THE PENNSYLVANIA RAILROAD

INSTRUCTIONS
FOR MAKING TESTS OF
SIGNAL APPARATUS

C. E. 227
NOTE: Immediately upon receipt of these Instructions, acknowledgment must be made by filling in and sending this blank to your Supervisor Communications & Signals.

Date_________________________________________

To: __________________________________________

Supervisor Communications & Signals

Received copy of current Instructions for Making Tests of Signal Apparatus, C.E. 227-(D).

Name _______________________________________

Title _________________________________________

Location _____________________________________
# THE PENNSYLVANIA RAILROAD

**INSTRUCTIONS FOR MAKING TESTS OF SIGNAL APPARATUS**

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INSTRUCTIONS FOR MAKING TESTS OF SIGNAL APPARATUS

GENERAL—

The normal functioning of any device shall not be interfered with in testing or otherwise without first taking measures for insuring safety of train operation which depends on normal functioning of such device.

When making electrical tests of switch and signal circuits, the proper meters must be used and no unsafe conditions must be set up by the application of such testing apparatus.

When switch, signal, or other circuits are used for temporary telephones, it must be determined that such use will not affect the circuits.

Tests of signaling and interlocking devices must be made periodically as specified and more frequently or with more stringent requirements when conditions warrant.

Additional tests, when required, must be made in accordance with instructions issued in connection therewith.

TEST 1—INTERLOCKING MACHINES

At Least Once Every Four Years, a complete test shall be made by Foreman, Inspector or Maintainer.*

A. Mechanical Locking:

1. Test is to determine that mechanical locking is in accordance with the drawings and specifications, and in such condition as to insure proper functioning.

2. Mechanical locking in interlocking machine shall be tested when new locking is placed in service or change in locking is made.

3. Inspect locking bed, supports and connections, driving pieces, dogs, stops, trunnions, etc., to see that they are properly secured. Splices in longitudinal locking bars must be straight, with bolts, nuts and cotter pins in place.

4. Test each swing dog to determine that it releases properly.

5. Locking and connections shall be maintained so that, when a lever or latch is mechanically locked the following will be prevented:

   (a) MECHANICAL MACHINE,

      1. Latch-operated locking. Raising lever latch block so that bottom thereof is within 3/8 inch of top of quadrant.

      2. Lever-operated locking. Moving lever latch block more than 7/16 inch on top of quadrant.

   **"MAINTAINER**—Employees classified in accordance with Article 5, Section 4, of the T.&S. Agreement. Employees not so classified regularly may, when qualified, be assigned to make test specified.

   (b) ELECTRO-MECHANICAL MACHINE.

      1. Lever moving in horizontal plane. Moving lever more than 3/16 inch when in normal position or more than 7/16 inch when in reverse position.

* Downloaded from http://PRR.Railfan.net - Collection of Rob Schoenberg - ©2019 - Commercial reproduction or distribution prohibited
2. Lever moving in arc. Moving lever more than 5 degrees.

(c) POWER MACHINE.

1. Latch-operated locking. Raising lever latch block so that bottom thereof is within 7/32 inch of top of quadrant.

2. Lever moving in horizontal plane. Moving lever more than 5/16 inch when in normal position, or more than 9/16 inch when in reverse position.

3. Lever moving in arc. Moving lever more than 5 degrees.

Note: The above requirements are for interlocking machines in service. For new machines there should be practically no lost motion in locking or connections.

6. Test mechanical levers of electro-mechanical machines to insure they cannot be operated except when released by electric levers.

7. Test latch shoes, rocker links, and quadrants of Saxby and Farmer machines to determine that locking will not release if a downward force not exceeding a man's weight is exerted on the rocker while the lever is in the mid-stroke position.

8. Compare locking with dog chart to insure they agree.

9. Using signal layout drawing and with locking bracket caps securely fastened in place—Test locking:

(a) Between switch, derail and M.P. frog levers.

(b) Between facing point lock and switch, derail and M.P. frog levers.

(c) For each route, endeavor to release latch or operate each signal lever which should be locked by the route, then raise latch on signal lever or reverse signal lever governing the route, and endeavor to release latch or operate each lever which should be locked by the signal lever; then restore latch or lever to normal position, and make similar test with levers or latches for opposing signals. Test similarly for route and traffic levers.

(d) For each route, endeavor to release or operate the lever for each signal that governs over route with trailing switch at a time when in the wrong position and locked.

(e) Where facing point locks are used, set up each route, and endeavor to release or operate the lever for each signal that governs over the route, with one switch at a time unlocked, and all levers in their proper positions.

(f) Set up parallel routes and operate signal levers for movements in both directions on each route, to determine that locking dogs do not interfere with the parallel routes.

B. Other Mechanical Parts:

1. Check segments, quadrants, latches, magnets, etc. for wear and adjustment.
At Least Once Every Two Years by Maintainer*

C. Quick Switch:

1. Test as follows to insure proper operation of quick switch:

   (a) Operate lever from normal against reverse indication tooth and from reverse against normal indication tooth. Quick switch should not operate.

   (b) Operate lever against 3/16 inch gauges placed against the normal and reverse shoulders of the lever quadrant. Quick switch should operate to full normal or reverse positions.

   (c) Manually place each quick switch in center position and operate lever between indicating positions. Quick switch should shift to normal or reverse position.

   (d) Failure of the quick switch to operate under either of the above tests may be due to dirty or worn parts, improper lubrication, weak toggle springs, lever not properly centered with relation to roller, contact springs too tight on quick switch, or quick switch resting on top of supporting brackets on frame of machine.

D. Contact Springs:

1. Contact springs must have sharp (V shape) bend at contact point, and main stem of springs must be straight. Springs must be secured to the insulating bed plates by bolts that pass through the bed plates with not more than two wires connected to the same terminal post.

2. Contact and roller surfaces must be clean and dry, and free from lint.

3. Contact part of springs must meet contact bands evenly and squarely, and circuits must open or close at the proper point of lever movement.

4. Check levers having 60 degree roller travel, to see that normal and reverse switch control bands, and NX and RY bands are on enlarged roller sections.

5. Check adjustment of each segment with lever position as determined by the quadrant so that, with lever at the indication or locking point on the quadrant, the locking on segment will clear the latch between .008 and .010 inch.

