

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



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

HWY15MH006

**By
Bill Tuccio, Ph.D.**

WARNING

The reader of this report is cautioned that the summary of onboard audio and video recordings is not a precise science but is the best product possible from a Safety Board group investigative effort. The summary or parts thereof, if taken out of context, could be misleading. The summary 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 summary as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

July 30, 2015

Onboard Image Recorder

Group Chairman's Factual Report
By Bill Tuccio, Ph.D.

1. EVENT

Location: Oxnard, California
Date: February 24, 2015
Vehicle #1: 2005 Ford F450 Pick-up towing a 2000 Tandem
Axle Utility Trailer
Vehicle #2: Metrolink Commuter Train #102
Lead Cab #645
Trailing Locomotive #870¹
NTSB Number: HWY15MH006

2. GROUP

A group was convened on March 24, 2015.

Chairman: Dr. Bill Tuccio
Aerospace Engineer
National Transportation Safety Board (NTSB)

Member: Ted Turpin
Rail Safety Investigator
NTSB

Member: Jason Talley
Senior Railroad Safety Specialist
Federal Railroad Administration

Member: George M. Warren
Assistant System General Road Foreman
Amtrak

¹ In this report, Lead Cab #645 will be referred to as "Metrolink #645" and Trailing Locomotive #870 will be referred to as "Metrolink #870."

Member: R.T. McCarthy
Operations Director
Metrolink

Member: Carl W. Fields
Coordinator, Safety Task Force
Brotherhood of Locomotive Engineers and Trainmen

3. DETAILS OF INVESTIGATION

On February 25, 2015, the NTSB Vehicle Recorder Division received the following onboard image recorders from the Metrolink train.

Metrolink Car:	Metrolink #645
Recorder Manufacturer/Model:	RailHead
Recorder Identification:	Sticker: 00101355

Metrolink Car:	Metrolink #870
Recorder Manufacturer/Model:	RailHead
Recorder Identification:	Sticker: 18000269

3.1. Recorder Description

The RailHead video recording system is a digital video recording (DVR) system. The unit is not crash protected. Recorded digital video and audio may be played back using RailHead's "HDPlayer" proprietary software. The HDPlayer software supports simultaneous playback of multiple camera views and, when one camera view is played back, playback of recorded audio.

3.2. Recorder Damage

Upon arrival at the NTSB Vehicle Recorder Division, it was evident that the DVRs had not sustained any heat or structural damage and the audio and video information were viewed using the RailHead HDPlayer software.

3.3. Referenced Personnel

The audio and video recorded three distinct personnel. In this report, these personnel are referred to as follows (acronym references are in parentheses):

- **Student Engineer in Training (ET)**. The engineer at the controls of Metrolink #645 at the time of the accident.
- **Locomotive Engineer, On the Job Training Instructor (OJTI)**. The locomotive engineer providing instruction in Metrolink #645, seated behind the ET during the period of time transcribed.
- **Conductor (CON)**. The train conductor who was recorded only on the DVR audio of Metrolink #645.

3.4. Video Files

Metrolink #645 contained three camera angles:

- Exterior, forward facing (fwd facing);
- In-cab, profile (side-view); and
- In-cab, control stand (view from behind the student engineer).

One or more of the in-cab cameras recorded audio from inside the cab.

The pertinent view of Metrolink #870 recorded exterior, rearward facing video (rwd facing).²

All video was recorded in color at a resolution of 320x240 pixels at 30 frames per second. At the time of the accident, the lighting was dark, night conditions with many external lights and unobstructed visibility.

3.5. Timing and Correlation

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

Timing of the transcript was established by correlating the video events to common events on the Locomotive Event Recorder.³ Specifically, three horn events recorded by the Locomotive Event Recorder at 5:41:31, 5:41:38, and 5:41:43 PST were aligned with the same events recorded by the Onboard Image Recorder's audio track of Metrolink #645 at 5:41:51, 5:41:59, and 5:42:03 Onboard Image Recorder time. It was further noted that the times recorded by MetroLink #645 and Metrolink #870 were synchronized with each other.

Therefore, a relationship between PST (as determined by the Locomotive Event Recorder) and the Onboard Image Recorder can be developed. Specifically for this report, it is assumed that Onboard Image Recorder PST = Onboard Image Recorder Time – 20 seconds.

3.6. Summary of Recording Contents

The video group examined the video from the time Metrolink Train #102 was stopped at Oxnard Station until about 1 minute after the collision. The attached transcript was produced containing the columns shown in table 1.

