APTA STANDARDS DEVELOPMENT PROGRAM

STANDARD

American Public Transportation Association
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APTA Rail Transit Signal & Communications Working Group

Time Locking Tests

Abstract: This document provides procedures for rail transit signal system time locking tests.

Keywords: signals, test, time locking

Summary: This standard provides prerequisites, procedures and requirements for testing rail transit time locking. Individual rail transit systems may modify these requirements to accommodate their specific equipment and mode of operation.

Scope and purpose: This document is intended to satisfy the following objectives:

- to ensure that special life/safety equipment is operational and reliable
- to incorporate safety considerations during the inspection and maintenance process
- to identify inspection criteria and maintenance requirements that provide a high level of passenger and personnel safety

The purpose of this standard is to verify that time locking circuitry and equipment are operating safely and as designed through testing, thereby increasing reliability and reducing risks of hazards and failures.

Table of Contents

Participants

The American Public Transportation Association greatly appreciates the contributions of **Bill Palko**, **Ben Feely**, **Howard Goldberg** and **Tru Hong**, who provided the primary effort in the drafting of this document.

At the time this standard was completed, the Rail Transit Signal & Communications Working Group included the following members:

Aderemi Omotayo, Los Angeles County Metropolitan Transportation Authority, *Chair*
Joel Jeff McCormack, AECOM**,** *Vice Chair*
Kurt Slesinger, Greater Cleveland Regional Transit Authority, *Secretary*

Jose Arriojas, *NJ TRANSIT*
Charles V. Barlow, *EverGlow NA*
Ryan Becraft, *Denver Transit Operators*
Frank Beeck, *Rail-IT*
Peter Bertozzi, *Patrick Engineering*
Mark A. Bressi, *Hitachi Rail Systems USA*
Randy Brundridge, *ALSTOM*
Anthony Patrick Candarini, *AECOM*
Sandy Castillo, *MTA*
Nicholas Columbare, *ALSTOM*
David Coury, *Transit Systems Engineering*
Michael Crispo, *Hatch LTK*
Stephen Farrell, *Transit Systems Engineering*
Bennett R. Feely, *Mott MacDonald*
Bruce Fenlason, *Metro Transit–Hiawatha LRT*
Johann Glansdorp, *WMATA*
Howard I. Goldberg, *ALSTOM*
Daniel Hernandez, *Chicago Transit Authority*
Tru Hong, *Gannett Fleming Transit & Rail*
Michael James Lowder, *Chicago Transit Authority*
Scott Matonak, *Hitachi Rail STS*
William McClellan, *ACI*
Jerry McCormack, *Vomar Products*
Eric McGraw, *Chicago Transit Authority*
Douglas James Minto, *Siemens Mobility*
Javier Molina, *Dallas Area Rapid Transit*
Ojo Nwabara, *Hitachi Rail STS*
William J. Palko, *Mott MacDonald*
Stephen Ranck, *ALSTOM*
Daniel Reitz, *Port Authority Trans-Hudson*
Tim Shoppa, *WMATA*
Otobong Usoro, *HNTB Corporation*
Christopher Weil, *Greater Cleveland RTA*
Phil Wellman, *Metro Transit–Hiawatha Light Rail*
James Winter, *Siemens Mobility*

Project team

Eugene F. Reed, *American Public Transportation Association*
Narayana Sundaram, *American Public Transportation Association*

Introduction

This introduction is not part of APTA RT-SC-S-006-02, Rev. 1, "Time Locking Tests."

APTA recommends the use of this document by:

- individuals or organizations that operate rail transit systems;
- individuals or organizations that contract with others for the operation of rail transit systems; and
- individuals or organizations that influence how rail transit systems are operated (including but not limited to consultants, designers and contractors).

Note on alternate practices

Individual rail transit systems may modify this standard to accommodate their specific equipment and mode of operation. APTA recognizes that some rail transit systems may have unique operating environments that make strict compliance with every provision of this standard impossible. As a result, certain rail transit systems may need to implement the standard herein in ways that are more or less restrictive than this document prescribes. A rail transit system may develop alternates to APTA standards so long as the alternates are based on a safe operating history and are described and documented in the system's safety program plan (or another document that is referenced in the system safety program plan).

Documentation of alternate practices shall:

- identify the specific APTA rail transit safety standard requirements that cannot be met;
- state why each of these requirements cannot be met;
- describe the alternate methods used; and
- describe and substantiate how the alternate methods do not compromise safety and provide a level of safety equivalent to the practices in the APTA standard (operating histories or hazard analysis findings may be used to substantiate this claim).