6. Check proper relation between segments and switch control band by holding up the reverse indication magnet and throwing lever so that the reverse safety tooth binds against and holds up the latch. With any lost motion taken out by turning the roller by hand toward full reverse position as far as possible, the reverse control band must be open not less than one-thirty-second inch, and normal control band will be open slightly more. Repeat this test for operation toward normal side, checking adjustments in same manner.
7. Where Model 14 switch and lock movement type valves are in service, check to see that BD band, for control of lock magnet, remains open when the lever is moved from either the normal or reverse position against detector tooth lock.

8. Where a back contact of switch repeating relay is used for energizing the lock magnet of "C" or "CP" valve, check to see that "NX" and "RY" bands controlling this relay remain closed when the lever is against the detector tooth lock.

E. Adjustment of Model 12 or Similar Electric Locks on Mechanical Machines.

Check cut and adjustment of segments as follows:

(a) Where latch is locked down as in detector or similar locking, locking dog must be free to drop to locked position with a one-quarter inch obstruction under bottom of latch rod, and latch cannot be raised more than \( \frac{3}{8} \) inch when in locked position.

(b) Where latch is locked up, as in signal indication or similar locking, latch must be held up by electric lock not less than \( \frac{5}{8} \) inch from normal position, and locking dog must not bind on locking segment with latch raised and lever normal.

TEST 2—INSULATION RESISTANCE

Test is to insure that the insulation of wires and connected apparatus meets the resistance values shown below.

Tests shall be made in accordance with recognized megger practice. Record of wire insulation resistance shall be recorded on C.E. 218.

Provisions of C.E. 223 covering the use of jumpers, and safeguarding of train movements, and other safety precautions, must be observed.

Tests shall be made when wires, cables, and insulation are dry. Wires and cables, except wires connected directly to track rails shall be tested as indicated below. Conductors shall be promptly repaired or renewed when insulation resistance is below the values indicated.

A. Low Voltage (660 volts or less) Wires and Cables; Minimum Allowable Resistance—1 Megohm:

At Least Once Every Five Years by Maintainer*

1. Braided rubber insulated wires and cables (except Kerite underground cable) including those with metal tape but no lead sheath (any part of which is underground or in trunking).

At Least Once Every Eight Years by Maintainer*

2. Braided rubber insulated aerial wires and cables (no part of which is underground or in trunking).

3. Lead sheath cables, Parkway cables with lead sheath, Kerite underground cable, cables in underground conduit and submarine cables.
4. Local Signal Wiring.

NOTE: Tests must not be made on control circuits except when completely disconnected from battery and common.

Where circuit to be tested embraces types of wires or cables of more than one class under A1, A2 and A3, of this test, and it is more convenient, the entire circuit may be tested in accordance with the class due for test most frequently.

B. Lead Covered Signal Power Cables, Aerial and Underground:

At Least Once Every Eight Years by Maintainer*

1. Aerial: (No part of which is underground).
   Reading should be not less than 100 megohms between sectionalizing switches.
   (The insulation resistance of cables exposed to extreme summer heat will be somewhat below the values shown for the same cable at lower temperatures.)

2. Underground:
   Reading should be not less than 1000 megohms between sectionalizing switches.

C. Underground Signal Power Lines Not Lead Sheathed:

At Least Once Every Five Years by Maintainer*

1. Readings between sectionalizing switches should be not less than 1000 megohms for voltage exceeding 660.

2. Reading for section tested should be not less than 40 megohms for voltages up to and including 660 volts.

NOTE: Tests under B and C include secondary distribution wiring.

TEST 3—ELECTROLYSIS, LEAD-COVERED CABLES

At Least Every Three Years by Maintainer*

(Unless Experience Indicates More Frequent Tests Required)

Test is to determine whether deterioration of lead covered cables is occurring through effect of electrolysis corrosion by the presence of currents passing from any point on the cable system to ground.

The most effective means of determining whether stray current is passing from a particular cable sheath to ground is to determine the direction of any potential difference that may exist between the sheath and small isolated piece of the same material in contact with damp earth in bottom of manhole. Where the sheath is found to be positive to this testing electrode, it is generally to be assumed that current is flowing from sheath to ground, since the only condition under which current flow would not occur would be one where the cable sheath was effectively insulated from the earth, and such cases are rare. Observations of potential difference to near-
by rails, pipes and other sub-surface metallic structures and observance of fall of potential along the sections of the cable sheath, should also be made in connection with the measurement of potential difference to earth and will serve to throw light upon what the stray current is doing. When measurements of this character have been made at all parts of the cable system and show that no current is flowing from the cable sheath to ground, except through drainage wires and that no excessive amount of stray current is flowing from ground to the sheath, it may safely be concluded that the cable system is not undergoing an electrolytic corrosion. If contrary indications are found, it is necessary to conclude that electrolytic corrosion is taking place and to adopt measures which will serve to mitigate its effects.

Readings should be taken as follows:

(a) Difference of potential between points on the cable system and the adjacent earth.

(b) Difference of potential between the cable system and electric railway rails, other cable systems, piping systems, metal bridges, steam railway rails, etc. at points where these cross the cable system or come in close proximity to it.

(c) Measurements of current flowing in the cable sheath. Test to be made in accordance with A. A. R. Manual, Comm. Section, Protection Against Electrolysis, Section 3-1 adopted August, 1939. Report results of test on C.E. 211.

TEST 4—FOREIGN CURRENT—D.C. NON-CODED TRACK CIRCUITS

Where foreign current is prevalent—Test at least once a year by Maintainer*.

Test is to determine the presence of foreign current and insure proper corrective action to prevent interference with track circuits.

Where there is known to be a trolley line or other direct current exposure, test should be made during periods in which the outside current is at or near maximum value.

A. This test shall be made by placing a milli-ammeter in series with the relay then disconnecting the wires from the battery and taking a reading, it being noticed at the same time whether the current is sufficient to pick up the relay. Where it is found that the relay picks up, this circuit should be considered one which should be carefully watched and the results reported. If the relay does not pick up, a second test should be made in the same manner as the first, but by placing a connection around first one and then the other of the insulated joints at the battery end of the circuit, so that one of the rails of the circuit being tested will be connected to one side of the relay and the other rail in the circuit, plus one of the rails in the next circuit, will be connected to the other side of the relay, thus unbalancing the
circuit and making a severe test. If the relay picks up, this circuit should also be watched and reported. If any appreciable readings are obtained in either test, the following precautions shall be constantly observed.

