

SSIT-702 Track Circuits

Purpose

Track circuit tests and inspections shall be performed to verify that track circuits are in good condition, adjusted properly and operating in accordance with design and manufacturer's recommended practices. Track circuits shall be adjusted to detect presence of trains and broken rails regardless of changing conditions that may affect the circuits.

Test Intervals

Track circuit tests and inspections shall be performed when installed, as required, and at least once every twelve (12) months. Track circuits shall also be tested whenever there is a significant change in the track or circuit configuration such as: Rail size, rail connections, switches, ballast resistance, track structure, track lead length, track batteries, track relays, etc. **Tests shall be performed in dry ballast conditions whenever possible.**

Refer to *SSIT-7 Signal System Inspection and Test Intervals* for all test intervals.

Rail Safety

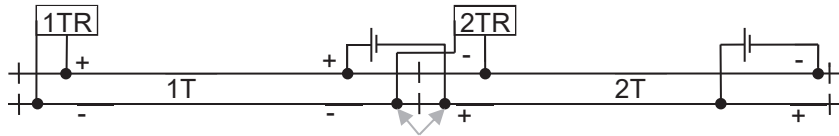
Employee shall ensure the site is safe for employees, the public, vehicular traffic and train operations as defined in *SSIT-8 Protecting Train Operations* prior to performing tests and inspections.

Equipment Manuals

A copy of the track circuit equipment manufacturer's manual should be on hand for reference when performing tests.

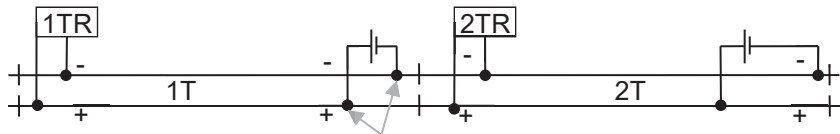
Track Connection Tests

The following tests shall be performed following work that may cause polarity swap or track lead crossing:

Step	Procedure
1. Check Track Circuit Isolation	<ul style="list-style-type: none"> Shunt each track around affected track leads. → Check proper track relay drops when shunted. <p>If track does not drop: Track leads may have been crossed, as depicted in figure below. Reinstall track leads with proper configuration.</p> <p>CAUTION: This is not a test. The diagram illustrates what can happen when two track lead connections are disarranged. It is provided to emphasize the importance of following proper test procedures whenever track connections are installed, replaced, or reconnected.</p>  <p><i>When 2T track is shunted, 2TR remains energized by 1T battery.</i></p>

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Step	Procedures
2. Check Track Polarity	<ul style="list-style-type: none"> Perform 0.06 ohm shunt tests to verify polarity. → Check polarity is in accordance with approved site plans. <p>If polarity not swapped at joint: Track leads may have been swapped. Reinstall track leads with proper configuration.</p> <p>CAUTION: This is not a test. The diagram illustrates what can happen when two track polarities are not staggered. It is provided to emphasize the importance of following proper test procedures whenever track connections are installed, replaced, or reconnected.</p>  <p style="text-align: center;"><i>If IJ between 1T and 2T failed, batteries connect in parallel.</i></p>

Stored Energy Tests

The following tests shall be performed on all DC track circuits at locations where foreign energy is known to exist, or crossings that employ the use of concrete slabs where road salt is used:

