National Transportation Safety Board

Washington, DC 20594

Safety Recommendation Report

Rail Transit Vehicle Safe Braking

Accident Number:	DCA17FR003
Operator:	Southeastern Pennsylvania Transportation Authority
Transit Vehicle:	Trolley Car 9085
Location:	Philadelphia, Pennsylvania
Date:	January 4, 2017
Recommendation No.:	R-17-04
Adopted:	May 1, 2017

The National Transportation Safety Board (NTSB) is providing the following information to urge the Federal Transit Administration (FTA) to take action on the safety recommendation issued in this letter. The NTSB's on-going investigation of a January 4, 2017, accident involving two Southeastern Pennsylvania Transportation Authority (SEPTA) trolley cars in Philadelphia, Pennsylvania, highlights the need for FTA to require state safety oversight agencies (SSOA) to direct rail transit agencies to identify unexpected system failures in rail transit brake systems. As a result of the on-going investigation, the NTSB is issuing one safety recommendation to the FTA at this time.

Background and Analysis

On January 4, 2017, at 12:47 p.m., eastern standard time, SEPTA trolley car 9101, with 41 passengers, was traveling north on trolley route number 10 when it stopped at the southeast corner of Lancaster Avenue and 38th Street, Philadelphia, Pennsylvania, to offload passengers. SEPTA trolley car 9085, with five passengers, traveling in the same direction, collided with the rear of the stopped SEPTA trolley car at an estimated speed of 11 miles per hour (mph). Emergency responders transported both operators and 46 passengers to local hospitals for nonlife-threatening injuries.

Follow-up brake testing identified the failure of the emergency brake push-button electrical switch to activate the track brake.[1] Although the trolley operator in this accident activated the track

[1] A *track brake* is an electromagnetic mechanism that slows or stops a trolley car or rail transit vehicle by pressing against the running rail. It consists of a spring-mounted mechanism suspended above the rail between the wheels of each truck. Force transfer members, which connect the track brakes on each side of the truck to the truck-side frame,

brake by using the foot pedal instead of the push-button electrical switch, the circumstances of this switch failure could, unless immediately addressed, contribute to accidents or incidents on other trolley or rail transit vehicles across the United States with similar emergency brake electrical switch designs.

Investigators contacted the manufacturer of the emergency brake push-button electrical switch, WABTEC Corporation (WABTEC), concerning this issue. Because of the NTSB outreach, WABTEC published a service bulletin that explained the proper installation and adjustment of the electrical switch. WABTEC distributed this service bulletin to its customers who use this design in rail transit vehicles.

In response to the SEPTA push-button electrical switch failure, the NTSB released a safety alert (SA) to warn rail transit agencies, the FTA, and the SSOAs of the potential for similar failures in vehicles of a comparable design.[2] The NTSB believes the SA will help rail transit operators: (1) identify vehicles that may use comparable designs, and (2) prevent or reduce the severity of accidents that may result from an emergency brake push-button electrical switch failure. Further, the NTSB believes the FTA and the SSOAs should use the SA as a tool in the hazard management processes.

Congress directed the FTA to establish the State Safety Oversight (SSO) Program in the Intermodal Surface Transportation Efficiency Act of 1991; this program went into effect in 1997. The FTA has responsibility for the safety oversight of rail transit operations through the SSO program, as described in the final rule, Title 49 *Code of Federal Regulations* (*CFR*) Part 670, Public Transportation Safety Program.[3]

The Moving Ahead for Progress in the 21st Century Act (MAP-21) allowed the FTA to issue equipment standards to transit agencies. The Fixing America's Surface Transportation Act (FAST Act) reiterated that authorization and also enabled the FTA to issue other safety standards.[4]

On January 18, 2017, the FTA published its final *National Public Transportation Safety Plan* as a guidance document.[5] While some commenters believed that the FTA should issue safety standards in accordance with the authority granted in MAP-21 and the FAST Act, the FTA chose to include only voluntary standards in the plan and stated its intent to conduct a review of public transportation safety standards and protocols currently in use and evaluate their efficacy, as required by the FAST Act.