1. Trolley and power companies requested to see that their bonding is as good as practicable.
2. Ballast kept clear from the rails.
3. Rail joints kept tight and insulated joints maintained in good condition.
4. Rail bonding carefully maintained.

**B. Foreign current test need not be made where foreign current protection is provided; where coded current is used for wayside signal control; where there is no apparent source of foreign current such as trolley lines, etc., or where for a 3 year period indicate no evidence of foreign current where it had previously existed, but where the source is still in existence, tests shall be continued at 3-year intervals to detect recurrence of foreign current.**

**NOTE**: Under certain conditions there is a storage battery effect between rails and ballast, that may have a current value sufficient to hold the relay closed several minutes after the battery feed wires have been disconnected. If such condition is observed, either short circuit the rails temporarily or wait a sufficient time for the amperage to drop before deciding that foreign current exists.

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**TEST 5—RELAYS AND OTHER ELECTROMAGNETIC APPARATUS**

*At Least Once Every Two Years by Maintainer*

Test is to insure that operating characteristics of electromagnetic apparatus shall be maintained in accordance with the limits within which such apparatus is designed to operate.

A. **Field tests on A.C. and D.C. relays shall be made in accordance with C.S.E. 22 and C.E. 221, respectively.**

B. **Field tests on magnets (Exclusive of forced drop type of electric locks), slots, traffic-control system and coded carrier control equipment, etc., shall be made by observing, insofar as possible, the instructions in C.E. 221, C.S.E. 22 and L.G.P. 245.**

C. For apparatus not covered by P.R.R. instructions, instructions furnished by the manufacturer should be followed.

**NOTE**: Apparatus which fails to meet the requirements of the specified test, shall be removed from service and not restored to service until its operating characteristics are in accordance with the limits within which such relay or electromagnetic device is designed to operate.

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**TEST 6—RESISTANCE OF MADE GROUNDS**

Test is to insure that grounds are maintained at sufficiently low resistance, so that protection may function as intended.
Resistance of grounds shall not exceed 15 ohms. Where a resistance of 15 ohms or less seems impracticable, it should be reported promptly to the Supervisor Communications and Signals.

Tests shall be made in accordance with plan S-817, and recorded on C.E. 250.

When ground resistance is found to be above limits specified, corrective action must be taken. In testing protector grounds on power lines, test apparatus shall be connected at the ground rod, and careful visual inspection shall be made of the ground wires. In test of other protector grounds, connections shall be made at the arrester, for the purpose of checking the wire and connection, in addition to the actual ground.

At Least Once Every Six Years by Maintainer*

A. When grounded to steel catenary structures, and other ground connections—unless experience indicates more frequent test in certain locations are necessary.

TEST 7—LIGHTNING ARRESTERS—GAS OR VACUUM TYPE

At Least Once a Year by Maintainer*

Test is to insure that arresters are in condition to provide the desired protection, and shall be conducted in accordance with instructions furnished with the test set, or instructions furnished by manufacturer of arrester under test.

TEST 8—SIGNAL INDICATION LOCK CIRCUITS

Test is to insure that levers of power and electro-mechanical machines and the latches of mechanical levers cannot be placed in normal position until the corresponding control relays for position and color light signals are open (or properly poled) and the corresponding arms of semaphore signals are within 5 degrees of their normal positions; also, that the repeating indicator or light where used to indicate the position of a non-interlocked signal corresponds to the position of the signal.

At Least Once Every Two Years by Foreman or Inspector

A. Light Signals: Place signal lever at indicating position. Disconnect lock circuit wire at each relay contact in the circuit, on the side of the contact from which battery is feeding, and signal lever should not indicate to normal position.

At Least Once a Year by Foreman or Inspector

B. Semaphore Signals: Place signal lever at indicating position. Move each signal arm approximately 15 degrees from its normal position and slowly return it to within approximately 5 degrees of normal position. Signal lever should not indicate to normal position.

Make careful visual inspection of each contact involved to see that it opens and closes as called for on plan, and is clean and free of any possible fouling.
NOTE: Repeating indicators or lights for non-interlocked signals should be checked and observed in accordance with the above.

In traffic-control system or relay type interlocking, proceed as above, except that lever is restored to normal position, checking the stick locking relays (KM or ASR—as applies) in lieu of the indication locks.

TEST 9—APPROACH LOCKING

Test, when lock is on signal lever, is to insure that the signal lever or latch cannot be restored to the normal position with proper route set and the approach circuit open; when combined with switch lever locking, to insure that the switch or lock lever cannot be moved from normal or reverse position after signal lever has been reversed and restored to normal with the approach circuit open.

At Least Once a Year by Foreman or Inspector

A. Locking on Signal Levers:

1. Check that approach relay is open when each track circuit involved is shunted and open or close any multiple circuits or other contacts involved separately, to insure approach relay functions as required.

2. With approach circuit closed (multiple circuits must be open) restore lever or latch to normal position; lever or latch should not be locked.

3. With approach circuit open (multiple circuits must be open) attempt to restore lever or latch to normal position; lever or latch should be locked.

4. Repeat, closing each multiple circuit separately; lever or latch should not be locked.

5. For traffic-control system or relay type interlocking, proceed as above, except checking stick locking relay (KM or ASR—as applies) in lieu of indication lock.

B. Locking on Switch Levers:

1. Proceed as in A, test lever or latch, of switches or locks in normal and reverse positions, as required.

2. Check operation of stick relay to determine that locks do not release unless signal lever is in normal position when release is started, or if signal lever is moved from the normal position at any subsequent time.

TEST 10—TIME LOCKING

Test, when lock is on signal lever, is to insure that signal lever or latch cannot be restored to normal position until the specified time interval has elapsed; when combined with switch lever locking, to insure that the switch or lock lever
or latch cannot be moved from the normal or reversed positions, after signal lever has been reversed and restored to normal, until specified time interval has elapsed. Test to be made as follows:

**At Least Once a Year by Foreman or Inspector**

A. Locking on signal lever or latch:

1. With lever or latch at indicating point, operate time release making sure multiple circuits are open, and attempt to restore lever or latch to normal position while time release is operating. Lever or latch should be locked until predetermined time interval has elapsed. Starting of latch type release must open signal control circuit.

2. With lever or latch at indicating point, and time release in normal position, close each multiple circuit separately and restore lever or latch to normal position; lever or latch should not be locked.

