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National Highway Traffic Safety Administration

NHTSA

DOT HS 813 767

March 2026

# Special Crash Investigations: On-Site Ambulance Crash Investigation; Vehicle: 2018 Chevrolet Silverado 3500 Type I Ambulance; Location: Kentucky; Crash Date: April 2024

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**15. Supplementary Notes**

Each crash represents a unique sequence of events and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was submitted.

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**16. Abstract**

This on-site investigation documents the front plane underride crash of a 2018 Chevrolet Silverado 3500 Type I ambulance and a 2021 Kenworth T3 series refrigerated box truck. The front of the ambulance struck and underrode the left side of the Kenworth. The crash resulted in fatal injuries to the ambulance's belted 26-year-old male EMT driver and 75-year-old male patient secured to the cot, and police-reported B-level (non-incapacitating) injuries to the belted 22-year-old male EMT seated in the patient compartment. The ambulance emergency lights and siren were not activated. The Kenworth was stopped at a stop sign to make a left turn. As it began the left turn, the front plane of the ambulance struck the left side of the Kenworth and underrode it.

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**Special Crash Investigations**
**On-Site Ambulance Crash Investigation**
**Case Number: CR24010**
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**Location: Kentucky**
**Crash Date: April 2024**

## Background

This on-site investigation documents the front plane underride crash of a 2018 Chevrolet Silverado 3500 Type I ambulance (Figure 1) and a 2021 Kenworth T3 series refrigerated box truck (Figure 2). The front of the ambulance struck and underrode the left side of the Kenworth. The crash resulted in fatal injuries to the ambulance's driver and patient, and police-reported B-level (non-incapacitating) injuries to the emergency medical technician (EMT) seated in the patient compartment.

This crash occurred in April 2024 and was identified by the National Highway Traffic Safety Administration's Office of Emergency Medical Services. Investigation of the crash was assigned to the Special Crash Investigations (SCI) team at Crash Research & Analysis, Inc. in April 2024. The SCI team established cooperation with the police in April 2024. The investigating officer arranged a group inspection of the vehicles that included attorneys and investigators/recon-structionists. Inspection of the vehicles and the crash scene were completed in June 2024.

*Figure 1. The 2018 Chevrolet Silverado 3500 Type I ambulance*

*Figure 2. The 2021 Kenworth T3 (detached box immediately behind)*

The crash occurred in the three-leg intersection of an undivided U.S. highway and a county roadway. The ambulance was traveling north on the U.S. highway and the driver intended to go straight ahead. The vehicle's emergency lights and siren were not activated. The Kenworth was stopped at a stop sign, facing west on the county roadway. As the driver began the left turn across the highway the front plane of the ambulance struck its left side and underrode it. During its approach the ambulance had begun braking and steering to the right. The impact separated the cargo box from the Kenworth and both vehicles were redirected north, across the southbound lanes, and onto the west roadside. The ambulance came to final rest facing north and the Kenworth facing west.

The ambulance was driven by a belted 26-year-old male and transported a belted 22-year-old male EMT and a 75-year-old male patient secured to the patient cot. The driver and patient were

fatally injured and transported to the medical examiner. The EMT was taken by ambulance to a hospital where he was admitted for one night. The Kenworth driver sustained police-reported C-level (possible) injuries, and an ambulance took him to a hospital. His injury information is unknown. Both vehicles were towed due to damage.

On-site investigation included documentation and measurement of the ambulance's exterior and interior damage and intrusion, identification of occupant contact points, assessment of the manual and supplemental restraint systems, and detailed inspection of the patient compartment and its Stryker Power-Pro 2 patient cot. Additional on-site work included documentation of the crash site's physical environment using photographs and a total station mapping system. A surveillance camera from a business at the intersection recorded the crash and the police gave the video to the SCI team. The Chevrolet had an event data recorder (EDR) that was imaged by the police and a PDF copy of the data was given to the SCI investigator.

## Ambulance Service Information

The SCI team collected the following information from the municipal ambulance service, that had been in operation for 41 years, providing non-emergency transfer as well as 911 service. Its area of responsibility was 1,753 square km (677 square miles) with a reported population of 65,654 that were covered by 13 ambulances.

The service required its drivers to take the Volunteer Firemen's Insurance Services emergency vehicle operators' course as well as State fire rescue training. This training was provided by in-house and State fire/rescue training personnel and included classroom and driving instruction. Defensive driving was included in the training and recertification was required every 2 years. The driver was an EMT who had been employed by the service for 16 months. He had been an EMT for 2 years. His work schedule was random and he had been working for 1.5 hours at the time of the crash. He did not work the day before the crash.

The EMT in the patient compartment was a part-time employee and had been with the service for 2 months. His work schedule was variable. He had been working for 1.5 hours at the time of the crash.

The patient sustained a fall at a regional hospital and was being transported to an urban medical center.

## Summary

### Crash Site

The crash occurred during the day in the intersection of a 6-lane undivided U.S. highway and a two-lane undivided county roadway. Weather and police reports indicated dry conditions, a temperature of 20 °C (68 °F), and 16 km/h (10 mph) winds from the southwest. The ambulance's five-lane highway was level bituminous and was oriented southwest/northeast. The roadway curved slightly left with a radius of 1,084 m (3,556 ft). There were two through lanes in each direction that were separated by a center left turn lane. There was also a right turn lane on the northbound side of the trafficway. All lanes were 3.6 m (12.0 ft) wide and the speed limit was 89 km/h (55 mph). The Kenworth's country roadway had one lane in each direction that were 4 m (13.1 ft) wide in a general east/west direction but at the junction with the U.S. highway, the roadway was oriented in a northwest/southeast direction. There was no posted speed limit for this roadway. A crash diagram is included at the end of this report.

### Pre-Crash

The ambulance was traveling northeast in the second through lane at an EDR recorded speed of 142 km/h (88 mph) 5.0 seconds prior to algorithm, enable (AE). The driver intended to continue straight ahead (Figure 3). People in surrounding traffic who saw the ambulance reported it was weaving in and out/around traffic. Its emergency lights and siren were not activated. A surveillance camera located on a business at the intersection recorded the crash and the video showed the Kenworth initially facing northwest and stopped at the stop sign, just in front of the stop bar. The driver then pulled forward about 1.5 m (5 ft) and stopped again. The driver was intending to cross the northbound lanes of traffic and turn left onto the U.S. highway (Figure 4) to go south. The video showed the Kenworth proceeding northwest, into the center of the intersection and the ambulance could be seen approaching from the south. Based on roadway markings made by the police, the ambulance driver braked and steered to the left in an attempt to avoid contact with the Kenworth. The EDR recorded the driver began braking 2.0 seconds prior to AE. At AE the speed of the ambulance was 108 km/h (67 mph).

