with a 0.06 ohm resistance shunt applied to any part of the island circuit(s). This section applies to all train detection circuits that utilize the track rails as part of the detection circuit.

For purposes of this section a train detection circuit is a dc, ac, or audio frequency track circuit, or track circuit associated with a motion sensing device or constant warning time device that is used to detect the presence and/or motion of a train, engine, or car. For dc, ac, or audio frequency track circuits, the active portion of the train detection circuit includes all the track between the ends of the track circuit. For motion sensing device or constant warning time device, the active portion of the train detection circuit includes all the trackage between the crossing and the point where the device is designed to activate the warning system.

CLASSIFICATION OF DEFECTS

234 0229 01 Train detection circuit does not detect the application of a shunt of 0.06 ohms resistance when the shunt is connected across the track rails of the circuit.

§ 234.231 Fouling wires.

This section requires that when a switch turnout located within a highway-rail grade crossing train detection circuit is equipped with fouling wires, those wires shall consist of two discrete conductors, and each conductor shall be of sufficient conductivity and maintained in such condition to ensure proper operation of the train detection circuit as required in Section 234.227.

Application:

This section applies only to installations where parallel fouling circuits are utilized as part of the highway-rail grade crossing warning system.

The installation of a single duplex wire with single plug as fouling wires is prohibited. The single plug constitutes a single conductor. Existing installations having single duplex wires with single plug for fouling wires may be continued in use until such time as they require repair or replacement.

Fouling circuits shall be maintained with the requirement of two fouling wires at the heel of the reverse switch point, toe and heel of the switch frog, and between the outer rails of the main track and turnout.

CLASSIFICATION OF DEFECTS

234 0231 01 Fouling wires do not consist of at least two discrete conductors.

234 0231 02 Fouling wires not of sufficient conductivity to detect occupancy when train detection circuit is shunted.

234 0231 03 Fouling wires not maintained in such condition to detect occupancy when train detection circuit is shunted.

§ 234.233 Rail joints.

This section requires that each non-insulated rail joint located within the limits of a highway-rail grade crossing train detection circuit be bonded by means other than joint bars and that the bonds be maintained in such condition to ensure electrical conductivity.

CLASSIFICATION OF DEFECTS

234 0233 01 Non-insulated rail joint located within the limits of highway-rail grade crossing train detection circuit not bonded to ensure electrical conductivity.

§ 234.235 Insulated rail joints.

This section requires that each insulated rail joint used in train detection circuits of a highway-rail grade crossing be maintained to prevent current from flowing between the rails separated by the insulation, in an amount sufficient to cause a failure of any train detection circuit.

CLASSIFICATION OF DEFECTS

234 0235 01 Insulated rail joint not maintained in condition to prevent current from flowing between rails separated by the insulation, in an amount sufficient to cause a failure of any train detection circuit.

234 0235 02 Insulation in insulated rail joint in bad condition.

§ 234.237 Reverse switch cut-out circuit.

This section requires that when a switch is equipped with a switch circuit controller connected to the point and interconnected with highway-rail grade crossing warning system circuitry, such switch circuit controller shall be maintained so the warning system can be cut out only when the switch point is within one-half inch of the full reverse position.

Application:

Tests shall be made by placing appropriate gauge between the reverse switch point and rail, 6 inches from the end of the point and applying pressure against the gauge until it cannot be removed.

Normally open contacts shall be open at least one sixteenth inch. The one sixteenth inch requirement applies to reverse contacts when the switch is in full normal position, or the normal contacts when the switch is in full reverse position.

This section applies specifically to highway-rail grade crossing reverse switch position cut-out circuits using switch circuit controllers. The switch circuit controller shall be securely fastened in place with its connections also securely fastened.

CLASSIFICATION OF DEFECTS

234 0237 01 Switch circuit controller contacts on hand-operated switch adjusted to cut out warning system when reverse switch point is open more than one-half inch.

234 0237 02 Contact opening of switch circuit controller contact less than one-sixteenth inch.

234 0237 03 Switch circuit controller not securely fastened in place.

234 0237 04 Switch circuit controller connections not securely fastened.

§ 234.239 Tagging of wires and interference of wires or tags with signal apparatus.

This section requires that each wire be tagged or otherwise so marked that it can be identified at each terminal. Tags and other marks of identification shall be made of insulating material and so arranged that tags and wires do not interfere with moving parts of apparatus.

Application:

Applies to each wire at each terminal in all housings including switch circuit controllers and terminal or junction boxes. This requirement does not apply to flashing light units, gate arm light units and other auxiliary light units.

Wiring shall be tagged or otherwise marked at a terminal. A terminal is any point where the wire terminates from its point of origin to and including the point of final termination. The wire may be tagged or marked in any manner so that it can be identified. All tag and wire identification shall correspond with the circuit plan. If it is necessary to pull the wire to identify it, the railroad is in non-compliance.

The local wiring on a solid state crossing controller rack will not require tags, as long as the wiring is an integral part of the solid state equipment.

CLASSIFICATION OF DEFECTS

234	0239	01	Wire not tagged or otherwise marked so that it can be identified at terminal.
234	0239	02	Nomenclature of tag or wire identification does not correspond to that of the circuit plan.
234	0239	03	Tag interferes with moving parts of apparatus.
234	0239	04	Wire interferes with moving parts of apparatus.
234	0239	05	Tag or other mark of identification in instrument case or apparatus housing not made of insulating material.

§ 234.241 Protection of insulated wire; splice in underground wire.

This section requires that insulated wire be protected from mechanical injury. The insulation shall not be punctured for test purposes. A splice in underground wire shall have insulation resistance at least equal to that of the wire spliced.

Application:

Insulated wire shall be placed in wire runs, strung on pole line or messenger, buried or otherwise protected in a manner that it cannot be damaged by the operation of apparatus, vehicles, tools, workers, or by the opening or closing of doors. No insulated wire or conductor, whether in housing or outside, shall be punctured for test purposes. Temporary installation of cable or wires on top of the ground must be made permanent as soon as practical.

CLASSIFICATION OF DEFECTS

234	0241	01	Insulated wire not protected from mechanical injury.
234	0241	02	Insulation of insulated wire punctured for test purposes.

234 0241 03 Splice in underground wire does not have insulation resistance value at least equal to that of the wire spliced.

§ 234.243 Wire on pole line and aerial cable.

This section requires that all wires be securely tied in on insulators that are properly fastened to a crossarm or bracket attached to a pole or fixture. Wires are required to be maintained clear of all other wires.

Open-wire transmission lines of 750 volts or more must be placed at least 4 feet above the nearest crossarm carrying highway-rail grade crossing control circuits.

Application:

Applies to all wires that affect the proper operation of highway-rail grade crossing warning systems, including AC power supply carried on pole line.

Particular attention should be given to vertical runs of cable. These are frequently found tied off at the top of the run, at which point the entire weight of the cable is self-supported. The cable is required to be supported throughout by messenger.

CLASSIFICATION OF DEFECTS

234	0243	01	Wire carried on pole line not securely tied in on insulator.
234	0243	02	Wire not secured because of broken, missing, or burnt pole.
234	0243	03	Wire not secured because of broken, missing, or burnt crossarm.
234	0243	04	Wire interferes with or is interfered with by another wire.
234	0243	05	Cable used aerially not supported on insulators or by messenger.
234	0243	06	Open wire transmission lines operating at 750 volts or more, less than 4 feet above nearest crossarm carrying highway-rail grade crossing control circuits.

§ 234.245 Signs.

This section requires that each sign mounted on a highway-rail grade crossing signal post or mast be maintained in good condition and be visible to the highway user.

Application:

This section applies to signs located at highway-rail grade crossings equipped with any type of active warning system.

CLASSIFICATION OF DEFECTS

234	0245	01	Sign not clearly visible to highway user.
234	0245	02	Sign not in good condition.
234	0245	03	Sign missing or not secure.

[\(Reference Technical Bulletin S-96-09\)](#)

§ 234.247 Purpose of inspections and tests; removal from service of relay or device failing to meet test requirements.

This section requires that the inspections and tests set forth in Sections 234.249 through 234.271 are required at highway-rail grade crossings with active warning systems located on in-service railroad tracks and shall be made to determine if the warning system and its component parts are maintained in a condition to perform their intended function.

If a railroad elects not to comply with the requirements of these sections because all tracks over the grade crossing are out of service or the railroad suspends operations during a portion of the year, and the grade crossing warning system is also temporarily taken out of service, a full inspection and all required tests must be successfully completed before railroad operations over the grade crossing resume.

Any electronic device, relay, or other electromagnetic device that fails to meet the requirements of tests required by this part shall be removed from service and shall not be restored to service until its operating characteristics are in accordance with the limits within which such device or relay is designed to operate.

Application:

The purpose of inspections and tests is to determine if operating characteristics of electronic devices, relays, or other electromagnetic devices are within specified values and that apparatus and equipment is being maintained in a condition to assure proper operation of warning systems at highway-rail grade crossings.

A railroad may elect not to comply with the requirements of these sections if tracks over the grade crossing are out of service or the railroad suspends operations during a portion of the year, and the grade crossing warning system is also temporarily taken out of service. A full inspection and all required tests must be successfully completed before railroad operations over the grade crossing resume.

CLASSIFICATION OF DEFECTS

234 0247 01 Electronic device, relay, or other electromagnetic device that fails to meet the requirements of specified tests not removed from service.

234 0247 02 Electronic device, relay, or other electromagnetic device that fails to meet requirements of specified tests restored to service with operating characteristics not in accordance with limits within which it is designed to operate.

§ 234.249 Ground tests.

This section requires a test for grounds on each energy bus furnishing power to circuits that affect the safety of highway-rail grade crossing warning system operation. The test shall be made when such energy bus is placed in service and at least once each month thereafter.

Application:

Ground tests are not required to be made on track circuit wires, AC distribution circuits grounded in the interest of safety, or common return wires of grounded common single break circuits. At some locations it may be necessary to remove the primary power when testing.

Use of an appropriate external battery source is an acceptable means of testing.

Test shall be made by measuring the voltage potential between each energy bus and a point known to be grounded with the warning system activated. Warning system activation is not necessary when each

warning system circuit is tested with an external battery supply. If a voltage potential is detected between energy bus and ground, a current reading shall be taken to determine whether the ground is in excess of that permitted by Section 234.213. In no case shall a reading be taken when a train is closely approaching or passing, nor shall a meter connected between an energy bus and ground be left unattended.

Tests shall be applied to each output circuit of those electronic devices installed to provide one or more individual isolated power supplies from a single common storage battery or power supply.

CLASSIFICATION OF DEFECTS

234 0249 01 Ground test not made on each energy bus furnishing power to circuits that affect the safety of warning system operation when such energy bus is placed in service and at least once each month thereafter.

[\(Reference Technical Bulletin S-99-03\)](#)

§ 234.251 Standby Power

This section requires that standby power be tested at least once each month.

Application:

Standby power shall be tested at least once each month to determine its capability to operate the warning system in instances of primary power interruption.

CLASSIFICATION OF DEFECTS

234 0251 01 Standby power not tested at least once each month.

§ 234.253 Flashing light units and lamp voltage.

This section requires that each flashing light unit be inspected when installed and at least once every 12 months for proper alignment and frequency of flashes in accordance with installation specifications. Lamp voltage is required to be tested when the system is installed and at least once every 12 months thereafter. Each flashing light unit shall be inspected for proper visibility, and for dirt and damage to roundels and reflectors at least once each month. A visual external inspection of flashing light unit is an acceptable means of compliance.

Application:

Part of this section requires lamp voltage to be tested when the system is installed and at least once every 12 months thereafter. Measuring lamp voltage at the base of a mast is an acceptable means for the railroad to perform the test on an annual basis, provided the railroad can determine 85 percent of the rated voltage at the lamp. However, FRA Inspectors or State Inspectors can observe a flashing light unit voltage test at any point in the system to determine compliance with Section 234.221. When there is a need for gate arm lamp voltage to be verified, the voltage measurement will normally be tested at the gate mechanism or suitable junction box.

It is acceptable for railroads to test lamp voltage with primary power applied or with standby power applied if they elect to do so. However, FRA Inspectors or State Inspectors can observe tests of lamp voltage with primary power or standby power applied, for compliance with Section 234.221. This section does not require periodic testing of gate arm lights.

When the test is conducted with primary power removed, the lights should operate for not less than 2 minutes and not more than 5 minutes before lamp voltage readings are taken.

CLASSIFICATION OF DEFECTS

- 234 0253 01 Each flashing light unit not inspected for alignment and frequency of flashes when installed and at least once every 12 months thereafter.
- 234 0253 02 Lamp voltage not tested when system is installed and at least once every 12 months thereafter.
- 234 0253 03 Each flashing light unit not inspected for proper visibility, and for dirt and damage to roundels and reflectors at least once each month.

§ 234.255 Gate arm and gate mechanism.

This section requires that each gate arm and gate mechanism be inspected at least once each month to determine compliance with Section 234.223. Gate arm movement shall be observed for proper operation at least once each month and hold-clear devices shall be tested for proper operation at least once every 12 months.

Application:

Hold-clear devices are not required to be tested for operating values. An observation of the hold-clear device to ensure that it is functioning properly is an acceptable means of testing.

CLASSIFICATION OF DEFECTS

- 234 0255 01 Gate arm and gate mechanism not inspected at least once each month.
- 234 0255 02 Gate arm movement not observed for proper operation at least once each month.
- 234 0255 03 Hold-clear device not tested for proper operation at least once every 12 months.

§ 234.257 Warning system operation.

This section requires that each highway-rail grade crossing warning system be tested for proper operation when the warning system is placed in service and at least once each month thereafter, and whenever modified or disarranged.

When a warning bell or other stationary audible warning device is used, it shall be tested for proper operation when placed in service. Thereafter it must be tested at least once each month and whenever modified or disarranged.

Application:

"Disarranged" includes, but is not limited to, situations in which a relay, circuit board, termination shunt, joint bypass coupler, or other electronic device is replaced with another; two or more conductors in a cable are severed; a cable or conductor in a warning system is replaced with another; or wires are removed at the same time from more than one terminal of a relay, electronic device, terminal board, or other vital component of a warning system. The extent of testing the warning system for proper operation will be dependent on the degree of modification or disarrangement. The use of a test switch or similar device is permissible while performing a routine test at least once each month.

CLASSIFICATION OF DEFECTS

234 0257 01 Highway-rail grade crossing warning system not tested to determine that it functions as intended when placed in service or when modified or disarranged.

234 0257 02 Highway-rail grade crossing warning system not tested at least once each month to determine that it functions as intended.

234 0257 03 Warning bell or other stationary audible warning device not tested when placed in service or when modified or disarranged.

234 0257 04 Warning bell or other stationary audible warning device not tested at least once each month.

[\(Reference Technical Bulletin S-96-10\)](#)

§ 234.259 Warning time.

This section requires that each highway-rail grade crossing warning system be tested for the prescribed warning time at least once every 12 months and when the warning system is modified because of a change in train speeds.

Application:

Testing can be accomplished by observation of a train movement, if practical, by calculation and track shunt simulation of a train movement, or by use of an electronic device that accurately determines warning time.

If calculation and track shunt simulation of a train movement is not practical for testing constant warning time devices and motion detection devices, observation of a train movement or use of an electronic device that accurately determines warning time can be used.

The calculation method would require that the maximum train speed be converted from miles per hour to feet per second. The resulting feet per second train speed would then be multiplied by a minimum of 20 (representing a minimum of 20 seconds warning time). This product would then represent a point, in feet, a minimum distance from the edge of the grade crossing where train detection by the warning system must occur to assure adequate warning time. A shunt must then be placed at that point to ensure that the system detects the presence of the shunt.

This section applies to all equipment (including standby units, if equipped) used in each highway-rail grade crossing warning system.

CLASSIFICATION OF DEFECTS

234 0259 01 Crossing warning system not tested for the prescribed warning time at least once every 12 months.

234 0259 02 Crossing warning system not tested for the prescribed warning time when warning system is modified because of a change in train speeds.

§ 234.261 Highway traffic signal pre-emption.

This section requires that highway traffic signal pre-emption interconnections, for which a railroad has maintenance responsibility, be tested at least once each month.

Application:

The pre-emption of a highway traffic signal requires an electrical circuit between the control device of the crossing warning system and the controller assembly of the highway traffic signal. The railroad will only be responsible for the maintenance and testing of its interconnections.

CLASSIFICATION OF DEFECTS

234 0261 01 Highway traffic signal pre-emption interconnections, for which a railroad has maintenance responsibility, not tested at least once each month.

§ 234.263 Relays.

This section requires that each relay which affects the proper functioning of a crossing warning system shall be tested at least once every 4 years thereafter, except:

- (1) Alternating current vane type relays, direct current polar type relays, and relays with soft iron magnetic structure shall be tested at least once every 2 years.
- (2) Alternating current centrifugal type relays shall be tested at least once every 12 months.

Application:

Applies to in-service relays used in vital circuits of highway-rail grade crossing warning systems. Does not apply to miniature non-vital relays or motor control and gate mechanism relays.

This section is applicable only to relays in service. A relay, after being tested or repaired, is not considered in service until it is installed in a warning system.

Use of an "in-service" relay that has broken glass, high resistance contacts, burnt contacts, burnt ribbons, broken or bent contacts, improperly installed ribbons, or evidence of moisture or other foreign matter inside its housing is not properly maintained and is prohibited.

Tests of operating characteristics include pick-up, release, and working values. They may be recorded in either voltage or current values.

CLASSIFICATION OF DEFECTS

234 0263 01 Tests of relay in service not made at least once every 4 years.

234 0263 02 Tests of AC vane type relay, DC polar type relay, or relay with soft iron magnetic structure in service, not made at least once every 2 years.

234 0263 03 Tests of AC centrifugal type relay in service not made at least once every 12 months.

§ 234.265 Timing relays and timing devices.

This section requires that each timing relay and timing device be tested at least once every 12 months. The timing shall be maintained at not less than 90 percent nor more than 110 percent of the

predetermined time interval. The predetermined time interval shall be shown on the plans or marked on the timing relay or timing device.

Application:

Timing relays and timing devices are essential components of time-out circuits which are primarily used for train switching movements at active warning system installations using conventional relay type train detection circuits.

Timing devices which perform internal functions associated with motion detectors, motion sensors, and grade crossing predictors are not subject to the requirements of this section.

CLASSIFICATION OF DEFECT

- | | | | |
|-----|------|----|---|
| 234 | 0265 | 01 | Timing relay or timing device not tested at least once every 12 months. |
| 234 | 0265 | 02 | Timing of timing relay or timing device less than 90 percent or more than 110 percent of predetermined time interval. |
| 234 | 0265 | 03 | Predetermined time interval not shown on plans or marked on timing relay or timing device. |

§ 234.267 Insulation resistance tests.

This section requires that insulation resistance tests be made when wires or cables are installed and at least once every 10 years thereafter.

Application:

Insulation resistance tests shall be made between all conductors and ground and between all other wires or conductors within a cable.

Track wires, line wires, and case wiring are excluded from the requirements of this rule.

Where a conductor is found with insulation resistance of less than 500,000 ohms, prompt action is required for repair or replacement of the defective wire or cable. Until repair or replacement, insulation resistance tests must be made annually. The reason for this provision is to allow lead time for acquisition of cable or scheduling of work forces. However, if material and work forces are available to effect repairs or replacement, corrective action shall be taken immediately.

Where a conductor is found with insulation resistance of less than 200,000 ohms, the conductor shall be either repaired immediately or removed from service.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|---|
| 234 | 0267 | 01 | Tests of insulation resistance not made when installed, within specified period, or at least once every 10 years. |
| 234 | 0267 | 02 | Action not taken to promptly repair or renew conductor having insulation resistance value less than 500,000 ohms. |
| 234 | 0267 | 03 | Circuit permitted to function on a conductor having insulation resistance value less than 200,000 ohms. |

§ 234.269 Cut-out circuits.

This section requires that each cut-out circuit be tested at least once every 3 months to determine that the circuit functions as intended.

Application:

For purposes of this section, a cut-out circuit is any circuit which overrides the operation of automatic warning systems. This includes reverse switch cut-out circuits and devices which enable personnel to manually override the operation of automatic warning systems.

This section is not applicable to key switches that manually activate the warning system.

CLASSIFICATION OF DEFECTS

234 0269 01 Cut-out circuit not tested at least once every 3 months.

§ 234.271 Insulated rail joints, bond wires, and track connections.

This section requires that each insulated rail joint, bond wire, and track connection be inspected at least once every 3 months.

Application:

Each insulated rail joint shall be inspected at least once every 3 months for compliance with Section 234.235.

Each bond wire shall be inspected at least once every 3 months for compliance with Section 234.233.

Each track connection shall be inspected at least once every 3 months to maintain the integrity of the warning system.

CLASSIFICATION OF DEFECTS

234 0271 01 Insulated rail joint, bond wire, or track connection not inspected at least once every 3 months.

§ 234.273 Results of inspections and tests.

This section requires that the results of inspections and tests be recorded on forms provided by the railroad, or by electronic means, subject to approval by the Associate Administrator for Safety. Each record shall show the name of the railroad, DOT/AAR inventory number, place and date, equipment tested, results of tests, repairs, replacements, adjustments made, and condition in which the apparatus was left.

Each record shall be signed or electronically coded by the employee making the test and shall be filed in the office of a supervisory official having jurisdiction.

Each record shall be retained until the next record for that test is filed, but in no case for less than one year from the date of the test.

Application:

Each inspection or test performed in compliance with the requirements as set forth in Sections 234.249 through 234.271 inclusive shall be recorded.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|--|
| 234 | 0273 | 01 | Record of tests and inspections not made. |
| 234 | 0273 | 02 | Tests and inspections not recorded on form or electronically. |
| 234 | 0273 | 03 | Record of tests and inspections not complete. |
| 234 | 0273 | 04 | Record of tests and inspections not filed with a supervisory official having jurisdiction. |
| 234 | 0273 | 05 | Record of test and inspection form does not show name of railroad, DOT/AAR inventory number, place and date, equipment tested, results of tests, repairs, replacements, adjustments made, condition in which apparatus was left, and signature or electronic code by employee making the test. |

[\(Reference Technical Bulletin S-99-06\)](#)

**Alternate Methods of Protection under
49 CFR 234.105(c), 234.106, and 234.107(c)
This is a summary-see body of text for complete requirements**

	Flagger For Each Direction Of Traffic	Police Officer Present	Flagger Present, But Not One For Each Direction of Traffic	No Flagger/ No Police
False Activation	Normal Speed	Normal Speed	Proceed with caution--maximum speed of 15 mph	Proceed with caution--maximum speed of 15 mph
Partial Activation*	Normal Speed	Normal Speed	Proceed with caution--maximum speed of 15 mph	Proceed with caution--maximum speed of 15 mph
Partial Failure**	Normal Speed	Normal Speed	Proceed with caution--maximum speed of 15 mph	Stop: Crewmember flag traffic and reboard

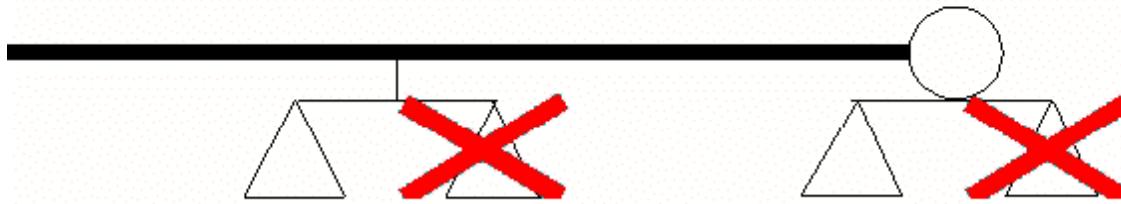
* Partial activation--full warning not given.

Non-gated crossing with one pair of lights designed to flash alternatively, one light does not work (and back-lights from other side not visible).

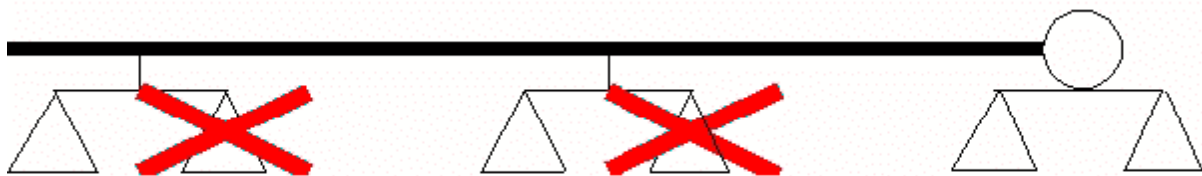
Gated crossing--gate arm not horizontal; or any portion of a gate arm is missing if that portion had held a gate arm flashing light.

**Activation failure includes--if more than 50% of the flashing lights on any approach lane not functioning; or if an approach lane has two or more pairs of flashing lights, there is not at least one pair operating as intended.

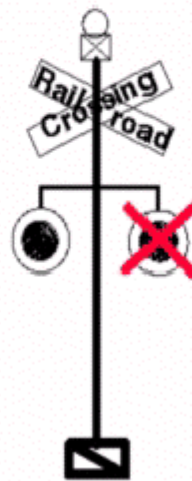
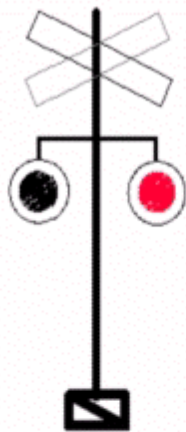
Activation Failure; Not one operating pair.



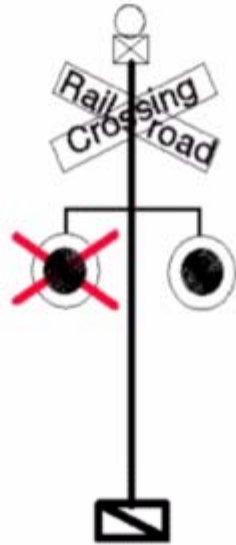
Partial Activation Failure; Full warning not given for each lane of approaching traffic.



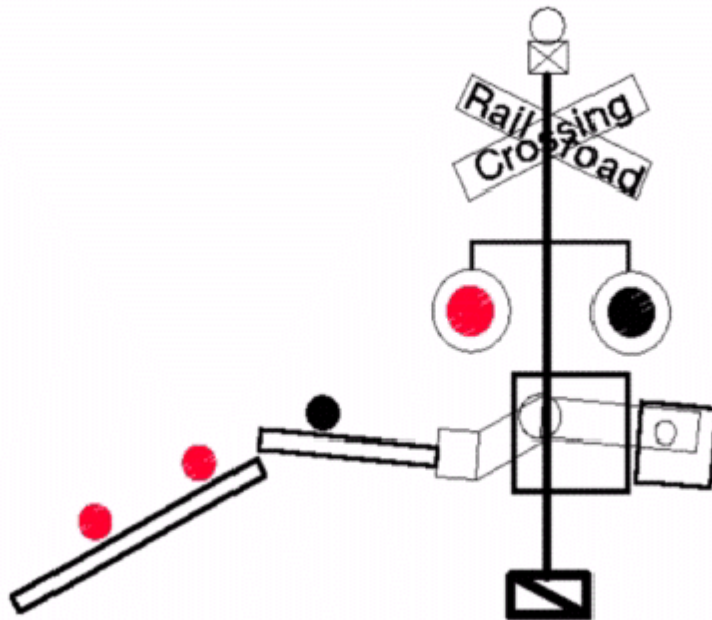
Track speed, facing pair of back lights visible to highway user



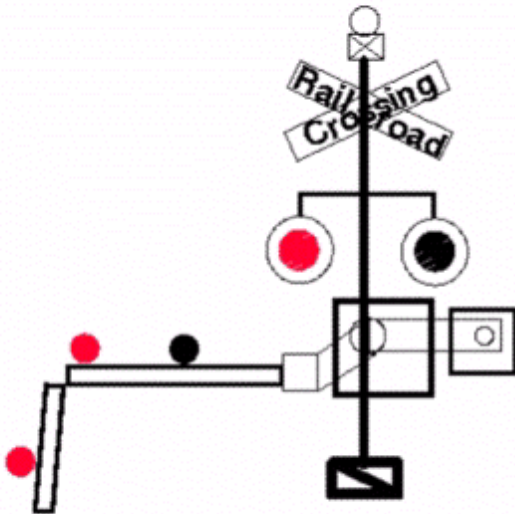
Partial Activation Failure, single pair of flashing lights on approach to crossing, no back lights visible.



Partial Activation Failure, gate arm broken holding flashing marker light.



Track Speed; Gate arm tip broken outside of flashing gate lights.



PART 235 - INSTRUCTIONS GOVERNING APPLICATIONS FOR APPROVAL OF A DISCONTINUANCE OR MATERIAL MODIFICATION OF A SIGNAL SYSTEM OR RELIEF FROM THE REQUIREMENTS OF PART 236

§ 235.1 Scope.

This section identifies those changes in S&TC systems, methods, and appliances that require FRA approval, those that are exempt from approval, and provides for relief from the RS&I.

Application:

This section is applicable to all block signal systems, interlockings, traffic control systems, automatic train stop, train control, or cab signal systems or other similar appliances, methods, or systems.

§ 235.3 Application.

This section makes this part applicable to each common carrier by rail subject to the Signal Inspection Act, 49U.S.C. 26.

Application:

Applies to each railroad that is part of the general railroad system of transportation.

Does not apply to rapid transit systems or privately owned systems not transporting interstate commerce.

§ 235.5 Changes requiring filing of application.

This section prescribes application for approval of discontinuance, decrease of limits of a system, or material modification, except as exempted in §235.7.

Application:

Except as provided in §235.7, an application must be filed to cover the discontinuance of a block signal system, interlocking, traffic control system, automatic train stop, train control, or cab signal system or other similar appliance or device. Except as provided in §235.7, an application must be filed to cover the decrease of the limits or modification of a block signal system, interlocking, traffic control system, automatic train stop, train control, or cab signal system.

Other similar appliances or devices are considered to be signal arrangements or protective devices such as slide detectors, high water detectors, or earthquake detectors that are interconnected with a signal system.

A signal arrangement is considered to be those signaling installations such as tunnel protection, spring switch protection, etc., that govern train movements but do not meet the requirements of Subpart B, C, or D.

This does not apply to automatic classification yards or highway-rail grade crossing warning devices.

Except as provided in §235.7, a material modification consists of but is not limited to the following:

1. Change in type of interlocking from manual to automatic.
2. Change in type of signal system from traffic control to automatic block, interlocking to traffic control, or traffic control to interlocking;

3. Re-spacing projects involving the removal of signals to reduce maintenance costs; or
4. Conversion of power-operated switches/derails to hand or spring operation.

CLASSIFICATION OF DEFECTS

235	0005	01	Discontinuance without FRA approval.
235	0005	02	Decrease of the limits without FRA approval.
235	0005	03	Material modification without FRA approval.
235	0005	04	Noncompliance with an order approving an application.
235	0005	05	Noncompliance with an order of FRA.

§ 235.7 Changes not requiring filing of application.

This section specifically identifies those changes permitted without FRA approval.