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maintain track brake magnets over the center line of the rail. The force transfer members are equipped with friction elements to transmit the braking force generated by the electromagnetic track brake.

[2] National Transportation Safety Board, *Rail Transit Vehicle Emergency Brake Push-button Electrical Switch Failure*, NTSB Safety Alert SA-063, March 31, 2017 (Washington, DC: National Transportation Safety Board, 2017).

[3] *Federal Register* (*FR*) 81, no. 155 (August 11, 2016): 53046.

[4] (a) Moving Ahead for Progress in the 21st Century Act, Pub. L. 112-141, July 6, 2012. (b) Fixing America's Surface Transportation Act, Pub. L. 114-94, December 4, 2015.

[5] Federal Transit Administration, National Public Transportation Safety Plan (Washington, DC: US Department of Transportation, Federal Transit Administration, 2017).

The FTA published an advance notice of proposed rulemaking (ANPRM) on October 3, 2013.[6] The NTSB commented on the ANPRM on February 13, 2014. In that comment, the NTSB said:

> Industry standards, including those issued by APTA [American Public Transportation Association], should be incorporated into mandatory equipment standards. In addition, each individual vehicle component should have safety performance standards specified by its manufacturer. Those performance standards should be detailed in terms of wear limits, electrical tolerance, age, or any other criteria as appropriate. Any deviation from those standards should be cause for regulatory sanctions by FTA. [7]

In this response, the NTSB further stated that after a rail transit vehicle is placed in revenue service, the design criteria for that particular vehicle should become standard and any proposed deviation from that standard should be preapproved by the FTA. In addition, the NTSB commented that transit vehicles should be maintained as close as possible to a "designed-as-built" condition with regular vehicle inspections and detailed preventative maintenance programs based on designed-as-built standards. Despite these comments, the *National Public Transportation Safety Plan* includes no equipment standards, as authorized in both MAP-21 and the FAST Act.

In its Public Transportation Safety Program final rule, the FTA describes the process whereby it may issue a general directive to require correction of "an unsafe condition or practice, or a combination of unsafe conditions and practices, exists such that there is risk of death or personal injury, or damage to property or equipment."[8]

The NTSB is very concerned about latent defects of any kind that may exist in rail transit systems, such as the failure of the emergency brake push-button electrical switch found during follow-up testing as part of the investigation of this accident. The expectation that rail transit vehicle brake systems are performing as designed is achievable only through proper maintenance, thorough inspection, periodic brake performance testing, and independent oversight.[9] Therefore, the NTSB recommends the FTA utilize its authority under Title 49 *CFR* 670.25, and immediately issue a general directive that would require all SSOAs to direct rail transit agencies to periodically test the performance of their rail transit vehicles' braking systems to detect potential latent system failures.

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[6] *FR* 78, no. 192 (October 3, 2013): 61251.

[7] NTSB response to ANPRM, "The National Public Transportation Safety Plan, the Public Transportation Agency Safety Plan, and the Public Transportation Safety Certification Training Program: Transit Asset Management," February 13, 2014. The NTSB response to the ANPRM is available at https://www.regulations.gov/document?D=FTA-2013-0030-0114.

[8] *FR* 81, no. 155, (August 11, 2016): 53046. Public Transportation Safety Program final rule, Section 670.25.

[9] *Brake performance testing* refers to a braking test designed to evaluate deceleration rates, stopping distance, and system design integrity. This type of testing on rail transit vehicles generally requires the use of a test track or out-of-service track.

Recommendation

To Federal Transit Administration:

Utilize your authority under Title 49 *Code of Federal Regulations* 670.25, and issue a general directive that would require all state safety oversight agencies to direct rail transit agencies to periodically test the performance of all of their rail transit vehicle braking systems to detect potential latent system failures. (R-17-04)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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