

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594**



**GROUP CHAIRMAN'S FACTUAL REPORT OF
INVESTIGATION**

DCA16MR011

**By
Charles Cates**

WARNING

The reader of this report is cautioned that the transcription of an image and audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

May 22, 2017

Onboard Image Recorder – Outward Facing

Group Chairman's Factual Report By Charles Cates

1. EVENT

Location: Hoboken, New Jersey
Date: September 29, 2016
Vehicle: Passenger Train Number 1614
Operator: New Jersey Transit (NJT)
NTSB Number: DCA16MR011

For a summary of the accident, refer to the *Accident Summary* report, within this docket.

2. GROUP

A group was convened on October 11, 2016. The group consisted of the following members:

Chairman: Chris Babcock
Aerospace Engineer
National Transportation Safety Board (NTSB)

Member: David Bucher
Rail Accident Investigator
NTSB

Member: Randy Fannon
Investigator
Brotherhood of Locomotive and Train Engineers (BLET)

Member: Fred Mattison
System Train and Engine (T&E) Compliance Officer
New Jersey Transit

Member: William Smith
Operations Specialist
Federal Railroad Administration (FRA)

3. DETAILS OF INVESTIGATION

On October 4, 2016, the NTSB Vehicle Recorder Division received the following solid state hard drive associated with an outward facing image recording system from NJT Train #1614:

Recorder Manufacturer/Model: **RailHead Systems 480GB Solid State Drive (SSD)**
Recorder Serial Number: **12009904**

3.1. Recorder Description

New Jersey Transit passenger train #1614 was equipped with a RailHead Systems forward facing image recorder. The RailHead Systems recorder installed in this train consists of two forward/outward facing video cameras that record to external storage, in this case a solid state hard drive with a proprietary file structure. One camera records video looking directly forward of the train from the area of the engineer's windshield at a resolution of approximately 768x494 pixels at 30 frames per second (fps) in color. The second camera records wide angle video looking forward from the lower right hand side of the train to capture wayside signal information. The second camera records at a resolution of approximately 758x540 pixels at 30 fps in color. External audio is synchronized to both cameras.

Figure 1. As-received condition of Railhead Systems 480GB data module.



3.2. Recorder Damage

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the RailHead Systems data module had not sustained any heat or structural damage. See figure 1 for an image of the as-received condition of the data module. The data was extracted normally, using the manufacturer's designed procedures and hardware.

3.3. Video Files

Files were extracted from the recorder as self-contained executable files. The executable file contains the manufacturer's video playback software and the desired video file. The time frame extracted from the recorder started prior to the train leaving the yard for its run through the collision at the Hoboken station.

3.4. Timing and Correlation

The times used in this report are expressed as local time of the accident (EDT).

Timing of the transcript was established by correlating the video events to common events on the locomotive's event recorder. For more information regarding time correlation, refer to the Locomotive Event Recorder Factual Report which can be found in the public docket for this accident.

For the remainder of this report, all times are given in EDT. Transcript times are given in EDT in the format HH:MM:SS.

3.5. Summary of Recording Contents

In agreement with the Investigator-In-Charge, an outward facing video group convened on October 11, 2016, and a transcript was prepared. It was determined that events would be transcribed between the time at which the locomotive was stopped in the yard prior to starting for the day, (06:55:00) and until the time the recording ended due to a power loss of the recorder (08:42:52).

3.5.1. Video Recording

Items in brackets are describing sounds that are heard on the recording. Items in quotation marks are words spoken that were picked up by the recorder.

06:55:00 The video begins around dawn. Weather conditions are partly cloudy with no restrictions to visibility.

06:58:30: The engineer and conductor approach the train.

06:58:52: [Sound similar to cab door opening followed by unintelligible vocalization/conversation]

07:01:35: "Looking good."