B. Locking on switch lever:

1. Proceeding as above, test lever or latch, of switches or locks, in normal and reverse positions, as required.

2. Check operation of stick locking relay (KM or ASR—as applies) to determine that locks are locked unless signal lever is in normal position when release is started, or if signal lever is moved from the normal position at any subsequent time.

**TEST 11—TIME RELEASES AND TIMING RELAYS**

**At Least Once Every Three Months by Maintainer**

Test is to insure that specified time interval has elapsed. The timing of the time releases and timing relays shall be not less than the predetermined time interval, which is shown on the drawings and marked on or near the time releases or timing relays.

Start time release or relay and check time until lever locking is released, or stick locking relay (KM or ASR—as applies) of all relay or traffic control system, is energized.

**TEST 12—SWITCHES**

**At Least Once a Year by Maintainer**

A. Switch Indication:

The purpose of this test is to insure that controlling lever cannot be latched in either normal or reverse position unless switch or switches and control valves, controllers or relays have properly operated to the corresponding position.

1. Power Switches:

   (a) With each switch point obstructed successively by one-half inch obstruction, operate
switch lever and test normal and reverse indication; switch should not indicate.

Locations with 45' switch points and midpoint circuit controller, with each switch point obstructed successively by three quarter inch obstruction at the midpoint, between point and stockrail opposite connection of circuit controller rod, operate switch lever, test normal and reverse indication, switch should not indicate.

Also test with valve stem removed from lock magnet of E.P. switch, or with motor circuit of electric switch open, to prevent operation of switch movement; switch should not indicate.

(b) 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 or normal position. Restore plug and open globe valve, reverse switch, and repeat test. This test may also be made by blocking slide bar of switch movement and operating the lever.

(c) Where Type "F" controllers, or relays, are used. With switch lever normal, open motor circuit. Move lever to reverse indicating point, remove fuse in controller or disconnect control for relay, then operate lever to normal indicating point; indication should not be received. Restore fuse or relay control, indication should be received. Repeat test, starting from reverse position.

NOTE: When making above tests for traffic-control system, relay type machine, or at "Pitt" tower, observe switch indication lights in lieu of checking indication with lever.

2. Mechanical Switches:
   (a) With each switch point obstructed successively by three-eights of an inch obstruction and switch operating lever latched, F.P.L. lever should be electrically locked in the normal position.

3. Electro-Mechanical Switches:
   (a) With switch normal and locking lever at the indicating point, open normal indication circuit at each indication box; locking lever should not indicate. Repeat with switch reversed.

At Least Once Every Three Months by Maintainer

B. Restoring Feature:

1. E. P. Switches:
   (a) Using a bar, move slide bar of switch movement toward opposite position to determine that air restores slide bar before SS contacts open.
(b) Check contact operation either by voltmeter or observing switch repeating (SS) relay. Where "C" or "CP" valves are in service with Model 14 movements, restoring should be effective when the indication contacts open.

2. Electric Switches:
   (a) Remove fuse or open motor circuit, crank switch movement toward opposite position to determine that motor circuit contacts close before indication contacts open. Replace fuse or close motor circuit and switch movement should restore to original position.

C. Valve locks and valve magnets:
1. 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.
2. Test each set of cut-off valves, with switch in normal position, by holding lock and reverse armatures 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.

TEST 13—CROSS PROTECTION ELECTRIC INTERLOCKING MACHINES (G.R.S. AND FEDERAL TYPES)

At Least Once Every Three Months by Maintainer

The purpose of this test is to insure that protection devices work properly to prevent movement of switches, signals, etc., when current is improperly applied to the circuits.

Test 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.

TEST 14—C.E. 40—SWITCH OBSTRUCTION

Test is to insure proper maintenance and adjustment of switches.
Test shall be made in accordance with instructions on back of C.E. 40.

At Least Once Every Month by Maintainer and Track Foreman

A. Obstruction Test:
   1. Interlocked Switches.
   2. Hand-operated Switches,
      (a) Spring Switches
      (b) Facing Point
      (c) Locked with Electric Lock

To insert obstruction between switch point and stock rail of mechanical interlocked switches with F. P. L., pry switch point open while lock lever is normal with its latch held up. After obstruction has been inserted, attempt to lock switch.

Repeat for each position of each switch.

At Least Once Every Three Months by Maintainer and Track Foreman

B. Obstruction Test:
   1. Hand-operated Switches not included in A. 2 above.

TEST 15—MOVABLE BRIDGES

The purpose of this test is to insure proper maintenance and adjustment of movable bridge apparatus, to provide protection in accordance with approved plans.

At Least Once Every Three Months by Maintainer

A. Mechanical Rail Locks:
   1. Center pivot type bridge. Test each lift rail with the mitre end one-fourth inch higher than the fixed mitre rail. Rail lock should foul.

B. Operation of Circuit Controllers, Electric Locks, Mechanical Plunger Locks, Ground Lever Locking:
   1. 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.
   2. Inspect mechanical wedge locks and controllers.
   3. Check bolt locks and electric locks to insure that levers are not released for operation until all functions involved are in proper position.

At Least Once a Year by Maintainer and Foreman or Inspector

C. Adjustment of Locks, Locking, and Circuit Controllers:
   1. In addition to A. and B. of this test, check adjustment of each mechanical wedge lock, plunger shall fail if wedge is not within one inch of full driven position. Check locking between mechanical ground levers. Check adjustment of all circuit controllers in accordance with the following schedule:
| Surfacing Wedges or Bridge Locks | Driven | 1 in. full stroke |
| Lift Rails or Rail Lift Beams | Raised | Lift rail clear fixed rail 2 in. |
| | Lowered | Top of lift rail $\frac{3}{4}$ in. higher than top of fixed rail |
| Rail Locks (Plan S-371) | Locked | Locking block 1 in. beyond far side of tongue. |
| | Unlocked | Locking block 1 in. clear of tongue. |
| Rail Locks (Plan S-372 and S-375) | Locked | Through rail seat casting at least full thickness. |
| | Unlocked | Clear rail seat casting 1 in. |
| Latches | Raised | 1 in. full stroke |
| | Dropped | 1 in. from seat |
| Bridge Couplers | Driven | 1 in. full stroke |
| | Withdrawn | 1 in. full stroke |
| Trolley Contact Blades | Open | $\frac{3}{4}$ in. full stroke |
| | Closed | $\frac{3}{4}$ in. full stroke |
| Dead Weight Rollers | Each position | As near end of stroke as possible |
| | | Weight of bridge must be off rollers before contacts make |
| Bridge Seating Controllers | Closed | When bridge is $\frac{3}{4}$ in. from bridge seat |

**TEST 16—SWITCH LEVER LOCKING**

The following test is to determine that route or other switch locking circuits are functioning properly and that switch lever operation is prevented while a train occupies any portion of the protecting track circuits.