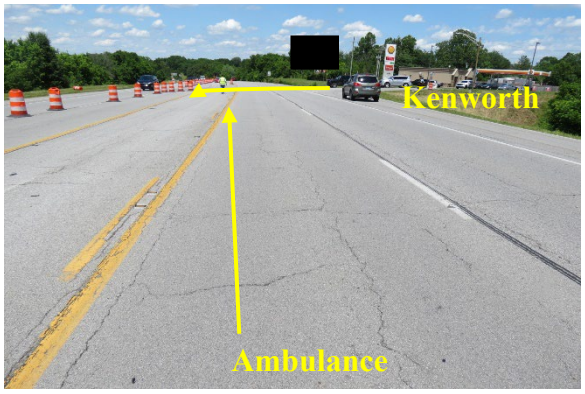


*Figure 3. Northeast view, ambulance's pre-crash travel path to impact area (note: construction barrels were not present at time of crash)*

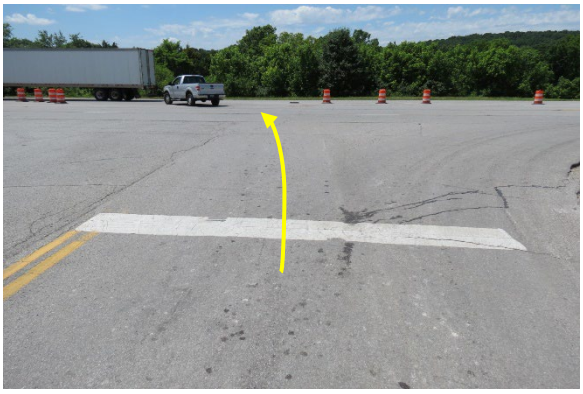

*Figure 4. Northwest view, Kenworth's pre-crash travel path to impact area (note: construction barrels were not present at time of crash)*

## Crash

The front of the ambulance struck the left side of the Kenworth at the back and behind of the left corner of its cab (Event 1). During the impact, the ambulance's front plane underrode the refrigerated cargo box and truck frame (Figure 5). The impact separated the cargo box from the truck's frame (Figure 6). Both vehicles were redirected to the left, across both southbound lanes and onto the west roadside. The ambulance came to final rest facing north and the Kenworth was facing west.

*Figure 5. West view, video surveillance of impact. Image used with permission.*


*Figure 6. Video surveillance of impact, truck/ cargo box separation from truck frame (ambulance is under truck). Image used with permission.*

## Post-Crash

The EMT ambulance driver and patient were fatally injured and removed from the ambulance by rescue personnel. They were transported to a medical examiner. The EMT passenger exited the vehicle under his own power and tried to render aid to the driver and patient. He sustained police-reported B-level injuries and was transported by ambulance to a hospital where he was admitted for one night. Requests for his injury and treatment information were refused. The Kenworth driver sustained police-reported C-level injuries and was transported by ambulance to a hospital. His medical records were not obtained. Both vehicles were severely damaged and were towed from the crash scene.

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## 2018 Chevrolet Silverado 3500 Type I Ambulance

### Description

The Chevrolet was constructed as an incomplete vehicle with the VIN 1GB3KZCY8JFxxxxxx and had a 6.6-liter, 8-cylinder, diesel engine with 4-wheel drive. It was configured on a 426 cm (167.7 in) wheelbase and had antilock brakes on all 4 wheels, stability and traction control, emergency brake assist, seat belt retractor pretensioners, and dual stage frontal air bags. Crash avoidance features were optional for this model, and it is unknown if any of the features were present. The gross vehicle weight rating was 5,988 kg (13,200 lb) with a front rating of 2,540 kg (5,600 lb) and a rear rating of 4,423 kg (9,750 lb). The manufacturer's recommended tires size was LT235/80R17. The ambulance had Goodyear Wrangler Workhorse HT tires, all the recommended size. All tires were in good condition prior to the crash with a minimum of 7 mm (9/32 in) tread on each tire.

The patient compartment was manufactured by REV Ambulance Group Orlando, Inc.,[1] in May 2018, installed onto the Chevrolet chassis in the same year, and completed as a truck-based Type I ambulance. It was a certified "Star of Life" ambulance, conforming to Federal Specification KKK-A-1822F on the date of manufacture. This specification refers to the General Services Administration's standard for minimum specifications, test parameters, and criteria for design, performance, equipment, and appearances of ambulances.

### Exterior Damage

The front plane of the ambulance struck the left side of the Kenworth at a speed estimated at 108 km/h (67 mph) and underrode the refrigerated cargo box and frame. The entire front plane sustained direct damage that extended rearward to the right front portion of the patient compartment (Figure 7). The Field L was 182 cm (71.7 in). Crush measurements were taken on the front bumper beam. Above-bumper crush measurements were not taken as there were no remaining measurable structures. The maximum residual bumper crush was 56 cm (22.0 in) and occurred 58 cm (22.8 in) left of the center line. The residual crush profile of the bumper was C1 = 52 cm (20.5), C2 = 56 cm (22.0 in), C3 = 55 m (21.7 in), C4 = 50 cm (19.7 in), C5 = 50 cm (19.7 in), C6 = 42 cm (16.5 in). The WinSMASH program could not be used for this impact since medium-heavy vehicles are out of scope for the program. The Truck Deformation Classification[2] for frontal impact damage was 12FDAW9.

[1] Located in South El Monte, CA, it is a subsidiary of REV Group, Inc., Brookfield, WI.
[2] SAE J1301_202206 – SAE Recommended Practice describing truck (medium, heavy, and articulated combination) collision damage in an alphanumeric format.


*Figure 7. Overhead view of front end/cab damage (WS header noted for reference)*

## Event Data Recorder

The Chevrolet had a sensing diagnostic control module mounted to the floor on the center tunnel. The module monitored the diagnostic functions of the vehicle's passive safety systems (air bags and seat belt pretensioners) and controlled their actuation and deployment based on crash event severity. It had EDR capabilities. The module was removed during the police investigation and imaged by the police via a direct-to-module connection using the Bosch Crash Data Retrieval tool and software version 23.4. A PDF copy of the data was given to SCI at the conclusion of the police investigation and is attached to the end of this report as Appendix A.

The EDR could record non-deployment and deployment events and could store up to three records. Non-deployment events record pre-crash and crash data but do not deploy an air bag. The minimum recorded vehicle velocity change that was needed to record a non-deployment event was 8 km/h (5 mph). The oldest non-deployment event could be overwritten by a deployment event, if all three records were full and the non-deployment event is not locked. A non-deployment event could also be overwritten by a more recent non-deployment event if all three records are full and the non-deployment is older than approximately 250 ignition cycles. Non-deployments could also be recorded if one of the following occurs without the deployment of any of the frontal air bags, side air bags, or roll bars: pretensioner only deployment, head rest deployment, battery cut-off deployment. Deployment events are locked events containing pre-crash and crash data and cannot be overwritten.

The EDR was imaged by the police on ignition cycle 16,551 and contained two deployment records. Event Record 1 was a historical event that occurred on ignition cycle 12,455 and was not related to this crash. Event Record 2 occurred on ignition cycle 16,551 and its data was attributed to this crash.