- 07:01:38:** [Sound of clunk, followed by clicks]
- 07:01:41:** [Sound of single beep]
- 07:01:46:** [Sound of two buzzes]
- 07:01:47:** [unintelligible words]
- 07:02:13:** [sound of clunk and beeps]
- 07:02:43:** "We're getting power, @conductor¹." [spoken from cab]
- 07:03:17:** [sound of several beeps, similar to cab signal test]
- 07:03:50:** [sound similar to communicating buzzer]
- 07:04:00:** [sound similar to communicating buzzer four times]
- 07:05:36:** [sound similar to light test alarm]
- 07:05:40:** [sound similar to communicating buzzer two times]
- 07:05:42:** Bell rings four times.
- 07:05:49:** Train begins to move forward, moves to the end of the rail yard and stops.
- 07:06:06:** [sound similar to cab signal alarm]
- 07:07:26:** [sound similar to door closing alarm bell]
- 07:08:45:** Conversation begins in the cab regarding shift schedules and other unrelated topics. Most of the conversation is unintelligible.
- 07:17:04:** Bell begins to sound, train begins moving forward.
- 07:17:34:** Four horn blasts sound as the train approaches and moves through a grade crossing. Unintelligible conversation continues.
- 07:17:44:** [sound similar to cab signal alarm]
- 07:18:18:** Running brake test performed.
- 07:18:18:** Bell stops sounding.

¹ Individual's name withheld for privacy concerns.

- 07:19:06:** [sound similar to cab signal alarm]
- 07:20:00:** Train approaches a grade crossing with bell sounding and four whistle blasts. The bell is silenced after passing through the crossing.
- 07:20:02:** [sound similar to cab signal alarm]
- 07:20:30:** Train approaches a grade crossing with bell sounding and four horn blasts. The bell is silenced after passing through the crossing.
- 07:21:20:** Train approaches a grade crossing with bell sounding and five horn blasts. Alerter sounds and is silenced. The bell is silenced after passing through the crossing.
- 07:22:18:** Train stops at the Spring Valley station.
- 07:24:38:** [sound similar to door closing alarm bell]
- 07:25:33:** [sound similar to communicating buzzer two times]
- 07:25:34:** Train departs the Spring Valley station with the bell sounding. The bell is silenced once the train is clear of the station.
- 07:26:01:** Train approaches a grade crossing with the bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:27:19:** Train approaches a grade crossing with the bell sounding and 5 horn blasts. The bell is silenced after passing through the crossing.
- 07:28:15:** Train approaches a bridge overpass with the bell sounding and 5 horn blasts. The bell is silenced after crossing the overpass.
- 07:28:44:** Sound of 2 horn blasts
- 07:28:59:** Train approaches a bridge overpass with the bell sounding and 4 horn blasts. The bell continues to sound after crossing the bridge.
- 07:29:48:** Sound of 3 horn blasts.
- 07:30:16:** Train approaches a grade crossing with bell sounding and four horn blasts. The bell continues to sound after passing through the crossing.
- 07:30:54:** Train stops at the Nanuet station. Bell is silenced.

- 07:31:30:** "Here we go." [spoken from cab]
- 07:31:54:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:32:02:** Train departs Nanuet station.
- 07:32:28:** Train approaches crossing with bell sounding and 4 horn blasts. The horn sequence was incomplete prior to reaching the crossing. The bell continues to sound.
- 07:33:16:** Train passes a clear signal.
- 07:33:50:** [sound similar to crew alerter for about 3 seconds]
- 07:33:55:** Train approaches a grade crossing with bell continuing to sound and 4 horn blasts.
- 07:34:12:** Train approaches a grade crossing with bell continuing to sound and 4 horn blasts. The horn sequence finished early, and two more blasts were heard immediately after passing the crossing.
- 07:34:55:** Train approaches a grade crossing with bell continuing to sound and 4 horn blasts.
- 07:35:14:** Train approaches a grade crossing with bell continuing to sound and 4 horn blasts.
- 07:35:48:** Train stops at the Pearl River station and the bell is silenced.
- 07:36:46:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:36:50:** Train departs the Pearl River station.
- 07:37:10:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:38:44:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:39:09:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.