² Metrolink #870 also had in-cab video and audio; however, the cab was not occupied and thus was not pertinent.

³ See the Locomotive Event Recorder in the public docket for this accident.

Table 1. Transcript column descriptions.

Column	Description
Time	Time in PST
Camera	Which cab and camera recorded the information
Video Description	Group description of the video images
Audio-Who	When audio was recorded, which person was the speaker
Audio-Text	What was said on the audio

Transcribed audio content uses the symbols shown in table 2.

Table 2. Transcription symbols.

Symbol	Meaning
*	Unintelligible word
#	Expletive
()	Questionable insertion
[]	Editorial insertion or paraphrased content.

Figure 1 shows an image from the Metrolink #645's forward facing camera at 5:42:41 PST.

Figure 1. Metrolink #645's forward facing video at 5:42:41 PST.



Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:38:40	645 In-Cab Control Stand	START OF TRANSCRIPT At Oxnard Station		
5:39:09	645 In-Cab Control Stand	ET tapped fingers of left hand on a piece of paper (paper identified as track warrants and bulletins) on center of Control Stand. OJTI was sitting in jumpseat (behind and slightly right of the ET).	ET	[sound of finger tapping]
5:39:35	645 In-Cab Control Stand		CON	(this is Oxnard. next station stop Camarillo.)
5:39:38	645 In-Cab Control Stand	ET stopped tapping fingers		[sound of beeping, similar to audible warning for doors closing]
5:39:39	645 In-Cab Control Stand	ET placed left hand on Reverser, which was in the center position		
5:39:41	645 In-Cab Control Stand	ET moved Reverser forward to forward position		[sound of click]
5:39:42	645 In-Cab Control Stand	ET moved Reverser back to center position		[sound of click]
5:39:44	645 In-Cab Control Stand	ET moved Reverser forward to forward position		[sound of click]
5:39:44	645 In-Cab Control Stand	Door Closed Circuit Light illuminated on Control Stand		
5:39:45	645 In-Cab Control Stand	ET moved left hand from Reverser to Throttle and moved Throttle backwards to position 2.	CON	Metrolink one oh two. highball. in on a clear delayed in block. out.
5:39:47	645 In-Cab Control Stand	ET placed left hand in lap.		
5:39:48	645 In-Cab Control Stand	ET depressed a button on the Control Stand with his right hand. ET then placed right hand on Automatic Brake Valve Handle		[sound of electronic bell begins]
5:39:49	645 In-Cab Control Stand	ET moved Automatic Brake Valve Handle backwards towards the release position; the white indicators on the Duplex Air Gauges moved clockwise to about the 12 o'clock position. ET placed right hand in lap.		[sound of click]

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:39:54	645 In-Cab Control Stand	ET placed right hand on Automatic Brake Valve Handle and pulled it backwards to full release position; the Duplex Air Gauges white indicators moved clockwise to about the 12:30 o'clock position (110 psi). ET's hand remained on the Automatic Brake Valve Handle.		[sound of click]
5:39:56	645 In-Cab Control Stand	With left hand, ET reached for radio handset, removed it from cradle, and positioned next to left ear.		[sound of click]
5:39:57	645 In-Cab Control Stand		ET	*** Oxnard D-I-B out ***.
5:40:00	645 In-Cab Control Stand	ET replaces radio handset in cradle. ET left hand returns to lap.		[sound of click]
5:40:02	645 In-Cab Control Stand	Train begins to move forward		
5:40:04	645 In-Cab Control Stand	ET placed left hand on Throttle and moved Throttle backwards to about position 4 or 5; ET then placed left hand in lap.		[sound of 3 clicks]
5:40:08	645 In-Cab Control Stand	ET pushed the 3rd button from the right of Control Stand, turning off the bell; then placed right hand in lap.		[sound of bell stopped]
5:40:13	645 In-Cab Control Stand	ET placed left hand on Throttle and moved Throttle backwards to about position 5 or 6; ET then placed left hand in lap.		[sound of two clicks]
5:40:21	645 In-Cab Control Stand	ET placed left hand on Throttle and moved Throttle backwards to about position 7 or 8; ET then placed left hand in lap.		[sound of one click]
5:40:35	645 In-Cab Control Stand	ET facing forward with both hands on lap; remains so until for about the next 9 seconds.		