*System Status at Event (Event Record 2):* This deployment event was recorded because of the ambulance's impact with the Kenworth. The frontal air bag warning lamp status was "Off" prior to the impact and the event was completely recorded. The driver's seat belt status was "Not Buckled," and the frontal air bag suppression switch status (for the front passenger position) was "On" (enabled)". The maximum longitudinal and lateral delta Vs were -73 km/h (-45 mph) and -17 km/h (-11 mph) and occurred at 298 msec and 216 msec after AE. The first stage of both driver and passenger frontal air bags deployed 9 msec after AE. Neither air bag's second stage deployed. The seat belt pretensioners were commanded 9 msec after AE.

The pre-crash data reported that the ambulance was traveling 142 km/h (88 mph) 5.0 seconds prior to AE and steady accelerator pedal application of 32 or 33 percent. The accelerator pedal percentage became 0 percent -2.5 seconds prior to AE and the brake status was "On" -2.0 seconds prior to AE due to a presumed driver avoidance maneuver. Steering was not recorded. The ambulance's pre-crash speed at AE was 108 km/h (67 mph).

## Interior Damage

The ambulance cab sustained significant damage and intrusion from the impact with the Kenworth. The right A-pillar, right, and center instrument panels intruded longitudinally 67 cm (26.4 in), 58 cm (22.8 in), and 44 cm (17.3 in) (Figure 8). The contact to the Kenworth frame rail bent the steering wheel rim 14 cm (5.5 in), to a 90° angle rearward (Figure 9). The driver seat was deformed and came loose from the floor/seat track due to passenger compartment intrusion. There were blood stains on the driver's air bag and windshield, but there were other no discernable occupant contacts in the vehicle interior.


*Figure 8. Right A-pillar/IP intrusion*

*Figure 9. 90° steering wheel deformation during Kenworth frame underride*

## Manual Restraint Systems

The front row had lap and shoulder seat belts with sliding latch plates, adjustable D-rings, and retractor pretensioner. The driver's adjustable D-ring was in the full down position. The driver was restrained by the lap and shoulder seat belt as evidenced by the extended webbing cut by rescue personnel, 14 cm (5.5 in) below the D-ring. It should be noted the EDR reported the seat

belt was not buckled. The seat belt pretensioner likely actuated since the remaining belt webbing would not retract into the B-pillar, consistent with usage.

### Supplemental Restraint Systems

The ambulance had driver and front passenger dual stage frontal air bags, both of which deployed during the crash. The driver air bag was removed from the steering assembly by other unknown investigators prior to SCI inspection. Significant blood was found on the front (Figure 10) and back of the air bag fabric and there was a small tear on the back side lateral to the vent port.

*Figure 10. Blood transfers on air bag*

### Ambulance Patient Compartment

The patient compartment had one right-side door and double doors on the back for patient/EMT egress. Storage cabinets were available along the left interior side and right front of the patient compartment. There was one rear-facing captain's chair at the forward end of the patient compartment, a bench seat on the left side, and two bench seats on the right side. The captain's chair had a 3-point lap and shoulder seat belt. The right bench had two 4-point shoulder harnesses, and 2-point lap belts. The left bench seat also had a 4-point harness with a 2-point lap belt. According to the police report, the EMT was seated and restrained in the rear-facing captain's chair at the time of the crash. The patient was restrained on the cot facing the rear, with the cot's backrest raised to an unknown angle.

There were no intrusions to the patient compartment but there was moderate impact damage to the right-side cabinets (Figure 11) and the front bulkhead (Figure 12).

*Figure 11. Damaged right front cabinets*

*Figure 12. Damaged bulkhead*

## Patient Cot System

The Stryker Power-Pro 2 patient cot[3] (S/N: 230600xxxx) was held in place by the electronic floor-mounted on/off loading system. The cot (Figure 13) was removed from the ambulance after the crash and later replaced back onto the floor mount. At the time of SCI inspection, the cot was fastened onto the mount. There was no power supply for the ambulance and the cot could not be removed.

*Figure 13. Stryker Power Pro 2 patient cot*

[3] Stryker Corporation, Portage, MI.

Cot restraints were present at the lower leg, thigh, and shoulder levels. All restraint webbings were anchored in the proper positions except for the shoulder restraints. The left restraint was anchored to the horizontal hinge (Figure 14) which allowed the back support to be raised and lowered; the proper anchoring point was on the cot frame (Figure 15). The right restraint was anchored to the back support frame; the proper anchoring point for both shoulder restraints was on the cot frame (Figure 16). There was no damage to the cot frame or any of the shoulder restraints; however, the impact force displaced the right shoulder webbing anchor forward and mildly deformed the back support (see Figure 16). The only other damage noted was a broken oxygen cylinder mount under the head of the cot.

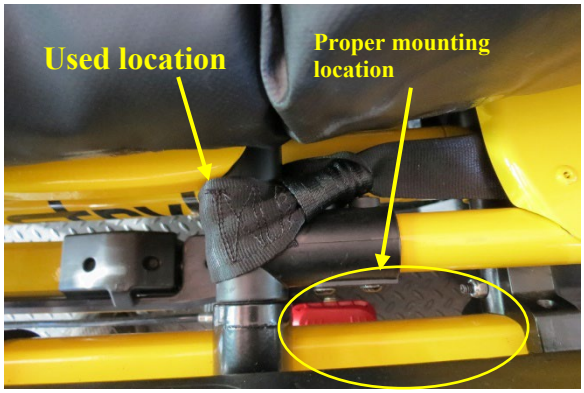


*Figure 14. Left shoulder strap anchor location (hinge for back support)*

*Figure 15. Proper mounting location for left shoulder restraint webbing*

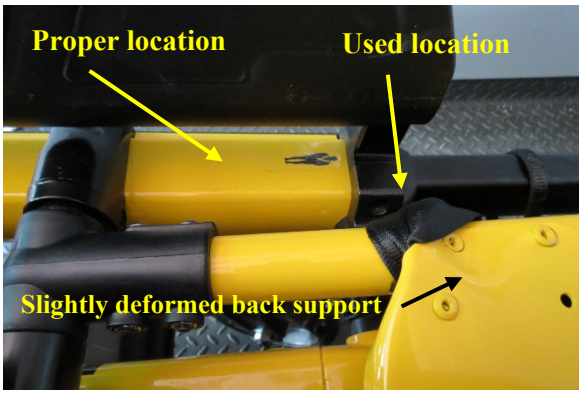


*Figure 16. Right shoulder strap anchor location*

The pneumatic piston that raised and lowered the cot's back support was deformed (Figure 17) as a result of the crash. This indicated that the back support was raised during transport and that the patient's loading during the crash forced it downward to a horizontal position. There was no evidence to indicate that the patient cot separated from the floor mount during crash sequence. A representative of the ambulance service confirmed this.