Application:

Signal changes not shown in this section are considered to be discontinuances, decrease of limits, or material modifications that require FRA approval.

§ 235.8 Relief from the requirements of Part 236.

This section provides for relief from any requirement contained in the RS&I.

Application:

The provisions of this section were formerly contained in §236.0. Relief from the requirements of the RS&I previously granted to any carrier constitutes relief to the same extent as relief granted under the requirements of this Part.

§ 235.9 Civil penalty.

This section establishes a civil penalty for failure to comply with the requirements of this Part.

Application:

Where, for any reason, a carrier does not file an application to cover a discontinuance, decrease in limits, or a material modification, this section prescribes a maximum civil penalty of \$2,500. Each day a failure to file continues is a separate offense.

§ 235.10 Contents of applications; and

§ 235.12 Additional required information-prints.

These sections set forth the information that is required when submitting an application.

Application:

These sections itemize the information that is required on block signal applications and applications for relief from the RS&I.

§ 235.13 Filing procedure.

This section sets forth the procedure for filing an application.

Application:

This section prescribes the manner in which block signal applications and applications for relief are to be filed.

At a joint facility, where the proposed changes affect more than one carrier, the application must be executed between the joint carriers before submitting to FRA.

At a joint facility, where the proposed changes or relief sought affect only one carrier, that carrier shall certify when filing that the other joint carriers have been notified of the application.

§ 235.14 Notice.

This section provides for the posting of a public notice in connection with the filing of each application or request for reconsideration.

Application:

The FRA will post a public notice of the filing of an application or request for reconsideration of an application in the FRA Office of Public Affairs. This public notice may be examined at FRA's Headquarters in Washington, DC. during regular business hours. A copy of each public notice will be mailed to all interested parties.

§ 235.20 Protests.

This section provides for the protest against granting of any application.

Application:

This rule prescribes the method and procedure for filing a protest against granting a block signal application or an application for relief from the requirements of the RS&I. Protests not filed in the prescribed time limit may not be considered.

INVESTIGATION OF APPLICATIONS

A thorough investigation and a complete report are required on each application for relief from the requirements of the Rules, Standards and Instructions (RS&I-Ap) and on each application for approval of a discontinuance or material modification of a block signal system, interlocking, automatic train stop, train control, and cab signal device (BS-Ap).

The information submitted by the carrier in accordance with the provisions contained in "Instructions Governing Applications for Approval of a Discontinuance or Material Modification of a Signal System or Relief from the Requirements of Part 236", (49CFR 235), will form the basis for report on each BS-Ap and RS&I. This information should be checked at the time of investigation to insure that it is correct for use in the preparation of the report and in order that additional information, if necessary to complete the report, may be obtained promptly. Two copies of this information are provided with each application assigned for field investigation. One copy is to be retained in the inspector's file.

Each application should be promptly investigated and field investigation report prepared and mailed in time to reach the Headquarters Staff in Washington, DC, prior to the closing date shown on the Public Notice.

The field investigation report shall be prepared on the Inspector's "Report Form for BS-Ap and RS&I-Ap Applications" according to the instructions contained herein.

On the first line, the FRA docket number should be inserted, the type "RS&I-Ap" or "BS-Ap" should be struck out as appropriate, and the filing date inserted. The filing date is the date the application was received in headquarters and is stamped on the application letter.

On the second line, insert the inspector's name, headquarters location, and date the report is prepared.

On the third line, insert the name of the railroad filing the application. In case of joint applications, each railroad that is a party to the application shall be shown. Do not show the name of the railroad official filing the application or the address of the carrier.

On the fourth and fifth lines, show the required information. Be sure to show the carrier or organization with which the representatives are associated.

In paragraph (a), the inspector certifies whether or not the Public Notice is correct by placing an "X" in the appropriate parenthesis. Where the Public Notice is found to be in error, the inspector should insert the correct language. It is also recommended that the inspector edit the correction into a copy of the Public Notice and return it with the report.

In paragraph (b), the inspector should identify other railroads that operate in the facilities involved through joint ownership, trackage rights, tenant agreement, switching agreement, etc., that will be affected by the proposed changes but were not shown in the Public Notice. The inspector should describe the manner in which each railroad will be affected. In addition, the inspector should determine whether the carriers have been made party to the application or duly notified of the proposed changes or relief as required.

In paragraph (c), the inspector should identify any additional documents obtained during the field investigation and included as part of the field report. A timetable, or a copy of the scheduled page involved, along with applicable special instructions should be included with each application.

Photographs of the application area and related devices should be included to assist the Safety Board in its deliberations.

Paragraphs (d) 1, 2, 3, 4, and 5 shall be prepared on pages 1a, 1b, 1c, etc., as necessary.

In (d) 1, the inspector should provide a thorough technical description of the existing signal installation and equipment (i.e: derails, defect detectors, and other pertinent devices). Descriptions of terrain, methods of operation, etc., should be avoided. Examples of technical descriptions required are: "An automatic block signal system on two main tracks arranged for movements with the current of traffic having US&S P-5 color light type signals controlled by D.C. non-coded track and line circuits;" or, "A traffic control system on a single main track having US&S H-2 searchlight type signals and US&S M-23 electric switch machines controlled by D.C. coded track circuits operated from a GRMS CAD control machine located in Springfield, Missouri;" or, "A manual interlocking having GRMS Model 2A upper quadrant semaphore signals and GRMS Model 5A electric switch machines controlled by d.C. non-coded track and line circuits operated from a 27- lever GRMS Model 2 interlocking machine."

In (d) 2, the inspector should describe the proposed changes or relief requested.

In (d) 3, the inspector should describe any proposed changes not described in the Public Notice. Do not use this paragraph for correction of mechanical errors corrected in paragraph (a).

Use this paragraph to describe the proposed changes where the Public Notice does not clearly do so.

In (d) 4, the inspector should provide an adjective description of the present and proposed methods of operation. The inspector should also describe the methods of operation on the trackage on either side of the limits covered by the application.

The inspector should verify the present method of operation with the carrier's timetable and operating rules.

The proposed method of operation should include specific details and procedures at locations such as an unprotected crossing at grade or unprotected moveable bridge.

Do not show operating rules as methods of operation. Examples of adjective description are: "The present method of operation is by timetable and train orders supplemented by the indications of an automatic block signal system. The proposed method of operation is by signal indications of a traffic control system;" or, "The present method of operation is by timetable, train orders, and signal indications of an automatic block signal system on two main tracks arranged for movements with the current of traffic. The proposed method of operation is by signal indication of a traffic control system;" or, "The present method of operation is by signal indications of an automatic interlocking and will not be affected by the proposed changes."

In the second paragraph of (d) 4, the inspector should describe the daily number of trains or other movements in the area involved. Train averages should be based on a 30-day period that is representative of normal traffic. Avoid periods having seasonal traffic, such as grain harvests, planting seasons, or a period of train detours. Train movements should be expressed distinguishing passenger trains from freight trains; through freight trains from local switchers.

Train movements may be expressed in columned format or adjectivally. Where the average number of trains is less than one daily, show the average number per week.

Train movements should be broken down separately for each carrier operating over the application area.

The areas of operation for local train movements should be specifically defined if they do not operate over the entire application area.

Where there are numerous switching movements in terminal or yard areas, the number of switch engine assignments daily may be shown.

The inspector should make a best effort to determine the potential for traffic or interchange growth on the line.

The inspector should note whether the involved trackage is subject to detours, and should state the last 2-year detour history.

In addition it should be noted whether the involved trackage is part of the Strategic Rail Network (STRACNET).

The last paragraph of (d) 4, should address speed restrictions and authorizations. The present and proposed maximum authorized speeds should be shown. Where various speeds are prescribed for different trains, the trains should be identified, e.g., passenger trains, TOFC or van trains, hazardous materials trains, and other freight trains but not including work trains, cranes, scale cars, etc. Speed restrictions that have a bearing on the proposed changes should be identified.

The inspector should reconcile that any proposed maximum authorized speed corresponds with the proposed method of operation.

In (d) 5, the inspector should state in the first paragraph whether or not the National Railroad Passenger Corporation (Amtrak) operated trains over the trackage involved in the application on February 1, 1979.

The second paragraph of (d) 5, should show the number of hazardous materials cars transported annually over the trackage involved in the application. Any discrepancies in carrier's hazardous material information must be reconciled.

When applicable, the third paragraph of (d) 5, should show the BS-Ap or RS&I-Ap number filed concurrently with the application.

In subsequent paragraphs of (d) 5, the inspector should provide additional information deemed necessary to fully understand the proposal such as changed traffic patterns and their causes, design problems, maintenance practices, obsolescence, vandalism, terrain, adverse weather conditions, etc.

On page 2, the inspector should complete items (e) and (f) on BS-Ap's only.

In (e) 1, describe the work, if any, found accomplished in connection with the proposed changes.

In (e) 2, the inspector should provide complete details on proposed changes found placed in service without approval. Use additional pages if more space is needed, numbering them 2a, 2b, 2c, etc.

In (f), the inspector should show whether or not the proposed changes of a BS-Ap will comply with the requirements contained in RS&I. If not, identify the rule number and provide details on the deficiency.

In (g), the inspector should check the appropriate description which most aptly states the consequences, in the inspector's opinion, should the proposed changes or relief be approved. The inspector's opinion and reasoning should not be based on personal preferences, but fairly and impartially within the guidelines and provisions contained in the RS&I and with due regard for the safety of train operation.

In (h), the inspector must provide a recommendation as to the disposition of the application. Keep in mind that this is where the initial agency policy begins concerning the proposed changes. The inspector may recommend approval of the application be granted; approval of the application be granted in part, denied in part; approval of the application be denied; or, approval of the application be granted with provisions. The inspector must state the reasons upon which his or her recommendations are based. Where provisions are recommended, the inspector should clearly support the need for each provision. Use additional pages if more space is necessary, numbering 2a, 2b, 2c, etc.

The investigative report should be based on factual remarks and documented information, and should support the inspector's ultimate conclusion and recommendation. Ambiguous statements should be avoided.

Inspectors are encouraged to insert appropriate information on the plans furnished with the applications. Notations on the plans are to be made in lead pencil and initialed. In no case shall a plan be marked in color.

In (i), the appropriate Regional Signal and Train Control Specialist, after reviewing the inspector's report, should make a recommendation as to the disposition of the application. If the Specialist's recommendation differs from that of the inspector, the Specialist should state the reasons and provide additional information if necessary.

Every March and September, inspectors shall submit Progress and Completion Report, Form FRA F6180.50 for each BS-Ap until completed. Progress and Completion Reports are not required for RS&I-Ap's. When progress and completion reports indicate that a railroad has not started or completed approved changes, FRA may request that railroads withdraw the BS-Ap.

2. If any of the proposed changes have been placed in service, give description of such changes, date such changes were placed in service and the reasons for making the changes before approval of the application.

(f) Will proposed changes conform to the Rules, Standards and Instructions?

If not, state the rule number and in what respect they fail to conform.

(g) Inspector's opinion: The proposed changes will:

- Reduce protection and safety.
- Provide adequate protection for existing operating conditions without materially reducing safety.
- Maintain the existing protection and safety.
- Increase protection and safety.

State reasons:

(h) Inspector's recommendation as to disposition of application.

State reasons:

Inspector

(i) Regional S&TC Specialist's recommendation as to the disposition of the application.

If different than Inspector's; state reasons:

Regional S&TC Specialist

PART 236 - RULES, STANDARDS, AND INSTRUCTIONS GOVERNING THE INSTALLATION, INSPECTION, MAINTENANCE, AND REPAIR OF SIGNAL AND TRAIN CONTROL SYSTEMS, DEVICES, AND APPLIANCES.

§ 236.0 Applicability of this Part.

This section specifies that the Rules, Standards and Instructions (RS&I) apply to each railroad that operates on standard gauge which is part of the general system of railroad transportation. Further, this section also prescribes the criteria requiring the installation of block signal systems, automatic train stop, train control, or cab signal systems.

Application:

This rule requires that a block signal system complying with the RS&I or a manual block system complying with the provisions of this section be installed where passenger trains operate at 60 or more miles per hour or freight trains operate at 50 or more miles per hour. Further, an automatic train stop, train control, or cab signal system shall be installed where any train operates at 80 or more miles per hour.

This section details how a manual block system shall operate and requires that it be permanently in effect, i.e., all trains must be operated by manual block system rules.

A manual block system is a method of train operation by mandatory directives or voice rules, in non signaled territory (or against current of traffic), which authorizes movements between defined limits or blocks, and conforms with §236.0(c)(1),(2),(3),&(4).

The individual operating rules of a carrier will determine if the method of operation conforms to a manual block system.

Note that a methodology, such as the track warrant control rules of some carrier's, which permit and establish yard limits within designated blocks; does not conform to the above manual block system, because trains are permitted to enter the main track within designated yard limit areas without direct authority or regard for block occupancy.

This section does not authorize the discontinuance of any signal system without FRA approval.

CLASSIFICATION OF DEFECTS

236 0000 01 Block signal system not installed or manual block system not permanently in effect on line where freight train operates at 50 or more miles per hour.

236 0000 02 Block signal system not installed or manual block system not permanently in effect on line where passenger train operates at 60 or more miles per hour.

236 0000 03 Manual block system provided where freight train operates at 50 or more miles per hour not permanently in effect.

236 0000 04 Manual block system provided where passenger train operates at 60 or more miles per hour not permanently in effect.

236 0000 05 Manual block system permits a passenger train to be admitted without flag protection to a block occupied by another train.

236 0000 06 Manual block system permits a train to be admitted without flag protection to a block occupied by a passenger train.

236 0000 07 Manual block system permits a train to be admitted without flag protection to a block occupied by an opposing train.

236 0000 08 Manual block system permits a freight train entering a block occupied by preceding freight train to exceed a speed that will permit stopping within one-half the range of vision.

236 0000 09 Manual block system permits a freight train entering a block occupied by preceding freight train to exceed 20 miles per hour.

236 0000 10 Automatic cab signal, train stop, or train control system not provided where train operates at 80 or more miles per hour.

Subpart A – Rules and Instructions All Systems General

§ 236.1 Plans, where kept.

Plans are necessary for the installation, inspection, maintenance, and repair of signal systems and are required to be correct and legible.

Application:

Track layout plan, circuit plan including circuits to approach signals, and locking sheet and dog chart where mechanical locking is used, shall be kept at each interlocking.

Circuit plan including circuits to approach signals shall be kept at each controlled point.

Circuit plans shall be kept at each automatic signal in automatic block signal territory, traffic control territory, automatic train stop, train control, or signal territory in other systems such as spring switch protection, slide protection, etc.

Plans are required to be legible and correct. Plans that are torn, faded, or those having experienced more than one change in colored pencil are not considered to be legible and correct.

CLASSIFICATION OF DEFECTS

- 236 0001 01 Track layout plan not kept at interlocking.
- 236 0001 02 Circuit plan not kept at interlocking.
- 236 0001 03 Locking sheet and dog chart not kept at interlocking where mechanical locking is used.
- 236 0001 04 Circuit plan not kept at controlled point.
- 236 0001 05 Circuit plan not kept at automatic signal.
- 236 0001 06 Track layout plan for interlocking not correct.
- 236 0001 07 Circuit plan for interlocking not correct.
- 236 0001 08 Locking sheet and dog chart for interlocking where mechanical locking is used not correct.
- 236 0001 09 Circuit plan for controlled point not correct.
- 236 0001 10 Circuit plan for automatic signal not correct.

236	0001	11	Profile plan not correct. (Includes plan not drawn to scale or not showing location of all signals, grades and alinement).
236	0001	12	Track layout plan for interlocking not legible.
236	0001	13	Circuit plan for interlocking not legible.
236	0001	14	Locking sheet and dog chart for interlocking not legible.
236	0001	15	Circuit plan for controlled point not legible.
236	0001	16	Circuit plan for automatic signal not legible.
236	0001	17	Profile plan not legible.
236	0001	18	Profile plan not available.

§ 236.2 Grounds.

Vital circuits shall be kept free of grounds equal to or in excess of 75% of the release value of relay or electromagnetic device in circuits. Track circuits, common return wires of single-wire, single-break signal control circuits grounded by design, and alternating current power distribution circuits grounded in the interest of safety are excluded.

Application:

Vital circuits designed to be ground free are required to be kept free of any ground current equal to or in excess of 75% of the release value of any relay or electromagnetic device in the circuit. There is no difference between an accidental or intentional ground.

Extreme care shall be exercised when testing for grounds. Carrier employee shall perform test. Testing shall not be conducted while trains are approaching or passing, and the meter shall be watched at all times. If the meter indicates the energization of a relay, the meter shall be immediately disconnected. An unobserved meter shall never be left connected to a vital circuit and ground.

Ground test shall be performed at every instrument case or house inspected. The preliminary test shall be with a voltmeter connected from line or track arrester ground to a track circuit which will prove the meter is operating and the integrity of the ground circuit.

AC power shall be interrupted during tests in order to check AC lighting circuits having DC stand by.

These requirements apply to highway-rail grade crossing warning devices, dragging equipment protection, slide detectors, etc., where signal control circuits are selected through relays energized by the power supply of such protection.

The railroad should take prompt action to correct a ground.

CLASSIFICATION OF DEFECTS

236	0002	01	Circuit grounded sufficiently to permit flow of current equal to or in excess of 75% of release value of relay or other electromagnetic device in circuit.
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§ 236.3 Locking of signal apparatus housing.

Housings of signal apparatus shall be secured to prevent unauthorized entry.

Application:

All outdoor housing of mechanical or power-operated devices used to operate signal or interlocked units must be kept locked, sealed, or secured. This includes signal cases, instrument cases, switch circuit controllers, facing-point locks, switch machines, junction or terminal boxes and battery boxes.

Power interlocking machine cabinets shall be locked or sealed to such extent that entry to or manipulation of the devices contained in the cabinet can only be accomplished by unlocking the lock or breaking the seal.

Time release and exposed electric locks must be locked or sealed.

Cabinets or cases containing apparatus designed to release locking in emergencies shall be locked or sealed.

Wrench or nut-locking with bell is acceptable.

CLASSIFICATION OF DEFECTS

236	0003	01	Signal case not secured against unauthorized entry.
236	0003	02	Instrument case not secured against unauthorized entry.
236	0003	03	Power interlocking machine cabinet not secured against unauthorized entry.
236	0003	04	Time release not secured against unauthorized entry.
236	0003	05	Exposed electric lock not secured against unauthorized entry.

§ 236.4 Interference with normal functioning of device.

Safety of train operation must be provided before interfering with the normal functioning of any device.

Application:

The intent of this rule is to insure carriers maintain the integrity of signal systems by prohibiting procedures or practices which defeat or nullify the minimum requirements of the RS&I.

Interference is any condition that circumvents, hinders, impedes, or diminishes whatsoever the intended protection of a device and may be accomplished by testing, installing, repairing, replacing, operating, or manipulating a signal component indicating or affecting the indication of safe passage for trains. There is no difference between accidental or intentional interference with respect to the enforcement of this rule.

Tests of signal equipment should not be conducted until it has been ascertained no train movements will be affected. No test should be conducted during the passage of a train, Hi-rail vehicle or motor car.

Areas where interference can occur include all components, devices, mechanisms, or apparatus in vital circuits including shunt and fouling wires of switches and turnouts.

Unless measures are taken to provide safety of train operation, the following are some examples of interference with various types of equipment and procedures:

1. Testing such as falsely energizing relays, jumpering contacts, turning relays upside down; operating hand-operated switch, adjusting switch circuit controller or shunt fouling circuit, in advance of approaching train; operating power-operated switch without permission of dispatcher or operator; performing ground

tests while train is approaching or moving over power-operated switch; defeating predetermined time interval of time release or time relay; and release of electric or mechanical locking.

2. Performing efficiency tests by removal of lamp bulbs that do not provide an approach aspect to the darkened signal; placing a shunt in advance of a signal after a train has passed its approach signal.
3. At interlockings, the unnecessary breaking of seals to force indications, defeat time, approach or route locking requirements. Note: The procedure to move trains through interlockings under flag protection and appropriate rules is not considered interference.
4. Defeat of protective features to avoid train delay or to expedite train movements such as disconnecting shunt or fouling wires, turning relays upside down, jumpering contacts, falsely energizing relays or circuits, or releasing electrical locking.

The following will be considered interference under all circumstances:

Performing repairs and replacements of equipment or apparatus such as relays, cables, and conductors without proper testing afterwards; replacing rails in shunt fouling circuits leaving fouling wires and rail bonds broken and disconnected; replacing ties under switch machines or switch circuit controllers and leaving the circuit controller improperly adjusted; and leaving a switch in mid-stroke position.

Excerpt from letter of January 3, 1985,
From: FRA Associate Administrator, Mr. J. W. Walsh,
To: Mr. L. M. Himmel, Sr., Executive Director
Communications and Signal Division, AAR

Section 236.4 Interference with normal functioning of device.

The AAR requested that during operational tests of locomotive engineers, a signal made dark without establishing an approach aspect not be considered as interference. The AAR recommends that FRA's Technical Manual be revised to make the requirements of this rule applicable only at controlled points and automatic interlockings.

This rule imposes on each carrier the requirement to prohibit procedures or practices which defeat or nullify the safety of its signal systems without first taking measures to provide for the safety of train operations.

The comments of the AAR clearly indicated that a dark signal is regarded as the most restrictive indication that can be given at that signal and that an engineer is required to act on the preview of the dark signal to reduce train speed or stop in compliance with the restrictive indication.

Section 236.23 requires that 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 45 degrees to the vertical be used to indicate that speed is to be restricted and stop may be required.

The FRA cannot condone a practice that is hazardous to the safety of train operation or that is contrary to its regulations. Accordingly, an aspect complying with Section 236.23 is required in approach to any signal made dark for operational tests.

CLASSIFICATION OF DEFECTS

236 0004 01 Interference with normal functioning of device without taking measures to provide safety of train operation.

§ 236.5 Design of control circuits on closed circuit principle.

This rule requires that control circuits which affect the safety of train operation be designed on the closed circuit principle.

Application:

Excludes circuits for roadway equipment of intermittent automatic train-stop systems, shunt fouling circuits, and normally open track circuits on auxiliary tracks used to approach light wayside signals.

Includes all vital circuits and track circuits through which signal control circuits are selected. Circuits should be so designed that failure of any part or component of the circuit will cause signals to display their most restrictive aspects.

CLASSIFICATION OF DEFECTS

236 0005 01 Control circuit, the function of which affects safety of train operation, not designed on closed circuit principle.

§ 236.6 Hand-operated switch equipped with switch circuit controller.

Hand-operated switch equipped with switch circuit controller connected to the point, or hand-operated switch equipped with facing-point lock and circuit controller, is required to shunt track circuit or open control circuits, or both, when point is open one-fourth inch or more on facing-point switch and three-eighths inch or more on trailing-point switch. Facing-point lock shall be so adjusted that it cannot be locked when point is so opened. Switch circuit controllers, facing-point locks, and switch-and-lock movements, and their connections must be securely fastened in place.

Contacts must open at least one-sixteenth inch when the contacts are fully open. Where switch circuit controller is connected to the point, the switch circuit controller shall be connected to the normally closed switch point.

The FRA has in the past and will continue to require each switch circuit controller to be connected to the switch point over which train movements are governed by signal indications. The utilization of a rigid front rod can meet this requirement.

Application:

This rule does not apply to power-operated switches, spring switches, or to the electric lock mechanisms on hand-operated switches.

Test should be made by placing appropriate gage between point and stock rail, six inches from the end of the point, and applying pressure against the gage until it cannot be removed.

Where control circuits are opened through switch circuit controller or through switch repeating relay, it is not a requirement that shunt wires be provided or that shunt wires be doubled.

CLASSIFICATION OF DEFECTS

236 0006 01 Switch circuit controller on hand-operated facing-point switch not adjusted to shunt track circuit or open control circuits when switch point is open one-fourth inch or more.

236 0006 02 Switch circuit controller on hand-operated trailing-point switch not adjusted to shunt track circuit or open control circuits when switch point is open three-eighths inch or more.

- 236 0006 03 Hand-operated facing-point switch equipped with facing-point lock and circuit controller can be locked when switch point is open one-fourth inch or more.
- 236 0006 04 Hand-operated trailing-point switch equipped with facing-point lock and circuit controller can be locked when switch point is open three-eighths inch or more.
- 236 0006 05 Switch circuit controller not securely fastened in place.
- 236 0006 06 Facing-point lock not securely fastened in place.
- 236 0006 07 Switch-and-lock movement not securely fastened in place.
- 236 0006 08 Contact opening of switch circuit controller contact less than one-sixteenth inch.
- 236 0006 09 Switch circuit controller connections not securely fastened.
- 236 0006 10 Switch-and-lock movement connections not securely fastened.
- 236 0006 11 Facing-point lock connections not securely fastened.
- 236 0006 12 Switch circuit controller not connected to normally closed switch point.

§ 236.7 Circuit controller operated by switch-and-lock movement.

Circuit controller operated by switch-and-lock movement is required to be maintained so that normally open contacts will remain closed and normally closed contacts will remain open until switch is locked.

Application:

Applies to hand-operated, mechanical, or power-operated switch-and-lock movements including such machines as models M-22, M-23, 5, 55, T-20, etc. Before locking bar is completely withdrawn from lock rod, normally closed contacts must open and normally open contacts must close and remain so until locking bar has again engaged lock rod.

CLASSIFICATION OF DEFECTS

- 236 0007 01 Contacts of circuit controller operated by switch-and-lock movement not adjusted so that normally open contacts remain closed until the switch is locked.
- 236 0007 02 Contacts of circuit controller operated by switch-and-lock movement not adjusted so that normally closed contacts remain open until the switch is locked.

§ 236.8 Operating characteristics of electromagnetic, electronic, or electrical apparatus.

Operating characteristics of electromagnetic, electronic, or electrical apparatus in service shall be in accordance with the limits within which it is designed to operate.

Application:

Rules 101, 102, 105, 106, 107, 108, 109, 551, 552, 588, and 589 address those devices so important to safety of train operation that periodic tests are required to ascertain that operating characteristics remain unchanged.

Applies to all electromagnetic, electronic, or electrical devices used in or associated with vital circuitry or switch machine operation.

Each carrier should have specifications setting forth the pick-up values, release values, working values, and condemning limits of these values for all electromagnetic, electronic, or electrical devices in use on its property. Some examples of deficient operating characteristics are:

- a. Pick-up value too high.
- b. Pick-up value too low.
- c. Release value too high.
- d. Release value too low.

Manufacturer specifications or carrier standards compatible with manufacturer specifications shall be used to determine such values.

Some examples of electromagnetic devices covered by this rule not requiring periodic tests are:

- a. Switch machine controllers.
- b. Thermal relays of switch machine controllers.
- c. Indicating magnets on interlocking machines.
- d. Coils of forced drop electric locks.

CLASSIFICATION OF DEFECTS

236 0008 01 Pick-up value of electromagnetic device not in accordance with the limits within which it is designed to operate.

236 0008 02 Drop-away value of electromagnetic device not in accordance with the limits within which is it designed to operate.

236 0008 03 Working value of electronic or electrical apparatus not in accordance with the limits within which the apparatus is designed to operate.

§ 236.9 Selection of circuits through indicating or annunciating instruments.

Signal control and electric locking circuits are required to be selected through contacts of safety relays.

Application:

This rule does not prohibit the use of annunciating or indicating devices, but does prohibit selecting vital circuits through contacts operated by such devices.

Some examples of annunciating or indicating devices are:

- a. Switch indicator
- b. Block indicator
- c. Cab indicator
- d. Approach indicator
- e. Track indicator

- f. OSing device
- g. Semaphore indicator
- h. Manually-operated calling-on device.

Test such devices that are in non-compliance by manually moving indicator to energized position and observing if armature and contacts are actuated. If so, contacts of such devices may not be used in vital circuitry.

CLASSIFICATION OF DEFECTS

236 0009 01 Signal control circuit selected through contacts of indicator or annunciator in which the indicating element attached to the armature is arranged so that it can in itself cause improper operation of the armature.

236 0009 02 Electric locking circuit selected through contacts of indicator or annunciator in which the indicating element attached to the armature is arranged so that it can in itself cause improper operation of the armature.

§ 236.10 Electric locks, force drop type; where required.

This rule requires that electric locks applied to new installations and new electric locks applied to existing installations be of the forced-drop type.

Application:

Applies to all electric locks installed after October 1, 1950, on new locations.

Applies to all electric locks on hand-operated switches and interlocking machines.

Tests should be made to determine that the locking dog is forced down into the locking sector. This test can be made by observing movement of the locking dog as the switch lock is locked in normal position.

Since most forced-drop type locks are spring loaded, they should be checked to determine that the spring is of sufficient strength so that normal operation does not release the locking dog unless the lock is energized.

A non-forced-drop electric lock may be removed from service, repaired and restored to service only when replacing another non-forced-drop type electric lock.

CLASSIFICATION OF DEFECTS

236 0010 01 Electric lock not forced-drop type. (Applies only to electric lock installed after October 1, 1950.)

236 0010 02 New electric lock applied to existing installation not forced-drop type.

§ 236.11 Adjustment, repair, or replacement of component.

This rule requires a carrier to determine the cause of a signal aspect that is not in accordance with known operating conditions and requires that a failed signaling component which adversely affects safety of train operation be adjusted, repaired, or replaced without undue delay.

Application:

A signal aspect "not in correspondence with known operating conditions," means a signal aspect other than that intended by normal signal system operation.

A carrier is required to determine the cause of each "stop" or "stop and proceed" aspect resulting from an unknown condition. If that condition is the result of the failure of a signaling component and is a hazard to the safety of train operation, corrective action is required before the next train movement. Should train operation require night-time or weekend corrections, they must be made.

Conditions which cause false stop or false restrictive indications may cause inconvenience and additional expense to train movements. Examples of such conditions that do not necessarily pose a threat to safety of train operation are a burned out lamp, a broken track circuit connector, or a broken line wire.

Applies to adjustable components which, when improperly adjusted, creates a safety hazard such as circuit controller, point detector and lock rod adjustments exceeding the requirements; insufficient predetermined time intervals; and excessive track circuit values.

Applies to components which, if not repaired, creates a safety hazard such as grounded circuits; insecure circuit controllers, switch machines, pipeline carriers and cranks; and bent, worn, or insecure connecting rods, lock rods, and point detector rods.

Applies to components which, if not replaced, creates a safety hazard such as broken connecting rod, lock rod, point detector rod, pipeline, or crank; broken fouling wires, shunt wires, and bond wires in fouling circuit; defective relays, cable, and conductors.

Test equipment and instruments are excluded.

CLASSIFICATION OF DEFECTS

236 0011 01 Component, essential to the safety of train operation, failing to perform its intended function not adjusted without undue delay.

236 0011 02 Component, essential to the safety of train operation, failing to perform its intended function not repaired without undue delay.

236 0011 03 Component, essential to the safety of train operation, failing to perform its intended function not replaced without undue delay.

236 0011 04 Cause not determined for signal component out of correspondence with known operating conditions.

§ 236.12 Spring switch signal protection, where required.