**At Least Once Every Three Months by Maintainer**

**A. Switch Detector Locking:**

1. With track circuit unoccupied, and no train approaching the route to be tested, open the lock circuit (not at the lever latch) and move switch lever sharply, closely observing action of locking parts, locking tooth on segment should engage latch. Test for each lever position for which the locking is effective. Check correlation between detector lock and detector indication lights.
2. In traffic control system or relay type interlocking, test each switch in each route with stick locking relay (KM or ASR—as applies) for the signal governing that route, open.

Also determine, for each switch, if switch can be operated with track relay of each protecting track circuit open, and stick locking relay for signal governing over switch, energized.

B. Route Locking & Sectional Route Release:

1. For all routes, in each direction, test routes to insure that detector lock on switch is effected at proper time; that detector lock remains effective for proper duration and that release is at designed location.

A tabulation of observations of switch detector indication lights as correlated with train movements may be employed for this test, using test as in C-1 below for those routes for which no train movements are made. In all tests, restore appropriate signal lever for route involved, to normal position as soon as first track circuit of route is shunted.

To be made as required by Foreman or Inspector

C. On new installations or at time subsequent changes to existing installations are made, test should be made as A above and in addition, test as outlined below:—

1. Have route lined up and signal displayed; with first track circuit in route shunted, restore signal lever to normal position and move latch of each switch lever in the route sufficiently to close latch contact, or step on floor push of each F.P.L. Note that each lever lock is, and remains deenergized, being sure not to move lever if lock should pick up. Have each track circuit in the route shunted successively (establish a shunt on successive track circuit before releasing shunt on a preceding circuit) and observe results, including section route release in each direction if applicable. Test all routes.

***NOTE: Where track relay repeater has delayed pick up to protect against loss of shunt, care should be exercised when making progressive shunts, to insure that locking is not effective by track relay repeaters other than those being tested, as applies, to tests above.***

**TEST 17—TRAFFIC AND CHECK LOCKING**

*At Least Once a Year by Maintainer*

The following test is to determine that levers for changing the direction of traffic, or opposing signals, cannot be manipulated while the section of track involved is occupied or signal is displayed for movement to proceed into that section.
A. Traffic Locking:
1. Test traffic levers as specified under Test 16 insofar as the instructions apply.
2. In traffic control territory, determine if direction of traffic can be changed while track circuits are separately shunted or occupied, and that opposing signals cannot be displayed.
3. Make test with traffic in each direction.

B. Check Locking:
1. Where check locking is provided on a certain track, the test is to insure that, when the check locking is operated to prevent the display of a proceed signal to that track, the signal cannot be displayed.
   Set up separately each route to the track being tested, with check locking device for the track leaving the interlocking operated in the direction opposite to direction of signal being tested. See that proceed signal cannot be displayed.

TEST 18—SIGNAL MECHANISMS, POWER OPERATED SEMAPHORE SIGNALS

Inspection and test is to insure that power operated semaphore signals are functioning as intended, and are free from friction or other interference which might prevent returning to most restrictive aspect.

A. Inspect At Least Once Every Six Months—by Maintainer or Maintainer*

Test at Least Once Every Two Years by Maintainer or Maintainer*

B. Friction Torque:
   Test must be made in accordance with C.S.E. 31 or manufacturer's instructions.

TEST 19—GROUND DETECTOR READINGS

Test is to detect any leakage between switch or signal circuits and earth, or interlocking machine frame.

Observe ground detector meter, checking different sets of batteries with dial switch where provided, making observations as far as practicable, while apparatus is being operated. Record readings on Form C.E. 204.

At Least Once Each Work Day by Maintainer

A. Interlockings and movable bridges, except locations under B.

At Least Once a Week by Maintainer

B. Remote and Automatic Interlockings.

TEST 20—FOULING CIRCUITS ON SWITCHES

Inspect and Test at Least Once Every Three Months by Maintainer.

Inspection and test is to insure that fouling wires provide good electrical connection between main rails of a track cir-
cuit and sections of rail blocked off by insulating joints in turnouts, crossovers, etc.

Make thorough inspection of all parts of fouling wires on interlocked and hand-operated turnouts and crossovers which are open to such inspection.

Test by connecting voltmeter across main track rails and apply shunt to turnout or crossover rails, checking meter.

TEST 21—SWITCH CIRCUIT CONTROLLERS

Inspect and Test at Least Once Every Three Months by Maintainer.

Inspection and test is to insure that switch circuit controllers are in good condition and proper adjustment.

Circuit controllers operated by switch and lock movement (Style T10, T20, S20, A1, A5, M, M2, M3, G, etc.) shall be maintained so that normally open contacts will remain closed and normally closed contacts will remain open until the switch is locked.

Switch circuit controllers, facing point locks and switch-and-lock movements and their connections shall be securely fastened in place and contacts maintained with an opening of not less than 1/16 inch when open.

When making inspections and tests shown below, connect voltmeter across binding posts of circuit controller. On normally open contacts, with all other contacts in the circuit closed, it should read circuit voltage and change to zero when controller functions. On normally closed contacts, zero reading should change to circuit voltage when controller functions.

A. Hand-operated switches, equipped with circuit controllers connected to the point shall be so adjusted that the control circuits will be opened or shunted, or both, or track will be shunted when point is open, as follows:

(1) ¼ inch or more on facing point switch, with or without F.P. lock.

(2) ⅜ inch or more on trailing point switch, with or without F.P. lock.

B. Switch circuit controller connected to the point of interlocked switch, derail, or movable-point frog, shall be adjusted so that its contacts will not be in position corresponding to switch point closure when switch point is open ¼ inch or more.

