

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

July 28, 2020

Onboard Image Recorder

Specialist's Factual Report

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1. EVENT

Location: Mount Pleasant Township, Pennsylvania
Date: January 5, 2020
Vehicle: 2018 Freightliner Cascadia Semi-truck with 2019 Hyundai Semitrailer
Operator: FedEx Ground
NTSB Number: HWY20MH002

For a summary of the event, refer to the *Crash Summary Report* which is available in the docket for this investigation.

2. ONBOARD IMAGE RECORDER GROUP

An onboard image recorder group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following electronic files:

Recorder Manufacturer/Model: **Lytx DriveCam Files**

Recorder Serial Number: **Unknown**

3.1. Lytx DriveCam Description

The Lytx DriveCam is a driver monitoring and recording device mounted on a vehicle's windshield that continually tracks driving performance metrics and records pertinent information when triggered by critical events, such as stability control or hard braking. The Lytx DriveCam has both an outward and inward-facing camera, an integrated omnidirectional microphone, a 9-axis accelerometer (accelerometer, gyroscope, and magnetometer), built-in motion sensor, and built-in GPS. As an option, the unit can record parameters (speed, fuel, vehicle data) from the vehicle's engine control monitor (ECM).

The DriveCam continuously records video at a maximum resolution of 752 x 548 pixels at 10 frames per second (fps) and stores it to the device's 64GB internal memory. Unlike video, audio and parametric data are only stored to the device's internal memory when a lateral or longitudinal acceleration threshold is exceeded, referred to as an event by the manufacturer. For this device, the event threshold was a 0.6 g longitudinal or a 0.6 g lateral g-force.

Singular event records are approximately 12 seconds long, beginning at 8 seconds before the event and continuing for 4 seconds after the event. If multiple events occur within the 12 second recording period, the device creates additional data files to record at minimum 4 seconds of parametric data following the last event.

3.2. Time Correlation

Time in this report is expressed as video elapsed time, which is the time from the beginning of the recording made by the Lytx DriveCam.

3.3. Summary of Recording Events

In agreement with the Investigator-in-Charge, a video group did not convene, and a summary report was prepared.

This report covers only the video and audio data captured on the device. For parametric data, refer to the Event Data Recorder Factual Report available in the public docket for this event.

3.3.1. Forward-Facing Camera (FFC) Description and Summary

The video from the Lytx DriveCam FFC was in color and was provided in .mp4 format with a frame size of 640 x 352 pixels at 10 frames per second (fps). The video had a file size of 8.8 MB and a duration of three minutes and thirty-one seconds. The camera was mounted on the windshield and per the manufacturer provided an 82-degree field of view, which included the median, both travel lanes, and the right shoulder. Light snow was seen falling throughout the FFC's field of view for the duration of the recording.

Audio was captured for 16 seconds surrounding the impact of the semi-truck and motorcoach at a sampling rate of 32 kHz.

The following events were observed at the indicated times as shown in Table 1 and Figure 1 to 4.

Table 1. Observations from forward-facing camera.

Video Elapsed Time (mm:ss)	Observations
00:01	At the start of the video, the view included the center median, both travel lanes, and the right shoulder. All lane markings were visible ¹ . The semi-truck was traveling in the right, westbound lane. No accumulated snow was visible on the road surface. See Figure 1.
00:19 to 00:21	The motorcoach could be seen passing the semi-truck in the left, westbound lane. Rear lights on the motorcoach were illuminated. See Figure 2 and 3.

¹ Refer to the Highway Group Chairman's Factual Report for more details related to the roadway layout and nomenclature.