This rule prescribes signal protection for spring switches in interlockings and for spring switches installed after October 1, 1950, in automatic block signal, train stop, train control or cab signal territory where movements over the switch exceed 20 miles per hour.

Application:

This rule prescribes where spring switch protection is required. Rules 236.13 and 236.14 prescribes how it will operate. This rule prescribes where spring switch protection is required. Rules 236.13 and 236.14 prescribes how it will operate.

On all spring switches installed after October 1, 1950, in automatic block signal, train stop, train control, and cab signal territory where the speed exceeds 20 miles per hour, signal protection is required in the facing and both trailing routes.

Protection is required only with the current of traffic on track signaled for movement in one direction.

Protection is required for movements against the current of traffic from the reverse main of main tracks to a single main track.

CLASSIFICATION OF DEFECTS

236 0012 01 Signal protection not provided for facing movements through spring switch within interlocking limits.

236 0012 02 Signal protection not provided for trailing movements through spring switch within interlocking limits.

236 0012 03 Signal protection not provided for trailing movements through spring switch in automatic block signal, train stop, train control, or cab signal territory where train movements over switch exceed 20 m.p.h. (Applies only to spring switch installed after October 1, 1950.)

236 0012 04 Signal protection not provided for facing movements over spring switch in track signaled for movements in both directions within automatic block signal, train stop, train control, or cab signal territory where train movements over switch exceed 20 m.p.h. (Applies only to spring switch installed after October 1, 1950.)

§ 236.13 Spring switch; selection of signal control circuits through circuit controller.

This rule requires that control circuits of signals governing facing movements over a main track spring switch be selected through the switch circuit controller or a relay repeating the position of such circuit controller.

Application:

This rule applies to interlockings, automatic block signal and other protective systems. Rules 236.303 and 236.342 apply to spring switches in interlocking and traffic control systems.

This rule requires point protection for facing movements over spring switch. Trailing protection is not required.

Control circuits for facing movements must be selected through either switch circuit controller or track relay where switch shunting circuit is used.

This rule applies to spring switch provided with signal protection in non-signaled territory. It does not require such protection be provided, but if protection is provided, it must meet these requirements.

Test of spring switch shall be made by placing a one-fourth inch gage six inches from the end of the switch point on either the normal or reverse side and then placing the spring switch throw lever in either the full normal or reverse position as appropriate.

CLASSIFICATION OF DEFECTS

236 0013 01 Control circuits of signal governing facing movements over main track spring switch not selected through contacts of switch circuit controller or through contacts of relay repeating the position of switch circuit controller.

236 0013 02 Signal governing facing movements over main-track spring switch does not display its most restrictive aspect when normally closed switch point is open one-fourth inch or more. (Does not apply where separate aspect is displayed for facing movement over the switch in the reverse position.)

236 0013 03 Signal governing facing movements over main-track spring switch in both the normal and reverse positions does not display its most restrictive aspect when the switch points are open one-fourth inch or more from either the normal or reverse position.

§ 236.14 Spring switch signal protecting; requirements.

This rule prescribes how spring switch signal protection required by Rule 236.12 shall operate in automatic block signal territory when it governs movements with the current of traffic from a siding to main track signaled for movements in one direction; when it governs movements from a siding to a main track signaled for movements in either direction; and when it governs movements from the end of double track territory signaled for movements in one direction with the current of traffic to single track territory. It permits the use of approach or time locking.

Application:

Applies to automatic block signal territory only.

Paragraph (a) sets forth the requirements for signals governing movements from siding to main track signaled for movements with the current of traffic.

Paragraph (b) sets forth the requirements for signals governing movements against the current of traffic from the reverse main of main tracks to single track or from siding to main track signaled for movements in either direction when block into which signal governs is occupied by preceding trains or by opposing trains.

Paragraph (c) sets forth the requirements for signals governing movements against the current of traffic from the reverse main of main tracks to single track or from siding to main track signaled for movements in either direction when a train is approaching the switch within 1,500 feet in approach of the approach signal located stopping distance from the main track signal governing trailing movements over the spring switch.

Tests to determine compliance with paragraph (a) should be conducted by placing a shunt in the block of the signal governing movements from siding to main track. The signal should then be observed to determine its aspects is not more favorable than "Proceed at Restricted Speed."

Tests should then be made by shunting each track circuit on the main track, from at least 1,500 feet in approach to the approach signal to the main track signal governing trailing movements over the switch. The leave siding signal should be observed to determine that its aspect is "STOP" when each track circuit is shunted. This test procedure is the same whether the main track signal governing trailing movements over the switch is located adjacent to the leave siding signal or located a mile or more in approach of the switch.

A time release, push button or key release may be provided that, when operated, causes the main track signal to indicate "Stop" or "Stop and Proceed" and will permit the leave siding signal to clear after a predetermined time interval.

Test to determine compliance with paragraph (b) should be conducted by making an operational shunt test in approach to and then in the block of the main track signal governing trailing movements over the switch into single track and observing the reverse main or leave siding signal aspect to determine it is not more favorable than "Proceed at Restricted Speed" for a following movement. Test should then be made

by making an operational shunt test on single track in the facing direction and observing the reverse main or leave siding signal aspect to determine it is "stop" for an opposing movement.

Tests to determine compliance with paragraph © should be conducted by making an operational shunt test from at least 1,500 feet in approach to the approach signal to the main track signal governing trailing movements over the switch and observing the reverse main or leave siding signal aspect to determine that it indicates "Stop" until the switch is passed.

CLASSIFICATION OF DEFECTS

236 0014 01 Indication of signal governing movements from siding to main track with the current of traffic on track signaled for movements in only one direction through spring switch in automatic block signal territory, less restrictive than "Proceed at Restricted Speed" when the block, into which movements are governed by the signal, is occupied.

236 0014 02 Indication of signal governing movements from siding to main track with the current of traffic on track signaled for movements in only one direction through spring switch in automatic block signal territory, not "Stop" when main track is occupied by a train approaching switch within at least 1,500 feet in approach of the approach signal for the main track signal governing trailing movements over switch.

236 0014 03 Indication of signal governing movements against the current of traffic from the reverse main of main tracks to single track through spring switch in automatic block signal territory, less restrictive than "Proceed at Restricted Speed" when the block, into which movements are governed by the signal, is occupied by a preceding train.

236 0014 04 Indication of signal governing movements from siding to main track signaled for movements in either direction, through spring switch in automatic block signal territory, less restrictive than "Proceed at Restricted Speed" when the block, into which movements are governed by the signal, is occupied by a preceding train.

236 0014 05 Indication of signal governing movements against the current of traffic from reverse main of main tracks to single track through spring switch in automatic block signal territory, not "Stop" when the block on the single track into which the signal governs is occupied by an opposing train.

236 0014 06 Indication of signal governing movements from siding to main track signaled for movements in either direction through spring switch in automatic block signal territory, not "Stop" when the block on the single track into which the signal governs is occupied by an opposing train.

236 0014 07 Indication of signal governing movements against the current of traffic from the reverse main of main tracks to single track through spring switch in automatic block signal territory, not "Stop" when the normal direction main track of the double track is occupied by a train approaching the switch within at least 1500 feet in approach of the approach signal for the main-track signal governing trailing movements over switch.

236 0014 08 Indication of signal governing movements from siding to main track signaled for movements in either direction through spring switch in automatic block signal territory, not "Stop" when the single track signaled for movements in both directions is occupied by a train approaching the switch within at least 1500 feet in approach of the approach signal for the main-track signal governing trailing movements over the switch.

236 0014 09 Indication of signal governing movements from siding to main track with the current of traffic on track signaled for movements in only one direction through spring switch in automatic block signal territory less restrictive than "Proceed at Restricted Speed" when the block into which movements are governed by the signal is occupied and approach or time locking is ineffective.

236 0014 10 Indication of signal governing movements from siding to main track, with the current of traffic, on track signaled for movements in only one direction through spring switch in automatic block signal territory, not "Stop" when main track is occupied by a train approaching switch within at least 1500 feet in approach of the approach signal for the main track signal governing trailing movements over the switch and approach or time locking is ineffective.

§ 236.15 Timetable instructions.

This rule requires automatic block, traffic control, train stop, train control, and cab signal territory be designated in timetable instructions.

Application:

May be published in either timetable or special instructions in any manner carrier chooses. Interlockings are not required to be so designated.

CLASSIFICATION OF DEFECTS

236	0015	01	Automatic block signal territory not designated in timetable instructions.
236	0015	02	Traffic control territory not designated in timetable instructions.
236	0015	03	Automatic train stop territory not designated in timetable instructions.
236	0015	04	Automatic train control territory not designated in timetable instructions.
236	0015	05	Automatic cab signal territory not designated in timetable instructions.

§ 236.16 Electric lock, main track releasing circuit.

This rule sets forth the requirements for main track releasing circuit for electric lock on hand- operated switch.

Application:

This rule does not require that a main line quick release circuit be installed at electrically locked switches.

However, where such circuits are installed, the rule prohibits the electric lock releasing circuit on the main track from being of such length that distance or curvature of track will prevent a crew member standing at the switch from observing a train or car occupying the releasing circuit.

The rule also requires that where the electric lock releasing circuit extends into the fouling section of turnout, train shall be prevented from occupying the fouling section by pipe- connected or independently operated, electrically locked derail at the clearance point. The releasing circuit shall be considered as extending into the fouling section if it extends further than the heel of the switch points.

CLASSIFICATION OF DEFECTS

236	0016	01	Length of electric lock releasing circuit on main track too long to permit crew member standing at the switch to see a train or car occupying the releasing circuit.
236	0016	02	Curvature of track on which electric lock releasing circuit is provided prevents crew member standing at the switch from seeing a train or car occupying the releasing circuit.

236 0016 03 Electric lock releasing circuit on main track extends into fouling circuit where the turnout is not equipped with a derail at the clearance point either pipe-connected to the switch or independently locked, electrically.

§ 236.17 Pipe for operating connections; requirements.

This rule prescribes steel or wrought-iron pipe one inch or larger for operating connections of pipe-connected appliances, with each joint fully screwed into coupling with each end of pipe secured by two rivets. Pipe shall be supported on carriers not more than 8 feet apart on tangent and curves of less than 2 degrees and not more than 7 feet apart on curves of more than 2 degrees. Pipeline shall be properly aligned and compensated and couplings shall not foul carriers. Up-and-down rods of mechanically operated signals may be three-fourths inch pipe or solid rod.

Application:

Steel or wrought-iron pipe prescribed by this rule is one-inch nominal inside diameter pipe, or 1.315 inch actual outside diameter pipe. Three-fourths inch pipe measures 1.05 inch actual outside diameter.

Pipelines should be operated and carefully observed for bowing when pipe is under compression. The pipeline shall be so installed that when a device is obstructed, the pipeline shall be prevented from bowing enough to permit latching of lever or full drive of power operated machine.

Carriers must be complete and properly assembled and spacing strictly adhered to. Pipeline must be kept in proper alinement and carrier foundations must be secure and permit no movement when pipeline is operated. Bent or damaged pipe is prohibited.

This rule does not apply to pipeline used as "helper rods" associated with power-operated switch machines.

CLASSIFICATION OF DEFECTS

236	0017	01	Operating connection for switch, derail, movable-point frog, facing-point lock, rail-locking device of movable bridge protected by interlocking or mechanically operated signal not made of steel or wrought-iron pipe one inch or larger, or member of equal strength. (Does not apply to up-and-down rod of mechanically operated signal.)
236	0017	02	Pipe not fully screwed into coupling.
236	0017	03	Pipe not riveted to pipe plug with 2 rivets.
236	0017	04	Pipe line out of alinement sufficiently to interfere with proper operation.
236	0017	05	Pipe line not properly compensated for temperature changes.
236	0017	06	Pipe line carriers spaced more than 8 feet apart on tangent or on curve of less than 2 degrees.
236	0017	07	Pipe line carriers spaced more than 7 feet apart on curve of 2 degrees or more.
236	0017	08	Coupling in pipe line fouls carrier.

Roadway Signals and Cab Signals

§ 236.21 Location of roadway signals.

This rule requires that roadway signal be positioned and aligned so that it is clearly associated with track it governs.

Application:

This rule requires that each signal be positioned and aligned so that the aspect it displays is clearly associated with the track it governs.

Inspectors must be alert for installation where it is possible to mistake the aspect of one signal for that of another.

The FRA relies heavily on the inspector's judgment whether the location and alignment of a signal complies with the intent of this rule.

CLASSIFICATION OF DEFECTS

236 0021 01 Roadway signal not positioned and aligned so that the indication aspects it displays can be clearly associated with the track it governs.

§ 236.22 Semaphore signal arm; clearance to other objects.

This rule requires one-half inch clearance between a semaphore arm and any object which may interfere with its operation.

Application:

Operational test of semaphore signal should be made to insure any object, including light unit, clears arm, and spectacle at least one-half inch throughout its arc of travel.

CLASSIFICATION OF DEFECTS

236 0022 01 Semaphore arm clears object that may interfere with its operation less than one-half inch.

§ 236.23 Aspects and indications.

This rule prescribes how aspects shall be shown, that each aspect shall be named and indicate action to be taken and the fundamental indications of the aspects.

It provides that signals may be qualified and prohibits the use of reflector lenses or buttons or other devices depending upon reflected light for visibility in lieu of signal aspects. It prescribes that the names, indications, and aspects be defined in the carrier's operating rule books or special instructions on file with the FRA.

Application:

Applies to all system. Each aspect and indication is required to be defined in carrier's rule book or special instructions.

Use of single white light is prohibited except for indicators of protective devices such as hotbox or dragging equipment detectors and for use as a qualifying appurtenance.

It is permissible for carriers to qualify red aspect to permit its use to indicate "Proceed at Restricted Speed" without requiring stop (see Rule 236.204). Yellow or lunar aspect must be used to approach such signals.

The absence of a semaphore arm on a semaphore signal is an imperfectly displayed signal and does not meet these requirements.

Fixed signal aspects, without lights or which depend for visibility upon a reflected light from an external source, is in violation of this part for night train operation.

The rule prohibits future installation of reflective devices in lieu of signal aspects such as the yellow triangle that will permit a higher speed when certain aspects are displayed.

The failure of a lamp in a light signal, a false restrictive position of a semaphore arm or the absence of a qualifying appurtenance shall not cause a signal to display a more favorable aspect than intended.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|---|
| 236 | 0023 | 01 | Aspects of roadway signal shown by means other than position of semaphore blade, color of lights, position of lights, flashing of lights, or combination thereof. |
| 236 | 0023 | 02 | Single white light used for aspect of roadway signal. |
| 236 | 0023 | 03 | Reflector lenses, buttons, or other devices which depend for visibility upon reflected light from an external source used in night aspect of roadway signal. |
| 236 | 0023 | 04 | Aspects of cab signals shown by means other than lights, illuminated letters, or illuminated numbers. |
| 236 | 0023 | 05 | Signal aspect not identified by name. |
| 236 | 0023 | 06 | Signal aspect does not indicate action to be taken. |
| 236 | 0023 | 07 | More than one name and indication applies to aspects indicating the same action to be taken. |
| 236 | 0023 | 08 | Same aspect used with more than one name and indication. |
| 236 | 0023 | 09 | Aspect other than a red light, a series of horizontal lights or a semaphore blade in the horizontal position, used to indicate stop. |
| 236 | 0023 | 10 | Aspect other than a yellow light, a lunar light, a series of lights, or a semaphore blade in the upper or lower quadrant at an angle of approximately 45 degrees to the vertical, used to indicate that speed is to be restricted and stop may be required. |
| 236 | 0023 | 11 | Aspect other than a green light, a series of vertical lights, or a semaphore blade in a vertical position in the upper or 60° or 90° in the lower quadrant, used to indicate proceed at authorized speed. |
| 236 | 0023 | 12 | Names, indications and aspects of roadway signals and/or cab signals not defined in carrier's block signal and interlocking rules currently in effect. |
| 236 | 0023 | 13 | Copy of modification of carrier's block signal and interlocking rules not filed with the Federal Railroad Administration within thirty days after such modification became effective. |
| 236 | 0023 | 14 | Night aspects of roadway signals not shown by lights. |

236 0023 15 Signal displays a less restrictive aspect than intended when arm of semaphore signal assumes a false restrictive position.

236 0023 16 Signal displays a less restrictive aspect than intended when a lamp fails in a light signal.

236 0023 17 Signal displays a less restrictive aspect than intended when a qualifying appurtenance is missing from its normal location on the signal mast.

§ 236.24 Spacing of roadway signals.

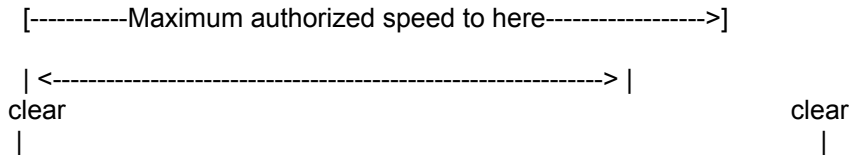
This rule requires signals to be adequately spaced to provide proper distances for reducing speeds or stopping by use of other than an emergency brake application before reaching the point where reduced speed or stopping is required.

This rule also requires that in ACS, ATCS and ATS territory, these braking distances be adequate to compensate for the 8 second delay time which is designed into almost all ACS, ATCS and ATS systems. Section 236.563 states in part, ". . . and the spacing of signals to meet the requirements of §236.24 shall take into consideration the delay time." Thus, the proper spacing of signals must also include the spacing of code change points so that a train may comply with the indications of a cab signal, train stop or train control system without using an emergency brake application before reaching the point where reduced speed or a stop is required.

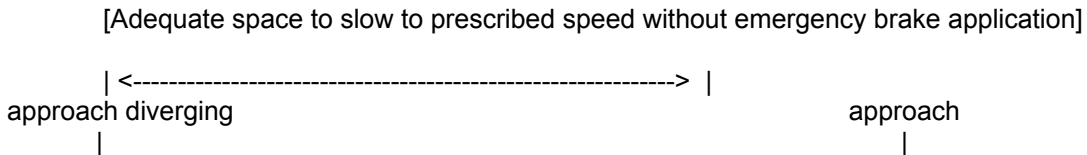
Application:

Carrier's braking distance charts shall be used to determine proper spacing. In event a carrier does not have a braking distance chart, braking tests may be required at suspected locations.

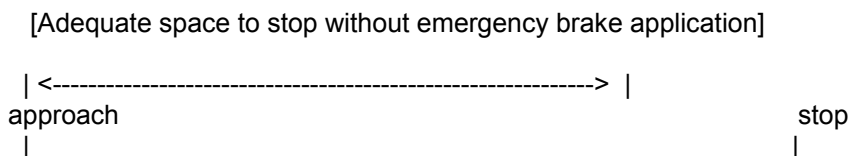
A proceed aspect authorizes maximum authorized speed to next signal without regard of preview of next signal:



A reduced speed aspect requires spacing adequate to slow to prescribed speed before reaching next signal:



An aspect requiring stop at next signal, whether operative or inoperative, requires spacing adequate to stop without emergency brake application before reaching next signal:



These requirements apply to all systems including protective devices such as slide protection, high water protection, movable bridges, spring switches, etc. Where speed is increased, profiles and circuit plans should be reviewed for proper braking distances.

Where yellow or lunar aspect does not provide stopping distance to stop aspect, an advance approach or successive restrictive signals are necessary.

CLASSIFICATION OF DEFECTS

236 0024 01 Roadway signal not located with respect to the next signal or signals in advance which governs train movements in the same direction, so that when it displays a restrictive aspect the indication of that aspect can be complied with by means of a brake application, other than an emergency application initiated at such signal, by stopping at the signal where a stop is required.

236 0024 02 Roadway signal not located with respect to the next signal in advance governing movements in the same direction, so that when it displays a restrictive aspect the indication of that aspect can be complied with by means of a brake application, other than an emergency application, initiated at such signal, by a reduction in speed to the rate prescribed by the next signal in advance.

§ 236.26 Buffing device, maintenance.

This rule requires that buffing device be so maintained that it cannot cause a signal to display a less restrictive aspect than intended.

Application:

Operational test should be made to observe that oil or air buffers operate properly.

In the event the buffing device causes a signal to display a less restrictive aspect than intended, a false proceed report shall be filed with the FRA.

CLASSIFICATION OF DEFECTS

236 0026 01 Buffing device causes signal to display a less restrictive aspect than intended.

Track Circuits

§ 236.51 Track circuit requirements.

This rule is the standard by which all track circuits which control home signals or locking circuits shall be designed and installed. This rule is not applicable to track circuits which do not affect the safety of train operation.

Application:

Applies to all types of track circuits which control home signals or locking circuits. Does not apply to track circuits that do not affect safety of train operation such as annunciator circuits or approach lighting circuits on non-signalized sidings.

Automatic train stop, train control, and cab signal systems track circuits required to be de-energized under this rule include those superimposed on track circuits of the conjunctive system.

Maximum authorized speed through a turnout equipped with shunt fouling circuit is 45 mph. Exception should not be taken to series or parallel type track circuits where a small section of the turnout is provided with a shunt fouling circuit.

Track relay shall be de-energized or device that functions as a track relay shall be in its most restrictive state when a rail is broken or a rail or switch frog is removed; when any part of the track circuit or fouling section is occupied by a train, locomotive or car; and, where switch shunting circuit is used, when switch is not in proper position, facing point lock is not locked, or independently operated derail is not in derailing position.

It is not a violation if the track relay is not de-energized or the device that functions as a track relay is not in its most restrictive state when a rail is broken or removed in a shunt fouling circuit; when a break occurs between the end of a rail and track circuit connector, within the limits of a rail-joint bond appliance, or other protective device; as a result of leakage current or foreign current in the rear of a point where a break occurs; or as a result of sand, rust, dirt, grease or foreign matter preventing shunting.

Where sand, rust, dirt, grease, or other foreign matter is known to prevent or possibly prevent effective shunting, the carrier is required to take adequate measures to safeguard safety of train operation.

Track relay must be in de-energized position or device that functions as a track relay must be in its most restrictive state when a rail is removed.

Non-shunting sections caused by insulated rail joint stagger on short track circuits and in connection with crossing frogs are one of the most overlooked variances with this rule. Staggered insulated rail joints in excess of five (5) feet create the possibility of cars or locomotives occupying part of a track circuit undetected.

CLASSIFICATION OF DEFECTS

236 0051 01 Track relay not in de-energized position or device that functions as track relay not in its most restrictive state in rear of broken rail.

236 0051 02 Track relay not in de-energized position or device that functions as a track relay not in its most restrictive state when rail or switch frog is removed from track.

236 0051 03 Shunt fouling circuit used where permissible speed through turnout is greater than 45 miles per hour.

236 0051 04 Track relay not in de-energized position or device that functions as a track relay not in its most restrictive state when a train, locomotive, or car occupies any part of the track circuit, except fouling section of turnout of hand-operated main-track crossover. (Explain fully condition of rails with respect to presence of rust, dirt, grease or other foreign matter).

236 0051 05 Adequate measures to safeguard train operation not taken when it is known that a condition of sand, rust, dirt, grease or other foreign matter exists that has prevented effective shunting of a track circuit when occupied by a train, locomotive, or car.

236 0051 06 Track relay not in de-energized position or device that functions as a track relay not in its most restrictive state when switch points are not closed in normal position, where switch shunting circuit is used.

236 0051 07 Track relay not in de-energized position or device that functions as a track relay not in its most restrictive state when switch is not locked where switch is equipped with facing-point lock with switch circuit controller and where switch shunting circuit is used.

236 0051 08 Track relay not in de-energized position or device that functions as a track relay not in its most restrictive state when independently operated fouling-point derail equipped with switch circuit controller is not in derailing position, where switch shunting circuit is used.

236 0051 09 Track circuit of an automatic train stop, train control or cab signal system not de-energized in rear of broken rail.

236 0051 10 Track circuit of an automatic train stop, train control or cab signal system not de-energized when rail or switch frog is removed from track.

236 0051 11 Track circuit of automatic train stop, train control or cab signal not de-energized in the rear of a train, locomotive or car when such equipment occupies any part of a track circuit, except the fouling section of turnout of hand-operated main-track crossover. (Explain fully condition of rail with respect to presence of rust, dirt, grease, or other foreign matter.)

236 0051 12 Adequate measures to safeguard train operation not taken when it is known that a condition of sand, rust, dirt, grease or other foreign matter exists that has prevented effective de-energization of a track circuit of automatic train stop, train control or cab signal system in the rear of train, locomotive, or car when track circuit is occupied by such equipment.

236 0051 13 Track circuit of automatic train stop, train control, or cab signal system not de-energized when switch points are not closed in normal position, where switch shunting circuit is used.

236 0051 14 Track circuit of automatic train stop, train control, or cab signal system not de-energized when switch is not locked where switch is equipped with facing-point lock with circuit controller and where switch shunting circuit is used.

236 0051 15 Track circuit of automatic train stop, train control, or cab signal system not de-energized when independently operated fouling-point derail equipped with switch circuit controller is not in derailing position, where switch shunting circuit is used.

§ 236.52 Relayed cut-section.

This rule requires that where energy of non-coded direct-current track circuit is supplied through contacts of adjoining non-coded track relay, energy circuit shall be opened and track circuit shunted when relay is de-energized.

Application:

Apply at relayed cut-section of non-coded direct-current track circuit only, including polar, neutral or biased relays.

CLASSIFICATION OF DEFECTS

236 0052 01 Where relayed cut-section is used in territory where non-coded direct current track circuits are in use, the energy circuit to the adjoining track circuit not open when track relay at the cut-section is in de-energized position.

236 0052 02 Where relayed cut-section is used in territory where non-coded direct current track circuits are in use the adjoining track circuit not shunted when the track relay at the cut section is in de-energized position.

§ 236.53 Track circuit feed at grade crossing.

At crossing-at-grade of a non-electrified railroad using non-coded direct-current track circuits with electrified railroad, this rule requires the battery end of direct-current track circuit be located at the crossing.

Application:

This rule is not applicable unless foreign current is proven to be present.

CLASSIFICATION OF DEFECTS

236 0053 01 At grade crossing with electric railroad where foreign current is present, the electric energy for non-coded direct current track circuit feeds toward the crossing.

§ 236.54 Minimum length of track circuit.

This rule permits the use of track circuits shorter than the inner wheelbase of any locomotive or car provided other means are used to provide the equivalent of track circuit protection.

Application:

Track circuits shorter than the inner wheelbase of any car or locomotive operating over the track are prohibited unless supplemented with other protective devices or circuits that provide protection equivalent to a track circuit.

This rule is applicable to all track circuits which control home signals or electric locking circuits. The rule does not apply to track circuits used exclusively for approach lighting circuits on sidings or auxiliary tracks or to annunciator circuits or other non vital type track circuits.

In addition to trap circuits, directional stick circuits, and check-in check-out circuits permitted in the past, carriers may now provide devices that detect the presence of locomotives or cars if such devices are so interconnected with the signaling system that it will perform equivalent to a track circuit of proper length.

CLASSIFICATION OF DEFECTS

236 0054 01 Length of track circuit used for controlling signaling facilities that is less than maximum inner wheelbase of locomotive or car, not supplemented by special circuit or protective device that provides equivalent of full track circuit protection.

§ 236.55 Dead section; maximum length.

This rule prohibits the use of dead section longer than the shortest outer wheel base of a carrier's locomotive but in no case longer than 35 feet without protecting it with a special circuit.

Application:

This rule applies to the outer wheelbase of locomotives only and does not apply to cars.

Trap circuits are more commonly used to protect dead sections; however, directional stick circuits fall into the category of special circuits.

Presence detector or other such devices satisfy the requirement of this part.

This rule is not applicable to non-shunting section caused by the stagger of insulated rail joints. Apply rule 51 where stagger of insulated rail joints permit cars to span a live rail of the track circuit.

CLASSIFICATION OF DEFECTS

236 0055 01 Dead section exceeds 35 feet and special circuit not installed.

236 0055 02 Length of dead section exceeds length of outer wheelbase of locomotive operating over such dead section and special circuit not installed. (Applies where length of outer wheelbase of locomotive is less than 35 feet.)

§ 236.56 Shunting sensitivity.

This rule requires that track circuit controlling signal aspects or electric locking shall be maintained so that when a shunt of 0.06 ohm resistance is connected across the rails of the track circuit at any location in the circuit, including shunt fouling section, the track relay shall assume the de-energized position or if an electronic device is used in lieu of a track relay, such electronic device shall assume its most restrictive state.

Application:

This requirement applies to any type track circuit of which the rails form a part of the circuit and used for controlling signal aspects or electric locking. Does not apply to approach lighting circuits on non-signalized track, annunciator circuits, etc.

The most difficult time to shunt a track circuit is when the ballast is dry or frozen.

Car frame type track circuit must comply with this section.

Each turnout has three fouling sections which should be tested.

Most restrictive state is defined in § 236.813a as the mode of an electronic device that is equivalent to a track relay in its de-energized position. Regardless of the type of track circuit, this rule requires that signals governing movements over the track circuit must display their most restrictive aspects when the track circuit is shunted with a resistance of 0.06 ohms.

CLASSIFICATION OF DEFECTS

236 0056 01 Track relay not in de-energized position or device that functions as a track relay not in its most restrictive state with a shunt of 0.06 ohm resistance connected across rails of track circuit, when track circuit is dry.

§ 236.57 Shunting and fouling wires.

Shunt wires and fouling wires are each required to be of sufficient conductivity and maintained in such condition that the track relay will be de-energized when the track circuit is shunted. Two completely separate conductors are required, except where switch circuit controller is used to both open control circuits and shunt the track circuit.

Application:

This rule prohibits the installation of a single duplex wire with single plug as fouling or shunt wires. The single plug constitutes a single conductor. Existing installations having single duplex wires with single plug for shunt or fouling wires may be continued in use until such time as they require repair or replacement. The use of two duplex wires with single plug is acceptable.

A conductor consisting of many small strands, such as that with the trade name "Bondstrand," can only be considered as a single conductor.

Two fouling wires are required at the heel of the reverse switch point, and toe and heel of the switch frog, and between the outer rails of the main track and turnout.

Shunt wires to switch circuit controller shall consist of two separate conductors connected to each rail and extending to the terminals of switch circuit controller.

This rule is not applicable to rail joint bonds in fouling section.

CLASSIFICATION OF DEFECTS

236 0057 01 Shunt or fouling wires do not consist of at least two discrete conductors. (Does not apply to shunt wires to switch circuit controller through which signal control circuits are controlled and track circuits are shunted, or where track circuit is opened and relay side of track circuit is shunted.)

236 0057 02 Shunt wires not of sufficient conductivity so that track relay is in de-energized position or device that functions as track relay is in its most restrictive state when circuit is shunted.

236 0057 03 Shunt wires not maintained in such condition that track relay is in de-energized position or device that functions as track relay is in its most restrictive state when circuit is shunted.

236 0057 04 Fouling wires not of sufficient conductivity so that track relay is in deenergized position or device that functions as track relay is in its most restrictive state when circuit is shunted.

236 0057 05 Fouling wires not maintained in such condition that track relay is in deenergized position or device that functions as track relay is in its most restrictive state when circuit is shunted.