*Figure 17. Bent pneumatic piston for back support adjustment denoted by the yellow arrow*

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## 2018 Chevrolet Silverado Type I Ambulance Occupants

### Driver Demographics

| | |
|---|---|
| Age/sex: | 26 years/male |
| Height: | 178 cm (70 in) |
| Weight: | 104 kg (230 lb) |
| Eyewear | Unknown |
| Seat type: | Bucket seat (van type) with adjustable head restraint |
| Seat track: | Unknown |
| Manual restraint usage: | Lap and shoulder belt |
| Usage source: | Vehicle inspection, police crash report |
| Air bags: | Frontal available; deployed |
| Alcohol/drug involvement: | None |
| Egress from vehicle: | Fatal before removed from vehicle |
| Transport from scene: | None |
| Type of medical treatment: | None; fatally injured |

### Driver Injuries

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| 1 | Gaping 9-inch laceration of left side of forehead and scalp, extending from approximately the midline of the left eyebrow to posterior midline, exposing a comminuted fracture of the skull and calvarium, rupture of dura matter, disruption of brain tissue; subscalp hemorrhage | 150406.4 | Isolated IPC<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 2 | Subdural hemorrhage | 140650.3 | Isolated IPC<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 3 | Subarachnoid hemorrhage | 140693.2 | Isolated IPC<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| 4 | Bilateral pulmonary contusions, NFS | 441410.3 | Tandem IPC<br>Primary: Interior - Shoulder portion of belt restraint<br>Secondary: Left Air Bag - Steering wheel hub<br>Tertiary: Front – Steering wheel (combination of rim and hub/spoke) | Possible<br>Probable<br>Certain |
| 5 | Left distal humerus fracture, closed | 751331.2 | Isolated IPC<br>Front - Left instrument panel | Probable |
| 6 | 4 ¼ x 3-inch irregular discontinuous red-to-orange abrasion on right temporal and parietal scalp | 110202.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 7 | 1 ¼ x up to 1 ½-inch laceration in a vaguely 90-degree angle shape around lateral side and top of right eye | 210602.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 8 | Laceration on right side of face, NFS | 210600.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 9 | 10 ¼ x up to 9-inch laceration involving chin | 210602.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 10 | 2 ¼ x 1 ½-inch irregular yellow-to-orange-to-red abrasion involving the lateral half of the left eyebrow and face and forehead lateral to left | 210202.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| | eyebrow; 1 ¼ x up to 1 ½-inch irregular discontinuous red abrasion in a vaguely 90-degree angle shape around lateral side and top of right eye; scattered irregular red abrasions on left cheek, each measuring up to ¾ inch; 10 ¼ x up to 9-inch irregular discontinuous red-to orange abrasion on right side of face and chin | | | |
| 11 | Laceration involving the right side of the neck and posterior neck, NFS | 310600.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 12 | 10 ¼ x up to 9-inch irregular discontinuous red-to orange abrasion involving right side of neck and posterior neck | 310202.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 13 | 5/8 x 1 1/16-inch linear red abrasion on left lateral neck | 310202.1 | Isolated<br>Interior – Shoulder portion of belt restraint | Probable |
| 14 | 1 ½ x ½-inch irregular yellow-tan contusion on left upper chest | 410402.1 | Isolated<br>Interior – Shoulder portion of belt restraint | Probable |
| 15 | ¼ x 1/8-inch irregular red-orange abrasion on right superior torso | 410202.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Probable |
| 16 | Laceration involving the left supraclavicular region, NFS | 710600.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| 17 | 10 ¼ x up to 9-inch irregular discontinuous red-to-orange abrasion involving the left supraclavicular region | 710202.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 18 | 2 x 1 ½-inch superficial laceration on superior left shoulder | 710602.1 | Isolated<br>Interior – Shoulder portion of belt restrain | Probable |
| 19 | 3 x 2-inch superficial laceration on distal dorsal right forearm | 710602.1 | Isolated<br>Front – Center instrument panel | Possible |
| 20 | 7 x 4-inch discontinuous irregular red-to-orange abrasion involving the anterior superior, and lateral right shoulder | 710202.1 | Isolated<br>Exterior of Other Motor Vehicle – Other exterior of other motor vehicle (specify): Refrigerated cargo box | Certain |
| 21 | Scattered irregular red-to-orange abrasions on right upper extremity, each measuring up to ½-inch | 710202.1 | Isolated<br>Front – Center instrument panel | Possible |
| 22 | 3 x 2-inch irregular red-to-orange abrasions to distal dorsal right forearm | 710202.1 | Isolated<br>Front – Center instrument panel | Possible |
| 23 | 3 x 2 ½-inch irregular blue-gray to red-purple contusion on dorsal right hand | 710402.1 | Isolated<br>Front – Center instrument panel | Possible |
| 24 | Scattered irregular abrasions on dorsal right hand | 710202.1 | Isolated<br>Front – Center instrument panel | Possible |
| 25 | 7 ½ x 6-inch irregular discontinuous blue-gray contusion on distal posterior and medial left arm | 710402.1 | Isolated<br>Front – Left instrument panel | Possible |
| 26 | 7 ½ x 6-inch red abrasion on distal posterior and medial left arm; 5 x 4-inch irregular discontinuous red abrasion overlying humerus fracture | 710202.1 | Isolated<br>Front – Left instrument panel | Possible |

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| 27 | 2 ½ x 1 ½-inch irregular red abrasion on proximal dorsal left forearm | 710202.1 | Isolated<br>Front – Left instrument panel | Possible |
| 28 | 2 x 1 ¼-inch irregular red abrasion on dorsal left hand | 710202.1 | Isolated<br>Front – Left instrument panel | Possible |
| 29 | Scattered red contusions on left upper extremity, each measuring up to 1 ½-inches | 710402.1 | Isolated<br>Front – Left instrument panel | Possible |
| 30 | Scattered linear to irregular red abrasions on left upper extremity, each measuring up to 1 ½-inches | 710202.1 | Isolated<br>Front – Left instrument panel | Possible |
| 31 | 2 x ¾-inch irregular blue-gray contusion on anterior left hip | 810402.1 | Isolated<br>Interior – Lap portion of belt restraint | Probable |
| 32 | 1 ½ x ¾-inch irregular red-purple contusion on distal medial left thigh | 810402.1 | Isolated<br>Front – Steering wheel rim | Possible |
| 33 | 2 ½ x 1 ¾-inch irregular blue-gray contusion on medial left knee | 810402.1 | Isolated<br>Front – Left lower instrument panel (includes knee bolster) | Probable |
| 34 | 2 x 1 ¾-inch contusion on mid anterior right leg; 2 ½ x 2 ½-inch irregular blue-gray contusion and overlying cutaneous impression on the proximal to mid anterior right leg; additional scattered faint irregular blue-gray to red-purple contusions on right lower extremity | 810402.1 | Isolated<br>Front – Left lower instrument panel (includes knee bolster) | Probable |
| 35 | Additional scattered faint irregular blue-gray to red-purple contusions on left lower extremity | 810402.1 | Isolated<br>Front – Left lower instrument panel (includes knee bolster) | Probable |

Source: Autopsy report (internal)

## Driver Kinematics

The driver was likely seated in a nominal upright position and was restrained by the seat belt based upon the SCI inspection of the seat belt. It should be noted the EDR reported the seat belt was not buckled. He had been on duty for 1.5 hours of his shift.