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:40:44	645 In-Cab Control Stand	ET moved right hand and pressed 4th button from the right on the Control Stand (the Alerter Reset Button); the button illuminated momentarily.		[sound of click]
5:41:02	645 Fwd Facing	Train exited the curve and entered tangent track southbound. The lights of the accident truck appeared on the video; however, due to camera resolution limitations and the distance from the truck, only one bar of white, steady light was visible. Ahead of the accident truck lights, cars were passing east/west at the Rose Ave. grade crossing.		
5:41:04	645 Fwd Facing	Right forward of train, green upward facing arrow reflectorized sign (designates resume maximum speed of 79 mph passenger, 60 mph freight). In distance, South Oxnard control signal was visible and illuminated green to the right of the tracks and past the Rose Ave. grade crossing.		
5:41:04	645 In-Cab Profile		OJTI	clear.
5:41:05	645 In-Cab Profile		ET	clear.
5:41:06	645 In-Cab Profile	With left hand, ET reached for radio handset, removed it from cradle, and positioned next to left ear. Also, with right hand pressed 4th button from the right on the Control Stand (the Alerter Reset Button); the button illuminated momentarily.		[sound of click]
5:41:07	645 In-Cab Profile		ET	one oh two. clear South Oxnard. over. [spoken into radio handset]
5:41:10	645 In-Cab Profile	ET placed radio handset back in cradle		[sound of click]

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:41:14	645 In-Cab Profile		CON	clear South Oxnard Metrolink one oh two.
5:41:23	645 In-Cab Control Stand	ET moved right hand and pressed 4th button from the right on the Control Stand (the Alerter Reset Button); the button illuminated momentarily.		[sound of click]
5:41:30	645 Fwd Facing	Lead car of train passed Milepost 405 sign and reflectorized sign with an "X" (Whistle Board).		
5:41:30	645 In-Cab Control Stand	ET moved right hand and pressed the 3rd button from the right (electronic bell).		[sound of electronic bell begins]
5:41:31	645 In-Cab Control Stand	ET moved right hand and holds down the 1st button from the right (horn) with his thumb for 3 seconds.		[sound of horn]
5:41:34	645 Fwd Facing	Lights of Rose Ave. grade crossing were flashing and crossing gates were in motion, downward.		
5:41:39	645 In-Cab Control Stand	ET still had his thumb over the 1st button from the right (horn); and held the button down for 3 seconds.		[sound of horn]
5:41:43	645 In-Cab Control Stand	ET still had his thumb over the 1st button from the right (horn); and held the button down for 1 second.		[sound of horn]
5:41:46	645 In-Cab Control Stand	ET still had his thumb over the 1st button from the right (horn); and held the button down for 4 seconds.		[sound of horn]
5:41:48	645 Fwd Facing	Lead car of train passed over Rose Ave.		
5:41:52	645 In-Cab Control Stand	ET moved right hand from 1st button from right to 3rd button from right and pressed 3rd button from right (electronic bell).		[sound of bell stopped]

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:41:56	645 Fwd Facing	White lights of accident truck first appeared to pulsate; however, due to camera resolution limitations and the distance from the truck, it was not clear what the source of the flashing was or the actual color of the flashing source.		
5:41:58	645 Fwd Facing	Lead car of train passed the South Oxnard control signal.		
5:42:07	645 In-Cab Control Stand	ET moved right hand and pressed 4th button from the right on the Control Stand (the Alerter Reset Button); the button illuminated momentarily.		[sound of click]
5:42:12	645 In-Cab Control Stand	ET turned head to left, raised right hand to ear. Remained in this position for 2 seconds.		
5:42:15	645 Fwd Facing	As the train got closer to the truck, details became clearer: the two headlights of the accident truck were distinguishable forward of the train; one headlight was right of the right rail, the other was between the two rails.		
5:42:16	645 In-Cab Control Stand	ET moved right hand and pressed the 3rd button from the right (electronic bell) ⁴ .		[sound of click]
5:42:17	645 In-Cab Control Stand	ET moved right hand and pressed the 3rd button from the right (electronic bell).		[sound of click]
5:42:23	645 Fwd Facing	As the train got closer to the truck, the pulsating lights on the accident truck were identifiable as follows: two white, steady headlights; two yellowish-orange hazard lights below the headlights.		

⁴ The group could not hear the bell unless otherwise documented.