§ 236.58 Turnout, fouling section.

The fouling section of each turnout is required to be bonded and to extend to the clearance point.

Application:

This rule requires that the fouling section of each turnout shall extend to a point on the turnout where a standing car or engine will clear a movement on the main track under all circumstances, such as overhang of cars.

This rule requires that each rail joint in the fouling section be bonded. The rule does not require double bonding of the rail joints.

CLASSIFICATION OF DEFECTS

236 0058 01 Fouling section of turnout does not extend to clearance point.

236 0058 02 Rail joint in shunt fouling section not bonded.

§ 236.59 Insulated rail joints.

Insulated rail joints are required to be maintained in such condition as to prevent energy from flowing between adjoining track circuits.

Application:

Applies to all insulated rail joints in all systems.

An insulated rail joint is considered defective when tests prove insulation is worn, deteriorated or otherwise bypassed so as to conduct sufficient current between adjoining track circuits to cause track circuit failure.

The breakdown of insulation in a single insulated rail joint is considered a failure of a track circuit even though the insulated rail joint on the other rail is in good condition.

CLASSIFICATION OF DEFECTS

236 0059 01 Insulated rail joint not maintained in condition to prevent flow of sufficient track circuit current between rails separated by the insulation to cause failure of the track circuit.

236 0059 02 Insulated rail joint not maintained in such a condition that the track circuit through the switch circuit controller can be opened when switch point open.

236 0059 99 Insulation in insulated rail joint in bad condition.

§ 236.60 Switch shunting circuit, use restricted.

This rule prohibits the installation of switch shunting circuit except where track or control circuit is also opened through the switch circuit controller.

Application:

This rule applies to all systems including signal arrangements such as tunnel protection, slide detector or high water detector.

This rule prohibits the use of a switch shunting circuit as the only method of protection. The rule permits the use of a circuit to shunt the track circuit only if the circuit controller also opens the track circuit or a signal control circuit.

This rule permits the continued use of existing installations of switch shunting circuits.

The rule applies to all new switch locations in revenue service. The FRA has defined a new switch as:

An additional switch installed in a system existing on February 27, 1984;

All switches of each system installed after February 26, 1984; and

A switch installed as the result of the shortening or lengthening of a siding or other auxiliary track except when such switch is moved for routine track maintenance (including rail relay) or the angle of the switch frog is changed as the result of a change in carrier track standards.

CLASSIFICATION OF DEFECTS

236 0060 01 Switch shunting circuit installed where track circuit or control circuit not opened by switch circuit controller. (Does not apply to installations made before February 27, 1984.)

Wires and Cables

§ 236.71 Signal wires on pole line and aerial cable.

Signal wires carried on pole lines are required to be securely fastened to insulators. Cable used aerially is required to be supported by messenger.

Application:

The intent of this rule is that all signal wires, including A.C. power supply carried on pole line, are required to be tied in on insulators that are securely fastened to a crossarm or bracket attached to a pole or fixture. Signal wire is required to be maintained clear of all other wires.

Particular attention should be given to vertical runs of cable. These are frequently found tied off at the top of the run at which point the entire weight of the cable is self-supported. The cable is required to be supported throughout by messenger.

CLASSIFICATION OF DEFECTS

236	0071	01	Signal wire carried on pole line not securely tied in on insulator.
236	0071	02	Signal wire not secured because of broken, missing or burnt pole.
236	0071	03	Signal wire not secured because of broken, burnt, or missing crossarm.
236	0071	04	Signal wire interferes with or is interfered by another wire.
236	0071	05	Cable used aerially not supported on insulators or by messenger.

§ 236.73 Open-wire transmission line; clearance to other circuits.

This rule requires that open-wire transmission lines of 750 volts or more be placed at least four feet above the nearest crossarm carrying signal or communication wires.

Application:

Applies where power of 750 volts or more is transmitted by open-wire line.

CLASSIFICATION OF DEFECTS

236	0073	01	Open-wire transmission line operating at voltage of 750 volts or more, less than 4 feet above nearest crossarm carrying signal or communication circuits.
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§ 236.74 Protection of insulated wire; splice in underground wire.

This rule requires insulated wire be protected from mechanical injury. It prohibits puncturing insulation for test purposes and requires that splice in underground wire have insulation resistance at least that of the wire spliced.

Application:

Insulated wire shall be placed in wire runs, strung on pole line, or messenger, or buried in a manner that it cannot be damaged by the operation of apparatus, vehicles, tools, workmen, or by closing doors.

No insulated wire or conductor, whether in housing or outside, should be punctured for test purposes.

This rule does not permit temporary installation of cable or wires on top of the ground.

CLASSIFICATION OF DEFECTS

236	0074	01	Insulated wire not protected from mechanical injury.
236	0074	02	Insulation of insulated wire punctured for test purposes.
236	0074	03	Splice in underground wire does not have insulation resistance value at least equal to the wire spliced.

§ 236.76 Tagging of wires and interference of wires or tags with signal apparatus.

Each wire is required to be tagged or otherwise marked so it can be identified at each terminal. Nomenclature shall correspond to that of the circuit plan. Tags or other marks of identification are required to be made of insulating material and wires and tags are prohibited from interfering with moving parts of signal apparatus.

Application:

Applies to each wire at each terminal in all housings including switch circuit controllers, switch machines, and terminal or junction boxes.

Shunt wires inside switch circuit controllers are not required to be tagged as long as the carrier's nomenclature is uniform and corresponds to its circuit plans.

Signal wiring shall be tagged or otherwise marked at a terminal. A terminal is any point the wire terminates from its point of origin to and including the point of final termination. The wire may be tagged or marked in any manner so that it can be identified.

Breaks in a relay or other breaks that are identified on the circuit plan by the terminal post number meet the requirements of this rule. However, the circuit plan must be available in the signal case in such instances. If a carrier identified their wires in this manner, it would require every signal and cut section to have a circuit plan. If they do not, and the wires cannot be identified, the installation does not comply with this part.

All tag or wire identification should correspond with the circuit plan. All tags and identification should be of insulating material. Wires and tags shall not interfere with the moving parts or apparatus. This includes the contact members of relays, switch machines, interlocking machines, semaphore signal mechanism and apparatus, etc.

If it is necessary to pull the wire to identify it, the carrier is in non-compliance.

CLASSIFICATION OF DEFECTS

236	0076	01	Wire not tagged or otherwise marked so it can be identified at terminal.
236	0076	02	Nomenclature of tag or wire identification does not correspond to that of circuit plan.
236	0076	03	Tag or other mark of identification in instrument case or apparatus housing not made of insulating material.
236	0076	04	Tag interferes with moving parts of apparatus.
236	0076	05	Wire interferes with operating part of mechanism.

Inspections and Tests; All Systems

§ 236.101 Purpose of inspections and tests; removal from service of relay failing to meet test requirements.

This rule prescribes certain inspections and tests of vital importance be made. The inspections and tests must be performed in accordance with carrier specifications which are subject to FRA approval. Electronic device, relay or other electromagnetic device which fails to meet requirement of specified tests must be removed from service and not restored to service until its operating characteristics are within the limits prescribed by the manufacturer.

Application:

Applies to all systems.

Purpose of inspections and tests is to determine if operating characteristics of relays, electronic apparatus and electromagnetic devices are within specified values and that apparatus and equipment is being maintained in condition to assure safety of train operation.

CLASSIFICATION OF DEFECTS

236 0101 01 Relay which failed to meet requirements of specified tests not removed from service.

236 0101 02 Relay which failed to meet requirements of specified tests restored to service with operating characteristics not in accordance with the limits within which the relay is designed to operate.

236 0101 03 Electromagnetic device other than relay, which failed to meet requirements of specified tests not removed from service.

236 0101 04 Electromagnetic device other than relay, which failed to meet requirements of specified tests restored to service with operating characteristics not in accordance with the limits within which the electromagnetic device is designed to operate.

236 0101 05 Electronic device which failed to meet requirements of specified tests not removed from service.

236 0101 06 Electronic device which failed to meet requirements of specified test restored to service with operating characteristics not in accordance with the limits within which the electronic device is designed to operate.

§ 236.102 Signal mechanism.

This rule requires a visual inspection of semaphore and searchlight signal mechanism at least once every six months. Tests of the operating characteristics are required to be made every two years.

Application:

Applies to all semaphore and searchlight type signal mechanisms. Record of six-month inspection is not required. The rule requires the observation of the searchlight mechanism while it is operated to all positions during the six-month inspection.

Tests of operating characteristics include pick-up, release, and working values. They may be recorded in either voltage or current values.

CLASSIFICATION OF DEFECTS

236 0102 01 Signal mechanism not inspected at least once every six months.

236 0102 02 Tests of signal mechanism operating characteristics not made at least once every two years.

236 0102 03 Mechanical movement to all positions of searchlight mechanism not observed at least once every six months.

§ 236.103 Switch circuit controller or point detector.

Switch circuit controllers and point detectors are required to be inspected and tested at least once every three months.

Application:

Applies to all switch circuit controllers and point detectors in all systems required by Rules 236.6, 236.13, 236.51, 236.57, 236.202, 236.203, 236.334 and 236.342.

Inspection should determine general condition, such as extent of wear of bearings and connections, secure fastening, condition of contacts and shunt wires, wiring, gaskets, etc. in compliance with these rules.

Test should be made with gage placed between the stock rail and the switch point, six inches from the end of switch point, to determine proper adjustment and operation.

This rule is not applicable to a switch that is removed from revenue service and is effectively spiked, clamped, or blocked in proper position. Inspectors should be aware of carriers procedure for removal of switches from service.

CLASSIFICATION OF DEFECTS

236	0103	01	Switch circuit controller not inspected at least once every three months.
236	0103	02	Tests of switch circuit controller not made at least once every three months.
236	0103	03	Point detector not inspected at least once every three months.
236	0103	04	Tests of point detector not made at least once every three months.

§ 236.104 Shunt fouling circuit.

Shunt fouling circuit is required to be inspected and tested at least once every three months.

Application:

Applies to all shunt fouling circuits in all systems.

Inspection should determine bonds and fouling wires are applied in compliance with Rules 236.51, 236.56, 236.57, and 236.58 at the proper places, intact and in good condition.

Test should be made at clearance point and on both sides of insulated rail joints between points and frog by connecting 0.06 ohm shunt across rails and determining if the associated track relay is in de-energized position, or the device that functions as a track relay is in its most restrictive condition.

A switch removed from revenue service does not eliminate the requirements of this rule.

CLASSIFICATION OF DEFECTS

236	0104	01	Shunt fouling circuit not inspected at least once every three months.
236	0104	02	Tests of shunt fouling circuit not made at least once every three months.

§ 236.105 Electric lock.

This rule requires that electric locks be tested once every two years. It excludes forced drop type electric locks.

Application:

Applies to all systems and interlocking machines.

Locks failing to meet test requirements must be replaced. Electric locks of the non-forced drop type may be removed from service, repaired, and replaced in service.

Tests of operating characteristics include pick-up, release, and working values. They may be recorded in either voltage or current values.

CLASSIFICATION OF DEFECTS

236 0105 01 Tests of electric lock not made at least once every two years. (Does not apply to electric locks of forced-drop type.)

§ 236.106 Relays.

This rule requires that each relay used in vital circuits of wayside equipment be tested at intervals prescribed for its type of design.

Application:

Applies to relays used in vital circuits of wayside equipment in all systems.

Each relay is required to be tested at least once every four years except:

1. Centrifugal relays shall be tested at least once every 12 months.
2. Vane relays and D.C. polar relays shall be tested at least once every two years.
3. Relays with soft iron magnetic structure which tends to become permanently magnetized, shall be tested at least once every two years.

This rule is applicable only to relays in service. A new relay placed in service shall be tested at intervals prescribed for its type of design. A shopped relay, after being tested or repaired in the shop, is not considered in service until it is installed within a signal system.

A relay that has broken glass, high resistance contacts, burnt contacts, burnt ribbons, broken or bent contacts, improperly installed ribbons, or evidence of moisture or other foreign matter inside its housing is not properly maintained and is prohibited.

Tests of operating characteristics include pick-up, release, and working values. They may be recorded in either voltage or current values.

CLASSIFICATION OF DEFECTS

236 0106 01 Tests of relay in service not made at least once every four years.

236 0106 02 Tests of centrifugal relay in service not made at least once every twelve months.

236 0106 03 Tests of AC vane relay, D.C. polar relay, or relay with soft iron magnetic structure not made at least once every two years.

§ 236.107 Ground tests.

This rule requires a test for grounds on vital circuitry be made when placed in service and at least once every three months thereafter.

Application:

This test shall be made at energy buses supplying power to signal control circuits. The test is not required to be made on track circuit wires, AC distribution circuits grounded in the interest of safety or common return wires of grounded common single break circuits.

Test shall be made by measuring the voltage potential between each energy bus and ground. If a voltage potential is detected between energy bus and ground, a current reading shall be taken to determine whether the ground is in excess of that permitted by Rule 236.2. In no case shall a current reading be taken when a train is closely approaching or passing, or a meter connected between an energy bus and ground be left unattended.

The ground test should also be applied to each output circuit of those electronic devices installed to provide one or more individual isolated power supplies from a single common storage battery or power supply.

CLASSIFICATION OF DEFECTS

236 0107 01 Ground test on energy bus which furnishes power to circuits, the functioning of which affects the safety of train operation, not made when installed or at least once every three months.

§ 236.108 Insulation resistance tests, wires in trunking and cable.

This rule requires tests of insulation resistance of wires in trunking and cable be made when installed and at least once every ten years thereafter. Conductors having insulation resistance of less than 500,000 ohm shall be tested annually.

In no case shall a conductor with insulation resistance of less than 200,000 ohms be left in service.

Application:

Tests must be made when wires, cables, and insulation are dry. However, wet conditions do not under any circumstances provide relief from Section 236.2.

Insulation resistance tests of each wire within trunking or within a cable must be tested to ground and tested against all other wires within the trunking or cable.

Single-conductor wire buried underground shall be tested to ground, but is not required to be tested against all other wires in the cable run.

This rule applies to conductors and cables used for signal power.

Track wires, line wires and case wiring are excluded from the requirements of this rule.

Where a conductor is found with insulation resistance of less than 500,000 ohms, prompt action is required for repair or replacement of the defective wire or cable. Until repair or replacement, insulation resistance tests must be made annually. The reason for this provision is to allow lead time for acquisition

of new cable or scheduling of manpower. However, if material and manpower are available to effect repairs or replacement, corrective action shall be taken immediately.

Where a conductor is found with insulation resistance of less than 200,000 ohms, it shall be either repaired or removed from service.

CLASSIFICATION OF DEFECTS

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|-----|------|----|--|
| 236 | 0108 | 01 | Tests of insulation resistance not made within specified period. |
| 236 | 0108 | 02 | Action not taken to promptly repair or renew conductor when its insulation resistance is below 500,000 ohms. |
| 236 | 0108 | 03 | Circuit permitted to function on a conductor having insulation resistance value less than 200,000 ohms. |

§ 236.109 Time releases, timing relays and timing devices.

This test requires that time releases, time relays, and timing devices be tested once every twelve months, and that timing be maintained at not less than 90% of the predetermined time interval, which shall be shown on the plans or marked on the time release, time relay, or timing device.

Application:

Applies to all systems. Tests should not be conducted while rail traffic is approaching or within any route involved in the test.

This test is required to determine the length of time that a time release, time relay, or timing device must run before the locking is released.

Test shall be conducted by starting time release, time relay or timing device and checking the length of time from the instant the device is started or from the opening of check contact (if used) until release of lever lock or energization of electric stick locking relay.

Releasing time must not be less than 90% of that shown. It may be any amount of time over the predetermined time. Predetermined time interval must be shown on plans or marked on the time release or relay.

CLASSIFICATION OF DEFECTS

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|-----|------|----|---|
| 236 | 0109 | 01 | Time release not tested at least once every twelve months. |
| 236 | 0109 | 02 | Timing relay not tested at least once every twelve months. |
| 236 | 0109 | 03 | Timing device not tested at least once every twelve months. |
| 236 | 0109 | 04 | Timing of time release less than 90 percent of predetermined time interval. |
| 236 | 0109 | 05 | Timing of timing relay less than 90 percent of predetermined time interval. |
| 236 | 0109 | 06 | Timing of timing device less than 90 percent of predetermined time interval. |
| 236 | 0109 | 07 | Predetermined time interval not shown on plans or marked on time release, timing relay, or timing device. |

§ 236.110 Results of tests.

This rule requires that the results of vital tests be recorded and filed in the office of the responsible division officer. It specifies those results to be recorded, prescribes the general format to be used and requires that the recording be made by the employee who makes the test.

Application:

The result of each required test must be recorded on preprinted or computerized form designed for that purpose. Results of tests recorded on other than prescribed form is prohibited.

The form must show name of carrier, place, date, equipment tested, results of tests, repairs, replacements, adjustments, condition in which apparatus was left and signature of employee making the test. This required information may be shown in any order the carrier chooses and forms may provide for several tests. Equipment tested refers to each piece of equipment tested in compliance with Rules 236.102 to 236.109, inclusive; 236.376 to 236.387, inclusive; 236.576; 236.577; and 236.586 to 236.589 inclusive.

Each form required by this rule shall be filed in the office of a supervisory official having jurisdiction. The divisional officer may be an assistant signal supervisor, signal supervisor, or any other divisional officer. ATCS, ATS and ACS test records shall be kept at test points.

Except for the results of tests made in compliance with section 236.587, all such records of tests shall be kept on file until the next record of the same tests are made and put on file. The records of tests made at intervals of less than one year shall be retained for at least one year.

The records of results of tests made in compliance with section 236.587 shall be kept on file for at least 92 days.

(Reference Technical Bulletin S-96-05)

CLASSIFICATION OF DEFECTS

236	0110	01	Record of tests not made.
236	0110	02	Tests not recorded on form.
236	0110	03	Record of tests not complete.
236	0110	04	Record of tests not filed with a supervisory official having jurisdiction.
236	0110	05	Record of test form does not show name of railroad, place and date, equipment tested, repairs, replacements, adjustments made, condition in which apparatus was left, and signature of employee making the test.

Subpart B - Automatic Block Signal Systems Standards

§ 236.201 Track-circuit control of signals.

This rule requires that aspects of signals with indications more favorable than "Proceed at Restricted Speed" be controlled automatically by track circuits extending through the entire block.

Application:

Applies to automatic block and traffic control systems.

Rule 236.708 requires the limits of the block for last signal be defined.

The aspect and indication determine compliance with this rule. A carrier is in non-compliance if any aspect with an indication more favorable than "Proceed at Restricted Speed" is used even though the speed may be 20 miles per hour or less.

A block extends from signal to signal or from signal to its defined limits at end of the system.

This rule is not applicable to so-called distant or approach signals outside of a system.

CLASSIFICATION OF DEFECTS

236 0201 01 The control circuits for home signal aspects more favorable than "proceed at restricted speed" not controlled automatically by track circuits extending through the entire block.

§ 236.202 Signal governing movements over hand-operated switch.

Signal governing movements over hand-operated switch is required to display its most restrictive aspect when the points are not in proper position.

Application:

Applies to both automatic block and traffic control systems.

This rule requires each switch to be so interconnected with the signal system that when the switch is not in proper position each signal governing movements over the switch will display its most restrictive aspect.

This rule does not apply to spring switches.

This rule applies to the circuitry necessary to comply with the requirements of the rule, but does not apply to defective conditions such as circuit controller adjustments, absence of shunt wires, etc.

CLASSIFICATION OF DEFECTS

236 0202 01 Signal does not display its most restrictive aspect when points of facing-point hand- operated switch over which it governs movements are open one-fourth inch or more.

236 0202 02 Signal does not display its most restrictive aspect when points of trailing-point hand- operated switch over which it governs movements is open three-eighths inch or more.

236 0202 03 Signal which displays a separate aspect for facing movements over hand-operated switch in the normal and in the reverse position does not display its most restrictive aspect when the switch points are open one-fourth inch or more from either the normal or reverse position.

§ 236.203 Hand-operated crossover between main tracks; protection.

This rule requires that hand-operated crossover between main tracks provide protection for train movements by either an arrangement of one or more track circuits and switch circuit controllers; facing-point locks on both switches operated from a single lever; or, by electric locks on both switches of the crossover.

Signals governing movements over either switch must display their most restrictive aspect: where switch circuit controller and track circuits are used, when either switch is not in proper position, or the crossover is occupied by a train, locomotive, or car; where facing-point locks are used, either switch is unlocked;

and, where electric locks are used, before the electric locking releases. Relief is provided for certain conditions adverse to shunting.

Application:

Applies to both automatic block and traffic control systems.

Relief of the shunting requirements does not exceed that of rule 236.51 - where such conditions are known to exist, adequate measures to safeguard train operation must be taken.

These requirements apply to crossovers between main track and signaled siding in traffic control territory.

Time or approach locking must be provided for electric locking.

Inspectors should be alert for staggered insulated rail joints that will permit undetected occupancy by a locomotive or car where one or more track circuits and circuit controllers are used. Such defective conditions are prohibited by rule 236.51.

Arrangements meeting the requirements of paragraphs (2) or (3) do not require the use of track circuits.

This rule prohibits the use of shunt fouling circuits only to provide protection against the occupancy of the turnouts between the two main tracks.

CLASSIFICATION OF DEFECTS

236 0203 01 At hand-operated crossover between main tracks protection not provided by one of the following: (1) An arrangement of track circuits and switch circuit controllers, (2) facing-point locks on both switches of the crossover, with both locks operated by a single lever, or (3) electric locking of the switches of the crossover.

236 0203 02 Signal governing movements over switch of hand-operated crossover between main tracks does not display its most restrictive aspect when either switch of the crossover is open, where crossover protection is provided by track circuits and switch circuit controllers.

236 0203 03 Signal governing movements over switch of hand-operated crossover between main tracks does not display its most restrictive aspect when crossover is occupied by a train, locomotive, or car in such manner as to foul the main track, where crossover protection is provided by track circuits and switch circuit controllers. (Explain fully condition of rail with respect to presence of sand, rust, dirt, grease or other foreign matter.)

236 0203 04 Signal governing movements over switch of hand-operated crossover between main tracks does not display its most restrictive aspect when either switch of crossover is unlocked, where switches of crossover are provided with facing-point locks operated by a single lever.

236 0203 05 Signal governing movements over switch of hand-operated crossover between main tracks does not display its most restrictive aspect before electric locking releases, where switches are electrically locked.

236 0203 06 Electric locking releases before the expiration of predetermined time interval after signals display their most restrictive aspect. (Applies only to electric locking of switches of hand-operated crossover between main tracks.)

§ 236.204 Track signaled for movements in both direction, requirements.

This rule requires that on track signaled for movements in both directions, a train shall cause one or more opposing signals ahead of it to display the most restrictive aspect. Signals are required to be spaced or arranged to provide stopping distance for opposing trains.

Application:

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

Headblock Signal is defined by Part 1.1.1 of the AAR Signal Manual as, "A home signal governing entrance into the block between sidings on single track.

Braking distances should be obtained from carrier's braking distance chart.

CLASSIFICATION OF DEFECTS

236 0204 01 On track signaled for movements in both directions a train does not cause one or more opposing signals immediately ahead of it to display the most restrictive aspect the indication of which is not more favorable than "proceed at restricted speed."

236 0204 02 On track signaled for movements in both directions where opposing signals are spaced stopping distance apart for movements in one direction only, signals not arranged so that a restrictive aspect will be displayed by at least one of the signals in approach of the opposing signals, when such approach signals are passed simultaneously by opposing trains.

236 0204 03 On track signaled for movements in both directions where opposing signals are spaced less than stopping distance apart for movements in one direction, signals not arranged so that restrictive aspects will be displayed by both signals in approach of the opposing signals for trains passing such approach signals simultaneously

236 0204 04 In APB signaling, train passing head block signal does not cause opposing head block signal to display an aspect not more favorable than "stop."

§ 236.205 Signal control circuits; requirements.

Control circuits are required to be installed so that each signal will display its most restrictive aspect when the block it governs is occupied by a train, locomotive, or car; a switch is not in proper position; an independently operated derail equipped with switch circuit controller is not in derailing position; when a track relay is in de-energized position or device that functions as a track relay is in its most restrictive state; or when a signal control circuit is de-energized.

Application:

Applies to both automatic block signal and traffic control systems.

A signal must display its most restrictive aspect when any of the conditions listed under (a), (b), (c) or (d) of this rule occur. However, it is permissible, after the signal's most restrictive aspect has been displayed for such conditions, for a push button, switch, lever or other device to be operated manually by the operator or trainman and an indication not more favorable than "proceed at restricted speed" then be obtained.

This rule is applicable to the design and installation of control circuits and does not apply to defective conditions which appear to affect this rule, such as circuit controller adjustments, missing shunt or fouling wires, dead section, track circuit adjustments, grounds, etc.

This rule does not require that the most restrictive aspect be a red or stop aspect.

CLASSIFICATION OF DEFECTS

236 0205 01 Circuits not so installed that signal will display its most restrictive aspect when the block into which it governs train movements is occupied by a train, locomotive, or car.

236 0205 02 Circuits not so installed that signal will display its most restrictive aspect when points of a switch in the block into which it governs train movements are not closed in proper position.

236 0205 03 Circuits not so installed that signal will display its most restrictive aspect when an independently operated fouling-point derail equipped with switch circuit controller in the block into which it governs train movements is not in derailing position.

236 0205 04 Circuits not so installed that signal will display its most restrictive aspect when a track relay within the block into which it governs train movements is in de-energized position.

236 0205 05 Circuits not so installed that signal will display its most restrictive aspect when a device that functions as a track relay within the block into which it governs train movements is in its most restrictive state.

236 0205 06 Circuits not so installed that signal will display its most restrictive aspect when its control circuit is de-energized.

§ 236.206 Battery or power supply with respect to relay; location.

This rule requires that the source of energy be located at the end of the circuit farthest from the relay where open-wire circuit or common return circuit is used.

Application:

Applies to automatic block signal and traffic control systems. Does not apply to interlockings.

This rule prohibits use of loop circuits in vital circuitry.

CLASSIFICATION OF DEFECTS

236 0206 01 Battery or power supply for signal control relay circuit not located at the end of the circuit farthest from the relay. (Applies only to open-wire circuit or common return circuit.)

§ 236.207 Electric lock on hand-operated switch; control.

Electric lock on hand-operated switch is prohibited from being unlocked before control circuits of signals governing movement over switch are opened.

Approach or time locking must be provided.

Application:

This rule is applicable only to automatic block signal systems.

There are no requirements for the installation of electric locks in automatic block signal territory. However, if an electric lock is installed on a hand-operated switch in ABS territory, such electric lock must comply with this rule, including the provision that approach or time locking be provided. The testing requirements for approach and time locking do not apply to ABS systems, therefore the carrier is not required to make periodic tests of the approach or time locking within automatic block signal systems.

CLASSIFICATION OF DEFECTS

- 236 0207 01 Electric lock on hand-operated switch can be unlocked before control circuits of signals governing movements over such switch have been opened.
- 236 0207 02 Approach or time locking not provided for electric lock on hand-operated switch.
- 236 0207 03 Electric lock on hand-operated switch can be unlocked before expiration of predetermined time interval where time locking is provided.
- 236 0207 04 Electric lock on hand-operated switch can be unlocked before expiration of predetermined time interval with approach circuit occupied where approach locking is provided.
- 236 0207 05 Approach locking not effective.
- 236 0207 06 Time locking not effective.
- 236 0207 07 Approach or time locking of electric lock on hand-operated switch can be defeated by the unauthorized use of emergency device which is not kept sealed in the non-release position.

Subpart C – Interlocking - Standards

§ 236.301 Where signals shall be provided.

This rule requires that a signal be provided to govern train movements into and through interlocking limits except over electrically locked hand-operated switch equipped with either a pipe-connected derail or independently-operated electrically locked derail.

Application:

This rule applies to interlocking only. It does not apply to controlled points in traffic control systems.

Electric locks installed under this rule must conform to requirements of rules 314, 760, 768 without regard to speed.

All interlocked signals must be operative unless relief has been heretofore granted. The word "into" is defined as, "to or toward the inside of from outside; past or through the outer boundary

or limit." The word "through" is defined as, "into one side, end or point and out of the other." Therefore, an inoperative red signal does not meet these requirements.

Signals shall be provided to govern movements into and through interlocking limits. A carrier utilizing red inoperative signals for movement of trains or engines into and through interlocking limits is not in compliance.

A signal is not required to govern movements over a hand-operated switch into interlocking limits if the hand-operated switch is equipped with an electric lock and a derail is provided at the clearance point that is either pipe-connected or locked electrically. There are no restrictions on train speed at such installations.

A non-electrically locked switch without derail may be utilized within interlocking limits provided a signal is provided to govern movements on all routes and speed does not exceed 20 mph.

An electrically locked switch without derail but with signal governing movements out of the switch may be utilized without restriction on train speed.

Where an electrically locked switch and/or derail is used within the interlocking, locking must protect against all possible conflicting routes and once the locking has been released, it should be impossible to clear a conflicting route.

All electrically locked switches and derails within interlocking limits must have approach or time locking.

CLASSIFICATION OF DEFECTS

236 0301 01 Signal not provided to govern train movements into and through interlocking limits. (Note: This does not apply to a turnout over a hand-operated switch into interlocking limits if the switch is provided with an electric lock and a derail at the clearance point, either pipe-connected to the switch or independently locked, electrically. Electric locks installed under this rule must conform to the time and approach locking requirements of Section 236.314 (without reference to the 20-mile exceptions), and those of either Section 236.760 or Section 236.768, as may be appropriate.)

§ 236.302 Track Circuits and Route Locking.

This rule requires track circuits, and route locking where power operated switches are used, be provided throughout interlocking limits.

Application:

Applies to interlocking only.

Route locking shall be effective at a point not more than 13 feet in advance of the signal measured from the center of the signal mast or if there is no mast, from the center of the signal.

When a train or engine passes a signal displaying any type of proceed aspect, including "proceed at restricted speed," track circuits and route locking shall be provided. Electric locking, either in the interlocking machine or the wayside equipment, that prevents the movement of any switch, movable point frog, or derail in the route entered is required. However, it may be so arranged that after a train clears a track section of the route, the locking affecting that section may be released.

Route locking is not required nor provided where there is an absence of a power-operated switch, movable point frog or derail in the route.

CLASSIFICATION OF DEFECTS

236 0302 01 Track circuits not provided throughout interlocking limits.

236 0302 02 Route locking not provided throughout interlocking limits. (Note: Route locking shall be effective when the first pair of wheels of a locomotive or car passes a point not more than 13 feet in advance of the signal governing the movement.)

236 0302 03 Route locking not effective.

§ 236.303 Control circuits for signals, selection through circuit controller operated by switch points or by switch locking mechanism.

This rule is a standard that requires control circuits of signal aspects with indications more favorable than "proceed at restricted speed" be selected through switch circuit controller or relay operated by circuit controller of each hand-operated, power-operated, or mechanically-operated switch; movable-point frog; or derail in the route governed. It requires each switch, movable-point frog, or derail to be in proper position before such signal aspect can be displayed.