The ambulance struck the Kenworth's left side and underrode its refrigerated box unit. The driver responded to the frontal impact with a forward trajectory, and he loaded the lap and shoulder belt and deployed frontal air bag. This resulted in bilateral pulmonary contusions as well as abrasions, contusions, and lacerations to the left side of his neck and shoulder, as well as a contusion to his left hip from the lap belt. As he loaded the seat belt, the bottom of the cargo box intruded deep into the windshield and passenger compartment. The box struck the driver and caused the open skull fracture, brain hemorrhages, and the face and right upper arm injuries. He sustained a fractured left distal humerus and abrasions and contusions on both arms and hands from contact to the instrument panel. He sustained contusions to his lower legs from contact to the left lower instrument panel. The driver was fatally injured and required removal from the ambulance. He was transported to the county medical examiner.

## EMT Demographics

| | |
|---|---|
| Age/sex: | 22 years/male |
| Height: | Unknown |
| Weight: | Unknown |
| Eyewear | Unknown |
| Seat type: | Pedestal-mounted, rear-facing captain's chair with integral head restraint |
| Seat track: | None |
| Manual restraint usage: | Lap and shoulder belt |
| Usage source: | Police crash report |
| Air bags: | None available |
| Egress from vehicle: | Exited under own power |
| Transport from scene: | Ambulance to hospital |
| Type of medical treatment: | Hospitalized one night |

## EMT Injuries

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| 1 | Unknown | Unknown | Unknown | Unknown |

Medical information request denied

## EMT Kinematics

Based on conversations with the investigating officer and a representative from the ambulance service, as well as vehicle inspection, the EMT was seated and belted in the rear-facing captain's chair at the time of the crash.

The frontal impact with the Kenworth displaced the EMT toward the front of the patient compartment and he loaded onto the seatback of the captain's chair. He remained belted in the

seat and rode down the force of the impact. He exited under his own power. He sustained police-reported B-level injuries and was transported by ambulance to a hospital where he was admitted for one night. Requests for his medical information were denied.

## Patient Demographics

| | |
|---|---|
| Age/sex: | 75 years/male |
| Height: | 170 cm/67 in |
| Weight: | 129 kg/285 lb |
| Eyewear | Unknown |
| Seat type: | Patient cot |
| Seat track: | Fixed |
| Manual restraint usage: | Lower leg, thigh, and shoulder harness of patient cot |
| Egress from vehicle: | Removed by rescue personnel |
| Transport from scene: | None |
| Type of medical treatment: | None; fatally injured |

## Patient Injuries

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| 1 | Fracture of all ribs in multiple locations | 450214.5 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 2 | Transection of right lung | 441432.4 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 3 | Right hemothorax, 250 mL | 442200.3 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 4 | Open fracture of posterior left parietal scalp with associated subscalp hemorrhage | 150404.3 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 5 | Subarachnoid hemorrhage | 140693.2 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 6 | Rupture of pericardial sac | 441602.2 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 7 | Fracture of 5th cervical vertebra | 650230.2 | Isolated IPC | Possible |

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| | | | Interior – Other interior object (specify): Cot back support | |
| 8 | Fracture of 5th thoracic vertebra | 650430.2 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 9 | Fracture of 6th thoracic vertebra | 650430.2 | Isolated IPC<br>Interior – Other interior object (specify): Cot back support | Possible |
| 10 | Scattered mesenteric hemorrhage | 542010.2 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Possible |
| 11 | 1 x ¼-inch irregular red abrasion on left parietal scalp | 110202.1 | Isolated<br>Interior – Other interior object (specify): Cot back support | Possible |
| 12 | ½ x 1/16-inch linear oblique red abrasion on right upper forehead at hairline; 1 x 1/16-inch linear oblique red abrasion on right lower forehead | 210202.1 | Unknown | Unknown |
| 13 | 9 x up to 1-inch red-to-orange abrasion extending from the right lateral neck across the anterior neck to the left lateral neck | 310202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 14 | 27-inch red abrasion extending from posterior right shoulder over superior right torso to lower medial left breast | 410202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 15 | 5 x 2-inch irregular brown-to-tan contusion on right lower abdomen | 510402.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 16 | 8 x up to 1-inch red abrasion extending from medial posterior left | 710202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |

| Injury No. | Injury | Injury Severity AIS 2015 | Involved Physical Components (IPC) | IPC Confidence Level |
|---|---|---|---|---|
| | shoulder to middle anterior neck | | | |
| 17 | 27-inch red abrasion extending from posterior right shoulder over superior right torso to lower medial left breast | 710202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 18 | 5 ½ x 3-inch irregular purple-tan contusion on anteromedial left arm | 710402.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 19 | ¾ x ½-inch irregular red abrasion on anteromedial left arm overlying contusion | 710202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 20 | 5 ½ x 3-inch irregular discontinuous red abrasion around right elbow | 710202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |
| 21 | 2 x ½-inch irregular skin avulsion on dorsal left hand | 710802.1 | Isolated<br>Interior – Other interior object (specify): Cot frame | Possible |
| 22 | 2 x 2-inch irregular discontinuous red abrasion on lateral right knee | 810202.1 | Isolated<br>Interior – Other interior object (specify): Cot restraint webbing | Probable |

Source: Autopsy (internal)

## Patient Kinematics

Based on physical evidence and information from the ambulance service, the patient was restrained on the patient cot, with the backrest elevated to an unknown angle above horizontal. Cot restraints were in use at the lower leg, upper leg, and waist levels, and the shoulder harness straps crossed over the chest and were clipped into the waist level restraint.

The frontal impact with the Kenworth displaced the patient toward the front of the vehicle and he heavily loaded the shoulder straps and the back support. The mass of the patient (129 kg/285 lb) and the severity of the impact loaded and deformed the pneumatic piston that adjusted the back support. It was forced into a horizontal position. This impact resulted in fractures of all ribs and transection of the right lung and right hemothorax, three vertebra fractures, and an open fracture and abrasion of the left posterior parietal scalp. Loading on the other restraint webbing resulted in mesenteric hemorrhage as well as abrasions about the neck, shoulders, chest, and arms.

He sustained fatal injuries and required removal from the ambulance by rescue personnel. He was transported to the county medical examiner.

## 2021 Kenworth T3

### Description

The Kenworth was a medium-heavy truck, incomplete vehicle with a refrigerated box mounted to the chassis. It was manufactured in September 2020 with the VIN 2NKHHM60MMxxxxx and had a 6.6 liter, in-line, 6-cyliner engine. The wheelbase was 523 cm (206 in) and the gross vehicle weight rating was 11,793 kg (26,000 lb).