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:42:25	645 In-Cab Control Stand	ET momentarily looked to left, then back forward.		
5:42:29	645 In-Cab Control Stand	ET moved right hand and pressed the 3rd button from the right (electronic bell).		[sound of click]
5:42:30	645 Fwd Facing	Lead car of train passed Milepost 406 sign and reflectorized sign with an "X" (Whistle Board).		
5:42:30	645 In-Cab Control Stand	ET moved right hand and held down the 1st button from the right (horn) with his thumb for 3 seconds.		[sound of horn for 3 seconds]
5:42:31	645 In-Cab Control Stand	ET moved left hand to Throttle and moved Throttle forward to idle position.		[sound of clicks]
5:42:31	645 Fwd Facing	Lead of train passed Milepost 406.		
5:42:32	645 In-Cab Control Stand	ET adjusted posture in seat, moved torso upright and forward.	ET	(you see) that (a) car?
5:42:33	645 In-Cab Profile	OJTI began to move forward and up from jumpseat; looking forward.		
5:42:33	870 Rwd Facing			[sound of engine decreases]
5:42:34	645 In-Cab Control Stand	ET moved right hand to Automatic Brake Valve Handle.	OJTI	yeah. yeah. plug it.
5:42:34	645 In-Cab Profile	OJTI was nearly fully upright, torso and head leaning forward.		
5:42:36	645 In-Cab Control Stand	ET moved Automatic Brake Valve Handle all the way forward to the emergency position. White indicators on Duplex Air Gauges began to move counter-clockwise towards the 7 o'clock (zero psi) position.		[sound of rushing air, similar emergency brake application]
5:42:36	645 In-Cab Profile	OJTI reached his right hand across his torso in the direction of the radio handset, stopping short of the handset.		

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:42:36	645 In-Cab Control Stand	ET raised the left arm rest and began to move his torso left while removing his left hand from the Throttle.	OJTI	let's go.
5:42:37	645 Fwd Facing	The train was now close enough to the truck to discern that the driver's side door was open; the truck's running lights on top of the cab were on and illuminated yellowish.		
5:42:37	645 In-Cab Control Stand	ET momentarily put his hand on the throttle.		
5:42:37	645 In-Cab Profile	OJTI stopped reaching forward and began to move his body backwards, opened the cab door while his head was still looking forward; then OJTI rotated his body towards the back of the cab compartment and exited the cab.		
5:42:38	645 In-Cab Control Stand	ET began to get out of his chair towards the left and backwards.		
5:42:38	645 In-Cab Profile	OJTI was no longer visible to any camera.		
5:42:39	645 In-Cab Control Stand	ET's body was out of his seat and he maneuvered his legs through the limited space between the left of the seat and the left wall of the control cab; moving towards the back of the cab rapidly.		
5:42:40	645 In-Cab Profile	ET was no longer visible to any camera (control compartment was now empty).		
5:42:41	645 Fwd Facing	No persons were visible in or around the accident truck. The S. Rice Ave. grade crossing gates were down and red lights were flashing.		
5:42:43	645 Fwd Facing	Lead car of train impacted the truck.		[sound of first impact]

Time (PST)	Camera	Video Description	Audio-Who	Audio-Text
5:42:44	645 Fwd Facing	Lead car exited tracks to the left.		[sound of rapid, high pitch beeping, similar to the Alerter]
5:42:49	645 Fwd Facing	Lead car struck cement columns on a fence and continued to turn left.		[sound of 2nd impact]
5:42:50	870 Rwd Facing	Orange glow began to appear in video image.		
5:42:50	645 Fwd Facing	Lead car began to roll over (right rotation).		[sounds of scraping]
5:42:54	870 Rwd Facing	Fire visible west of the track. S. Rice Ave. crossing gates were in motion upward.		
5:42:55	645 Fwd Facing	Lead car stopped, camera angle consistent with car resting on right side.		[sounds of scraping]
5:42:56	870 Rwd Facing	Rear locomotive came to a stop, south of S. Rice Ave.		
5:42:58	645 Fwd Facing	Lead car moved back and forth, consistent with being struck by another railroad car.		[sound of 3rd impact.] [sound of person groaning.] [sound of ringing bell.]
5:43:10	645 Fwd Facing			[sounds of groaning, sounds of screaming.]
5:43:13	870 Rwd Facing	Automotive vehicles resumed crossing S. Rice Ave.		
5:43:22	870 Rwd Facing			[Rear Locomotive engine sound decreased, similar to reducing to low idle.]
5:43:40	645 Fwd Facing	END OF TRANSCRIPT		[sound of groans, distress, continue]