Application:

Applies to both interlocking and traffic control systems. This rule is not applicable to control circuits of aspects indicating "proceed at restricted speed."

Each switch, movable-point frog or derail shall be equipped with a switch circuit controller operated directly by the switch points or by a circuit controller operated by a switch locking mechanism. An aspect with an indication more favorable than "proceed at restricted speed" must be selected through such switch, movable-point frog or derail circuit controller.

This rule applies to all hand-operated, power-operated or mechanically-operated switches within interlockings or traffic control systems. These include power switches of any kind, (electric, electro-pneumatic, or hydraulic) and pipe-connected switches operated from a lever of a mechanical interlocking machine.

Non-compliance with this rule should be reflected in indication locking tests for power-operated switches, movable point frogs and derails. Test hand-operated switches by opening contacts of switch circuit controller.

Rule 236.6 is a maintenance standard that is applicable to hand-operated switches, (both electrically locked and non-electrically locked).

Rule 236.13 is a design standard that is applicable to spring switches installed in interlockings, traffic control systems, and automatic block signal systems. This rule prescribes the requirements for signal control circuits governing facing-point movements where spring switches are installed in interlockings, traffic control, and ABS systems. It should be noted that 236.13 does not require the signal control circuits for aspects governing trailing movements over a spring switch to check the position of the switch points.

Rules 236.334 and 236.342 are maintenance standards that dictate that the circuit controllers be maintained in such condition as to fulfill the requirements of Section 236.303.

The combination of indication and/or mechanical locking, as provided by an electro-mechanical interlocking machine, does not comply with this rule. A circuit controller is required at each switch through which control circuits of aspects more favorable than "proceed at restricted speed" must be selected.

Switch selection circuits are required for each aspect of a power-operated signal with an indication more favorable than "proceed at restricted speed" regardless of whether the speed through the interlocking is restricted by carrier operating rule or civil speed restriction.

CLASSIFICATION OF DEFECTS

236 0303 01 Control circuit for signal aspect with indication more favorable than "proceed at restricted speed" of power-operated signal governing movements over switches, movable-point frogs, and derails not selected through circuit controller operated directly by switch points or by switch locking mechanism, or through relay controlled by such switch circuit controller on each switch, movable-point frog, and derail in the routes governed by the signal.

236 0303 02 Control circuit for signal aspect with indication more favorable than "proceed at restricted speed" is not so arranged that such aspect can only be displayed by a signal when each switch, movable-point frog, and derail in the route governed is in proper position.

§ 236.304 Mechanical locking or same protection effected by circuits.

This rule requires that mechanical locking or the equivalent protection by means of circuits be provided at each interlocking.

Application:

Each interlocking is required to be arranged either mechanically and/or electrically so that operation of controlling devices or apparatus must succeed each other in proper sequence before a proceed aspect can be displayed.

CLASSIFICATION OF DEFECTS

236 0304 01 Mechanical locking, or the same protection effected by means of circuits not provided.

§ 236.305 Approach or time locking.

This rule requires approach or time locking be provided in connection with signals displaying aspects with indications more favorable than "proceed at restricted speed."

Application:

Any signal that displays an aspect more favorable than "proceed at restricted speed" must have approach or time locking.

This is applicable to any aspect more favorable than "proceed at restricted speed" no matter what speed restriction the carrier has on the track. For example, a green aspect interlocking signal that does not have approach or time locking where the speed is 10 mph does not comply with these requirements.

This rule requires the time or approach locking be effective for the maximum authorized speed permitted on each route.

CLASSIFICATION OF DEFECTS

236 0305 01 Approach or time locking not provided in connection with signal displaying aspects with indication more favorable than "proceed at restricted speed."

236 0305 02 Approach locking not effective.

236 0305 03 Time locking not effective.

§ 236.306 Facing point lock or switch-and-lock movement.

Facing point lock or switch and lock movement is required for mechanically-operated switch, movable-point frog or split-point derail.

Application:

Mechanically-operated, as applied to this part, refers to a switch, movable-point frog or derail operated by the control operator from a central point by means of pipe connection. It would also apply to a mechanically operated cabin-type interlocking with the appurtenances operated by trainmen. It does not apply to hand-operated derails or switches.

CLASSIFICATION OF DEFECTS

236 0306 01 Facing-point lock or switch-and-lock movement not provided for mechanically operated switch, movable- point frog, or split-point derail.

§ 236.307 Indication locking.

This rule requires indication locking for operative approach signals of the semaphore type, power-operated home signals, power-operated switches, movable point frogs and derails, and for all approach signals, except light signals with all aspects controlled by polar or coded track circuits, or line circuits so installed that a single fault will not permit a more favorable aspect than intended to be displayed.

Application:

Applies to both interlocking and traffic control systems.

Indication locking is electric locking which assures that the operation of signal appliances succeed each other in proper sequence. Indication locking falls into three primary categories; levers, signals, and switches.

Depending upon the type of interlocking machine, indication locking of levers prevents the lever from being operated full-stroke until the operated unit has properly completed its movement, or prevents the final lever from being operated until all units have properly completed their required movements.

Indication locking of home signals prevents the established route from being changed. It prevents the operation of all switches, movable point frogs, derails, and other operative units in the route and prevents the clearing of conflicting signals. Indication locking of approach signals prevents the route governed by

a home signal from being changed until the approach signal displays an aspect not more favorable than "Approach Next Signal Prepared to Stop."

Indication locking of switches, movable point frogs, derails and other operative units such as bridge locking members prevents the clearing of signals governing movements over the unit until each operative unit has completed its required movement.

Inoperative approach signals, mechanically-operated (pipe-connected) home signals and switches are excluded from these requirements.

Each operative approach signal of the semaphore type, power-operated home signal, power-operated switch, movable-point frog or derail is required to be provided with indication locking.

Each operative approach signal of the light type shall be provided with indication locking except where its aspects are controlled by polar or coded track circuits, or by line circuits so arranged that a single fault will not permit a false proceed signal to be displayed.

CLASSIFICATION OF DEFECTS

236	0307	01	Indication locking not provided for semaphore type approach signal.
236	0307	02	Indication locking not provided for power-operated home signal.
236	0307	03	Indication locking not provided for power-operated switch, movable point frog, or derail.
236	0307	04	Indication locking not provided for approach signal of the light type. (Applies to each light signal except light signal all aspects of which are controlled by polar or coded track circuits or line circuits so arranged that a single fault will not permit a more favorable aspect than intended to be displayed.)
236	0307	05	Single fault in line circuit controlling approach signal aspect, where indication locking is not provided, permits more favorable aspect than intended to be displayed.
236	0307	06	Indication locking not effective.

§ 236.308 Mechanical or electric locking or electric circuits; requisites.

This rule prohibits display of conflicting aspects except on track used for switching movements only by one train at a time. Manual interlockings installed prior to October 1, 1950, are excluded provided simultaneous opposing movements are not permitted between stations on either side of the interlocking when it is unattended.

Application:

Mechanical locking, electric locking, or electric circuits are required to be installed so that signals cannot display aspects which permit conflicting movements.

Opposing signals on track used for switching movements only are excluded and may display aspect indicating "proceed at restricted speed" when used by only one train at a time. This arrangement is prohibited for use by through trains. It is prohibited for more than one switch crew to perform movements on track used for switching only.

Unattended manual interlockings having signals that display conflicting aspects that are interconnected with automatic block signal systems meet the requirements of this rule.

CLASSIFICATION OF DEFECTS

236 0308 01 Signals can display aspects which permit conflicting movements. (Does not apply to signals that may display restricting aspects at the same time on a track used for switching movements only, by one train at a time, or to opposing signals on the same track at manual interlocking which are permitted simultaneously to display aspects authorizing conflicting movements when interlocking is unattended, provided that simultaneous train movements in opposite directions on the same track between stations on either side of the interlocking are not permitted.)

§ 236.309 Loss of shunt protection; where required.

This rule requires that loss of shunt of 5 seconds or less, regardless if it occurs on the approach circuit or on a track circuit within the limits of an automatic interlocking, must not permit established route to be changed. It also requires that loss of shunt of 5 seconds or less shall not permit the release of route locking.

Application:

Applies to all automatic interlockings whether or not they are connected to other signal systems, and to traffic control systems. Includes automatic drawbridges, manual interlockings arranged for automatic operation when unattended, and interlockings having both automatic and controlled routes. Applies to route locking of power-operated switch installed after February 26, 1984.

Test for compliance on approach circuits that activate approach locking should be made by placing a shunt on the approach circuit to establish a route. The route is established when the interlocked signal displays an aspect authorizing movement into interlocking limits. After the route is established, remove the shunt while observing the interlocked signal to assure its aspect does not change until the expiration of five or more seconds. Each track circuit in the approach circuit should be tested.

Test for compliance on approach circuits that activate time locking should be made by placing a shunt on the approach circuit to establish a route. The route is established when the interlocked signal displays an aspect authorizing movement into interlocking limits. After the route is established, remove the shunt and determine that when the interlocked signal obtains an aspect indicating stop, a predetermined time interval is activated which prevents the clearing of a conflicting signal or operation of an interlocked device. Each track circuit in the approach circuit should be tested.

Test for compliance on track circuits within interlocking limits should be made by making an operating shunt test into interlocking limits, then place a shunt on the approach circuit of a conflicting route. Remove the shunt from the track circuit within interlocking limits while observing the conflicting route home signal to assure it does not clear until after the expiration of more than five seconds. Each track circuit within interlocking limits should be tested.

Test for compliance at power-operated switch by clearing signal governing movement over the switch; place a shunt on track circuit in approach to signal; place a shunt on track circuit in advance of signal; remove shunt from track circuit in approach to signal; remove shunt in advance of signal and determine that switch cannot be operated for at least five seconds. If more than one track circuit is in the route locking circuit, check each circuit in turn.

CLASSIFICATION OF DEFECTS

236 0309 01 Loss of shunt for five seconds or less permits established route at automatic interlocking to be changed.

236 0309 02 Loss of shunt of five seconds or less permits the release of route locking of power-operated switch, movable point frog, or derail. (Does not apply to power-operated switch, movable point frog, or derail installed prior to February 27, 1984.)

§ 236.310 Signal governing approach to home signal.

This rule requires that a signal be provided on main track to govern the approach with the current of traffic to any home signal. It excludes the first signal encountered when leaving yards or stations and authorized speed approaching home signal is not higher than slow speed. It provides for use of inoperative approach signal when authorized speed between home signals on route governed is 20 miles per hour or less.

Application:

Applies to both interlocking and traffic control systems.

A signal to govern the approach to a home signal is required on main track only. Auxiliary tracks are excluded regardless of how heavily traveled.

An approach signal is required for current of traffic only where normal operation is with the current of traffic.

A signal is not required to govern the approach to the first signal encountered when leaving a yard or station where all trains originate or stop if the authorized speed approaching the first signal encountered is not higher than slow speed. If trains are operated that do not stop at the yard or station, an approach signal must be provided. In addition, the first signal encountered must be within yard or station limits. If it is outside yard or station limits, it becomes the first signal encountered after leaving the yard or station and requires that an approach signal be provided.

Where speed between home signals of an interlocking or controlled point exceeds 20 miles per hour, an operative approach signal must be provided.

An operative approach signal must comply with Rule 236.803, i.e., its aspect must convey advance information about the indication of the home signal. This requires that operative approach signals be capable of displaying aspects less restrictive than, "approach next signal prepared to stop," when the home signal displays an aspect indicating proceed.

An approach signal capable of displaying a single aspect, yellow or lunar, is an inoperative signal.

An approach signal capable of displaying two aspects, red and yellow, is an inoperative signal in the application of this rule. It cannot furnish advance information about the indication of the home signal when the home signal displays an aspect indicating proceed.

An approach signal in non-signaled territory capable of displaying two aspects, yellow and green, is an operative signal.

An approach signal capable of displaying three aspects, red, yellow, and green, is an operative signal.

CLASSIFICATION OF DEFECTS

236 0310 01 Approach signal not provided for home signal on main track. (Does not apply where home signal is the first signal encountered when leaving yard or station where authorized speed approaching such signal is not higher than slow speed).

236 0310 02 Inoperative approach signal provided for home signal where authorized speed between home signals is greater than 20 miles per hour.

§ 236.311 Signal control circuits, selection through track relays or devices functioning as track relays and through signal mechanism contacts and time releases at automatic interlocking.

This rule requires that at all interlockings, the control circuit for aspect with indication more favorable than "proceed at restricted speed", be selected through relays or devices that function as track relays of all track circuits in the route governed or through repeating relays for such track circuits. Additionally, at automatic interlocking, such control circuits shall be selected through relays or devices that function as track relays of track circuits in all conflicting routes or through repeating relays for such track circuits; through signal mechanism contacts or through relay contacts closed when conflicting signals display stop aspects; and through normal contacts of time releases or timing devices for conflicting routes or contact of relays repeating the normal position of contacts on such time releases or timing devices.

Application:

Applies to both interlocking and traffic control systems.

This rule does not require control circuits at manual or remote controlled interlockings or controlled points be selected through track relays or devices that function as track relays on conflicting routes, nor through contacts of signal mechanisms, or relay contacts closed when such signals display "stop" for conflicting routes, nor through "check" contacts closed when timing relays, releases, or devices are in their normal state.

This rule does not apply to control circuits of signals displaying aspects with indications of "proceed at restricted speed" aspects except at automatic interlockings.

CLASSIFICATION OF DEFECTS

236 0311 01 Control circuit for aspect with indication more favorable than "Proceed at restricted speed" not selected through relays or devices that function as track relays for all track circuits in the route governed or through repeating relays for such track circuits.

236 0311 02 Signal control circuit at automatic interlocking not selected through relays or devices that function as track relays for all track circuits in the route governed or through repeating relays for such track circuits.

236 0311 03 Signal control circuit at automatic interlocking not selected through relays or devices that function as track relays for track circuits in all conflicting routes within interlocking limits or through repeating relays for such track circuits.

236 0311 04 Signal control circuit at automatic interlocking not selected through signal mechanism contacts for signals on all conflicting routes or through relay contacts closed when such signals display stop aspects.

236 0311 05 Signal control circuit at automatic interlocking not selected through normal contacts of time releases or timing devices for all conflicting routes or through contacts of relays repeating the normal position of contacts of such time releases or timing devices.

§ 236.312 Movable bridge, interlocking of signal appliances with bridge devices.

This rule requires that interlocking of movable bridge be so interconnected with bridge devices that bridge must be properly locked and track properly aligned before a signal governing movements over the bridge can display an aspect to proceed.

Application:

There are three types of movable spans, bascule, lift and swing. Regardless of the type of bridge, the sequence of operation for rail traffic is as follows:

1. The bridge must be seated, then locked.
2. The movable rails must be determined to be in proper surface and alinement with the rails on the abutment or fixed span.
3. Derails, if any, must be placed in non derailing position.
4. Interlocked signal may then be operated to display proceed aspect.

For water traffic the sequence of operation is precisely the opposite.

Bascule and lift spans require bridge locking devices that can drive locking members between the movable span and abutment or fixed span only when the bridge is properly seated. Locking devices are required on both ends of lift spans. Only the lift end of bascule spans must be locked. When the locking members are within one inch of being fully driven, the bridge is considered to be properly locked. Bridge locks are not designed to hold the movable span down, but to determine that the bridge is properly seated. The movable rails of bascule and lift bridges frequently correctly aline before the bridge seats, hence the need of bridge locks.

Swing spans are properly seated when the wedges are driven to lift the span off the center pier. Consider swing spans locked when the wedges are within one inch of being fully driven. The latches of swing spans are not bridge locking members but are provided to stop swing bridges in proper alinement as it is being closed.

Rails which slide or lower to butt with those of the abutment or fixed span, or risers that slide into position in the movable joint must be locked in proper alinement.

Conley frogs are designed to be self alining and are not required to be locked or electrically checked for alinement. They are required to be checked for surface.

All movable joints are required to be locked or electrically determined to be in proper surface except for those on the hinged end of bascule bridges. If surface is checked electrically, closely inspect plungers and mechanical connections for binding.

Movable joints are "soft" joints. The three-eighths inch requirement of this rule was not revised by the Track Safety Standards and movable joints are not required to be maintained to meet these standards.

At automatic and remote-controlled movable bridge interlockings, those devices used to detect and govern movement of water traffic such as audible devices, signal aspects and electric eyes are considered interlocking appliances and must operate in their proper sequence and perform their intended function.

All the rules of Subpart C are applicable to interlocked draw bridges.

Test of bridge locking is determined by withdrawing locking member or wedge more than one inch and determining whether or not control circuits are opened.

Test of movable rails for alinement is made by measuring difference in alined rails. Slide and lift rails should also be tested by manually applying lateral force to the movable rails.

Test of movable rails for surface should be made by placing a one-half inch obstruction on each rail seat and determining whether or not rail can be locked or, if electrically checked, whether or not circuit controller contacts are opened.

The RS&I does not define bridge locking, therefore it is permissible for the carrier to utilize any type of bridge locking they desire. The only requirement for the bridge lock is that the movable span must be locked with the fixed span.

Where an emergency release is provided at bridge locking, it is required to be kept locked or sealed to prevent the emergency release from being used for routine day to day operation. Operation of the emergency release shall not defeat the time or approach locking circuits.

CLASSIFICATION OF DEFECTS

236 0312 01 Signal appliances at movable bridge protected by interlocking not so interlocked with bridge devices that before a signal governing movements over the bridge can display an aspect to proceed the bridge must be locked and the track properly aligned.

236 0312 02 Signal governing movements over movable bridge protected by interlocking can display aspect to proceed with bridge locking members displaced more than one inch from their proper position.

236 0312 03 Signal governing movements over movable bridge protected by interlocking can display aspect to proceed with the track rail on the movable span more than three- eighths inch from correct surface with the rail seating device on the bridge abutment or fixed span.

236 0312 04 Signal governing movements over movable bridge protected by interlocking can display aspect to proceed with the track rail on the movable span more than three- eighths inch from correct alignment with the rail seating device on the bridge abutment or fixed span.

236 0312 05 Emergency bypass switch or device not locked or sealed.

§ 236.314 Electric lock for hand-operated switch or derail.

This rule requires each hand-operated switch or derail within interlocking limits where train speeds exceed 20 miles per hour be electrically locked. At manually operated interlocking it shall be controlled by the operator of the machine. Approach or time locking shall be provided.

Application:

Applies to interlocking only. Applies to all hand-operated switches and derails in interlocking limits where speeds exceed 20 miles per hour.

Applies to each electric lock applied to a hand-operated switch or derail installed under provisions of 236.301 regardless of speed.

Approach or time locking must be provided for each electrically locked switch or derail regardless of speed.

CLASSIFICATION OF DEFECTS

236 0314 01 Electric lock not provided for hand-operated switch or derail within interlocking limits. (Does not apply where train movements are made at speeds not exceeding 20 m.p.h.)

236 0314 02 Electric lock on hand-operated switch or derail at manually operated interlocking not controlled by operator of the machine.

- 236 0314 03 Electric lock on hand-operated switch or derail within interlocking limits can be unlocked before signals governing movements over such switch or derail display aspects indicating stop.
- 236 0314 04 Approach or time locking not provided for electric lock on hand-operated switch or derail within interlocking limits.
- 236 0314 05 Electric lock on hand-operated switch or derail within interlocking limits can be unlocked before the expiration of the predetermined time interval, where time locking is provided.
- 236 0314 06 Electric lock on hand-operated switch or derail within interlocking limits can be unlocked before the expiration of the predetermined time interval, with approach section occupied, where approach locking is provided.
- 236 0314 07 Approach or time locking of electric lock at hand-operated switch or derail can be defeated by the unauthorized use of emergency device which is not kept sealed in the non-release position.
- 236 0314 08 Approach locking not effective.
- 236 0314 09 Time locking not effective.

Rules and Instructions

§ 236.326 Mechanical locking removed or disarranged; requirements for permitting train movements through interlocking.

This rule prescribes the procedures for train operation through interlocking when the mechanical interlocking is being changed or is removed from the machine, or locking becomes disarranged or broken.

Application:

The procedures prescribed by this rule apply when mechanical locking is being modified, is broken and during repairs, becomes disarranged and is inoperable or uncertain in its operation, is being replaced by electric circuits and for those occasions when interlocking is destroyed or heavily damaged by fire, derailment or storm.

When mechanical locking is inoperable, equivalent protection may be provided by electric locking or electric circuits. If such equivalent protection is not provided, each switch, movable point frog or derail in the route must be spiked, clamped or blocked in proper position before train movement is permitted, such movement not to exceed restricted speed. It is not necessary to spike, clamp or block each switch, movable point frog, or derail if protection is provided in accordance with 236.303 and control circuits are arranged to prevent display of aspects more favorable than "proceed at restricted speed."

CLASSIFICATION OF DEFECTS

236 0326 01 Train movement permitted through interlocking while mechanical locking of interlocking machine is being changed or is removed, or when locking is disarranged or broken, without each switch, movable point frog, and derail in route over which movement is made being spiked, clamped, or blocked so that it cannot be moved by its controlling lever. (Does not apply if protection equivalent to mechanical locking is provided by electric locking or electric circuits, or where protection is in service in accordance with Section 303 of the Rules, Standards and Instructions for all signal aspects, and signal controls are arranged so that the signals cannot display an aspect the indication of which is less restrictive than "Proceed at restricted speed.")

236 0326 02 Train movement exceeds restricted speed through interlocking while mechanical locking of interlocking machine is being changed, is removed from the machine, or is disarranged or broken.

§ 236.327 Switch, movable-point frog or split-point derail.

This rule requires that lock rod of switch, movable point frog or split point derail be so adjusted that locking is prevented when the switch point is obstructed by three-eighths inch obstruction.

Application:

Applies to both interlocking and traffic control systems.

Applies to power-operated or mechanically-operated switches, movable-point frogs and derails.

Test should be made by placing three-eighths inch obstruction between the switch point and stock rail about six inches from the end of the point, and then operating switch until the lock dog on the slide bar strikes lock rod.

Test may be made either under power or by operation of the hand operation lever or crank where such machine is designed to lock up in hand operation. Inspector should be alert for instances where excessive switch point pressure prevents the locking dog from moving far enough to strike lock rod.

CLASSIFICATION OF DEFECTS

236 0327 01 Switch, movable-point frog, or split-point derail can be locked when switch point is open three-eighths inch.

§ 236.328 Plunger of facing-point lock.

This rule requires that plunger of lever operated facing-point lock have at least 8 inch stroke and, when unlocked, clear the lock rod not more than one inch.

Application:

Applies to both interlocking and traffic control systems.

Applies only to independently operated mechanical pipe-connected facing-point lock. Does not apply to hand-operated switch machines or mechanically operated switch and lock movements.

CLASSIFICATION OF DEFECTS

236 0328 01 Stroke of plunger of facing-point lock less than 8 inches.

236 0328 02 End of lock plunger clears lock rod more than one inch when lock lever is in unlocked position.

§ 236.329 Bolt Lock.

This rule requires that bolt lock be so maintained that signal governing movement over a switch or derail cannot display an aspect to proceed unless derail is in non-derailing position and switch is within one-half inch of its proper position.

Application:

Applies to mechanically operated signal governing movements over switch or derail equipped with bolt lock.

CLASSIFICATION OF DEFECTS

236 0329 01 Bolt lock does not prevent signal from being operated to display an aspect less restrictive than "Stop" while derail is in derailing position.

236 0329 02 Bolt lock does not prevent signal from being operated to display an aspect less restrictive than "Stop" when switch point is open one-half inch or more.

§ 236.330 Locking dog of switch-and-lock movement.

This rule requires that locking dog of switch-and-lock movement extend through lock rod one-half inch or more when locked in either normal or reverse position.

Application:

Applies to both interlocking and traffic control systems.

Applies only to pipe-connected, mechanically-operated switch-and-lock movements. Does not apply to power-operated switch machines such as US&S M2, M3, M22, or M23 machines or GRMS Model 5 or 55 switch machines.

Holes and notches in lock rod should have square edges to prevent forcing locking dog or plunger into lock rod.

(Reference Technical Bulletin S-96-01)

CLASSIFICATION OF DEFECTS

236 0330 01 Locking dog of switch-and-lock movement extends through lock rod less than one-half inch in normal or reverse position.

§ 236.334 Point detector.

This rule requires that point detector be so maintained that contacts cannot be opened by manually applying force at the closed point when switch is locked in either normal or reverse position. Its circuit controller contacts shall not assume the position corresponding to switch point closure if the switch point is prevented by an obstruction from closing to within one-fourth inch where latch-out device is not used and three-eighths inch where latch-out device is used.

Application:

Applies to power-operated switches only in both interlocking and traffic control systems.

Tests for compliance should be made in the same manner as switch obstruction test described under Section 236.327, by placing an appropriate gauge between the stock rail and switch point about 6 inches from the end of the switch point and closing the switch point on the gauge.

Where carriers maintain lock rods to obstruct on one-fourth inch obstruction it may be necessary to either loosen the lock rod or displace point detector rod in order to test the point detector contact adjustment.

Lateral force should be applied to the closed switch point to determine if contacts can be opened because of excessive size of notch in lock rod, loose lock rod connections or improper point detector rod adjustment.

The inspector should determine latch-out device is properly adjusted and functioning within prescribed limit. If latch-out is not connected or functioning properly, point detector adjustment must comply with one-fourth inch requirements.

CLASSIFICATION OF DEFECTS

236 0334 01 Point detector contacts can be opened by manually applying force at the closed switch point when switch mechanism is locked in normal or reverse position.

236 0334 02 Point detector circuit controller contacts assume the position corresponding to switch point closure when switch point is prevented by an obstruction from closing to within one-fourth inch. (Applies only to point detector where latch-out device is not used.)

236 0334 03 Point detector circuit controller contacts assume position corresponding to switch point closure when switch point is prevented by an obstruction from closing to within three-eighths inch. (Applies only to point detector where a latch-out device is used.)

§ 236.335 Dogs, stops and trunnions of mechanical locking.

This rule requires that driving pieces, dogs, stops and trunnions be rigidly fastened to locking bars, that swing dogs have full and free movement and that top plates be securely fastened in place.

Application:

Applies to mechanical locking only.

Does not apply to locking of switch machines.

Mechanical locking cabinets should be opened to fully expose locking and close inspection made to assure compliance.

The floor of and around interlocking machine cabinets should be closely observed for parts that have fallen from locking; screws, rivets, shavings, chips, and other evidence of poor maintenance or abuse of locking.

CLASSIFICATION OF DEFECTS

236 0335 01 Driving piece not rigidly secured to locking bar.

236 0335 02 Dog not rigidly secured to locking bar.

236 0335 03 Stop not rigidly secured to locking bar.

236 0335 04 Trunnion not rigidly secured to locking bar.

236 0335 05 Swing dog does not have full or free movement.

236 0335 06 Top plate not secured in place.

§ 236.336 Locking bed.

This rule requires that various parts of the locking bed, locking bed supports, and tappet stop rail shall be rigidly secured in place and alined to permit free operation of locking.

Application:

Locking bed must be securely fastened in place for proper operation.

CLASSIFICATION OF DEFECTS

236 0336 01 Locking bed parts or supports or tappet stop rail not rigidly secured in place.

236 0336 02 Locking bed parts or supports or tappet stop rail not alined to permit free operation of locking.

§ 236.337 Locking faces of mechanical locking; fit.

This rules requires locking faces fit squarely against each other when locked with minimum engagement of at least one-half the designed locking face.

Application:

Apply this rule to broken or badly worn locking pieces, dogs, tappets and cross locking.

Some cross locking may require removal of cover plates for inspection.

CLASSIFICATION OF DEFECTS

236 0337 01 Locking faces do not fit squarely against each other.

236 0337 02 Locking faces fit with a minimum engagement when locked of less than one-half the designed locking face.

§ 236.338 Mechanical locking required in accordance with locking sheet and dog chart.

This rule requires that mechanical locking in service be in accordance with locking sheet and dog chart.

Application:

Rule 236.1 requires locking sheet and dog chart to be kept at mechanical interlocking and be correct and legible. Locking should be carefully examined to determine compliance with locking sheet and dog chart.

Most mechanical locking, being old, has been altered. Locking that is no longer in service is not required to be removed from locking bed and not required to be shown on locking sheet and dog chart.

CLASSIFICATION OF DEFECTS

236 0338 01 Mechanical locking not in accordance with locking sheet and dog chart currently in effect.

§ 236.339 Mechanical locking, maintenance requirements.

This rule requires that locking and connections be maintained so that motion of levers or latches, when locked, do not exceed prescribed tolerances.

Application:**Mechanical Machine:**

When this rule was first adopted, more than 90% of mechanical interlocking machines installed were of two types: Saxby and Farmer and Style A. Both have latch operated locking. They are easily recognizable in that S&F machines have rocker arms that stand above the quadrants and Style A machines have rocker arms that stand below the quadrants. Other latch operated machines are dwarf S&F, Johnson and National.

When locked, the latch block of each lever may not be raised so that the bottom thereof is within three-eighths inch of top of quadrant.

The balance of the machines installed have lever operated locking. The majority of these were Style C and Stevens which are almost identical, and dwarf machines other than S&F. These machines are easily recognizable by the absence of rocker arms.

When locked, the lever latch block may not be moved more than the three-eighths inch on top of the quadrant.

Electromechanical Machine:

Electromechanical machines are combinations of electric machines and mechanical machines. The electric machine levers are located above the mechanical levers and are usually Model 14, Model 2, Model 5 or Style S-8 type machines which control electrical circuits and which operate miniature type locking to release or lock the mechanical levers.

When locked, electric levers operating in horizontal plane may not be moved more than five- sixteenths inch in normal position or more than nine-sixteenths inch in reverse position.

When locked, electric levers moving in an arc may not be moved more than five degrees.

When locked, the mechanical levers must comply with requirements for mechanical machines.

Power Machine:

At some large manual interlockings power (electric) interlocking machines manufactured by the Federal Railway Signal Company were installed. These machines are a miniature Type S&F mechanical machine with dwarf type of S&F locking with latch locking. When locked, the latch block of each lever may not be raised so that the bottom thereof is within seven thirty-seconds inch of top of quadrant.

The majority of power interlocking machines installed at large manual interlockings were Model 2, Model 14, and Model 5. At small interlockings, Style TC and Type A table interlocking machines are frequently found. Model 2 and Model 5 machines have levers that move in a horizontal plane. The levers of these machines must meet the same requirements as the electric levers of electro-mechanical machines.

CLASSIFICATION OF DEFECTS

236 0339 01 Lever latch block can be raised so that its bottom is within three-eighths inch of top of quadrant when latch is mechanically locked. (Applies only to mechanical interlocking machine with latch-operated locking.)

236 0339 02 Lever latch block can be moved more than three-eighths inch on top of quadrant when lever is mechanically locked. (Applies only to mechanical interlocking machine with lever-operated locking.)

236 0339 03 Lever which is mechanically locked in normal position can be moved more than five- sixteenths inch. (Applies only to electro-mechanical interlocking machine with levers moving in a horizontal plane.)