C. Point detector circuit controller should be adjusted so that the contacts will not assume the position corresponding to switch point closure if the switch point is prevented by an obstruction from closing to within ¼ inch where latch is not used, and to within ⅜ inch where latch is used. Test of adjustments of point detectors on Type S20, T20, M2, M3, M22, A1 and A5 movements should be made with gages in accordance with Manufacturer's Instruction Pamphlet U-5453.

D. Circuit controllers connected at mid-point of 45 ft. switch points should function (proper indication con-
tacts closed) with obstruction of 1/2 inch, with a maximum tolerance of 1/8 inch over, between point and stock rail at or opposite connection of circuit controller rod.

TEST 22—VOLTMETER TESTS FOR GROUNDS WHERE APPARATUS HAS BEEN BURNED OUT BY LIGHTNING

Test to be made when replacing apparatus by Maintainer.

The purpose of this test is to detect any grounds which may have developed and prevent subsequent signal failures.

When apparatus has been burned out by lightning, voltmeter readings shall be taken on all associated wiring and apparatus to determine if ground exist.

TEST 23—TRIP ARMS, AUTOMATIC TRAIN STOP, MECHANICAL TRIP TYPE

Test is to insure that trip arms are located and function as shown under A and B.

At Least Once Every Month by Maintainer

A. 1. Trip arm of automatic train stop device of the flexible mechanical type (Hill's), when in stop position, shall be maintained at 3 7/8 inches above the plane of the top of rail, and at a horizontal distance from the center line of trip arm to the gauge side of running rail of 12 1/2 inches.

2. Trip arm of automatic train stop device of the rigid mechanical type, when in stop position, shall be maintained at 2 1/4 inches above the plane of the top of rail, and a horizontal distance from the center line of trip arm to the gauge side of running rail of 7 3/4 inches.

At Least Once Every Six Months by Foreman or Inspector

B. The controlling circuits and apparatus shall function properly and the operating mechanisms shall be maintained in accordance with the Manufacturer's instructions.

TEST 24—INTERLOCKINGS, AUTOMATIC SIGNALS, AND HIGHWAY CROSSING SIGNALS

To be made as required by Foreman or Inspector.

A. New installations must be given a detail check promptly upon installation as indicated below in B. and plans so marked; all subsequent changes must be checked and plans so marked promptly upon completion.

B. Detail check of layout, locking and circuits:

1. Layout Plan: Check conditions on the ground for agreement with plan as to track arrangement; number, location and frog angle of crossovers and turnouts; location, type, aspects and
routing of signals; location of tower and other structures which affect signalling.

2. Inspect physical conditions of tracks and switches, signals, signal bridges, foundations, pipe lines, machine, tower and any other buildings involved. Check tower and other buildings for fire hazard.

3. Locking and Dog Sheets: Check in accordance with Test No. 1.

4. Circuit Plans: Check should be made as to condition and location of insulated joints, fouling wires, battery, transformer, and relay connections, wires and cables, switch circuit controllers and rods, transformers, relay locations, switch movements, electric switch locks, and other apparatus on or about the tracks.

5. Check should be made of each relay location, including tower case, to see that it contains all the apparatus called for on plans and that there is no excess apparatus or foreign material, that apparatus is of proper type and has proper inspection dates, and that power and battery supplies are provided, and fused and designated according to plan.

6. Check should be made of groundmeter readings and volt and ampere readings as may be necessary.

7. Check should be made of the number in use, kind, condition and adjustment of contacts in relays, electric locks, circuit controllers, releases, and similar devices, and tagging and wire numbering of wires to controls and contacts.

8. Check should be made of interlocking machine spring combination condition and adjustment, type of quadrants, type and adjustment of segments, and cutting and adjustments of segments in electric locks.

9. Test should be made of all circuits to insure that the opening of each contact in a control circuit cuts off the control current under conditions shown on plan, following through all multiple circuits and cut arounds. When a circuit is broken over a relay twice, or when it is broken over some other contact that will be opened by opening the relay the wires in the circuit must be disconnected for test in addition to the opening of the relay.

10. Where conditions are found that are not in accordance with approved plans, these shall be corrected at once or steps taken for a revision of the plans to agree with the work.

11. When making this check and test, if conditions are observed in which the approved plans do not seem to provide proper protection or flexibility of operation, such conditions shall be
reported to the Supervisor Communications and Signals.

TEST 25—TRACK CIRCUITS

Test at Least Once Every Two Years by Maintainer or Maintainer*

A. Voltage at Relay:

Test is to insure that track relays are not over energized in accordance with instructions in C.E. 232.

Read track circuit voltage at relay terminals, record on proper forms, and arrange for prompt correction where voltage is high.

To be made as required by Maintainer or Maintainer*

New installations must be given a detail check promptly upon installation as indicated in A above, and below in B; all subsequent changes of tracks, wires, relays, batteries or transformers must also be checked.

B. Polarity:

Test is to insure that the polarities of adjoining track circuits are in accordance with approved plan or specification, and so arranged that least favorable signal indication will result from broken down insulated joints.

D.C. track circuits shall be tested by voltmeter which will show the actual polarity of the circuit.

A.C. track circuits shall be tested by polarity meter which will show the relative polarity (like or staggered) of the two adjoining track circuits. (S-809, S-816)

A.C. coded track circuit polarity shall be tested by making broken-down insulated joint test. (C.E. 232)

Arrange for prompt correction where necessary.

NOTE: In electrified territory, where centrifugal relays are fed through resistor or reactor, or both, the polarity meter may not give definite indication. Under these conditions, disconnect feed end of circuit being tested or place a good shunt across the track circuit at least 500 feet from the relay end and, after the relay rotor has come to rest, bridge each insulated joint separately, observing relay. If rotor turns backward toward or against the stop, the polarity is satisfactory.

At Least Once a Year by Maintainer or Maintainer*

C. Shunting Sensitivity:

Test is to insure that track circuits are adjusted to shunt at the maximum value.

If the resistance is less than 0.06 ohms, corrective measures must be taken at once.

Test should be made at both relay and feed ends of the circuit.

The use of the plug-in type track circuit shunting resistance box is recommended.

(15 feet of No. 16 AWG copper wire has a resistance of 0.06 ohms and may be substituted for the resistance box.)
D. Cab signal axle current:

Test is to insure that track circuits are adjusted properly for cab signals in coded track circuit territory.

Adjustments should be made in accordance with C.E. 232.