### Exterior Damage

The Kenworth's left plane was damaged during the impact with the ambulance. Direct damage began 142 cm (55.9 in) rear of the left front wheel, near the back of the cab, and extended 201 cm (79.1 in) rearward along the frame (Figure 18) and refrigerated cargo box. The cargo box separated from the frame during the impact (Figure 19). At inspection the cargo box was inverted, lying on its top surface. As the ambulance underrode the Kenworth, the diesel exhaust fluid tank ruptured and the diesel fuel tank was indirectly damaged. The WinSMASH program could not be used on this impact since medium-heavy vehicles are out of scope for the program. The TDC for this impact was 09LZAWB.

*Figure 18. Kenworth damaged left plane*

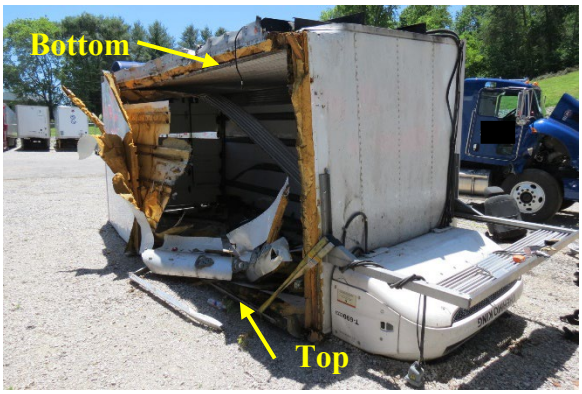
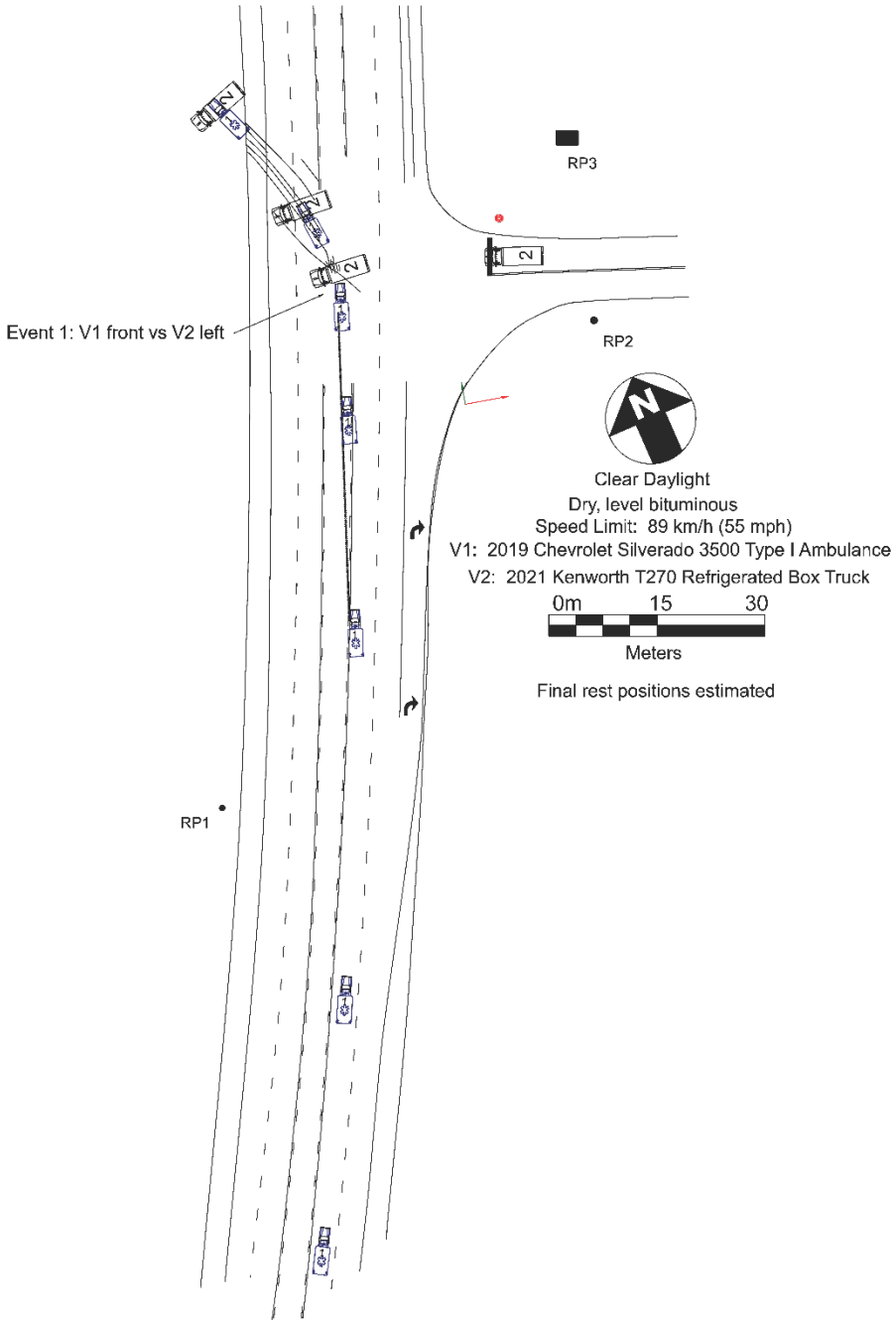



*Figure 19. Refrigerated box, separated from the Kenworth frame*

### Kenworth Occupant

The Kenworth driver sustained police-reported B-level injuries and was transported by ambulance to a hospital. His specific injury and treatment information is unknown.

# Crash Diagram




| | |
|---|---|
| | NHTSA NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION |
| Case Number: | CR24010 |

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# Appendix A: 2018 Chevrolet Silverado Event Data Recorder Report[4]

[4] The EDR contained in this technical report was imaged by the police during their investigation and a PDF copy of the data was given to the SCI investigator. The PDF report that follows has been sanitized due to the potential of personally identifiable information.

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

## CDR File Information

| | |
|---|---|
| User Entered VIN | 1GB3KZCY8JF |
| User | |
| Case Number | |
| EDR Data Imaging Date | |
| Crash Date | |
| Filename | |
| Saved on | |
| Imaged with CDR version | Crash Data Retrieval Tool 23.4 |
| Imaged with Software Licensed to (Company Name) | |
| Reported with CDR version | Crash Data Retrieval Tool 23.4 |
| Reported with Software Licensed to (Company Name) | |
| EDR Device Type | Airbag Control Module |
| Event(s) recovered | Deployment, Deployment |