236 0339 04 Lever which is mechanically locked in reverse position can be moved more than nine- sixteenths inch. (Applies only to electro-mechanical interlocking machine with levers moving in a horizontal plane.)

236 0339 05 Lever which is mechanically locked can be moved more than 5 degrees. (Applies only to electro-mechanical machine with levers moving in an arc.)

236 0339 06 Lever latch block can be raised so that its bottom is within seven thirty-seconds inch of top of quadrant, when latch is mechanically locked. (Applies only to power interlocking machine with latch-operated locking.)

236 0339 07 Lever which is mechanically locked in normal position can be moved more than five- sixteenths inch. (Applies only to power interlocking machine with levers moving in a horizontal plane.)

236 0339 08 Lever which is mechanically locked in reverse position can be moved more than nine- sixteenths inch. (Applies only to power interlocking machine with levers moving in a horizontal plane.)

236 0339 09 Lever which is mechanically locked can be moved more than 5 degrees. (Applies only to power interlocking machines with levers moving in an arc.)

§ 236.340 Electromechanical interlocking machine; locking between electrical and mechanical levers.

This rule requires that locking between electric and mechanical levers of electro-mechanical interlocking machine be maintained so that mechanical lever cannot be operated except when released by electric lever.

Application:

The mechanical levers that operate switches, movable point frogs and derails must be locked by the electric levers.

CLASSIFICATION OF DEFECTS

236 0340 01 Locking between electric and mechanical levers of electromechanical interlocking machine not effective to prevent operation of mechanical lever without being released by electric lever.

§ 236.341 Latch shoes, rocker, links, and quadrants.

This rule requires that latch shoes, rocker links, and quadrants of S&F machines be maintained so that locking will not release when a downward force not exceeding a man's weight is exerted on the rocker with the lever in mid-stroke position.

Application:

Care should be exercised when making this test. Rocker arms are cast metal and can easily be broken with lever in mid-stroke position. A cracked rocker arm or worn linkage will release the locking. If locking is worn, very little pressure is needed to ascertain a failure to meet the requirements.

CLASSIFICATION OF DEFECTS

236 0341 01 Mechanical locking of Saxby and Farmer interlocking machine releases when a downward force not exceeding a man's weight is exerted on rocker while lever is in mid-stroke position.

§ 236.342 Switch circuit controller.

This rule requires that switch circuit controller connected at the point to switch, derail, or movable point frog be maintained so that its contacts will not be in position corresponding to switch point closure when point is open one-fourth inch or more in either normal or reverse position.

Application:

Applies to both interlocking and traffic control systems.

Apply this rule where switch circuit controller is connected to spring switch, to pipe connected switch, derail, or movable-point frog, and where external circuit controller is added to power- operated switch.

CLASSIFICATION OF DEFECTS

236 0342 01 Contacts of switch circuit controller connected at the point to switch, derail, or movable-point frog are in position corresponding to switch point closure when switch point is open one-fourth inch or more.

Inspections and Tests

§ 236.376 Mechanical locking.

This rule requires testing of mechanical locking when new locking is installed, when there is a change in locking or when locking is restored after being disarranged. It requires a complete test of all mechanical locking at least once every two years.

Application:

Mechanical locking tests should be made by establishing a route and trying all conflicting signal control levers before pulling the signal lever. The signal lever should then be pulled. This should lock out all opposing and conflicting route lineups and prevent the movement of any lever controlling any switch, movable-point frog, or derail in the route lined up.

On levers equipped with electric locks, the lock should be de-energized and the latch rattled and moved around to see that it is mechanically impossible to release the lock.

Test should be made to insure that levers equipped with electric locks mechanically lock all levers previously operated in that lineup.

Check shall be made to determine that the locking is in accordance with the locking sheet and dog chart as required by Rule 236.338.

Test should not be made when the route has been cleared for a rail movement or if rail traffic is within the route or a conflicting route.

Compliance with rules Nos. 236.326, 236.335, 236.336, 236.337, 236.338, 236.339, 236.340, and 236.341 is required.

CLASSIFICATION OF DEFECTS

236	0376	01	Mechanical locking of interlocking machine not tested when new locking is placed in service.
236	0376	02	Mechanical locking not tested when change in locking is made.
236	0376	03	Mechanical locking not tested when restored after being disarranged.
236	0376	04	Complete test of mechanical locking in interlocking machine not made at least once every two years.

§ 236.377 Approach locking.

This rule requires that approach locking be tested when installed, modified or disarranged and at least once every two years thereafter.

Application:

Applies to both interlocking and traffic control systems. Applies to approach locking of both power operated devices and electrically locked hand-operated switches in both interlockings and traffic control systems.

Tests shall not be made if any route has been cleared for rail movement or if rail movement is within route to be tested or conflicting route.

Manual interlocking and controlled point:

Each track section within the limits of the approach circuit shall be shunted and inspection made to determine that the approach relay is de-energized by each shunt.

Signal shall then be cleared by regular operation and shunt placed in approach section or approach relay de-energized. Signal shall then be restored to its stop indication and inspection made to determine that timing relay or timing device, if provided, is energized. Each switch, movable point frog, derail, or electrically locked switch in route governed shall be tried to insure their positions cannot be changed or a conflicting signal be cleared during the predetermined time interval.

Where time release must be operated, each switch, movable point frog or derail must be tried to insure their positions cannot be changed or conflicting signal be cleared both prior to operation of time release and after its operation during its predetermined time interval.

Test each route governed by each signal.

Automatic interlockings:

Each track section within the limits of the approach circuit shall be shunted and inspection made to determine that the approach relay is de-energized by each shunt.

Clear home signal by placing a shunt in the approach section or by opening the approach circuit. Then place a shunt in the approach section or open the approach circuit of a conflicting route. Then operate the time release or push button for the conflicting route and determine that the home signal is immediately restored to its stop position and that the conflicting route is not established until the prescribed time interval has expired.

Some interlockings have superior routes that, when the approach section is occupied, causes any cleared signals governing conflicting routes, to display stop indications and timing relay or timing device to

operate, and after the expiration of the predetermined time interval, clears the signal governing the superior route. Some automatic interlockings have inferior routes that, when the approach section is occupied and home signal cleared, timing relay or timing device begins operating, and after the expiration of a predetermined time interval, restores the home signal to its stop indication. Regardless of the arrangement, changeover shall not occur until after the expiration of the prescribed predetermined time interval.

Hand-operated Electrically locked switches:

Signal shall be cleared for movement over the switch and a shunt placed on an approach section of the approach locking circuit. Then an attempt should be made to unlock the switch. The locking should prevent the unlocking of the switch. Where time is also provided, the switch may be unlocked after the expiration of a predetermined time interval. Each approach circuit should be checked individually.

CLASSIFICATION OF DEFECTS

236 0377 01 Approach locking not tested when installed, modified, or after being disarranged.

236 0377 02 Approach locking not tested at least once every two years.

§ 236.378 Time Locking.

This rule requires time locking to be tested when installed, modified, or disarranged and at least once every two years thereafter.

Application:

Applies to interlocking and traffic control systems.

This rule applies not only to power operated devices but also to electrically locked hand- operated switches within interlocking and traffic control systems where such electric locks are provided with time locking.

Test should not be made if any rail traffic is approaching or within route or conflicting routes.

Test shall be made by clearing a signal by regular operation. The signal shall then be restored to its stop indication and check made to determine timing relay or timing device, if provided, is energized. Each switch, movable point frog, derail or electrically locked switch in route governed shall be tried to insure their positions cannot be changed or a conflicting signal established during the predetermined time interval.

Where time release must be operated, the above units must be tried both prior to operation of time release and after its operation during its predetermined time interval.

Test of time locking of electrically locked switch shall be made by clearing a signal governing movement over the switch and attempting to unlock the switch. The electric lock on such switch should not energize and unlock the switch until a predetermined time interval has expired after all signals governing movement over the switch have assumed their most restrictive aspects. This test should be made for each signal governing movement over the switch.

CLASSIFICATION OF DEFECTS

236 0378 01 Time locking not tested when installed, modified, or after being disarranged.

236 0378 02 Time locking not tested at least once every two years.

§ 236.379 Route locking.

This rule requires that route or any other type of switch locking be tested when installed, modified, or disarranged and at least once every two years thereafter.

Application:

Applies to both interlocking and traffic control systems.

Tests should not be made if rail traffic is approaching or within route to be tested or with conflicting routes.

Test shall be made for all mechanical or power-operated switches and hand-operated electrically locked switches or derails that are locked in both the reverse and normal positions.

Test shall be made by clearing signal for an established route after which each track circuit within the route shall be progressively shunted beginning with the first track circuit in advance of the signal. While each track circuit is shunted, each switch, movable point frog, derail and facing point lock lever in the route shall be tried to insure their positions cannot be changed.

The rule permits sectional release locking that will release the locking of switches, movable point frogs, derails and facing point lock levers in the rear of the progressive shunt. Inspection shall be made to determine that as each section is released, a route cannot be established that would result in improper clearance between train movements.

Route locking tests shall be conducted over each route governed by each signal and repeated in each direction for each route.

Excerpt from Mr. Walsh's letter of January 3, 1985
To: Mr. L. M. Himmel, Sr. Executive Director
Operations and Maintenance Department
Communications and Signals Division
Association of American Railroads

* * * * *

- Section 236.376 Mechanical locking.
- Section 236.377 Approach locking.
- Section 236.378 Time locking.
- Section 236.379 Route locking.
- Section 236.380 Indication locking.
- Section 236.381 Traffic locking.

The AAR requested clarity of the term "disarranged"; questioned whether the removal of two or more wires constituted a disarrangement which required the above tests be performed; and suggested FRA's Technical Manual be revised to exempt the requirements of testing where a device is provided with plug couplers or the replacement is accomplished by removal of not more than one wire at a time.

These rules prescribe inspection and tests of the various types of locking. The rules require mechanical locking be tested when new locking is installed; electric locking be tested when placed in service; and all locking be tested thereafter when modified, disarranged, or at least once every two years, whichever shall occur first.

Major sources of false proceed failures for more than five years have been errors in connection and errors in design. The revision of these rules resulted in the requirements that tests be performed at the time such errors should be detected, before they present hazards to the safety of train operation.

Accordingly, mechanical locking is considered to be disarranged when (i) one or more pieces of locking are broken; or (ii) one or more pieces are removed.

Electric locking is considered to be disarranged when (i) a relay is replaced with another; (ii) when two or more signal line wires or a cable having two or more conductors are severed; (iii) when a cable or conductor in a locking circuit is replaced with another; or (iv) when wires are removed at the same time from more than one terminal of a relay or terminal board.

CLASSIFICATION OF DEFECTS

236 0379 01 Route or other type of switch locking not tested when installed, modified, or after being disarranged.

236 0379 02 Route or other type of switch locking not tested at least once every two years.

§ 236.380 Indication locking.

This rule requires that indication locking be tested when installed, modified, or disarranged and at least once every two years thereafter.

Application:

Applies to both interlocking and traffic control systems.

Indication locking for signals.

Home and approach signals shall be cleared by means of regular operation. Where a separate relay repeating only the red and yellow indications of the approach signal is used, visual check shall be made to insure that the clearing of the approach signal causes such relay to become de-energized. Where such relay is not used, then a voltmeter shall be connected to the control wire for the indication lock at a point between the home and approach signals (line arresters) to insure that the clearing of the approach signal removes energy from such wire. Where two or more approach signals are involved, test must be made to insure that the clearing of each one of the approach signals accomplishes this result.

After this part of the test has been completed, the approach signal shall be set in its restrictive position by opening its control circuit and then with the home signal clear, a visual check shall be made to insure that the indication lock on the signal lever or lock lever is properly de-energized, or in the case of all relay type locking, that the lock relay is de-energized.

Next, disconnect a coil wire of the home signal red repeater relay or lock relay or open the control wire of the indication lock where the meter reading was previously taken and then restore the home signal to stop indication. Visual check shall then again be made to insure that indication lock or lock relay is de-energized.

After above tests are made to insure that the clearing of either the home or approach signal de-energizes the indication lock or lock relay, test shall be made to insure that switches, derails, and movable point frogs in route cannot be changed and that conflicting signal cannot be obtained with indication lock or lock relay de-energized.

The test is then completed, where indication lock is used on a lever, by de-energizing the lock by opening its control circuit at the coil terminal and clearing the home signal. If the lock is on the home signal lever, it shall be tried to insure it cannot be latched full normal. If the indication lock is on a lock lever, the home signal lever shall be placed normal and the lock lever tried to insure that it cannot be unlatched from the reverse position. Where all relay type locking is used, open lock circuit at each signal control relay or red repeater relay and visually check to insure the lock relay becomes de-energized. At automatic interlocking, proceed as above except check stick locking circuits in lieu of indication locking circuits.

Where signals are of the semaphore type, visual inspection must also be made to insure that locking becomes effective with the signal blade not over five degrees above the 45 degree position on upper quadrant approach signals or five degrees below the 45 degree position on lower quadrant approach signal, and not over five degrees from horizontal on home signals.

Indication locking for switches:

Where indication lock is on control lever, with switch in full normal position, the reverse switch point shall be obstructed so that the switch cannot operate full throw. The lever shall then be operated so that the switch will operate against the obstruction and test made to insure lever cannot be latched reverse with the switch unlocked.

Where all relay type locking is used, the above method of obstruction and switch operation shall be followed and visual check made to insure indication light on control panel remains unlighted and trial made to insure signals governing movements over the switch cannot be cleared.

Above tests shall be made for both the normal and reverse positions of each switch.

(Reference Technical Bulletin S-96-02)

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|---|
| 236 | 0380 | 01 | Indication locking not tested when installed, modified, or after being disarranged. |
| 236 | 0380 | 02 | Indication locking not tested at least once every two years. |

§ 236.381 Traffic locking.

This rule requires that traffic locking be tested when installed, modified, or disarranged and at least once every two years thereafter.

Application:

Applies only to interlockings. This testing rule does not apply to traffic control systems.

Tests should not be conducted if rail traffic is approaching or within the route to be tested.

Tests shall be performed by clearing signal governing entrance to the traffic block and checking that traffic levers cannot be changed or opposing signal cleared until signal is restored to "Stop" position and approach or time locking released. Drop each track relay in the traffic block section and see that traffic lever cannot be moved, direction of traffic changed, or opposing signal cleared.

CLASSIFICATION OF DEFECTS

- | | | | |
|-----|------|----|--|
| 236 | 0381 | 01 | Traffic locking not tested when installed, modified, or after being disarranged. |
| 236 | 0381 | 02 | Traffic locking not tested at least once every two years. |

§ 236.382 Switch obstruction test.

This rule requires that a switch obstruction test be made when lock rod is installed and at least once a month thereafter.

Application:

Applies to interlocking and traffic control systems.

Test should not be conducted if rail traffic is approaching or within the route to be tested.

This rule applies to pipe-connected, mechanically operated switches; electric switches; electro- hydraulic switches; electro-pneumatic switches; and hand-operated switch machines with lock rods, where such hand-operated switch machines are located within interlockings or traffic control systems.

This rule does not apply to hand-operated switches not equipped with switch-and-lock- movements.

To test power-operated and mechanical pipe-connected switches for compliance with Section 236.327, place a three-eighths inch obstruction between the switch point and stock rail, six inches from the end of the switch point and attempt to lock up the switch.

To test a hand-operated switch-and-lock movement for compliance with Section 236.6, follow the same procedure, but use a one-fourth inch obstruction to make the test.

CLASSIFICATION OF DEFECTS

236	0382	01	Switch obstruction test not made when lock rod installed.
236	0382	02	Switch obstruction test not made at least once each month.

§ 236.383 Valve locks and valve magnets.

This rule requires that valve locks on valves of the non-cutoff type be tested at least once every three months and valves and valve magnets be tested once every year.

Application:

This rule applies to interlocking and traffic control systems. Tests should not be conducted while rail traffic is approaching or within any route which might be affected by the tests.

Test shall be conducted by removing valve stem or control wire from lock magnet of electro- pneumatic switch. Switch should not move.

Where "CP" valves are used, place switch lever normal, close globe valve and remove plug in reverse side of switch cylinder, then move lever to reverse indicating point. Indication should not be received when lever is moved to reverse. Restore plug and open globe valve, reverse switch, and repeat test.

Test "D" valve of non-cutoff type in normal and reverse positions by removing armature stem in lock valve magnet and operating controlling lever; switch should not respond.

Test each set of cutoff valves with switch in normal position by holding lock and reverse armature in for about one minute while normal magnet is energized; switch should not respond. Repeat in reverse position, holding lock and normal armatures while reverse magnet is energized.

CLASSIFICATION OF DEFECTS

236	0383	01	Valve lock in electropneumatic interlocking not tested at least every three months. (Applies only to valves of the non-cut-off type.)
236	0383	02	Valve in electropneumatic interlocking not tested at least once every year.
236	0383	03	Valve magnet in electropneumatic interlocking not tested at least once every year.

§ 236.384 Cross protection.

This rule requires that cross protection be tested at least once every six months.

Application:

This rule applies only to those interlockings provided with cross protection devices. Tests should not be conducted while rail traffic is approaching or within the section of interlocking to be tested.

This test insures that switches, signals, etc., do not respond when current is improperly applied to circuits. It is recommended that a variable resistor be used in making the test.

Tests should be made when plant voltage is at the maximum.

Make temporary connection between normal and reverse operating wires for each switch at the pole changer. This should open polar relay or circuit breaker.

Make temporary positive battery connection from the nearest switch to the signal control wire as close as practicable to the signal motor. This should open the polar relay or circuit breaker.

If the signal control circuit is connected to the common return wire through one or more switch circuit controllers, the energy should be applied to this wire, first opening the connection to the main common to prevent blowing fuse in the switch circuit. If plant is sectionalized, one or more functions in each section should be crossed with wires taking energy from each of the other sections. In case functions in various sections are too widely separated, the temporary crosses can be made between the binding posts on the terminal board of the interlocking machine. This should open the section breakers.

CLASSIFICATION OF DEFECTS

236 0384 01 Cross protection not tested at least once every six months.

§ 236.386 Restoring feature on power switches.

This rule requires that restoring feature on power switches be tested once every three months.

Application:

Applies to interlocking and traffic control systems.

Applies only to electro-pneumatic switches. Air shall be removed from switch before testing. Test shall be made by using a bar and moving slide bar of switch movement toward opposite position where locking dog will become disengaged from lock rod. Test to ascertain that indication circuits are opened and/or lock magnet circuit is energized before locking dog is completely withdrawn from lock rod. Restore air to determine that slide bar is driven back to its original position.

CLASSIFICATION OF DEFECTS

236 0386 01 Restoring feature on power switch not tested at least once every three months.

§ 236.387 Movable bridge locking.

This rule requires movable bridge locking to be tested at least once a year.

Application:

Applies to movable bridge interlockings. Test shall be made by displacing bridge locking members more than one inch from their proper position and determine that signals cannot be cleared to authorize movement over the movable bridge.

When movable bridge is equipped with circuit controllers with or without mechanical rail locks, movable rails shall be displaced ½ inch from their correct surface or alignment with adjacent fixed rail by an obstruction. With the movable rail thus displaced, the rail lock should not lock up and if rail lock is not provided, signals cannot be cleared to authorize movement over the movable bridge.

This test should be made for each rail lock or circuit controller on the bridge that checks for correct rail alinement or surface.

Check operation of all circuit controllers connected to the wedges, latches, rail locks, etc., to see that contacts make or break when corresponding functions are in their proper position.

CLASSIFICATION OF DEFECTS

236 0387 01 Movable bridge locking not tested at least once a year.

Subpart D – Traffic Control Systems - Standards

§ 236.401 Automatic block signal system and interlocking standards applicable to traffic control systems.

This rule prescribes the following automatic block signal system and interlocking standards be applied to traffic control systems:

- 236.201 Track-circuit control of signals.
- 236.202 Signal governing movements over hand-operated switch.
- 236.203 Hand-operated crossover between main tracks; protection.
- 236.205 Signal control circuits; requirements.
- 236.206 Battery or power supply with respect to relay; location.
- 236.303 Control circuits for signals, selection through circuit controller operated by switch points or by switch locking mechanism.
- 236.307 Indication locking.
- 236.309 Loss of shunt protection; where required.
- 236.310 Signal governing approach to home signal.
- 236.311 Signal control circuits, selection through track relays, or devices functioning as track relays, and through signal mechanism contacts and time releases at automatic interlocking.

Application:

The above automatic block signal and interlocking standards apply to traffic control systems.

§ 236.402 Signals controlled by track circuits and control operator.

This standard requires that all home signal aspects more favorable than "proceed at restricted speed" be controlled by track circuit extending through the entire block. At a controlled point the control circuits may be controlled by a control operator and at manually operated interlockings the home signals shall be controlled manually in cooperation with control operator.

Application:

Any aspect more favorable than "proceed at restricted speed" must be selected through track relays regardless of any speed limit or restriction. The aspects and indications of the governing signals determine compliance with this standard, not the authorized train speed.

A block extends from a signal to the next governing signal or from a signal to the limits or end of the system.

Control circuits do not have to be manually controlled by the operator and may be automatic. However, it is not the intention of this rule to give control to any other individual operation in opposition to or in conflict with the control operator.

CLASSIFICATION OF DEFECTS

236 0402 01 Signal control circuits for home signal aspects more favorable than "proceed at restricted speed" not controlled by track circuits extending through the entire block.

236 0402 02 Signal at manually operated interlocking not controlled manually in cooperation with control operator.

§ 236.403 Signals at controlled point.

This rule requires signals at a controlled point to be so interconnected that aspects to proceed cannot be displayed simultaneously for conflicting movements, except they may display an aspect indicating "proceed at restricted speed" at the same time on track used for switching movements only.

Application:

Signals at every controlled point must be so interconnected that aspects to proceed cannot be displayed simultaneously for conflicting train movements.

This is a companion rule to 236.308 in that it permits display of aspect indicating "proceed at restricted speed" at the same time on track used for switching movements only by one train at a time.

CLASSIFICATION OF DEFECTS

236 0403 01 Signals at controlled point simultaneously can display aspect to proceed for conflicting train movements. (Does not apply to signals on track used for switching movements only by one train at a time).

236 0403 02 Signals at controlled point on track used for switching movements only simultaneously can display aspect more favorable than "proceed at restricted speed" for conflicting train movements.

§ 236.404 Signals at adjacent control points.

This rule requires that signals at adjacent controlled points to be interconnected so that aspects to proceed on tracks signaled for movements at greater than restricted speed cannot be displayed simultaneously for conflicting movements.

Application:

This rule permits restricted speed aspects to be displayed simultaneously for opposing or converging routes at adjacent control points provided the speed restrictions between the control points do not exceed 20 mph. The rule was revised in 1964 primarily to permit restricted speed conflicting movements into a siding from each end. The maximum authorized speed between adjacent controlled points where signals can simultaneously display aspects indicating proceed at restricted speed shall not exceed 20 mph regardless of more favorable aspects displayed and regardless whether or not track is signaled.

CLASSIFICATION OF DEFECTS

236 0404 01 Signals at adjacent controlled points not so interconnected that aspects to proceed, on tracks signaled for movements at greater than restricted speed, cannot be displayed simultaneously for conflicting movements.

§ 236.405 Track signaled for movements in both directions, change of direction of traffic.

This rule prevents the changing of the direction of traffic from that which was obtained at the time the track was occupied between opposing signals at adjacent controlled points on track signaled for movement in both directions except that when a train having left one controlled point reaches a section of track immediately adjacent to the next controlled point at which switching is to be performed, an aspect permitting movement at not exceeding restricted speed may be displayed into the occupied block.

Application:

After a train or engine has passed a signal displaying an aspect permitting it to proceed into and through a controlled point, the opposing signals at the adjacent controlled point shall not display any aspect with an indication other than "stop", as long as the section of track between controlled points is occupied.

Rule 236.405's exception to the traffic locking requirements applies only in instances when a train is left on the main track while its engine and/or cars move into an adjacent siding or yard for switching purposes and must, in returning to its train, reverse its direction for a short distance. It is permissible in such instances to permit such movements to be made with a signal aspect indicating "proceed not to exceed restricted speed" into the occupied block.

CLASSIFICATION OF DEFECTS

236 0405 01 On track signaled for movements in both directions, occupancy of track between opposing signals at adjacent controlled points does not prevent changing the direction of traffic from that which obtained at the time the track became occupied. (Note: Exception added 1/24/66 permits display of an aspect not less restrictive than that indicating "proceed at restricted speed" by a signal to permit a locomotive, with or without cars, to return to a standing portion of the train in the immediate approach to a controlled point during switching operations. Where a carrier provides the necessary arrangement to permit a locomotive to return to its train, as set forth in the exception, such an arrangement when actuated does not constitute a violation of Section 236.405 and should not be reported as such.)

§ 236.407 Approach or time locking; where required.

This rule requires that approach or time locking be provided for each controlled signal where route or direction of traffic can be changed.

Application:

This rule applies to all controlled signals at controlled points where route can be changed or where direction of traffic can be changed. Does not apply to so called "holding signals" between controlled points where the direction of traffic cannot be changed.

CLASSIFICATION OF DEFECTS

236 0407 01 Approach or time locking not provided for controlled signal where route or direction of traffic can be changed.

236 0407 02 Approach locking not effective.

236 0407 03 Time locking not effective.

§ 236.408 Route locking.

This rule specifies where route locking shall be provided and where it shall become effective in the route entered.

Application:

At any location in traffic control territory where switches are power-operated, route locking must be provided and it must be effective when the first pair of wheels of a locomotive or car passes a point 13 feet in advance of the signal governing its movement.

The 13feet shall be measured from the center of the signal mast to the effective insulated joint. Where the signal is not mounted on a vertical ground mast, the 13 feet shall be measured from the center of the signal. This rule does not apply to automatic signals or controlled signals that do not have power-operated switches in the route governed.

CLASSIFICATION OF DEFECTS

236 0408 01 Route locking not provided where switches are power-operated.

236 0408 02 Route locking not effective

236 0408 03 Route locking not effective until first pair of wheels of locomotive or car passes a point more than 13 feet in advance of the signal governing the movement.

§ 236.410 Locking, hand-operated switch.

This rule requires that hand-operated switch in main track be locked either electrically or mechanically in normal position, or a signal be provided to govern train movements to the signaled track. It exempts those hand-operated switches on main track where train speeds do not exceed 20 mph, on signaled sidings without intermediate signals where train speeds do not exceed 30 mph, or where trains are not permitted to clear the signaled track. It requires approach or time locking and provides that locking may be released either automatically or by the control operator after the control circuits of signals governing movements over the switch have been opened directly or by shunting of track circuit.

Application:

Any signaled track in traffic control territory is considered as main track. If speed on main track, except signaled sidings, exceeds 20 miles per hour, each hand-operated switch must comply with this section. Speed may be controlled by permanent speed zone or by signal indication.

Sidings provided with signal protection and without intermediate signals are signaled sidings. If train speed exceeds 30 mph on a signaled siding, each hand-operated switch on such siding must comply with this section.

Hand-operated switches are not required to be locked where trains are not permitted to clear the main track.

Trains may enter such switches provided a car is left on main track, the switch is left open, or derail equipped with switch circuit controller is left in non-derailing position.

Approach or time locking must be provided for each lock, must be effective, and must be installed in such a manner that it cannot be defeated by any action of train crew members.

Locks may be provided with emergency release device which must be kept sealed. Emergency release device with broken or missing seals, except such release device with latch out feature that opens signal control circuits until reset by signal maintained, is prohibited.

Lock may be released either automatically or by control operator. Control circuits of signals governing movements over the switch which display aspects more favorable than "Proceed at Restricted Speed" must be opened, or track circuit must be shunted before locking is released.

Electric or mechanical lock provided with time locking must not release until after expiration of a predetermined time interval sufficient to permit a train, having passed the signal governing movement over the switch displaying an aspect with an indication more favorable than proceed at restricted speed, to pass the switch; or, to permit a train approaching the signal governing movement over the switch displaying an aspect of "stop" or "stop and proceed", to stop, or where the signal governing movement over the switch displays a "restricting" aspect, to permit the train to reduce to restricted speed.

Electric or mechanical lock provided with approach locking must not release when approach section is occupied until after expiration of a predetermined time interval sufficient to permit a train to stop or to pass the switch, or where signal governing movement over the switch displays "restricting" as its most restrictive aspect, the train can reduce its speed to restricted speed. If approach section is unoccupied, lock may release immediately after signal control circuits are opened.

Control circuit for electric lock must be so arranged and installed that shunting of turnout will not release lock for movement to main track.

Locking member of electric or mechanical lock must be so maintained that it cannot be displaced from its locked position by quickly operating the lock lever or pedestal.

Where signal is provided in lieu of a lock to govern train movements to signaled track, an aspect permitting a train to proceed shall not be displayed until the control circuits for all signals governing movement over the switch on the signaled track are opened, and approach circuits in both directions are unoccupied, or a predetermined time interval has expired.

Where exception (1) is relied upon, it is permissible for trains, after approaching the switch at speeds not exceeding 20 miles per hour, to accelerate after the locomotive occupies the switch points.

The provision of exception (2) does not apply to maintenance-of-way work equipment. Such maintenance-of-way equipment as motor cars and track machinery such as tampers, liners, burro cranes with or without cars, Sperry test car, and Spent Rail Grinder equipment is not considered to be a train, and may clear the main track in TCS territory without regard to requirements of this rule.

A footnote to this rule requires that all hand-operated switches in traffic control territory be brought into compliance with these provisions on or before December 31, 1986.

CLASSIFICATION OF DEFECTS

- 236 0410 01 Hand-operated switch on main track not electrically or mechanically locked in normal position where signal is not provided to govern movement to main track and train movements are made at speeds in excess of 20 miles per hour and train or engine movements may clear the main track.
- 236 0410 02 Hand-operated switch on signaled siding not electrically or mechanically locked in normal position where signal is not provided to govern movements to signaled siding and train movements are made at speeds in excess of 30 miles per hour and train or engine movements may clear the signaled siding.
- 236 0410 03 Approach or time locking not provided for electric lock on hand-operated switch.
- 236 0410 04 Time locking not provided in connection with mechanical lock on hand-operated switch.
- 236 0410 05 Approach or time locking not provided for signal used in lieu of electric or mechanical lock.
- 236 0410 06 Electric or mechanical lock on hand-operated switch can be unlocked before control circuits of signals governing movements over the switch, which display aspects more favorable than "proceed at restricted speed", have been opened directly or track circuit has been shunted.
- 236 0410 07 Signal provided in lieu of electric or mechanical lock can display an aspect to proceed before control circuits of signals governing movements over the switch have been opened.
- 236 0410 08 Electric or mechanical lock on hand-operated switch can be unlocked before expiration of predetermined time interval where time locking is provided.
- 236 0410 09 Signal provided in lieu of electric or mechanical lock can display an aspect to proceed before expiration of predetermined time interval where time locking is provided.
- 236 0410 10 Electric lock on hand-operated switch can be unlocked before expiration of predetermined time interval, with approach section occupied, where approach locking is provided.
- 236 0410 11 Signal provided in lieu of electric or mechanical lock can display an aspect to proceed before expiration of predetermined time interval, with approach section occupied, where approach locking is provided.
- 236 0410 12 Approach or time locking of electric lock at hand-operated switch can be defeated by the unauthorized use of emergency release device of electric lock which is not kept sealed in the non-release position.