*At Least Once Every Six Months by Maintainer or Maintainer*

E. Test and cut-in circuits:

1. Check test circuit for proper codes by manually operating test switch; where running test circuit is in service check that all codes are present and in proper sequence. Measure axle current to determine that it is as nearly two (2) amperes as practicable.

2. Check cut-in circuit for proper code, in accordance with drawing, and for proper axle current in accordance with C.E. 232.

TEST 26—PROTECTION OF TRACKS, USED IN LOADING OR UNLOADING FLAMMABLE LIQUIDS, ETC.

*At Least Once a Year by Maintainer*

This test is to determine if the protective apparatus installed is operative and in good condition.

Ascertain by observation and by making such tests as practicable that insulated rail joints, ground wires and other protective apparatus are intact and functioning as intended. (L.G.P. 140-( ))

TEST 27—AUTOMATIC AND MANUAL HIGHWAY GRADE CROSSING PROTECTION

This test is to determine that all equipment in connection with each installation is in good order and functioning as intended.

Inspect and test highway grade crossing signal apparatus in accordance with outline indicated below. All inspections and tests and any corrective action taken, must be recorded in C.E. 215.

A. At least once each month by Maintainer.

1. Check A.C. power supply, fuses, operation of power-off relay and power-off indication light.

2. Inspect main and track batteries for height of electrolyte, conditions of plates, connections and cleanliness. Record water consumption on battery record card. (To include other batteries, as applies)

3. Check charging rate of main and track storage batteries, simultaneously with power supply voltages. Record on battery record card.

4. Measure overall voltages of main and track batteries with protection inoperative and track circuits unoccupied. If low voltage is indicated,
measure voltage of individual cells to determine if any cell is below average voltage. Record voltage readings on battery record card and C. E. 215. (Designate cells 1, 2, 3, etc., from positive end of battery).

5. Measure total voltage of primary batteries after continuous load for 5 minutes, or after a shunt of \(\frac{1}{2}\) ohm has been applied for 5 minutes.

6. Check degree of exhaustion of main and track primary batteries.

7. Check operation of highway crossing protection for each track, each direction.

(a) Automatic

Where interlocking relays are used, observe that both armatures of the interlocking relay are picked up and that interlocking pawls have returned to normal position. (See Note)

(b) Manual

1. Check from point of control.
2. Check operation of annunciators (audible and visible) that indicate approach of trains to watchmen or other employees whose duties require them to operate crossing protection.

(c) Observe that all crossing protection lamps are burning with normal brilliancy.

(d) Observe operation of any auxiliary devices, such as Winko-Matic signs.

B. At Least Once Every Three Months by Maintainer.

1. Record number of operations of each gate mechanism and see that all indicate the same number of operations.
2. Inspect all lamps for blackening of glass, replacing as required.
3. Take hydrometer readings of main and track lead and storage battery cells. Record on battery record card using cell designations indicated in A-4.

C. At Least Once Every Six Months by Maintainer.

1. Check visibility and focus of signals, visibility and condition of signs (including R.R. advance warning signs on the highway and CC signs or equivalent).
2. Check flasher contacts by observing that at least one lamp on each crossarm is burning when flasher is at rest.
3. Electric gates must be checked to see that gates start to assume the horizontal position between 3 and 5 seconds after the flashing light signals start to operate.
4. Electric gates must be checked to see that gates assume the horizontal position 10 to 15 seconds after starting down.
5. Electric gates must be checked to see that gates fully raise in not less than 8 seconds nor more than 12 seconds.

D. At Least Once Each Year by Maintainer with Foreman or Inspector.

1. Check number of flashes per minute (30 to 45 times per minute).

2. Check voltage at each lamp unit with normal power supply. Voltage on 12-16 V., 21 C.P. lamp should be not less than 10 nor more than 13.0 volts. Voltage on 10 V., 18 Watt lamps should be not less than 9.0 nor more than 9.5 volts. Check gate arm lamp voltages at terminals in mechanism case.

3. Check voltage at the two lamps having lowest voltage reading under Tests D. 2 with A.C. power supply off and with a shunt of approximately two (2) ohms across the storage battery after this shunt has been in place for approximately ten (10) minutes. Voltage at 12-16 V., 21 C.P. lamps should not be below ten (10); voltage at 10 V., 18 Watt lamps should not be below nine (9), with shunt still applied.

4. With power off, compare back flow of current through rectifier with previous record.

5. Where circuit controllers are in service on outlying switches to cut out operation of crossing protection, test each circuit controller with proper obstruction between switch point and stock rail for which circuit controller is intended to operate. Observe that relay so controlled functions as intended.

6. Check gate arm torque adjustment in accordance with manufacturers instruction, to insure that gate arms are free from friction or other interference that might prevent them from functioning as intended.

7. Check time of time delay relays and timing units used in starting circuits; time must not be greater than amount shown on plans.

8. Where protection is automatic using directional stick relays, check operation for each track in each direction and after tests are completed, observe that the directional stick relays are deenergized. (See Note)

Note: Where applicable in paragraphs A-7(a) and D-8, train operation will suffice for operational check on a given track in a given direction.

TEST 28—INSULATING RAIL JOINTS AND SWITCH INSULATION

At Least Once Every Three Months by Maintainer.

If inspection indicates poor condition of insulation, test shall be made in accordance with Drawing S-818.
TEST 29—SHUNT TEST—HAND-OPERATED SWITCHES IN CAB SIGNAL TERRITORY

At Least Once Every Two Years by Foreman, Inspector or Maintainer*

Test is to insure that cab signals are operating properly approaching non-interlocked switches in the unlocked or open position.

Test shall be made with locomotive provided with cab signals properly adjusted in accordance with M.P. Instructions.

With facing point hand-operated switch open one-fourth (\(\frac{1}{4}\)) inch or more, or trailing point hand-operated switch open three-eighths (\(\frac{3}{8}\)) inch or more, the resultant restrictive cab signal shall be maintained to within 300 feet of the points of the switch.

Corrective action must be promptly taken if the requirements are not obtained.

This test to be made at the same time as Test 30.

TEST 30—CODE CHANGE POINTS

Test is to insure that the cab signal changes to restricting approaching signals in cab signal territory, arranged for code change points.

At Least Once Every Two Years by Foreman, Inspector or Maintainer*

A. At locations where bridging transformer, or relay shunting track, is employed:
   1. With signal, equipped with code change point, displaying either Restricting, Stop signal, or Stop and Proceed, cab signal shall assume Restricting when approximately 1000 ft. (3000 to 5000 ft., if applicable), in advance of the home signal.