## Comments

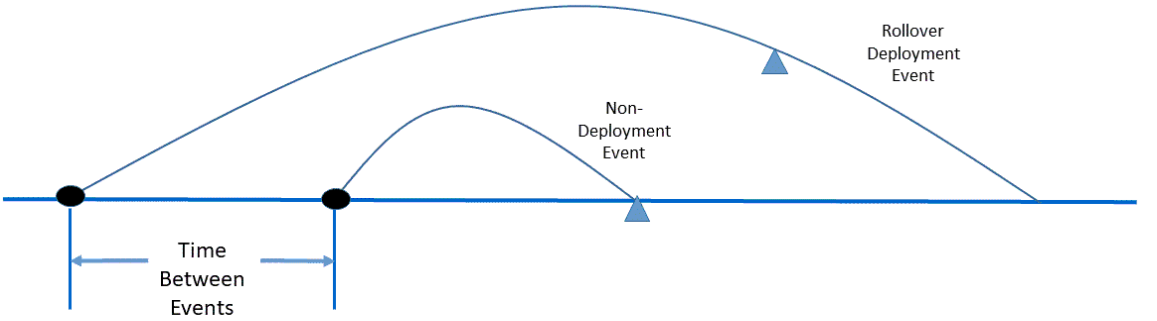
## Data Limitations

**Recorded Crash Events:**
There are two types of recorded crash events for Front, Side, and Rear (FSR) Events. The first is the Non-Deployment Event. A Non-Deployment Event records data but does not deploy the air bag(s). The minimum SDM Recorded Vehicle Velocity Change, that is needed to record a Non-Deployment Event, is five MPH [8 km/h]. A Non-Deployment Event contains Pre-Crash and Crash data. The oldest Non-Deployment event can be overwritten by a Deployment Event, if all three records are full and the Non-Deployment Event is not locked. A Non-Deployment Event can be overwritten by a more recent Non-Deployment Event if all three records are full and the Non-Deployment is older than approximately 250 ignition cycles. Also, a Non-Deployment event can be recorded if one of the following occurs without the Deployment of any of the frontal air bags, side air bags, or roll bars:

-Pretensioner(s) only Deployment
-Head Rest Deployment
-Battery Cut-Off Deployment

The second type of SDM recorded crash event for FSR Events is the Deployment Event. It also contains Pre-Crash and Crash data. Deployment Events cannot be overwritten or cleared by the SDM.
Rollover Events contains Pre-Crash and Crash data. Rollover event follow the same rules as FSR Deployment events.
The SDM can store up to three Events.

**Data:**
For FSR Events, SDM Recorded Vehicle Velocity Change reflects the change in velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event and is also not the Barrier Equivalent Velocity. For Deployment and Non-Deployment Events, the SDM will record up to 300 milliseconds of data after time zero. The SDM will also record up to 300 milliseconds of Vehicle Acceleration data after time zero.
For Rollover Events, the SDM may record Lateral Acceleration, Vertical Acceleration, and Roll Rate data, if the SDM is rollover capable. This data reflects what the sensing system experienced during the recorded portion of the event. For Rollover Deployment Events, the SDM will record up to 700 milliseconds of data before the Deployment criteria is met and 290 milliseconds after the Deployment criteria is met.
-Deployment loops may be displayed as being deployed in a Non-Deployment event record, if a Deployment event is qualified during the Non-Deployment event. That is, if two or more events are occurring at the same time and one is a Non-Deployment event and one of the others is a Deployment event, and the Deployment event is qualified while the Non-Deployment is still active, the deployed loops may be recorded in the Non-Deployment event record.
-Time between events is recorded in 10 msec intervals and is displayed in seconds for a maximum time of 655.33 seconds. The counter measures the time from the start of one event to the start of the next event if both events occur within the same ignition cycle.
-The Maximum SDM Recorded Vehicle Velocity Change may occur between the recorded 10 millisecond sample points of the SDM Recorded Vehicle Velocity Change. The SDM will only record Maximum SDM Recorded Vehicle Velocity Change for the first 300 milliseconds of the event.
-If the SDM Recorded Vehicle Velocity Change data exceeds the max output range of -127 km/h then the exceeded values will be displayed with an offset of a +256 km/h. If the SDM Recorded Vehicle Velocity Change data exceeds the max output range of +126 km/h then the exceeded values will be displayed with an offset of a -256 km/h.
-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.
-SDM Recorded Vehicle Speed accuracy can be affected by various factors, including but not limited to the following:
    -Significant changes in the tire's rolling radius
    -Final drive axle ratio changes
    -Wheel lockup and wheel slip
-Brake Switch Circuit Status indicates the open/closed state of the brake switch circuit.
-Pre-Crash data is recorded asynchronously. The 0.5 second Pre-crash data value (most recent recorded data point) is the data point last sampled before Time Zero. That is to say, the last data point may have been captured just before Time Zero but no more than 0.5 second before Time Zero. All subsequent Pre-crash data values are referenced from this data point.
-Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if:
    -The SDM receives a message with an "invalid" flag from the module sending the pre-crash data
-Pre-Crash Electronic Data Validity Check Status indicates "Data Not Available" if:
    -No data is received from the module sending the pre-crash data
-For diesel powered vehicles, the data displayed as Throttle Position (%) is actually the data for the Air Inlet Flap Position. This is not the same as the throttle position for a gasoline powered engine.
-Belt Switch Circuit Status indicates the status of the seat belt switch circuit.
-The ignition cycle counter will increment when the power mode cycles from OFF/Accessory to RUN. Applying and removing of battery power to the module will not increment the ignition cycle counter.
-Ignition Cycles Since DTCs Were Last Cleared can be recorded with a maximum value of 253 cycles and can only be reset by a scan tool.
-Dynamic Deployment Event Counter tracks the number of Deployment events that have occurred during the SDM's lifetime.
-Dynamic Event Counter tracks the number of qualified events (either Deployments, Non-deploy, or Rollover events) that have occurred during the SDM's lifetime.
-For Deployment Events, DTC B0052 (Deployment commanded) shall be recorded with the remainder of the data for this event even though it occurred after Event Enable.
-Once a firing loop has been commanded to be deployed, it will not be commanded to be deployed again during the same ignition cycle. Firing loop times for subsequent deployment type events, during the same ignition cycle, will record the deployment times as N/A.
-In an event where the module is operating on energy reserve, the Dynamic counters may report a value that is less than the actual value. If the stored values in the Dynamic counters are less than the counter values in the event records or if more than one event record has the same counter value as another, the module may have been operating on its energy reserve.
-A Concurrent Event is when two events are happening nearly simultaneously. The "Concurrent Event Flag Set" parameter will indicate "Yes" if one event begins, but before that event is qualified, another event begins and is qualified.
A Non-Deployment event typically becomes qualified if that event exceeds the 5 MPH (8 km/h) delta V recording threshold and the event has concluded. A deployment event (FSR or Rollover) becomes qualified when a deployment has been commanded for that event.
Example of a Concurrent Event:
A Rollover event begins. Before the Rollover event is qualified, a Non-Deployment event begins and is qualified. Sometime after the Non-Deployment event is qualified, the Rollover event is qualified. The Non-Deployment event will be recorded in the first open record even though the Rollover event enabled before the Non-Deployment event. The Rollover event will be recorded in the next open record. The "Concurrent Event Flag Set" parameter will indicate "Yes" for the Rollover event. The "Time Between Events" parameter will indicate the time from the start of the Rollover event to the start of the Non-Deployment event.




| Event Recor #1 | Event Record #2 |
|---|---|
| Event Record Type = Non – Deployment | Event Record Type = Rollover |
| Concurrent Event Flag = No | Concurrent Event Flag = Yes |
| Time Between Events = NA | Time Between Events = XX seconds |

-The GM parameter name is displayed in parentheses after the NHTSA Part 563 parameter name.
-The reported range of the longitudinal and lateral acceleration values is approximately ± 50 g.
-Due to a CDR Tool data imaging issue, all CDR files imaged from SDM-30 Delphi airbag control modules (ACM) using version 17.6 software are invalid and the ACM must be re-imaged using CDR version 17.6.1 and later software.
-All data should be examined in conjunction with other available physical evidence from the vehicle and scene.