Time Locking Tests

1. Test requirements

1.1 Test frequency

Time locking tests shall be performed based on the following intervals:

- Relay-based systems shall be tested when placed in service; after modification, repair or disarrangement; and at a regular interval not to exceed four years.
- Microprocessor-based systems being maintained under a configuration control plan conforming to APTA RT-SC-S-035-03 shall be tested when placed in service and after modification, repair or disarrangement.
- Microprocessor-based systems being maintained without a configuration control plan conforming to APTA RT-SC-S-035-03 shall be tested when placed in service; after modification, repair or disarrangement; and at a regular interval not to exceed four years.

1.2 Materials and data

The following materials are required for route locking tests:

- current book of plans for the location under test that includes the following details:
    - signals/routes to be tested
    - switches and their position in each route
    - diagram of route locking sections and limits
    - interlocking layout including track circuit limits and switch/signal locations
    - conflicting signals/routes
    - test data sheets or means to record test results

1.3 Tools

Test tools and apparatus shall be as required by the OEM and/or the rail transit system. Applicable tools shall be calibrated in accordance with rail transit system and/or OEM requirements.

1.4 Personnel

This test shall be performed by qualified personnel.

1.5 Personal protective equipment

Personal protective equipment shall be worn as required by the rail transit system.

1.6 Safety

Rail transit system safety rules, procedures and practices shall be followed at all times during testing. No work of any type shall be performed until train movements have been protected. The normal functioning of

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

1.7 Test prerequisites

Prior to performing time locking tests, the test person shall ensure the following:

- A test plan is established to ensure all time locking is tested consistent with the latest plans and procedures.
- Track circuit setup and shunting has been completed for all track circuits within the scope of this test.
- Switch lock relays or equations have been verified to lock the proper switches for each switch within the scope of this test.

2. Test procedure

Time locking tests verify that after a signal has been cleared and then set to stop, switches in the route governed by the signal cannot be operated, and no conflicting routes can be set, until the predetermined time interval has elapsed. The test for time locking shall be modified for each rail transit system's requirements (see "Note on alternate practices") but shall contain steps 1 through 9 as a minimum.

Test requirements represented here may be combined with other tests for efficiency or ease of execution. When performing the following test procedure, ensure that non-vital logic does not mask the proper operation of the vital logic (if the configuration of the system prevents this, then the method of testing shall be addressed through a documented alternate practice). Where actual relays are not available to verify logic states, the test person shall use the OEM-recommended microprocessor diagnostic tool to verify the internal states of vital logic equations.

1. Notify the Operations Control Center and/or other authorities of the test to be performed.
2. Establish the route to be tested.
3. Cancel the route established in step 2.
4. Verify that the timing device is running time and that time locking is in effect until the documented time interval has elapsed.
5. Use an accurate timing device to verify that the actual time interval is within 10% of the documented time requirements. Record the result on the data sheet.
6. Verify that each switch in the route is locked during the period when time locking is in effect by observing the status of the appropriate lock relay/equation. Record the result on the data sheet.
7. Verify that conflicting routes cannot be established during the period when time locking is in effect. Record the result on the data sheet.
8. Restore the system to its original operating condition.
9. Notify the OCC and/or other authorities that the test is complete.

3. Correction of deficiencies

Deficiencies identified during route locking tests shall be corrected and documented in accordance with OEM and/or rail transit system requirements.

4. Documentation

Testing activities shall be documented, reviewed and filed in accordance with rail transit system procedures.

Related APTA standards

APTA STD-ADMIN-GL-002-22, "Definitions for Signal & Communications Terms"
APTA-RT-SC-S-035-03, "Vital Processor-Based System Inspection, Testing and Configuration Control"

References

In addition to the most recent edition of OEM specifications for testing approach locking, as well as route aspect charts and/or track plans with approach locking specifications for the signals under test, this document shall be used in conjunction with the following:

American Railway Engineering and Maintenance-of-Way Association, "Communications and Signals Manual of Recommended Practices," Part 2.4.5, Section D: Approach Locking.

Federal Railroad Administration (FRA), Office of Safety, "Rules and Regulations Governing Railroad and Train Control Systems," Section 236.377: Approach Locking.

Abbreviations and acronyms

OCC Operations and Control Center
OEM original equipment manufacturer

Summary of document changes

- Document formatted to the new APTA standard format.
- Revisions made to the boilerplate sections for consistency among documents.
- Applied revisions addressing agreed-to comments from the March 10, 2016; June 8, 2016; and Oct. 4, 2016, committee meetings.
- Section 1.4 added.
- Changes made to "Personal protective equipment," "Test prerequisites," "Test procedure" and "Abbreviations and acronyms" sections.

Document history

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