Step	Procedure
1. Check Initial State	<ul style="list-style-type: none"> Check track circuit has been steady energized for at least 15 minutes.
2. Check Relay Drop	<ul style="list-style-type: none"> Disconnect track circuit battery. Time relay drop time. <p>If crossing circuit takes longer than 2 seconds to drop: Provide necessary track protection until resolved. Locate the source of the stored energy, report to the ONR S&C Supervisor and arrange for repair.</p> <p>If general track circuit takes longer than 2 seconds to drop: Locate the source of the stored energy, report to the ONR S&C Supervisor and arrange for repair.</p> <p>If general track circuit takes longer than 1 minute to drop: Disconnect relay and advise dispatcher track is disabled. Report to the ONR S&C Supervisor and arrange for replacement.</p>
3. Locate External Energy Sources	<ul style="list-style-type: none"> → Check for nearby AC power lines. → Check for nearby DC controller circuits. → Check for nearby pipelines equipped with <i>cathodic protection</i>. <p>If external source affecting track circuits: Provide necessary track protection until resolved. Report to the ONR S&C Supervisor.</p>
4. Restore Track Circuit (if applicable)	<ul style="list-style-type: none"> Locate and eliminate source of stored energy. Retest relay drop. <p>If stored energy eliminated: Remove protection and return track to regular operations.</p>

Track Circuit Test Procedure

The following tests shall be performed for each track circuit:

Step	Procedure
1. Check Track Insulation	<ul style="list-style-type: none"> Inspection of track hardware insulation shall be performed as outlined in <i>SSIT-701</i> prior to performing track circuit tests.
2. Check Rail Condition	<p>→ Check rail is free of rust. → Check rail is free of debris buildup. If rail condition is preventing proper shunting: Provide necessary track protection until resolved. Report to relevant authorities.</p>
3. Review Adjustment Criteria	<p>The following criteria must be noted when making track circuit adjustments:</p> <ul style="list-style-type: none"> Track circuits shall be maintained such that the track relay (or equivalent) stays energized during wet weather or minimum ballast resistance conditions, and assumes most restrictive state (i.e. drops) with 0.06ohm shunt both in wet weather and in dry weather or maximum ballast resistance conditions. Limiting resistor(s) shall not be removed or lowered below minimum specified value without the ONR S&C Supervisor's permission. Bridging resistor(s) may be used to limit effect of ballast, and shall only be replaced in kind. Track circuits shall be re-adjusted whenever bridging resistors are replaced or temporarily removed. Electronically driven track circuits shall not be set to a higher power output from original setting without The ONR S&C Supervisor's permission.
4. Check Initial State	<ul style="list-style-type: none"> Measure current at both the battery (or equivalent) and the relay (or equivalent) end. → Check current at the battery is less than maximum allowed. → Check current at the relay end does not show significant drop. If current at relay end significantly below battery end current: Check current is above relay (or equivalent) requirements as outlined in manufacturer's manual for proper operation.
5. Test Shunting at Installation (if applicable)	<ul style="list-style-type: none"> Connect 0.06 Ohm shunt to rails at battery (or equivalent) end. → Check all track circuit relays (or equivalent) are de-energized. Connect 0.06 Ohm shunt to rails at relay (or equivalent) end. → Check all track circuit relays (or equivalent) are de-energized. Disconnect the battery or energy source from the track circuit. → Check all track circuit relays (or equivalent) are de-energized.
6. Shunt DC Track Circuit (if applicable)	<ul style="list-style-type: none"> Apply 0.06 ohm shunt at the relay (or equivalent) end of circuit. → Check relay drops. → Check current at the relay is less than 85% of drop-away. If relay current too high: Adjust track circuits according to manufacturer manual(s).

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Step	Procedure
7. Drop AC or MS/CWD Track Circuit (if applicable)	<ul style="list-style-type: none"> • Apply 0.06 ohm shunt at least 100' from island for approach circuit. → Check track shunts. • Apply 0.06 ohm shunt within island for 75 seconds. → Check track remains shunted for entire time. <p>If tracks not shunting: Perform additional diagnostics as outlined in the manufacturer manual. Make necessary adjustments, as required.</p>
8. Test All Track Circuits	<ul style="list-style-type: none"> • Repeat steps 4 to 7 as required for all track circuits associated with location.
9. Update Log Book	<ul style="list-style-type: none"> • Add any notes of issues observed, or adjustments made.
10. Complete Test Form	<ul style="list-style-type: none"> • Record the test as completed on SSIT test form.