



National Transportation Safety Board  
Washington, D.C. 20594

Railroad Accident Brief

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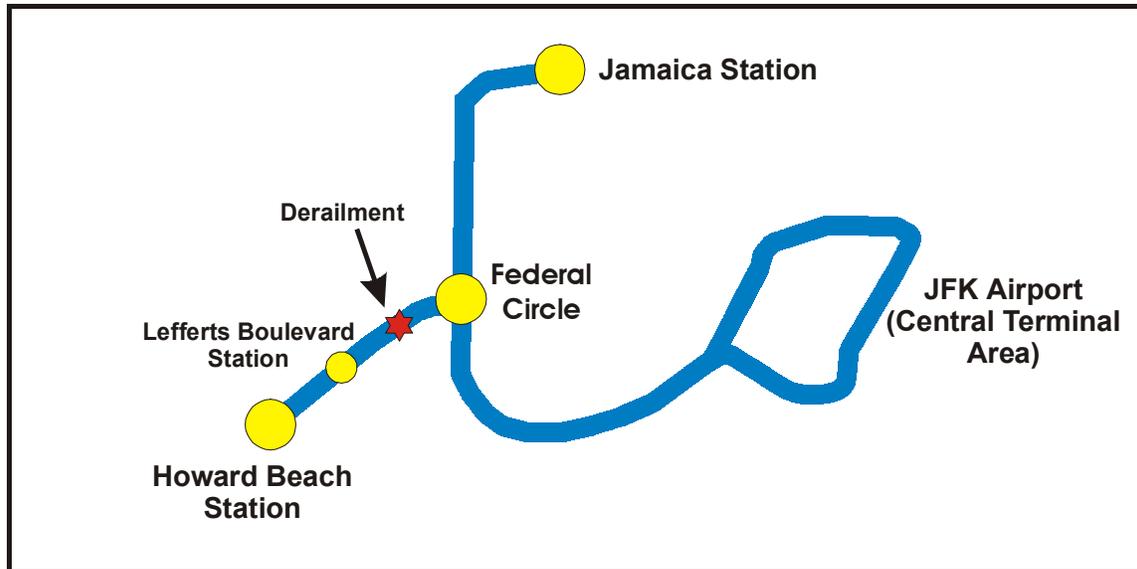
Accident No.:	DCA-02-FR-014
Location:	Jamaica, New York
Date of Accident:	September 27, 2002
Time:	12:25 p.m. eastern daylight time
Light Rail Transit:	AirTrain-JFK (Port Authority of New York and New Jersey) (Bombardier Total Transit Systems)
Fatalities:	1
Injuries:	None
Property Damage:	\$7.65 million
Type of Accident:	Derailment

### Accident Synopsis

At about 12:25 p.m., on September 27, 2002, AirTrain-JFK light rail transit test train No. 121 derailed in a curve on the aerial guideway that runs between the Howard Beach station and the Federal Circle station near JFK International Airport in Jamaica, New York. (See illustration.) At the time of the accident, AirTrain No. 121, with three cars and no occupants except the train operator, was participating in a power distribution system test under the authority of the transit system's testing and commissioning supervisor (test supervisor). When the train derailed, large concrete slabs that had been placed in the lead car for added weight shifted and pinned the train operator against the operator's console, severely injuring him. He was transported to a local hospital where he died at 3:05 p.m. on September 27, 2002.

### AirTrain-JFK System Overview

AirTrain-JFK, which has not yet been fully commissioned and placed into service, is owned by the Port Authority of New York and New Jersey. It is designed to be a fully automated, driverless transit system that runs from the JFK Airport to Howard Beach for connection to the New York City Transit System and to Jamaica, New York, for connection to the Long Island Railroad and the New York City Transit System. Of the 10 passenger stations that will make up the 8.1-mile system, 6 will be at the airport's central terminal area, 1 will be in the common corridor (Federal Circle), 2 will be on the Howard Beach branch, and 1 will be on the Jamaica branch.



The AirTrain-JFK system. For the September 27, 2002, test, train No. 202 departed the Howard Beach station at the same time train No. 121 departed Lefferts Boulevard station, both inbound toward Federal Circle.