- 07:39:27:** Train stops at the Montvale station at the 5 car marker.
- 07:39:53:** [sound similar to door alarm and communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:39:57:** Train departs the Montvale station.
- 07:41:08:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:41:23:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:41:45:** Train stops at the Park Ridge station at the 4 car marker.
- 07:42:26:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:42:31:** Train departs the Park Ridge station.
- 07:43:43:** Train passes a clear signal.
- 07:43:46:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:44:22:** Train stops at the Woodcliff Lake station.
- 07:44:50:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:44:56:** Train departs the Woodcliff Lake station.
- 07:45:50:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The horn sequence completes prior to reaching the crossing. The bell is silenced after passing through the crossing.
- 07:46:16:** Train passes through a grade crossing, starting a sequence of four horn blasts while entering the crossing.
- 07:46:44:** Train approaches 4 grade crossings in quick succession with bell sounding and horn blasts throughout. The bell is silenced after passing through the last crossing.

- 07:47:31:** Train stops at the Hillsdale station.
- 07:48:09:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:48:14:** Train departs the Hillsdale station.
- 07:48:42:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:49:16:** Train passes through a grade crossing with no horn or bell sounding. A horn sequence with 4 blasts starts after passing through the crossing.
- 07:49:25:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:49:36:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:50:14:** Train stops at the Westwood station.
- 07:50:58:** [sound similar to door alarm communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:51:04:** Train departs the Westwood station.
- 07:51:12:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:52:30:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:52:52:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:53:01:** Train approaches a grade crossing with bell sounding and 3 horn blasts. The bell is silenced after passing through the crossing.
- 07:53:23:** Train stops at the Emerson station.
- 07:54:15:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.

- 07:54:21:** Train departs the Emerson station and passes a work zone immediately adjacent to the track.
- 07:55:31:** Train passes a clear signal.
- 07:56:10:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:56:25:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:57:00:** Train stops at the Oradell station at the 4 car marker.
- 07:57:42:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 07:57:48:** Train departs the Oradell station.
- 07:58:42:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 07:59:48:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:00:26:** Train stops at the River Edge station.
- 08:01:14:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:01:19:** Train departs the River Edge station.
- 08:02:00:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:03:06:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:03:31:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:03:48:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.

- 08:04:25:** Train stops at the New Bridge Landing station just short of the 4 car marker.
- 08:05:20:** "You got a door hung up. Give me a second." [spoken from cab]
- 08:05:39:** [sound similar to door alarm and communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:05:42:** Train departs the New Bridge Landing station.
- 08:06:18:** Train passes clear signal.
- 08:06:59:** Train passes an approach limited signal.
- 08:07:04:** [sound similar to cab signal alarm]
- 08:07:07:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:07:19:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:07:33:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:07:41:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:07:48:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:08:20:** Train stops at the Anderson Street station.
- 08:09:01:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:09:07:** Train departs the Anderson Street station.
- 08:09:35:** Train passes through a grade crossing with no horn or bell.
- 08:09:48:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The four horn blast sequence completes after the train passes through the crossing.

- 08:09:58:** The bell continues to sound and four horn blasts are heard in an area where there is no crossing.
- 08:10:10:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:10:25:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:10:35:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:10:56:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:11:36:** Train stops at the Essex Street station.
- 08:12:52:** "We'll have to get that door outside." [spoken from cab]
- 08:12:53:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:12:59:** Train departs the Essex Street station.
- 08:13:34:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:15:00:** Train approaches station with one horn blast and bell sounding. The bell is silenced upon arrival at the station.
- 08:15:14:** Train stops at the Teterboro station.
- 08:16:05:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:16:10:** Train departs the Teterboro station.
- 08:16:31:** Train passes clear signal.
- 08:17:15:** Train passes clear signal.
- 08:17:16:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.