B. At locations where code change point is effected by use of time delay apparatus:
   1. After passing distant signal in advance to signals protected with code change displaying either Restricting, Stop and Proceed or Stop Signal, cab signal shall assume Restricting minimum of ten seconds after cab signal displays Approach in agreement with distant signal.

Test in A or B above to be made at the same time as Test 29.

To be made as required by Foreman or Inspector

C. At locations where code change point is effective at cut-section:
   1. Tests are to be made as part of and in accord with Test 24.

TEST 31—TORPEDO PLACING MACHINES

At Least Once a Year by Foreman or Inspector.

Test to determine that torpedo is properly exploded by locomotive moving over torpedo placing machine in the firing position.
When used in conjunction with a signal, the torpedo placing machine shall be in the firing position with signal displaying a stop indication, and the "T" sign, where required, shall be illuminated.

TEST 32—SHUNTING EFFICIENCY—RAIL MOTOR CARS AND OTHER LIGHT WEIGHT EQUIPMENT

At Least Once a Year by Foreman, Inspector or Maintainer*

Test is to insure that track circuits are effectively shunted by light weight equipment and must be made not less frequently than indicated at points where it is known that trouble may be experienced due to poor shunting.

Test should be made by observing proper electrical meter connected in the circuit when the track is occupied by the light weight equipment moving through the entire circuit.

TEST 33—DRAGGING EQUIPMENT DETECTOR CIRCUITS

At Least Once a Year by Maintainer.

Test is to insure that the dragging equipment detector circuits are in proper order to sound alarm and display restrictive signal aspects.

A. Dragging Equipment Detector installed per Std. Signal Plan S-241:

Disconnect wire at an arm of the detector unit and check that alarm is sounded, that proper wayside signal aspect is displayed. The operation of "E" lights and timing circuits, where installed, should also be checked. Any improper operation must be corrected at once.

B. Self-restoring Type Dragging Equipment Detectors:

Test shall be made as outlined in A above, however, in lieu of disconnecting wire at an arm, actuate detector. Test shall determine that pressure required to rotate plates, and the point that contacts open (in each direction) shall be in accordance with instructions furnished by manufacturer.

NOTE: Where an actuation has occurred within designated period, test as outlined in A or B above, not required.

TEST 34—SPRING SWITCHES—EQUIPPED WITH FACING POINT LOCK AND OIL BUFFER

At Least Once Every Month by Maintainer.

Test is to insure that the operating mechanisms are maintained in accordance with the manufacturer's instructions and functioning as intended.

TEST 35—SLIDE PROTECTION FENCE CIRCUITS

At Least Once a Year by Maintainer.

Test is to insure that the slide protection fence circuits will function to cause the slide protection signals or indicators
to display their most restrictive aspects, when the apparatus is actuated.

Manually operate the circuit controllers separately, checking that the most restrictive signal aspects are displayed.

**TEST 36—CAPACITY CHECK OF LEAD ACID TYPE STORAGE BATTERIES**

*At Least Once a Year by Maintainer.*

Test is to insure that the batteries are in condition to deliver the rated capacity. Test to be made by the "Minute-Man" or equivalent.

**TEST 37—CODE LINE CIRCUITS**

*At Least Once a Year by Maintainer.*

Test is to insure that the code line circuits of traffic-control systems and coded carrier controls are checked for grounds, line current and voltages, leaks or foreign currents.

**TEST 38—AFO DEVICES**

*To be Made as Required, by Maintainer or Maintainer.*

Test is to insure AFO devices are in proper condition to include transmitter output level and frequency, and receiver sensitivity and selectivity. Tests shall be made in accordance with special instructions from office of System Engineer Communications and Signals.

**TEST 39—AUTOMATIC INTERLOCKINGS**

In addition to tests prescribed for interlockings, the following tests shall be made:

*At Least Once a Year by Foreman or Inspector.*

A. Approach Circuits:

1. Open or shunt approach track circuit. Check to see that no conflicting signal can be displayed. Check must be made for each signal and route.

B. Loss of Shunt:

1. Check to see that a loss of shunt of five (5) seconds or less shall not permit an established route to be changed.

*At Least Once Every Two Years by Foreman or Inspector.*

C. Other Tests:

1. Open or shunt each track circuit between home signals and check to see that no conflicting home signal can be displayed.

2. Shunt each track circuit in sequence to correspond with the passage of a train on each route to determine that interlocking is released as the rear of the train leaves the interlocking.

3. Check manual release circuits to see that they operate properly by displaying signal for a route, then shunt approach on conflicting route and operate manual release. This test must be made for each signal and route.
4. Check to see that indications of operative approach signals are in accord with the position of the home signals.

5. Check to see that adjustment, inking and operation of time recorders, where used, are correct.

6. Where special features exist, such as supervisory control of signals, cut outs for shifting movements, means for engines returning to their train, etc., operation should be checked, to include timing intervals if involved.

TEST 40—TRANSFORMERS, OIL SWITCHES, AERIAL SECTIONALIZING SWITCHES ON SIGNAL POWER LINE

At Least Every Eight Years by Foreman or Inspector.

Test is to check the flash-over point of the oil, oil level and megger test the insulation.

REPORT ON TESTS

Report Test No. 14 on Form C.E. 40
Report Test No. 19 on Form C.E. 204
Report Test No. 27 on Form C.E. 215
Report all other tests on Form C.E. 247, "Report of Tests of Signal Apparatus", as follows:

Keep running record of tests as performed, using one sheet for tests due semi-monthly, one for monthly and one for quarterly and longer intervals. Date sheet for end of period covered, filling in name of district, headquarters, or name or number of section.

Column 1—List tests by number. If there is nothing in service which is covered by any test, report should so state.

Column 2—Give name of Interlocking, Interlocking Station or Block Station or territory covered:

From ___________________________ To ___________________________

Column 3—Show date of each test.

Column 4—If test is not complete, name Interlocking, Interlocking Station or Block Station or limits of territory covered.

Column 5—Report conditions. If defective state whether corrected or requiring attention.

Tests under Nos. 2, 3 and 5 (handled by test forces) should be reported on a percentage basis for each of the tests involved instead of by locations.

Issued Nov. 1, 1958 C. J. HENRY
Chief Engineer