AirTrain-JFK trains, which will be electrically powered through a third rail, will operate along two parallel tracks, or guideways. The guideway on which the trains will travel from the central terminal area toward Howard Beach and Jamaica is referred to as the “outbound guideway.” The side on which the trains normally travel from Howard Beach and Jamaica to the terminal area is referred to as the “inbound guideway.”

The system was designed and constructed by the Air Rail Transit Consortium. A member of the consortium, Bombardier Total Transit Systems (Bombardier), is responsible for cars and for the automatic train control and communications systems. Bombardier will also operate and maintain the system on behalf of the Port Authority.

### **Preaccident Events**

At the time of the accident, as part of its testing and commissioning responsibilities, Bombardier was carrying out a test designed to calibrate the trip limits of certain transit power substation circuit breakers. The test involved the simultaneous starting and accelerating of two trains, one at the Howard Beach inbound platform and the other at the Lefferts Boulevard inbound platform.

The test design called for two four-car trains to be started at the same time, accelerated to the maximum authorized speed, slowed, and then stopped. The duration of each test run was expected to be about 30 seconds. A supervisor in Bombardier’s engineering department informed the test supervisor that the test trains could be operated either manually or under automatic train control.

On September 20, 2002, the test supervisor sent an e-mail to the Bombardier engineering department stating, “We are having a problem getting two four-car trains together and making them work properly. Could we use two two-car trains with an AW-2 load?”<sup>1</sup> On September 23, 2002, the test supervisor sent an e-mail to the engineering supervisor stating, “We can use two three-car trains. Two cars of each three-car train will be AW-2 loads, and the third car will be an AW-0 load.” Later that same day, the test supervisor received approval via e-mail to use two three-car trains with the specified loading. To achieve the loading, eight 4 foot x 2 foot x 22 inch concrete slabs weighing approximately one ton each were placed in the lead and middle cars of the accident train (concrete slabs had been added to the other test train, train No. 202, for a previous test). The slabs were placed unsecured on sheets of ply-board in the passenger compartments of each of the loaded vehicles.

Test officials agreed that the tests would be conducted with the test trains operating in manual (operator-controlled) mode.<sup>2</sup> It was also agreed that the speed governor that limited train speed to 15 mph in manual mode would be disengaged for the test so that the two test trains could accelerate to the maximum authorized speed and thus generate maximum electric current draw.

Because the transit system was not yet in operation and was designed to be a driverless, fully automated system, neither of the two operators assigned for the test had experience operating on the main line. The operators were normally responsible solely for moving and positioning cars and trains within yards where they operated in manual mode and where the speed governor limited train speed to 15 mph. Although operators are trained to retrieve disabled trains from the main line, such retrievals are performed in manual mode with its 15-mph maximum speed. According to the AirTrain training officer at the time of the accident, operators received no training in operating trains at speeds greater than 15 mph. The test supervisor told investigators that he was disappointed when he learned that he would not be able to use more experienced operators for the test.

## **The Accident**

On the morning of the test, test officials, including a supervisor from the operations center, the train operator supervisor, engineering test supervisors, the general manager from Bombardier, the manager of the operations control center, and a control

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<sup>1</sup> *AW (added weight) loading* refers to the weight added to a vehicle to simulate passenger load. AW-0 simulates an empty car; AW-1 simulates a load with seated passengers only; AW-2 simulates a load with some seated and some standing passengers; and AW-3 simulates a train with a crush load (the maximum number of passengers that can possibly be riding in the railcar, standing and sitting).

<sup>2</sup> In a Safety Board interview, the testing and commissioning supervisor said manual mode was chosen because the test required that the two trains be started simultaneously, which could not be ensured during automatic operation. In other interviews, it was stated that one of the trains was not operating properly in automatic mode.

center operator, met to determine the limits for the test. They also coordinated test activities and confirmed that all requests for vehicles, track allocation, and train operators had been completed.