- 08:18:20:** Train approaches station with one horn blast and bell sounding. The bell is silenced upon arrival at the station.
- 08:18:54:** Train stops at the Wood Ridge station.
- 08:20:39:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:20:45:** Train departs the Wood Ridge station.
- 08:21:04:** Train passes clear signal.
- 08:21:10:** Train passes through a grade crossing with no horn. A four horn blast sequence starts after passing through the crossing.
- 08:21:47:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:22:07:** Train passes clear signal.
- 08:22:09:** Train passes through a grade crossing with no horn. A four horn blast sequence starts after passing through the crossing.
- 08:22:37:** Train passes clear signal
- 08:22:44:** Bell begins to sound with four horn blasts.
- 08:22:55:** Train approaches a grade crossing with bell sounding and 4 horn blasts. The bell is silenced after passing through the crossing.
- 08:23:01:** Train windshield wipers turn on. Light precipitation can be seen on the train's windshield.
- 08:23:26:** [sound similar to cab signal alarm]
- 08:23:43:** Train passes a limited clear signal.
- 08:24:46:** [sound similar to cab signal alarm]
- 08:25:08:** Train passes an advance approach signal.
- 08:25:54:** Alerter sounds for approximately 1 second.
- 08:26:28:** Train passes an advance approach signal.

- 08:26:44:** Train approaches drawbridge with one horn blast and bell sounding. Bell continues to sound after passing bridge.
- 08:27:00:** Train windshield wipers turn off.
- 08:28:36:** Bell silenced.
- 08:28:53:** Train passes an advance approach signal.
- 08:29:02:** Train windshield wipers turn on.
- 08:29:35:** Train passes an approach limited signal.
- 08:29:39:** Train passes through a grade crossing with horn blast sounding as the train passes through the crossing.
- 08:29:57:** Train approaches a grade crossing with 5 horn blasts.
- 08:30:21:** Train passes a clear signal.
- 08:31:02:** Train passes a clear signal.
- 08:31:22:** Train approaches station with one horn blast and bell and passes a clear signal.
- 08:31:31:** Train windshield wipers turn off.
- 08:32:10:** Train stops at the Seacaucus Junction station.
- 08:33:18:** [sound similar to communicating buzzer two times]
The bell begins to sound and continues until the train is clear of the station.
- 08:33:25:** Train departs the Seacaucus Junction station.
- 08:34:14:** Train passes a clear signal.
- 08:34:44:** Train passes an approach limited signal.
- 08:34:50:** [sound similar to cab signal alarm]
- 08:35:24:** Train passes an approach medium signal.
- 08:35:47:** [sound similar to cab signal alarm]
- 08:36:19:** [sound of thunk]

- 08:36:55:** Train passes a clear signal.
- 08:37:12:** Train enters a tunnel and the bell begins to sound.
- 08:37:53:** [sound of thunk]
- 08:38:05:** Train passes a clear signal.
- 08:38:42:** Train passes a clear signal.
- 08:39:16:** Train exits the tunnel and passes a clear signal. The bell is silenced when the train is clear of the tunnel.
- 08:39:46:** Train passes an approach medium signal.
- 08:39:51:** [sound similar to cab signal two times]
- 08:40:12:** Train passes an approach slow signal.
- 08:40:50:** Train passes a slow clear signal.
- 08:40:59:** The Hoboken station is in view and the train is headed towards the station. See figure 2 for a view of the station at this time.
[sound similar to cab signal]
- 08:41:01:** The cab signal is silenced.
- 08:41:22:** Train passes a slow approach signal.
- 08:41:53:** Horn sounds one blast.
- 08:41:55:** Bell begins to sound and continues to the end of the recording.
- 08:42:12:** The train reaches the far end of the asphalt platform at the Hoboken station.
- 08:42:20:** [sound similar to cab signal]
- 08:42:22:** The cab signal is silenced.
- 08:42:28:** The train passes under the edge of the canopy covering the platform.

08:42:49: The train is near the end of the track with the bumping post clearly visible. The signal to the lower right of the bumping post is glowing red.

08:42:50: [sound similar to surprised vocalization]
[sound of click]

08:42:51: [Sound similar to high pressure air release]
The train strikes the bumping post at the end of the track.
The train rides up over the bumping post.

08:42:52: The train strikes the panel at the end of the track.
The panel begins to fall.
A bright flash comes from the area of the panel.
Final video frame.

[End of recording]

Figure 2. View of the Hoboken station as the train progresses inbound.