§ 236.426 Interlocking rules and instructions applicable to traffic control systems.

This rule prescribes the following interlocking rules and instructions be applied to traffic control systems.

- §236.327 Switch, movable-point frog split-point derail.
- §236.328 Plunger of facing point lock.
- §236.330 Locking dog of switch-and-lock movement.
- §236.334 Point detector.

§236.342 Switch circuit controller.

Application:

Above rules and instructions apply to traffic control systems.

§ 236.476 Interlocking inspections and tests applicable to traffic control systems.

This rule prescribes the following interlocking inspections and tests be made of traffic control systems.

§236.377 Approach locking.

§236.378 Time locking.

§236.379 Route locking.

§236.380 Indication locking.

§236.382 Switch obstruction test.

§236.383 Valve locks, vales and valve magnets.

§236.386 Restoring feature on power switches.

Application:

Above inspections and tests apply to traffic control systems. Results of tests shall be recorded in compliance with Rule 236.110.

Subpart E – Automatic Train Stop, Train Control and Cab Signal Systems - Standards

§ 236.501 Forestalling device and speed control.

This rule permits the use of a forestalling device in automatic train stop systems and sets forth the minimum requirements for control of speed in automatic train control systems.

Application:

Applies to automatic train stop and train control systems.

An automatic train stop system may, but is not required to, include an acknowledging device by means of which the automatic application of the brakes can be forestalled.

An automatic train control system is required to have one or more of the following features:

- (1) A low-speed restriction, effective as long as the condition that causes the restriction exists, that prohibits movement exceeding slow speed either after the train has been stopped by automatic application of the brakes or its speed reduced to slow speed by manual application of the brakes.
- (2) A medium-speed restriction that, in order to prevent an automatic application of the brakes, requires the train to proceed under medium speed after passing a signal displaying an approach aspect, or when approaching a signal requiring a stop, or a stop indication point.
- (3) A maximum-speed restriction that will effect an automatic brake application whenever the predetermined maximum authorized speed is exceeded.

The speeds imposed by the slow speed or medium speed restrictions must comply with the carrier's definition of slow speed or medium speed which may not exceed that defined by Rules 236.813 or 236.811, respectively, without approval of FRA. Each carrier establishes its own maximum speed.

CLASSIFICATION OF DEFECTS

236 0501 01 Automatic train control system with low-speed restriction does not enforce slow speed after train has been stopped by an automatic application of the brakes, until the apparatus is automatically restored to normal because the condition which caused the restriction no longer affects the movement of the train.

236 0501 02 Automatic train control system with low-speed restriction does not enforce slow speed after the speed of the train, under control of the engine man, has been reduced to slow speed, until the apparatus is automatically restored to normal because the condition which caused the restriction no longer affects the movement of the train.

236 0501 03 Automatic train control system with medium-speed restriction does not require train to proceed under medium speed after passing a signal displaying an approach aspect in order to prevent an automatic application of the brakes.

236 0501 04 Automatic train control system with medium-speed restriction does not require train to proceed under medium speed when approaching a signal requiring a stop, or a stop indication point, in order to prevent an automatic application of the brakes.

236 0501 05 Automatic train control system with maximum-speed restriction does not require train to proceed at or under maximum authorized speed in order to prevent an automatic application of the brakes.

§ 236.502 Automatic brake application, initiation by restrictive block conditions stopping distance in advance.

This is a companion rule to Rule 236.504 and requires that the automatic brake application be initiated at least stopping distance from the entrance of a block where any condition exists as described in Rule 236.205.

Application:

Applies to automatic train stop and train control systems.

This rule requires that an automatic train stop or train control system be so arranged that it will operate to initiate an automatic brake application at least stopping distance in approach to a block wherein any condition described in Rule 236.205 exists and at each main track signal requiring a reduction in speed.

This rule is applicable to signals governing movements on or onto the main track. Signals on auxiliary tracks and sidings, whether signaled or non-signaled, are exempt from the requirements of this rule.

CLASSIFICATION OF DEFECTS

236 0502 01 Automatic train stop or train control system does not operate to initiate an automatic brake application at least stopping distance from the entrance to a block occupied by a train, locomotive, or car.

236 0502 02 Automatic train stop or train control system does not operate to initiate an automatic brake application at least stopping distance from the entrance to a block in which the points of a switch are not closed in proper position.

236 0502 03 Automatic train stop or train control system does not operate to initiate an automatic brake application at least stopping distance from the entrance to a block in which an independently operated fouling-point derail equipped with switch circuit controller is not in derailing position.

236 0502 04 Automatic train stop or train control system does not operate to initiate automatic brake application at least stopping distance from the entrance to a block in which a track relay is in de-energized position or device which functions as a track relay is in its most restrictive state.

236 0502 05 Automatic train stop or train control system does not operate to initiate an automatic brake application at signal requiring a reduction in speed.

§ 236.503 Automatic brake application; initiation when predetermined rate of speed exceeded.

This is a companion rule to Rule 236.501 and requires overspeed protection of all restrictive features used in automatic train control systems.

Application:

Applies to automatic train control systems only. This rule requires that automatic train control apparatus function to initiate an automatic brake application whenever the speed of the train exceeds any predetermined setting of the speed control mechanism. A tolerance of three miles per hour is permitted in excess of the predetermined setting of the speed control mechanism.

CLASSIFICATION OF DEFECTS

236 0503 01 Automatic train control system does not operate to initiate an automatic brake application when the speed of the train exceeds the predetermined rate as required by the setting of the speed control mechanism.

§ 236.504 Operation interconnected with automatic block-signal system.

This rule prescribes the interconnection and operation of an automatic train stop or train control system with a wayside block signal system.

Application:

Applies to automatic train stop and train control systems.

This rule requires that an automatic train stop or train control system operate in connection with an automatic block signal system. The train stop or train control system must be so interconnected with the signal system that it will impose an automatic application of the brakes in event the engine man fails, (1) to obey or acknowledge the indication of a cab signal requiring a reduction in speed in a continuous inductive automatic train stop or train control system; or (2) to acknowledge a restrictive wayside signal in an intermittent automatic inductive train stop system.

This rule is applicable only to those signals governing movements on or onto the main track. Signals on auxiliary tracks are exempt from the requirements of this rule.

CLASSIFICATION OF DEFECTS

236 0504 01 Automatic train stop or train control system does not operate in connection with an automatic block signal system.

236 0504 02 Automatic train stop or train control system not so interconnected with the signal system as to perform its intended function in the event of failure of the engine man to acknowledge or obey a signal requiring a reduction in speed.

§ 236.505 Proper operative relation between parts along roadway and parts on locomotive.

This rule requires that proper operation occur between parts along the roadway and parts on the locomotive under all conditions.

Application:

Applies to automatic cab signal, train stop and train control systems.

This rule requires that apparatus on locomotives and at wayside locations be properly interconnected and function as intended regardless of speed, weather, wear, oscillation or shock.

CLASSIFICATION OF DEFECTS

236 0505 01 Proper operative relation between the parts along the roadway and the parts on the locomotive does not obtain under all conditions of speed, weather, wear, oscillation, and shock.

§ 236.506 Release of brakes after automatic application.

This rule prescribes the conditions under which the brakes may be released following an automatic brake application.

Application:

Applies to automatic train stop and train control systems.

An intermittent inductive automatic train stop system shall not permit release of the brakes following an automatic brake application until after the train has been stopped.

A continuous inductive automatic train stop system shall not permit release of the brakes following an automatic brake application until after the train has been stopped, unless the condition that caused the brake application no longer exists.

An automatic train control system shall not permit release of the brakes following an automatic brake application until the speed has been reduced to a predetermined rate or until the train has been stopped unless the condition that caused the brake application no longer exists.

This rule prohibits use of a reset device in the control compartment that, when operated, permits release of the brakes before the train has been stopped.

CLASSIFICATION OF DEFECTS

236 0506 01 Automatic train stop apparatus permits release of the brakes after automatic application before a reset device has been operated, while the condition that caused the brake application still affects the movement of the train.

236 0506 02 Automatic train control apparatus permits release of the brakes after automatic application before the speed of the train has been reduced to a predetermined rate, while the condition that caused the brake application still affects the movement of the train.

236 0506 03 Reset device so located that it can be operated by engineer without leaving his/her accustomed position in the cab and not so arranged as to prevent release of the brakes until the train has been stopped.

236 0506 04 Brakes can be released following automatic brake application after reset device has been operated before train has been stopped, while the condition that caused the brake application still affects the movement of the train.

§ 236.507 Brake application; full service.

This is a companion rule to Rule 236.502 and requires the apparatus on the locomotive, when operated, to impose a full service application of the brakes.

Application:

Applies to automatic train stop and train control systems

This rule requires that an automatic train stop or train control brake application be a full service brake application as defined by Rule 236.701. The imposition of an emergency brake application is prohibited.

CLASSIFICATION OF DEFECTS

236 0507 01 Automatic train stop or train control apparatus, when operated, does not cause a full service application of the brakes.

§ 236.508 Interference with application of brakes by means of brake valve.

This rule prohibits use of apparatus that affects the proper functioning of the brake system.

Application:

Applies to automatic cab signal, train stop and train control systems.

When devices covered by this subpart are cut in service, the air passage of the automatic brake valve is necessarily altered, especially in train stop and train control systems.

This rule prohibits the installation and use of apparatus that interferes with the manual application of the brakes by means of the independent or automatic brake valves or that impairs the efficiency of the air brake or blended brake system when operated manually.

CLASSIFICATION OF DEFECTS

236 0508 01 Automatic train stop, train control, or cab signal apparatus interferes with the application of the brakes by means of the brake valves.

236 0508 02 Automatic train stop, train control, or cab signal apparatus impairs the efficiency of the brake system.

§ 236.509 Two or more locomotives coupled.

This rule requires automatic train stop, train control, or cab signal apparatus be operative only on the locomotive from which the brakes are controlled.

Application:

Applies to automatic cab signal, train stop and train control systems.

When two or more equipped locomotives are coupled together, or a pushing or helping locomotive is used, the automatic train stop, train control or cab signal apparatus affecting movement of that train must be so arranged that it is operative only on the locomotive from which the brakes are controlled.

CLASSIFICATION OF DEFECTS

236 0509 01 Automatic train stop, train control, or cab signal apparatus not arranged so that when two or more locomotives are coupled, or a pushing or helping locomotive is used, it can be made operative only on the locomotive from which the brakes are controlled.

§ 236.511 Cab signals controlled in accordance with block conditions stopping distance in advance.

This rule requires that automatic cab signals be continuously controlled and provide proper aspects and stopping distances to conditions described in Rule 236.205.

Application.

Cab signals are required to be continuously controlled to indicate that speed is to be restricted and stop may be required at least stopping distance to all conditions described in Rule 236.205.

Conditions that cause wayside false restrictive aspects such as open or crossed light circuit conductors or burned out lamp bulbs, except where light-out protection is provided, are exempt from these requirements.

CLASSIFICATION OF DEFECTS

236 0511 01 Automatic cab signal system not so arranged that cab signals are continuously controlled in accordance with conditions that obtain at least stopping distance in advance. (Applies only to conditions described in parts (a), (b), (c), and (d) of Section 236.205 of the Rules, Standards, and Instructions.)

§ 236.512 Cab signal indication when locomotive enters block where restrictive conditions obtain.

This is a companion rule to Rule 236.514 and requires the cab signal indicate "Proceed at Restricted Speed" when a locomotive enters or is within a block in cab signal territory wherein a condition described in Rule 236.205 exists.

Application:

This rule requires that the cab signal indicate "Proceed at Restricted Speed" when the locomotive enters or is within a block occupied by a train, locomotive or car; in which the points of a switch are not closed in proper position; in which an independently operated fouling point derail equipped with switch circuit controller is not in derailing position; or, where there are two or more track circuits, a track relay is in de-energized position.

Rule 236.514 permits the cab signal to change to a more favorable aspect after the train has passed the condition that exists or if the condition ceases to exist.

CLASSIFICATION OF DEFECTS

236 0512 01 Automatic cab signal does not indicate "Proceed at Restricted Speed" when locomotive enters or is within a block occupied by a train, locomotive, or car.

236 0512 02 Automatic cab signal does not indicate "Proceed at Restricted Speed" when locomotive enters or is within a block in which the points of a switch are not closed in proper position.

236 0512 03 Automatic cab signal does not indicate "Proceed at Restricted Speed" when locomotive enters or is within a block in which an independently operated fouling- point derail equipped with switch circuit controller is not in derailing position.

236 0512 04 Automatic cab signal does not indicate "Proceed at restricted Speed" when locomotive enters a block in which a track relay is in de-energized position or device that functions as a track relay is in its most restrictive state. (Where there is more than one track circuit in the block.)

§ 236.513 Audible indicator.

This rule requires that when the cab signal aspect changes to a more restrictive indication, an audible indicator shall sound continuously until silenced by manual operation of an acknowledging device. It requires that the cab indicator have a distinctive sound that can be clearly audible throughout the cab under all conditions.

Application:

Applies to automatic cab signal, train stop, and train control systems.

This rule requires an audible indicator be provided in cab signal systems and so arranged that it will sound continuously, until silenced by manual operation of an acknowledging device, when the cab signal changes to display a more restrictive aspect. The audible indicator may be electrically or pneumatically operated and must have a distinctive sound that identifies it with the system and be clearly audible through the cab under all operating conditions. The audible indicator may be so arranged that it will sound continuously during an overspeed condition and silenced only by reducing to proper speed.

Methods to silence or muffle the cab indicator such a wrapping or plugging with paper or cloth or bending or breaking the air pipe to reduce air flow are prohibited.

CLASSIFICATION OF DEFECTS

236 0513 01 Audible cab indicator of automatic cab signal system does not sound continuously until silenced by manual operation of acknowledging device, when cab signal changes to a more restrictive aspect.

236 0513 02 Cab indicator does not have a distinctive sound.

236 0513 03 Cab indicator not clearly audible throughout cab under all operating conditions.

§ 236.514 Interconnection of cab signal system with roadway signal system.

This rule prohibits the cab signal from indicating a speed higher than that authorized by roadway signal indication except when the condition changes after the roadway signal has been passed.

Application:

Applies to automatic cab signal systems.

This rule requires the locomotive cab signal apparatus be so interconnected to the wayside signals system that it will not authorize operation at a speed higher than that authorized by the wayside signal indication except when conditions affecting the movement of trains in a block change after the train passes the wayside signal.

These requirements apply to all signaled track, including signaled sidings and signaled auxiliary tracks, in automatic cab signal territory.

CLASSIFICATION OF DEFECTS

236 0514 01 Cab signal indication authorizes operation of train at a speed higher than that authorized by indication of roadway signal that governed movement of train into block. (Does not apply when conditions affecting movement of train in the block change after train passes signal.)

§ 236.515 Visibility of cab signals.

This rule requires that the cab signal be so located that the locomotive crew member or members can plainly see the aspect.

Application:

Applies to automatic train stop, train control and cab signal systems.

Cab signals are required to be so installed that the crew member or members can plainly see the aspect displayed from their accustomed positions in the cab.

The cab signal is required to be properly illuminated, without cracked or broken roundels and its view not obstructed by other equipment installed in the cab.

CLASSIFICATION OF DEFECTS

236 0515 01 Cab signal not plainly visible to member of locomotive crew from his/her station in the cab.

§ 236.516 Power supply.

This rule requires that each automatic train stop, train control or cab signal device hereafter installed on a locomotive operate from a separate or isolated power supply.

Application:

Applies to automatic train stop, train control, and cab signal systems.

The rule requires that the automatic train stop, train control or cab signal device be provided with a dedicated power supply used solely to operate the device. It is prohibited to utilize the power supply to provide power to any other device or system.

Devices installed on locomotive prior to the effective date of these RS&I are exempt from this requirement.

CLASSIFICATION OF DEFECTS

236 0516 01 Automatic train stop, train control, or cab signal device not provided with an isolated or separate power supply. (Does not apply to devices installed prior to February 27, 1984.)

236 0516 02 Power supply used to operate equipment other than automatic train stop, train control, or cab signal device.

RULES AND INSTRUCTIONS: ROADWAY

§ 236.526 Roadway element not functioning properly.

This rule requires that when the roadway element, except track circuit, of an automatic train stop, train control, or cab signal system has failed to perform its intended function, the associated signal shall be caused manually to display the most restrictive aspect.

Application:

Applies to automatic train stop, train control, and cab signal systems.

This rule requires that when a roadway element such as a tripper, inductor, loop, or electric circuit, except track circuit, becomes defective or is being repaired or replaced, the signal associated with the device must be manually caused to display its most restrictive aspect. It is prohibited to permit the signal to display a less restrictive aspect until the device has been restored to its normal operative condition.

CLASSIFICATION OF DEFECTS

236 0526 01 Signal not caused manually to display its most restrictive aspect when roadway element associated with such signal is not functioning as intended. (Does not apply to track circuit.)

236 0526 02 Signal which has been caused manually to display its most restrictive aspect when roadway element associated with the signal is not functioning as intended, caused to display a less restrictive aspect before such element has been restored to normal operative condition. (Does not apply to track circuit.)

§ 236.527 Roadway element insulation resistance.

This rule requires insulation resistance between roadway inductor winding and ground shall be maintained at not less than 10,000 ohms.

Application:

Applies to intermittent inductive automatic train stop systems.

This rule applies only to the roadway inductor winding. The insulation resistance of cable or conductors that connect the inductor to its associated signal must comply with the requirements of Rule 236.108.

Disconnect the coil wires and test each to ground. Do not test the coils against each other with an insulation resistance tester.

CLASSIFICATION OF DEFECTS

236 0527 01 Insulation resistance between roadway inductor winding and ground less than 10,000 ohms.

§ 236.528 Restrictive condition resulting from open hand-operated switch; requirement.

This rule requires that the restrictive condition of continuous inductive automatic train stop or train control device or restrictive cab signal indication of an automatic cab signal device be maintained to within 300 feet of an open hand-operated switch or unlocked facing-point lock in equipped territory.

Application:

Applies to continuous inductive automatic train stop, train control and cab signal systems.

This rule requires that switch shunting circuits or switch repeating circuits of hand-operated switch or facing-point lock with circuit controller effectively shunt the track circuit or open the signal control circuits to the extent that the restrictive condition of continuous inductive automatic train stop or train control device or restrictive aspect of cab signal device of an approaching locomotive is maintained to within 300 feet of a facing-point switch opened one-fourth inch or more, a trailing point switch opened three-eighths inch or more, or, a facing-point lock that is not locked.

CLASSIFICATION OF DEFECTS

236 0528 01 Restrictive condition of automatic train stop or train control device of the continuous type on an approaching locomotive not maintained to within 300 feet of the points of a facing-point hand-operated switch which is open one-fourth inch or more.

236 0528 02 Restrictive condition of automatic train stop or train control device of the continuous type on an approaching locomotive not maintained to within 300 feet of the points of a trailing-point hand-operated switch which is open three-eighths inch or more.

236 0528 03 Restrictive condition of automatic train stop or train control device of the continuous type on an approaching locomotive not maintained to within 300 feet of the points of a hand-operated switch which is not locked, where such switch is equipped with facing-point lock with circuit controller.

236 0528 04 Restrictive cab signal indication of automatic cab signal device on an approaching locomotive not maintained to within 300 feet of the points of a facing-point hand-operated switch which is open one-fourth inch or more.

236 0528 05 Restrictive cab signal indication of automatic cab signal device on an approaching locomotive not maintained to within 300 feet of the points of a trailing-point hand-operated switch which is open three-eighths inch or more.

236 0528 06 Restrictive cab signal indication of automatic cab signal device on an approaching locomotive not maintained to within 300 feet of the points of a switch which is not locked, where such switch is equipped with facing-point lock with circuit controller.

§ 236.529 Roadway element inductor; height and distance from rail.

This rule requires that inductors of the inert roadway type be installed and maintained in position in accordance with specifications of the carrier.

Application:

Applies to intermittent inductive automatic train stop systems.

This rule requires that the inductor pole faces be maintained at a height above the plane of the tops of the rails with its inner edge at a horizontal distance from the gage side of the nearest running rail in accordance with the carrier's specifications.

CLASSIFICATION OF DEFECTS

236 0529 01 Inductor of the inert roadway element type too high.

236 0529 02 Inductor of the inert roadway element type too low.

- 236 0529 03 Inductor of the inert roadway element too close to gage side of nearest running rail.
- 236 0529 04 Inductor of the inert roadway element type too far from gage side of nearest running rail.

§ 236.531 Trip arm; height and distance from rail.

This rule requires that trip arm of automatic train stop device, when in stop position, be installed and maintained in position in accordance with specifications of the carrier.

Application:

Applies to mechanical trip type automatic train stop system.

This rule requires that trip arm, when in stop position, be maintained at a height above the plane of the tops of the rails with its centerline at a horizontal distance from the gage side of the nearest running rail in accordance with the carrier's specifications.

CLASSIFICATION OF DEFECTS

- 236 0531 01 Trip arm of automatic train stop device, in stop position, too high.
- 236 0531 02 Trip arm of automatic train stop device, in stop position, too low.
- 236 0531 03 Trip arm of automatic train stop device, in stop position, too close to gage side of running rail.
- 236 0531 04 Trip arm of automatic train stop device, in stop position, too far from gage side of running rail.

§ 236.532 Strap iron inductor; use restricted.

This rule restricts the use of strap iron inductors or other roadway element with characteristics different from its standard type.

Application:

Applies to intermittent inductive automatic train stop system.

The use of strap iron inductors or other roadway element with characteristics differing from its standard type is prohibited on track where speed higher than 20 mph is permitted.

CLASSIFICATION OF DEFECTS

- 236 0532 01 Strap iron inductor or other roadway element with characteristics differing from standard type used on track where speed higher than restricted speed is permitted.

§ 236.534 Entrance to equipped territory; requirements.

This rule requires that where trains are not required to stop at the entrance to equipped territory, except when leaving yards and stations and speed until entering equipped territory does not exceed restricted speed, the automatic train stop, train control, or cab signal device shall be operative at least stopping distance from the entrance to such territory except where the approach thereto is governed by automatic approach signal.

Application:

Applies to automatic train stop, train control, and cab signal systems.

This rule requires that automatic train stop, train control, or cab signal device be operative at least stopping distance from the entrance to equipped territory except where trains are required to stop at the entrance to equipped territory, or the approach thereto is governed by an operative approach signal, or when leaving yards and stations where speed until entering equipped territory does not exceed restricted speed.

CLASSIFICATION OF DEFECTS

236 0534 01 Automatic train stop, train control, or cab signal device not operative at least stopping distance from entrance to equipped territory. (Does not apply where trains are required to stop at entrance to equipped territory or where the approach thereto is governed by automatic approach signal.)

RULES AND INSTRUCTIONS: LOCOMOTIVES

§ 236.551 Power supply voltage; requirement.

This rule prescribes the tolerance within which the power supply voltage shall be maintained.

Application:

Applies to automatic train stop, train control and cab signal systems.

The voltage of the power supply must be maintained to within 10 percent of the rated voltage.

CLASSIFICATION OF DEFECTS

236 0551 01 Voltage of power supply more than 10 percent above rated voltage.

236 0551 02 Voltage of power supply more than 10 percent below rated voltage.

§ 236.552 Insulation resistance; requirement.

This rule prescribes the minimum insulation resistance permitted between wiring and ground.

Application:

Applies to automatic train stop, train control and cab signal systems.

The insulation resistance between wiring and ground of continuous inductive automatic train stop, train control and cab signal systems shall be not less than one (1) megohm when periodic test is performed and not less than 250,000 ohms between periodic tests.

The insulation resistance between wiring and ground of intermittent inductive automatic train stop system shall be not less than 250,000 ohms when periodic test is performed and not less than 20,000 ohms between periodic tests.

CLASSIFICATION OF DEFECTS

236 0552 01 Insulation resistance between wiring and ground of continuous inductive type automatic train stop, train control, or cab signal device less than 1 megohm not corrected when periodic test is performed.

236 0552 02 Insulation resistance between wiring and ground of continuous inductive type automatic train stop, train control, or cab signal device less than 250,000 ohms between periodic tests.

236 0552 03 Insulation resistance between wiring and ground of intermittent inductive automatic train stop device less than 250,000 ohms not corrected when periodic test performed.

236 0552 04 Insulation resistance between wiring and ground of intermittent inductive automatic train stop device less than 20,000 ohms between periodic tests.

§ 236.553 Seal, where required.

This rule requires that a seal be maintained on any device other than brake pipe cutout cock (double heading cock), by means of which the operation of pneumatic portion of automatic train stop or train control apparatus can be cut out.

Application:

Applies only to automatic train stop and train control systems. Does not apply to automatic cab signal systems.

This rule requires that automatic train stop or train control apparatus be cut in and a seal applied to any device or cutout cock, except double heading cock, by means of which any part of the pneumatic portion of the apparatus can be cut out. The seal is required to be applied in such a manner that the device cannot be operated to cut out the apparatus without breaking the seal.

CLASSIFICATION OF DEFECTS

236 0553 01 Device by means of which operation of pneumatic portion of apparatus can be cut out, not sealed. (Does not apply to brake-pipe cut-out cock, or double heading cock, of automatic train stop or train control equipped locomotive or to the cut-out cock for the pneumatic whistle of an automatic cab signal system on an equipped locomotive.)

§ 236.554 Rate of pressure reduction; equalizing reservoir or brake pipe.

This is a companion rule to Rule 236.507 and requires that the equalizing reservoir pressure or brake pipe pressure reduction during an automatic brake application be at a rate not less than that which results from a manual service application.

Application:

Applies to automatic train stop and train control systems.

An automatic full service brake application is accomplished by piping and venting arrangements different than that accomplished manually.

This rule requires that the efficiency of the automatic brake application be at least equal to the efficiency of the manual application of the brakes.

CLASSIFICATION OF DEFECTS

236 0554 01 Equalizing reservoir or brake pipe pressure during automatic brake application reduces at a rate less than that which obtains during a manual service application.

§ 236.555 Repaired or rewound receiver coil.

This rule requires that a receiver coil which has been repaired or rewound have the same operating characteristics which it possessed originally or as currently specified for new equipment.

Application:

Applies to automatic cab signal, train stop and train control systems.

This rule requires receivers to be rewound with the same size wire and number of turns to achieve the resistive value and inductance it originally possessed or as currently specified for new equipment. The rule prohibits repair of receivers by removing turns of wire to eliminate shorts or opens.

CLASSIFICATION OF DEFECTS

236 0556 01 Receiver coil which has been repaired or rewound does not have same operating characteristics which it possessed originally or as currently specified for new equipment.

§ 236.556 Adjustment of relay.

This rule prohibits the adjustment of a relay elsewhere than in a shop equipped for that purpose except when receiver coils, electro-pneumatic valve or other essential part of the equipment is replaced.

Application:

Applies to automatic cab signal, train stop, and train control systems.

This rule requires that adjustment of relay be made only in a shop equipped for that purpose except when receiver coils, electro-pneumatic valve or other essential part of the equipment is replaced. The rule prohibits adjustment of the relay to compensate for irregularities in power supply voltage or other variable factors in its circuit.

CLASSIFICATION OF DEFECTS

236 0556 01 Change in adjustment of relay made elsewhere than in a shop equipped for that purpose. (Does not apply when receiver coils, electro-pneumatic valve, or other essential part of equipment is replaced.)

236 0556 02 Relay adjusted to compensate for irregularities of power-supply voltage or other variable factors in circuit.

§ 236.557 Receiver; location with respect to rail.

This rule requires that the receiver of an intermittent inductive automatic train stop device or the receiver of a continuous inductive automatic train stop, train control or cab signal device on locomotive equipped with onboard test device be maintained in accordance with specifications of the carrier.

Application:

Applies to all intermittent inductive automatic train stop systems and to those continuous inductive automatic train stop, train control or cab signal devices that are installed on locomotives equipped with onboard test device.

This rule requires that the receiver of covered devices be maintained with bottom of the receiver at a height above the plane of the tops of the rails and with its outer edge at a horizontal distance from the gage side of the nearest rail in accordance with specifications of the carrier.

CLASSIFICATION OF DEFECTS

236 0557 01 Receiver of intermittent inductive automatic train stop device of the inert roadway element type, or continuous inductive automatic train stop, train control, or cab signal device on locomotive equipped with onboard test device, too high.

236 0557 02 Receiver of intermittent inductive automatic train stop device of the inert roadway element type, or continuous inductive automatic train stop, train control, or cab signal device on locomotive equipped with onboard test device, too low.

236 0557 03 Receiver of intermittent inductive automatic train stop device of the inert roadway element type, or continuous inductive automatic train stop, train control, or cab signal device on locomotive equipped with onboard test device, too close to gage side of nearest rail.

236 0557 04 Receiver of intermittent inductive automatic train stop device of the inert roadway element type, or continuous inductive automatic train stop, train control, or cab signal device on locomotive equipped with onboard test device, too far from gage side of nearest rail.

§ 236.560 Contact element, mechanical trip type; location with respect to rail.

This rule requires that the contact element of automatic train stop device of the mechanical trip type be maintained in accordance with specifications of the carrier.

Application:

This rule requires that the contact element of automatic train stop device of the mechanical trip type be installed and maintained at a height above the tops of the plane of the rails and at a horizontal distance from the nearest rail in accordance with specifications of the carrier.

CLASSIFICATION OF DEFECTS

236 0560 01 Contact element of automatic train stop device of the mechanical trip type too high.

236 0560 02 Contact element of automatic train stop device of the mechanical trip type too low.

236 0560 03 Contact element of automatic train stop device of the mechanical trip type too close to gage side of rail.

236 0560 04 Contact element of automatic train stop device of the mechanical trip type too far from gage side of rail.

§ 236.562 Minimum rail current required.

This rule requires that the minimum pick-up value of the locomotive apparatus be maintained in accordance with specifications of the carrier.

Application:

Applies to continuous inductive automatic cab signal, train stop and train control systems.

This rule requires that minimum rail current required to restore the locomotive equipment of continuous inductive automatic train stop or train control device to normal condition, or to obtain a proceed indication of automatic cab signal device be in accordance with specifications of the carrier.

CLASSIFICATION OF DEFECTS

236 0562 01 Pick-up of locomotive equipment of continuous inductive automatic train stop, train control, or cab signal device too high.

236 0562 02 Pick-up of locomotive equipment of continuous inductive automatic train stop, train control, or cab signal device too low.

§ 236.563 Delay time.

This rule prescribes that the delay time of automatic train stop or train control system not exceed 8 seconds and that the spacing of signals to meet the requirements of Rule 236.24 take into consideration the delay time.

Application:

Applies to both intermittent inductive and continuous inductive automatic train stop and train control systems.