Video Elapsed Time (mm:ss)	Observations
00:22 to 00:41	The motorcoach brake lights illuminated on and off as it traveled further away from the semi-truck and passed two curves. The motorcoach remained in the left lane.
00:42	The motorcoach traveled around a curve and was no longer visible to the FFC.
00:58	The semi-truck traveled around the curve and the rear lights of the motorcoach were again visible ahead.
01:08	The motorcoach was no longer visible.
01:32	The semi-truck traveled around a curve toward the accident site.
01:35	The semi-trucks headlights illuminated the accident site and the motorcoach could be seen on its side blocking both westbound lanes. Debris were scattered in the roadway from the median to the shoulder. See Figure 4.
01:36	The semi-truck maneuvered into the left lane.
01:40	The semi-truck impacted the underbelly of the motorcoach.
01:41	The semi-truck came to a rest.
01:43	The semi-truck was struck from behind and pushed forward, then impacted the underbelly of the motorcoach again.
01:45 to 02:27	Smoke from the impact obscured the view of the camera.
02:28	The camera fell and showed an interior view of the cab, including the driver, who was still sitting in the driver seat.
03:31	The video ended.



Figure 1. FFC View.



Figure 2. Motorcoach Passing Semi-truck – FFC.



Figure 3. Motorcoach After Passing the Semi-truck - FFC.



Figure 4. First View of Overturned Motorcoach – FFC.

3.3.2. Inward-Facing Camera (IFC) Description and Summary

The video from the Lytx DriveCam IFC was in color and was provided in .mp4 format with a frame size of 640 x 352 pixels at 10 fps. The video had a file size of 9.5 MB and a duration of three minutes and thirty-one seconds. The camera was mounted on the windshield and per the manufacturer provided a 131-degree field of view of the cab, which included the driver and passenger window, the driver and passenger seats, and the entryway to the sleeper berth.

Audio was captured for 16 seconds surrounding the impact at a sampling rate of 32 kHz.

The following events were observed at the indicated times as shown in Table 2 and Figure 5.

Table 2. Observations from inward-facing camera.

Video Elapsed Time (mm:ss)	Observations
00:01	At the start of the video, the driver was sitting in the driver's seat with both hands on the steering wheel. The driver's three-point ² seat belt was visible and buckled. The driver was facing forward and was wearing over the ear headphones. The passenger seat was empty.

² A three-point seat belt is a safety harness with three mounting positions. The seat belt is built in a Y-shaped configuration and resembles a lap seat belt with the addition of a shoulder harness. Three-point safety belts help restrain the passenger's upper body in a collision.

Video Elapsed Time (mm:ss)	Observations
00:19 to 00:21	The motorcoach was seen through the driver's side window passing the semi-truck. Headlights on the motorcoach were illuminated. See Figure 5.
00:57 to 01:11	The driver reached with one hand to grab a beverage and drank it. The driver then set down the first beverage and picked up a second beverage to drink. While drinking the beverages, one of the driver's hands remained on the steering wheel and the driver's eyes were looking straight ahead toward the direction of travel.
01:12	Both hands returned to the steering wheel.
01:35	The driver reacted to seeing the motorcoach overturned and blocking both lanes of traffic. The driver exclaimed "oh [REDACTED]. oh [REDACTED]. hold on. hold on." The driver moved backward in the seat and gripped the steering wheel firmly with both hands and slightly maneuvered the steering wheel to the left.
01:40	The semi-truck impacted the motorcoach. The driver's headphones fell off. Both hands remained on the wheel. The driver exclaimed, "oh [REDACTED]."
01:41	The semi-truck came to a rest.
01:43	The driver was thrown back and toward the passenger seat due to another impact. Both hands left the steering wheel.
01:46	The driver returned to the upright position in the seat and put both hands on the steering wheel. The driver's three-point seat belt was still buckled.
02:10	The driver looked back into the sleeping berth. No movement was noticed.
02:15	The driver removed the three-point seat belt.
02:27	The interior cab light illuminated.
02:44	The driver re-buckled the three-point seat belt.
03:31	The video ended.



Figure 5. View of Cab from IFC³.

³ Note: Motorcoach can be seen passing in the driver's window.