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IEEE Standard for Rail Transit Vehicle Event Recorders

IEEE Vehicular Technology Society

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Approved 11 December 2013

IEEE-SA Standards Board

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Abstract: On-board devices/systems, with crashworthy memory, that record data to support accident/incident analysis for rail transit vehicles are covered. The requirements of this standard are limited to event recorder functions and interfaces. Data transmission methods are excluded. The information in this standard is independent of the hardware and/or software employed for other vehicle systems.

Keywords: crashworthiness, IEEE 1482.1™, input signal, rail transit vehicle event recorder, rail vehicles, rapid transit, self-test

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Introduction

This introduction is not part of IEEE Std 1482.1-2013, IEEE Standard for Rail Transit Vehicle Event Recorders.

Event recorders (called flight recorders) have been standard equipment on commercial airliners for many years, The Federal Railroad Administration (FRA) requires them for specific railroad applications, as described in 49 CFR 229 [B1][a] Other modes of public transportation, including rapid rail transit not regulated by the FRA, have begun to consider technical requirements for event recorders applicable to those modes. Because there are similarities between the rail modes under FRA jurisdiction and those that are not, a natural starting point for technical requirements is 49 CFR 229 [B1], This update brings the standard in line with 49 CFR 229 [B1].

As subsystems incorporate advanced processing capabilities and are linked together, and as processing capability is added to car and train monitoring and diagnostic systems (MDSs), an increasing number of the signals required by the FRA will become available in a central location, In fact typical MDS functionality meets and exceeds the formal definition of an event recorder. However, an MDS usually does not meet all requirements and implications of the FRA rule, particularly the physically and electrically secure retention of the most recent 48 hours of operating data,

It is intended that data collected by event recorders meeting this standard be used to help reduce the potential for future accidents in cases where equipment design, maintenance practices, training, or procedures can be modified based on such data.

A rail transit event recorder captures signals that could help an accident investigator determine the following:

— The status of the car throughout a timeframe before, during, and after the accident
— The status of the vehicle systems throughout a timeframe before, during, and after the accident
— The status of human (crew) controls and indicators throughout a timeframe before, during, and after the accident

The preceding statuses determine the sources of signals. An example of brake status might be as follows:

a) The actual status of the brakes could be determined by brake pipe pressure, brake cylinder pressure, and brake apply relay status
b) The vehicle system output for the brake status could be obtained from a network, car controller, or propulsion and brake controllers
c) The crew information could be obtained from the master controller position, and indicator lights or gauges in the cab

It is not the intent of this standard to preclude the requirements of an event recorder system being satisfied by a combination of on-board and wayside equipment. Neither is it the intent to define the circumstances under which event recorders must be purchased or installed (e.g., new rolling stock, major or minor overhauls, upgrades, or remanufacture of existing rolling stock)—only the requirements to be met are given, if the event recorders are purchased or designed to this standard.

[a]The numbers in brackets correspond to those of the bibliography in Annex A.

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1. Overview

1.1 Scope

This standard covers on-board devices/systems, with crashworthy memory, that record data to support accident/incident analysis for rail transit vehicles. The requirements of this standard are limited to event recorder functions and interfaces, exclude the data transmission method(s), and are independent of the hardware and/or software employed for other vehicle systems. Functions, parameters, signals, systems, and subsystems that shall be captured are identified. Diagnostic features ~~or~~ and self-test options are described.

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1.2 Purpose

~~There is currently no defined, independent standard defining event recorders for rail transit vehicles.~~ Each order of new ~~rail transit~~ vehicles or overhaul of ~~old~~ existing rail transit vehicles requires engineering effort by all parties to determine which signals to capture, how often to sample~~,~~ and how long to preserve the information~~, requiring~~. In addition, there can be varying requirements for crashworthiness. This standard identifies a ~~learning curve~~ common set of requirements for ~~every project~~event recorders for transit systems, including some correlation to Federal requirements for railroads. Users ~~of this standard include those who specify, purchase, design, and build rail transit vehicles and their subsystems. They should~~ benefit from a simplified process of integrating diagnostic information from multiple subsystem suppliers and from having a common method of crashworthiness certification.

2. Normative references

~~This standard shall be used in conjunction with the following publications. In case of a conflict between this standard and the referenced document, this standard shall take precedence. Those provisions of the referenced documents that are not in conflict with this standard shall apply as referenced.~~

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

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