The test supervisor had stationed himself at the Lefferts Boulevard station with the intention of riding train No. 121 during the test; however, the train doors malfunctioned, and he was forced to remain on the station platform during the test. Earlier that morning, he had issued test instructions to the first operator of train No. 202. When that operator was relieved for a lunch break, the test supervisor used his cellular telephone to issue the same instructions to the relief operator. The train No. 202 relief operator told the Safety Board that he was instructed to start from the Howard Beach inbound station. On the command “go,” he was to apply full throttle not to exceed maximum permissible speed and stop at the walkway just past the Lefferts Boulevard station. (Maximum allowable speed in the area was 45 mph, with a 15-mph speed limit over the switches.<sup>3</sup>)

The test supervisor said he issued his instructions to the operator of train No. 121 while they were both standing on the Lefferts Boulevard Station platform. He stated that he instructed the operator to operate his train at full throttle out of the station, pass over the switches entering the yard tracks not exceeding 15 mph, operate his train at full throttle not exceeding maximum permissible speed, and stop at a walkway MD-45. The test supervisor said both train operators acknowledged his instructions. Both train operators were told that they would receive the “start” command via radio from the senior test engineer for a Bombardier electrical subcontractor. According to the written test procedures, the senior test engineer was also to issue “slow” and “stop” commands as the test runs concluded, but he did not issue these commands during the September 27 test.

Data for the first test run taken from speed graphs show that train No. 202 had a normal run, reaching a top speed of 35 mph before stopping at the Lefferts Boulevard station as the operator had been instructed. Train No. 121 reached speeds up to 54 mph and went beyond the limits established for the test.

After the time when the first test run should have ended, the test supervisor radioed the operator of train No. 121 to ask his location and to instruct him to stop his train. The train operator replied, “I should stop?” The test supervisor repeated the command to stop and asked the train’s location. The train operator stated his location in the following taped conversation:

**Test supervisor:** Train 121, where are you? Stop!

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<sup>3</sup> The AirTrain-JFK *Operations Manual* states that “go slow zones are put in place over every switch on the mainline at 15 mph and are not to be removed.” The manual also states that temporary permission may be given to exceed 15 mph for completion of testing. The test supervisor stated in his interview that he specifically told the operator of train 121 to pass over the switches at 15 mph.

**Train operator 121:** I should stop?

**Test supervisor:** Roger, you can stop now.

**Train operator 121:** Roger that.

**Test supervisor:** Are you near a walkway?

**Train operator 121:** Affirmative. I'm now near the walkway and right now train No. 121 stopped at track section 3623.

The operator of train No. 121 repeated his location when he asked permission to change ends of his train at track section 3623. The test supervisor stated in interviews that he was not aware of train No. 121's location when it stopped at the end of the first test run.

The test supervisor stated that when train No. 121 returned to the Lefferts Boulevard station, the train operator told him he had exceeded 50 mph on his way back to the station. The test supervisor said he told the operator, "Oh no, don't go 55 to 60 mph. You know, follow the guide-ATC [automatic train control] guideway speed."

During the second test run, train No. 202 reached a top speed of 42 mph within the 30-second window required for the test. According to the on-board data logger, train No. 121 reached a speed of 44 mph within the 30-second time frame but then continued to accelerate. The train traveled at speeds of 50 mph and above for another 30 seconds before derailling in a curve rated for a 25-mph maximum speed. This curve was more than 1,500 feet past the point where the test design had called for the train to be stopped. Speed recorders indicate the train was traveling 58 mph just before it entered the curve. When the train derailed, the unsecured load of concrete slabs shifted forward, pinning the operator against the control console and causing fatal injuries. Toxicology tests performed on the deceased train operator were negative for alcohol and for all tested drugs.

## **Regulatory Requirements**

Because AirTrain-JFK receives no Federal or State monies, it is not subject to either Federal or State safety oversight programs. In addition, the Public Transportation Safety Board of New York has no jurisdiction over the AirTrain-JFK system.

## **Actions Taken Since Accident**

Since the accident, Bombardier has added a testing and commissioning manager with recent experience in the opening of a new line, hired a full-time training coordinator to identify employee training needs and organize required training, developed and implemented a train operator recertification training program for all operations and maintenance employees, and implemented workplace safety audits to identify safety hazards and take corrective actions.

Additionally, the Port Authority of New York and New Jersey has created an AirTrain-JFK oversight board to monitor conformance with established safety procedures and current industry standards for the operation and maintenance of AirTrain-JFK.

### **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the derailment of AirTrain No. 121 was the failure of the train operator, for undetermined reasons, to keep his train below maximum authorized speed and to stop his train at the location specified in the design of the test in which he was participating and the failure of Bombardier Total Transit Systems to take the actions necessary to ensure that the test trains were operated in accordance with the test protocols. Contributing to the severity of the accident was the failure to properly secure the load that had been added to the first car of the accident train.

Adopted: September 17, 2003