Delay time is provided to give the engineer enough time to take proper action to prevent an automatic brake application. This rule prohibits the delay time from exceeding eight seconds before the brakes begin to apply. The rule also requires that spacing of signals in equipped territory include the distance traveled at maximum authorized speed for eight seconds in order that trains may be stopped by the automatic brake application at the signal where a stop is required, or by reduction in speed to the rate prescribed by the next signal in advance where reduced speed is required.

Delay time is defined in the Definitions section of the RS&I as follows: "§236.831 Time, delay. As applied to an automatic train stop or train control system, the time which elapses after the onboard apparatus detects a more restrictive indication until the brakes start to apply."

When a test is made to determine the delay time, the elapsed time should be measured from the time the onboard device recognizes the change in track circuit current or code rate, or detects the passage over an inductor at a signal displaying an aspect less favorable than "proceed", until the actuation of the valves that initiate the braking. Or to put it more simply, the delay time is measured from the time the cab signal or indicator changes to a more restrictive aspect, until a reduction in brake-pipe pressure is started and the pressure in the brake cylinders starts to increase. In the case of the intermittent inductive train stop system, the delay time is measured from the instant the alarm whistle or electronic tone starts to sound until the brakes start to apply. The application of the brakes can be detected by watching the brake pipe-pressure gauge and the brake cylinder gauge, and by listening for venting of air from the braking system.

CLASSIFICATION OF DEFECTS

236 0563 01 Delay time of automatic train stop or train control system exceeds 8 seconds.

236 0563 02 Spacing of signals to meet the requirements of Section 236.24 of the Rules, Standards and Instructions not adequate in consideration of delay time during automatic train stop or train control brake application.

§ 236.564 Acknowledging time.

This rule prescribes that the acknowledging time of intermittent automatic train stop device not exceed 30 seconds.

Application:

Applies only to intermittent inductive automatic train stop systems.

Acknowledging time is provided in order to furnish the engineer an ample time period to forestall an automatic brake application by holding the acknowledging lever in reverse position while the locomotive passes a restricting signal. This rule prohibits the acknowledging lever from being held in the acknowledging position longer than 30 seconds before the brakes start to apply.

Acknowledging time is defined in the RS&I's Definitions as: "§236.830 Time, acknowledging. As applied to an intermittent automatic train stop system, a predetermined time within which an automatic brake application may be forestalled by means of an acknowledging device."

The acknowledging time should be tested by moving the handle to the acknowledging position and holding until the brakes start to apply. The application of the brakes can be detected by watching the brake-pipe pressure gauge for a reduction and listening for the venting of air from the braking system.

CLASSIFICATION OF DEFECTS

236 0564 01 Acknowledging time of intermittent automatic train stop device exceeds 30 seconds.

§ 236.565 Provision made for preventing operation of pneumatic brake-applying apparatus by double-heading cock; requirements.

This rule requires that where provision is made for preventing the operation of the pneumatic brake-applying apparatus of an automatic train stop or train control device when the double-heading cock is placed in double-heading position, the double-heading cock shall be so arranged that the automatic brake valve is cut out in advance of or simultaneously with the train stop or train control apparatus.

Application:

Applies to automatic train stop and train control systems.

This rule prohibits operation of the double-heading cock to the extent that the automatic train stop or train control pneumatic apparatus is rendered inoperative before the automatic brake valve.

CLASSIFICATION OF DEFECTS

236 0565 01 Automatic train stop or train control device is cut out before communication is closed between engineer's automatic brake valve and the brake pipe, when operating double-heading cock toward double-heading position.

§ 236.566 Locomotive of each train operating in train stop, train control or cab signal territory; equipped.

This rule requires that the locomotive, from which brakes are controlled, of each train operating in automatic train stop, train control or cab signal territory shall be equipped with apparatus responsive to the roadway equipment installed on all or any part of the route traversed, and such apparatus shall be in operative condition.

Application:

Applies to automatic cab signal, train stop and train control systems.

This rule requires that each locomotive from which the brakes are controlled which traverses automatic train stop, train control or cab signal territory be equipped with apparatus responsive to the roadway equipment installed on all or any part of the route traversed. The rule further requires that the apparatus of the locomotive be in operative condition upon departure from its initial terminal.

CLASSIFICATION OF DEFECTS

236 0566 01 Locomotive from which brakes are controlled on train operating in automatic train stop, train control, or cab signal territory not equipped with apparatus responsive to roadway equipment installed on all or any part of route traversed.

236 0566 02 Automatic train stop, train control, or cab signal apparatus on locomotive from which brakes are controlled of train operating in automatic train stop, train control, or cab signal territory not in operative condition.

§ 236.567 Restrictions imposed when device fails and/or is cut out en route.

This rule sets forth the procedures and restrictions that shall be followed when an automatic train stop, train control or cab signal device fails and/or is cut out en route.

Application:

Applies to automatic cab signal, train stop and train control systems.

This rule requires that when an automatic cab signal, train stop or train control device fails or is cut out en route the train shall proceed not exceeding 20 miles per hour, or, if an automatic block signal system is in operation, according to signal indication not exceeding 40 miles per hour, to the next available point of communication where a report must be made to a designated officer. Radio communications are permissible for this purpose.

Following the required report, in the event the train is in territory in which an automatic block signal system is not in use, the train may be permitted to proceed at not exceeding 20 miles per hour to a point where an absolute block is established.

In the event an automatic block signal system is in operation in the territory in which the train is operating, the train may be permitted to proceed according to signal indication at not exceeding 40 miles per hour to a point where an absolute block is established.

An "absolute block" is defined by §236.709 as "A block in which no train is permitted to enter while it is occupied by another train."

An absolute block may be established in both signaled and non signaled territory by use of manual block rules, train orders, track warrants, or other method of train operation, defined by the carrier's operating rules. An absolute block may also be established in block signal territory by designating in the carrier's

operating rules, that when an onboard train stop or train control device fails, all wayside signals displaying "restricting" or "stop and proceed" aspects will be considered to be displaying a "stop" aspect for the train with the failed device. Thus, an absolute block will essentially be established in front of that train.

Upon establishment of an absolute block in front of the train with the inoperative device, the train may then proceed at speeds not in excess of 79 miles per hour.

The carrier's operating rules shall effect these requirements.

(Reference technical Bulletin S-96-03)

CLASSIFICATION OF DEFECTS

236 0567 01 Train permitted to proceed at higher than restricted speed to next available point of communication when automatic train stop, train control, or cab signal device fails and/or is cut out en route and no automatic block signal system is in operation.

236 0567 02 Train permitted to proceed at higher than medium speed to next available point of communication when automatic train stop, train control, or cab signal device fails and/or is cut out en route and an automatic block signal system is in operation.

236 0567 03 Report not made to designated officer at next available point of communication after automatic train stop, train control, or cab signal device fails and/or is cut out enroute.

236 0567 04 Train permitted to proceed at higher than restricted speed to point where absolute block can be established when automatic train stop, train control, or cab signal device fails and/or is cut out en route and no automatic block signal system is in use.

236 0567 05 Train permitted to proceed at higher than medium speed to point where absolute block can be established when automatic train stop, train control, or cab signal device fails and/or is cut out en route and an automatic block signal system is in use.

236 0567 06 Train permitted to proceed at a speed exceeding 79 miles per hour where automatic train stop, train control, or cab signal devices fails and/or is cut out enroute when an absolute block is established in advance of the train on which the device is inoperative.

236 0567 07 Train permitted to proceed at a speed other than restricted speed after communications has been established, where automatic train stop, train control, or cab signal device fails and/or is cut out en route when an absolute block is not established in advance of the train on which the device is inoperative and no automatic block signal system is in operation.

§ 236.568 Difference between speeds authorized by roadway signal and cab signal; action required

The rule requires that in the event a cab signal authorizes a speed different from that authorized by a roadway signal, the most restrictive speed shall not be exceeded.

Application:

Applies to continuous inductive automatic cab signal, train stop, and train control systems.

This rules requires that if for any reason a cab signal authorizes a speed different from that authorized by a roadway signal, when a train enters the block governed by the signal, the lower speed shall not be exceeded.

The carrier's operating rules shall effect this requirement.

CLASSIFICATION OF DEFECTS

236 0568 01 Train operated at a speed higher than that authorized by the more restrictive indication when the speed authorized by the cab signal indication is different than that authorized by the indication of the roadway signal when train entered block governed by such signal.

INSPECTIONS AND TESTS: ROADWAY

§ 236.576 Roadway element.

This rule requires that roadway elements, except track circuits, including those for test purposes, shall be gaged monthly for height and alinement, and shall be tested at least once every 6 months.

Application:

Applies to automatic train stop systems.

This rule requires that inductor of the inert roadway type and trip arm be gaged monthly for height and alinement. The rule further requires testing of inductor for defective conditions in its winding or external controlling circuit and of trip arm valves and return springs every six months.

CLASSIFICATION OF DEFECTS

236 0576 01 Roadway element not gaged monthly for height and alinement.

236 0576 02 Roadway element not tested at least once every six months.

§ 236.577 Test, acknowledgment and cut-in circuits.

This rule requires that test, acknowledgment and cut-in circuits shall be tested at least once every twelve months.

Application:

Applies to automatic cab signal, train stop and train control systems.

This rule requires test at least once every twelve months of test circuits, including test equipment, acknowledgment and cut-in circuits.

An acknowledgment circuit is installed between the track rails at each signal or stop indication point in territory where an automatic train stop system of the continuous inductive type with two-indication cab signals is in service, to enforce acknowledgment by the engineer of restrictive conditions in order to forestall an automatic brake application. The acknowledgment circuit is required to be continuously energized and, if interrupted, it must de-energize its associated track circuit.

A cut-in circuit is a roadway circuit located at the entrance of equipped territory by means of which locomotive equipment of continuous inductive type system is actuated so as to be in an operative condition. The cut-in circuit shall be so arranged that it requires acknowledgment by the engineer of all restrictive features provided by the device.

Test circuits, including portable and onboard test equipment, may be used for performing the prescribed tests of apparatus on equipped locomotives.

CLASSIFICATION OF DEFECTS

236	0577	01	Test circuit not tested at least once every twelve months.
236	0577	02	Acknowledgment circuit not tested at least once every twelve months.
236	0577	03	Cut-in circuit not tested at least once every twelve months.
236	0577	04	Onboard test equipment not tested at least once every twelve months.

INSPECTIONS AND TESTS; LOCOMOTIVE

§ 236.586 Daily or after trip test.

This rule prescribes inspection and test daily or after each trip of the automatic cab signal, train stop, or train control apparatus on each locomotive operating in equipped territory, except where periodic tests are performed on such locomotives at intervals of not more than two months.

Application:

Applies to automatic cab signal, train stop, and train control systems.

This rule requires that the automatic cab signal, train stop, or train control apparatus on each locomotive operating in equipped territory be inspected and tested either once every 24 hours or within 24 hours before departure on each trip. Daily or after trip inspections and tests are not required for locomotives which are subject to periodic tests at intervals of not more than two months.

The purpose of the test is to determine the device is functioning properly before being dispatched into equipped territory. The test is required to be made by an employee capable of detecting defective conditions and taking corrective action prior to the locomotive being dispatched from its initial terminal. In all systems the daily or after trip test shall consist of a general inspection of the apparatus for evidence of damage or wear and a complete cycle of the systems's functions, in addition to the following:

In intermittent inductive automatic train stop system, the test shall determine if the apparatus is properly sensitive, that an automatic application can be forestalled, that an automatic application causes a full service application, that the brakes cannot be released during an automatic application until sufficient time has elapsed to stop a train from maximum authorized speed (reset time), and that seals are properly applied unless device is to be cut out between initial terminal and equipped territory.

In continuous inductive automatic train stop system, the test shall determine that an automatic application can be forestalled, that an automatic application causes a full service brake application, that the brakes cannot be released during an automatic application until sufficient time has elapsed to stop a train from maximum authorized speed (reset time), or the condition that caused the automatic application ceases to exist, and in noncoded continuous inductive automatic train stop system that pick-up of the device is within specified limits, and that seals are properly applied unless device is to be cut out between initial terminal and equipped territory.

In continuous inductive automatic train control system, the test shall determine that overspeed causes an automatic brake application unless suppressed, that an automatic application causes a full service brake application, that the brakes cannot be released during an automatic application until sufficient time has elapsed to stop a train from maximum authorized speed (reset time) or the speed of the train has been slowed to a predetermined rate, or the condition that caused the automatic application ceases to exist, and in noncoded continuous inductive automatic train control system, that pick-up of the device is within specified limits, and that seals are properly applied unless device is to be cut out between initial terminal and equipped territory.

In automatic cab signal system, the test shall determine that cab signal indications correspond to proper codes or track conditions, that the audible indicator has a distinctive sound and can be heard clearly throughout the cab and that the audible indicator sounds continuously until silenced manually each time the cab signal changes to a more restrictive indication.

Results of the daily or after trip test are required to be recorded by Rule 236.110.

CLASSIFICATION OF DEFECTS

236 0586 01 Automatic train stop, train control, or cab signal apparatus on locomotive operating in equipped territory not tested either once every 24 hours or within 24 hours before departure on each trip. (Does not apply to locomotive on which periodic test is made at least once every two months.)

§ 236.587 Departure test.

This rule requires that the automatic train stop, train control, or cab signal apparatus on each locomotive be tested prior to entering equipped territory to determine if such apparatus is in service and functioning properly.

Application:

Applies to automatic cab signal, train stop, and train control systems, except automatic train stop system of the mechanical trip type.

The rule requires the departure test be made on departure of the locomotive from its initial terminal and before it enters equipped territory. If the apparatus is cut out between initial terminal and equipped territory, the departure test must be made prior to entering equipped territory.

The purpose of the test is to determine the apparatus is in service and is functioning properly.

The rule permits departure tests to be made over track elements or test circuits permanently installed for that purpose, or with portable test equipment, or with onboard test equipment. In any case, it must be so arranged that it will produce any of the various track circuit, or restrictive conditions encountered in actual service.

If a locomotive makes more than one trip in a 24-hour period, only one departure test is required in such 24-hour period.

Rule 236.587 requires that whoever performs the test shall certify in writing that the test was made and that the certification and results of the tests shall be posted in the cab of the locomotive. Further, a copy of the certification and results of the tests is required to be left at the test location for filing in the office of the supervisory official having jurisdiction. The records of departure tests must be retained for at least 92 days. Rule 236.110 also requires that a record be made of the departure test.

The rule takes cognizance of locations where it is impractical for a copy of the test to be left at the location being tested, by providing that the results of the tests may be transmitted to either the dispatcher or to one other designated individual at each location. In either case, the employee who receives the information is required to keep a written record of the results of the tests and the name of the person performing the tests.

The rule does not permit the railroad to use a third party for reporting purposes, should the person designated not be available for reporting of departure tests. If the designated person is not available, the engineer must report the results of the departure test and the name of the person making such test to the dispatcher, or else leave a written record of such test at the test location.

CLASSIFICATION OF DEFECTS

236 0587 01 Test of automatic train stop, train control, or cab signal apparatus on locomotive not made on departure of locomotive from its initial terminal if equipment on locomotive is not cut out between its initial terminal and equipped territory. (Does not apply to locomotives and multiple-unit cars equipped with mechanical trip stop, or locomotives making more than one trip in each twenty-four hours where a departure test has been made on the locomotive equipment within the corresponding twenty-four hour period.)

236 0587 02 Test of automatic train stop, train control, or cab signal apparatus on locomotive not made immediately prior to entering equipped territory, if equipment on locomotive is cut out between its initial terminal and equipped territory.

236 0587 03 Automatic train stop, train control, or cab signal apparatus on locomotive making more than one trip within a twenty-four hour period not given a departure test within the corresponding twenty-four hour period.

236 0587 04 Record of departure test of automatic train stop, train control, or cab signal equipment not posted in cab of locomotive.

236 0587 05 Record of departure test of automatic train stop, train control, or cab signal equipment on locomotive not kept, at test location. (Does not apply where impractical and, in lieu thereof, certification and results of test are transmitted to the dispatcher or a designated individual.)

236 0587 06 Record of departure test of automatic train stop, train control, or cab signal equipment on locomotive not signed by employee making test.

236 0587 07 Record of departure test of automatic train stop, train control, or cab signal equipment on locomotive not transmitted to dispatcher or designated individual. (Does not apply where it is practical to leave copy of record at test location.)

§ 236.588 Periodic test.

This rule requires that except as provided in Rule 236.586, periodic tests of the automatic train stop, train control, or cab signal apparatus shall be made at least once every 92 days, and on multiple-unit cars as specified by the carrier subject to approval by FRA.

Application:

Applies to automatic cab signal, train stop, and train control systems.

In keeping with Rule 236.586, the prescribed 92 day requirement of this rule is not applicable where periodic tests are made on locomotives at intervals of not more than two months. No other deviation from these requirements is permissible without approval of FRA.

The daily or after trip test prescribed by Rule 236.586 is a test to determine the device is in good condition and functioning properly before being dispatched into equipped territory. The departure test prescribed by Rule 236.587 is a test to determine that the device is turned on, in service and functioning as intended before actually departing into equipped territory. The purpose of the periodic test prescribed by Rule 236.588 is to provide a more thorough and in-depth test and inspection of the electrical and pneumatic equipment.

All defective conditions shall be immediately corrected during the periodic test which shall consist of at least the following tests and inspections:

1. Thorough examination of the electrical portion including measurement of the insulation resistance.
2. Measurement of the power supply voltage.
3. Measurement of the pickup value required to restore the device to normal condition.
4. Measurement of the release value of the device in continuous noncoded systems.
5. Test of sensitivity of intermittent inductive automatic train stop system.
6. Measurement of acknowledging time.
7. Measurement of delay time.
8. Measurement of reset time in train stop and train control systems.
9. Measurement of height of receiver of intermittent inductive automatic train stop and continuous inductive systems having onboard test equipment, and of tripper of mechanical trip stop system.
10. Test of audible indicator.
11. Replacement of relays with dates that expire prior to next scheduled periodic test.
12. Replacement of pneumatic apparatus with cleaning dates that expire prior to next scheduled periodic test.
13. Measurement of accuracy of governor in train control systems.
14. Cycle test of apparatus to determine that it functions as intended.

Rule 236.110 requires that the results of periodic tests be recorded on a form provided for that purpose.

CLASSIFICATION OF DEFECTS

236 0588 01 Periodic tests of automatic train stop, train control, or cab signal apparatus not made at least once every 92 days.

236 0588 02 Periodic tests of automatic train stop, train control, or cab signal apparatus not made at least once every two months where daily or after trip test is not performed.

236 0588 03 Periodic tests of automatic train stop, train control, or cab signal apparatus on multiple-unit car not made at periods specified by carrier.

§ 236.589 Relays.

This rule requires that each relay, except master or primary relay of torque type, be removed from service and shopped at least once every six years. Master or primary relay of torque type depending on spring tension to return contacts to deenergized position shall be removed from service and shopped at least once every two years.

Application:

Applies to automatic cab signal, train stop, and train control systems.

The rule requires that each relay be removed from service as prescribed, subjected to thorough test, and necessary repairs and adjustment made.

The rule prohibits the relay from being returned to service unless its operating characteristics are in accordance with the limits within which such relay is designed to operate. In order to preclude loss of shelf time, a date tag may be applied showing when the relay was placed in service. In the absence of a date tag, or where the date is altered or illegible, the shop date of the relay will be used to determine when the relay should be removed from service.

CLASSIFICATION OF DEFECTS

236 0589 01 Relay, other than a master or primary relay of torque type, not removed from service for test and necessary repairs and adjustment at least once every six years.

236 0589 02 Master of primary relay of torque type depending on spring tension to return contacts to deenergized position of noncoded system not removed from service for test and necessary repairs and adjustment at least once every two years.

236 0589 03 Relay replaced in service after test and repair with operating characteristics not in accordance with the limits within which such relay is designed to operate.

§ 236.590 Pneumatic apparatus.

This rule requires that automatic train stop, train control, or cab signal pneumatic apparatus be inspected, cleaned, and the results of such inspection recorded as provided by §229.29(a).

Application:

Applies to automatic train stop, train control, and cab signal systems.

This rule requires that pneumatic apparatus of the automatic train stop, train control, or cab signal device be inspected and cleaned at least once every 736 days.

The results of such inspection recorded as provided by 229.29.

When a locomotive with automatic train stop, train control, or cab signal pneumatic apparatus receives out-of-use credit pursuant to § 229.33, the automatic train stop, train control, or cab signal apparatus shall be tested in accordance with § 236.588 prior to the locomotive being placed in service.

Per revisions published in the July 1, 1996 Federal Register, the rule in Section 236.590 is revised to read as follows:

§236.590 Pneumatic apparatus.

Automatic train stop, train control, or cab signal pneumatic apparatus shall be inspected, cleaned, and the results of such inspection recorded as provided by §229.29(a). When a locomotive with automatic train stop, train control, or cab signal pneumatic apparatus receives out-of-use credit pursuant to §229.33, the automatic train stop, train control, or cab signal apparatus shall be tested in accordance with §236.588 prior to the locomotive being placed in service.

[49 FR 3387, Jan. 26, 1984; 61 FR 33870, July 01, 1996]

Effective Date Note: Section 236.590 was revised at 49 FR 3387, Jan. 26, 1984. The reporting/recordkeeping requirements contained in this section are subject to OMB approval and are not required until such approval has been obtained.

CLASSIFICATION OF DEFECTS

- 236 0590 01 Automatic train stop, train control, or cab signal pneumatic apparatus not inspected and cleaned at least once every 736 days.
- 236 0590 02 Automatic train stop, train control, or cab signal pneumatic apparatus not inspected and cleaned as provided by § 229.29.
- 236 0590 03 The results of inspection and cleaning not recorded as provided by § 229.29.

TECHNICAL BULLETIN

SUBJECT: CLASSIFICATION OF DEFECTS CODES FOR HARMON AUTOMATIC TRAIN CONTROL USED ON CONRAIL.

NUMBER: TB-89-2 ORIGINAL ISSUE NUMBER AND DATE: 1-18-89

DISCIPLINE: SIGNAL AND TRAIN CONTROL REISSUE DATES: _____

On November 19, 1987, the Federal Railroad Administration issued a Notice of Final Orders of Particular Applicability (52 FR 44513) requiring that all trains operating on the Northeast Corridor (NEC) spine be controlled by locomotives equipped with automatic train control (ATC). At the time of issuance of those orders, FRA was conducting analyses to determine the optimally safe braking specifications for ATC devices on freight trains on the NEC. The FRA concluded its study and determined that ATC does not present any undue safety risk for freight service on the NEC. On January 19, 1988, FRA issued its supplement to the Final Orders of Applicability (53 FR 1433) that established specifications for a microprocessor based ATC system for freight train operation on the NEC. These specifications do not apply to passenger train operations.

Conrail is in the process of placing a microprocessor-based ATC device (braking profile system (BPS)) in service on 100 freight locomotives operating in the NEC. The Providence and Worcester Railroad has indicated it will install the same type ATC device as Conrail. The device is manufactured by Harmon Electronics and is programmed with braking curves that permit the locomotive engineer to control the train by means other than a brake application as long as the train speed is within the parameters of the braking profile. Thus, this device provides equivalent protection as conventional ATC without the necessity of severe braking to forestall a penalty brake application.

The following is a paragraph-by-paragraph of FRA's specifications followed by enforcement instructions for S&TC inspectors.

*Supplement to Final Orders:

In consideration of the foregoing the Final Orders of Particular Applicability issued November 19, 1987, are supplemented as follows;

1. Use of conventional ATC on freight train locomotives on the NEC is safe. Conventional ATC, which makes use of temporary suppression, results at most, in only moderate increases in buff forces. By careful use of the throttle during a temporary suppression application, the buff forces can be reduced. Therefore, no modification or specification changes are necessary for conventional ATC installation on freight train locomotives on the NEC."

For conventional Systems cite defective conditions using the classification of Defect Codes.

2. "Conrail's proposed ATC system utilizing a braking profile system, when used in conjunction with automatic cab signals supplemented with ATS, provides a safe alternative to conventional ATC systems." It is an acceptable ATC system for use on controlling locomotives of NEC freight trains provided that:

A. The BPS system complies with all provisions of 49 CFR Part 236 that apply to ATC systems, except as modified herein:

B. "The BPS system shall operate to initiate an automatic brake application at least stopping distance from the entrance to a block in which any condition described in Section 236.205 exists;"

Cite conditions that do not comply with paragraph 2B using Classification of Defect Codes 502.01, 502.02, 502.03 and 502.04.

C. "The BPS system shall operate to require a reduction in speed to that prescribed by a main track signal requiring a reduction in speed;"

Cite conditions that do not comply with paragraph 2C using Classification of Defect Code 502.05.

D. "The BPS system shall operate to initiate an automatic brake application within 27 seconds after the locomotive, at speeds exceeding 20 mph, enters or is within a block described in Section 236.205 occurs;"

Cite conditions that do not comply with paragraph 2D using Classification of Defect Code 235.5.05 and show the appropriate defect below in the "Description" column on the Signal and Train Control inspection report Form 6180.5.

– Automatic train control does not operate to initiate an automatic brake application within 27 seconds after the locomotive, at speeds above 20 mph, enters or is within a block occupied by a train, locomotive or car.

– Automatic train control system does not operate to initiate an automatic brake application within 27 seconds after the locomotive, at speeds above 20 mph, enters or is within a block in which the points of a switch are not closed in proper position.

– Automatic train control system does not operate to initiate an automatic brake application within 27 seconds after the locomotive, at speeds above 20 mph, enters or is within a block in which an independently operated fouling-point derail equipped with switch circuit controller is not in derailing position.

– Automatic train control system does not operate to initiate an automatic brake application within 27 seconds after the locomotive, at speeds above 20 mph, enters or is within a block in which a track relay is in deenergized position or device which functions as a track relay is in its most restrictive state. (Where there is more than one track circuit in the block.)

E. "The BPS system shall operate to initiate an automatic brake application when speed of the train exceeds the rate permitted by the braking profile curve;"

Cite conditions that do not comply with paragraph 2E using Classification of Defect Code 501.05.

F. "The BPS system shall operate to initiate an automatic brake application if the system is de-activated while the speed of the locomotive exceeds 20 mph;"

Cite conditions that do not comply with paragraph 2F using Classification of Defect Code 235.5.05 followed by the defect code below in the "Description" column on the Signal and Train Control Form 6180.5.

- Automatic train control system does not operate to initiate an automatic brake application when the system is de-activated while speed of the locomotive exceeds 20 mph.

G. "The visual display of the status of BPS is plainly visible to members of the locomotive crew from their stations in the cab;"

Cite conditions that do not comply with paragraph 2G using Classification of Defect Code 235.5-05 followed by the defect code below in the "Description" column on the Signal and Train Control inspection Form 6180.5.

- Automatic train control display not plainly visible to member of locomotive crew from his/her station in the cab.

H. "Indicators clearly visible from track side on both sides of each equipped locomotive are illuminated when BPS is activated and operating properly, and extinguished at all other times;"

Cite conditions that do not comply with Paragraph 2H using Classification of Defect Code 235- 5.05 followed by the defect code below in the "Description" column on the Signal and Train Control inspection Form 6180-5.

- Indicator on side of locomotive not clearly visible from track side when ATC system is activated and functioning as intended.

- Indicator on side of locomotive not illuminated when ATC system is activated and functioning as intended.

- Indicator on side of locomotive not extinguished when ATC system is de-activated.

I. "The BPS system shall be connected to an operating event recorder which records each instance of activation and de-activation of the BPS so that the time and location of each activation and de-activation can be determined for at least 48 hours following that event;"

Cite conditions that do not comply with paragraph 2I using Classification of Defect Code 235.5- 05 followed by the appropriate defect code below in the "Description" column on the Signal and Train Control inspection Form 6180.5.

- Automatic train control system not connected to an operating event recorder.
- Event recorder does not record when ATC system is de-activated.
- Event recorder does not record when ATC is activated.
- Time and location ATC system is activated or de-activated cannot be determined for at least 48 hours.

J. "Each profile braking curve program shall be identified by a unique identifying number that can be displayed on the BPS visual display for identification purposes;"

Cite conditions that do not comply with Paragraph 2J using Classification of Defect Code 235.5.05 followed by the appropriate defect code below in the "Description" column on the Signal and Train Control inspection Form 6180.5.

- Profile braking curve identifying number not displayed on ATC system display unit.
- Profile braking curve identifying number not currently in effect.
- More than one profile braking curve currently in effect.

K. "All components in the control circuits including, but not limited to programmable chips, are permanently installed by soldering;"

Cite conditions that do not comply with paragraph 2K using Classification of Defect Code 235.5.05 followed by the defect below in the "Description" column on the Signal and Train Control inspection Form 6180.5.

- Control circuit component not soldered in place.

L. "Installation is permanent on each controlling locomotive designated for operation on the NEC;"

Cite conditions that do not comply with paragraph 2L using Classification of Defect Code 235.5-05 followed by the defect below in the "Description" column on the Signal and Train Control inspection Form 6180.5.

- Automatic train control system not permanently installed on locomotive.

M. "Conrail and Amtrak issue operating rules governing operations of locomotives equipped with the BPS system that are in compliance with Part 236 and specifically address the situation in which the speed control system fails or is cut out en route;" and

Cite conditions that do not comply with paragraph 2M using Classification of Defect Codes 567.01, 567.02, 567.03, 567.04, 567.05, and 567.06.

N. "No train having a controlling locomotive with a failed or cut-out BPS system is permitted to depart its last terminal before entering the NEC."

Cite conditions that do not comply with paragraph 2N using Classification of Defect Code 566.02.

3. "Nothing contained herein, or in the Final Orders issued November 16, 1987, permits operation of non-ATC-equipped controlling locomotives after dates specified in the Final Orders. Carriers desiring to operate non-ATC equipped locomotives in switching, transfer or work train service must petition FRA for relief on a case-by-case basis through the waiver process as provided in 49 CFR Part 235."

Cite conditions that do not comply with paragraph 3 using Classification of Defect Code 566.01.

Subpart F – Dragging Equipment and Slide Detectors and Other Similar Protective Devices - Standards

§ 236.601 Signals controlled by devices; location.

This rule requires that signals controlled by devices to protect against unusual contingencies, such as landslides, dragging equipment, washouts, etc., shall be located so that stopping distance will be provided between the signal and the point where it is necessary to stop the train.

Application:

This rule is applicable to all signals or systems governing the movement of trains into one or more blocks that are not covered in Subparts B, C, D, and E of Part 236.

Subpart A of Part 236 shall be the section used when citing defective conditions of devices or systems covered by this rule.

Such protective devices are installed as safety features and shall not be removed without approval of FRA unless the condition that warranted their installation ceases to exist. If for some reason the signals or devices are removed from service for a temporary period the carrier shall take appropriate measures to protect safety of train operation.

CLASSIFICATION OF DEFECTS

236 0601 01 Signal controlled by device used to provide protection against unusual contingencies, such as landslides, dragging equipment, burned bridges or trestles, and washouts not located so that stopping distance is provided between the signal and the point where it is necessary to stop the train.

[Form FRA 6180.47](#) (Signal Systems Annual Report)

[Form FRA 6180.14](#) (False Proceed Signal Report)