**Data Source:**
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Status Data (Pre-Crash) is transmitted by the Body Control Module, via the vehicle's communication network.
-The Belt Switch Circuit is wired directly to the SDM.

**Data Element Sign Convention:**
The following table provides an explanation of the sign notation for data elements that may be included in this CDR report. Directional references to sign notation are all from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

| Data Element Name | Positive Sign Notation Indicates |
|---|---|
| Longitudinal Acceleration | Forward |
| Longitudinal Velocity Change | Forward |
| Lateral Acceleration | Left to Right |
| Lateral Velocity Change | Left to Right |
| Vertical Acceleration | Downward |
| Roll Rate | Clockwise Rotation |

**Hexadecimal Data:**
Data that the vehicle manufacturer has specified for data retrieval is shown in the hexadecimal data section of the CDR report. The hexadecimal data section of the CDR report may contain data that is not translated by the CDR program. The control module contains additional data that is not retrievable by the CDR tool.

01050_SDM30-delphi_r021

## System Status at Time of Retrieval

| | |
|---|---|
| Dynamic Deployment Event Counter | 1 |
| Multi-Event, Number of Events (Dynamic Event Counter) | 1 |
| Dynamic OnStar Notification Event Counter | 1 |
| Vehicle Identification Number (VIN) | 1GB3KZCY8JF |
| Ignition Cycle, Download (Ignition Cycles at Investigation) | 16551 |
| End Model Part Number | 00CE5141 |
| System Type | Delphi with integrated IMU |
| Software Module Identifier 1 | 00CE5133 |
| Software Module Identifier 2 | 05051755 |
| Software Module Identifier 3 | 015D57C1 |
| Manufacturing Traceability Data, LineID | K |
| Manufacturing Traceability Data, ShiftID | 1 |
| Manufacturing Traceability Data, Year | 18 |
| Manufacturing Traceability Data, DayOfTheYear | 004 |
| Manufacturing Traceability Data, Serial/Lot/BatchNumber | 3M3CLL800 |
| ESS # 1 Traceability Data, Component Identifier | ?? |
| ESS # 1 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 1 Traceability Data, Supplier Code | D |
| ESS # 1 Traceability Data, Traceability Number | A00000000 |
| ESS # 2 Traceability Data, Component Identifier | ?? |
| ESS # 2 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 2 Traceability Data, Supplier Code | D |
| ESS # 2 Traceability Data, Traceability Number | A00000000 |
| ESS # 3 Traceability Data, Component Identifier | AD |
| ESS # 3 Traceability Data, Part Number/Broadcast Code | 8676 |
| ESS # 3 Traceability Data, Supplier Code | D |
| ESS # 3 Traceability Data, Traceability Number | A00000000 |
| ESS # 4 Traceability Data, Component Identifier | ?? |
| ESS # 4 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 4 Traceability Data, Supplier Code | D |
| ESS # 4 Traceability Data, Traceability Number | A00000000 |
| ESS # 5 Traceability Data, Component Identifier | ?? |
| ESS # 5 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 5 Traceability Data, Supplier Code | D |
| ESS # 5 Traceability Data, Traceability Number | A00000000 |
| ESS # 6 Traceability Data, Component Identifier | ?? |
| ESS # 6 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 6 Traceability Data, Supplier Code | D |
| ESS # 6 Traceability Data, Traceability Number | A00000000 |
| ESS # 7 Traceability Data, Component Identifier | ?? |
| ESS # 7 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 7 Traceability Data, Supplier Code | D |
| ESS # 7 Traceability Data, Traceability Number | A00000000 |
| ESS # 8 Traceability Data, Component Identifier | ?? |
| ESS # 8 Traceability Data, Part Number/Broadcast Code | 0000 |
| ESS # 8 Traceability Data, Supplier Code | D |
| ESS # 8 Traceability Data, Traceability Number | A00000000 |

## System Status at Event (Event Record 1)

| | |
|---|---|
| Event Record Type | Deployment |
| OnStar Deployment Status Data Sent | Yes |
| Complete file recorded (Event Recording Complete) | Yes |
| Crash Record Locked | Yes |
| OnStar SDM Recorded Vehicle Velocity Change Data Sent | Yes |
| Deployment Event Counter | 1 |
| Multi-Event, Number of Events (Event Counter) | 1 |
| OnStar Notification Event Counter | 1 |
| Time From Event 1 to 2 (Time Between Events) (seconds) | Data Not Available |
| Ignition Cycle, Crash (Ignition Cycles at Event) | 12455 |
| Algorithm Active: Frontal | Yes |
| Algorithm Active: Side | No |
| Algorithm Active: Rollover | No |
| Algorithm Active: Rear | Yes |
| Concurrent Event Flag Set | No |
| Event Severity Status: Frontal Pretensioner | Yes |
| Event Severity Status: Frontal Stage 1 | Yes |
| Event Severity Status: Frontal Stage 2 | No |
| Event Severity Status: Left Side | No |
| Event Severity Status: Right Side | No |
| Event Severity Status: Rear | No |
| Event Severity Status: Rollover | No |
| Safety Belt Status, Driver (Driver Belt Switch Circuit Status) | Not Buckled |
| Frontal air bag suppression switch status (Passenger SIR Suppression Switch Circuit Status) | On (Enabled) |
| Passenger Air Bag ON Indicator Status | On |
| Passenger Air Bag OFF Indicator Status | Off |
| Low Tire Pressure Warning Lamp Status 0.5 Seconds Prior to Time Zero | Off |
| Frontal Air Bag Warning Lamp (SIR Warning Lamp Status 0.5 Seconds Prior to Time Zero) | Off |
| SIR Warning Lamp ON/OFF Time Continuously (seconds) | 655330 |
| Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously | 11890 |
| Ignition Cycles Since DTCs Were Last Cleared 0.5 Seconds Prior to Time Zero | 253 |
| Maximum Delta-V, Longitudinal (Maximum Longitudinal SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h] | -2 [-4] |
| Time, Maximum Delta-V (Time From FSR Time Zero to Maximum Longitudinal SDM Recorded Vehicle Velocity Change)(msec) | 140 |
| Maximum Delta-V, Lateral (Maximum Lateral SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h] | -1 [-1] |
| Time Maximum Delta-V, Lateral (Time From FSR Time Zero to Maximum Lateral SDM Recorded Vehicle Velocity Change)(msec) | 138 |
| High Voltage Disable Notification Sent | Yes |
| Deployment Commanded in Energy Reserve Mode | No |

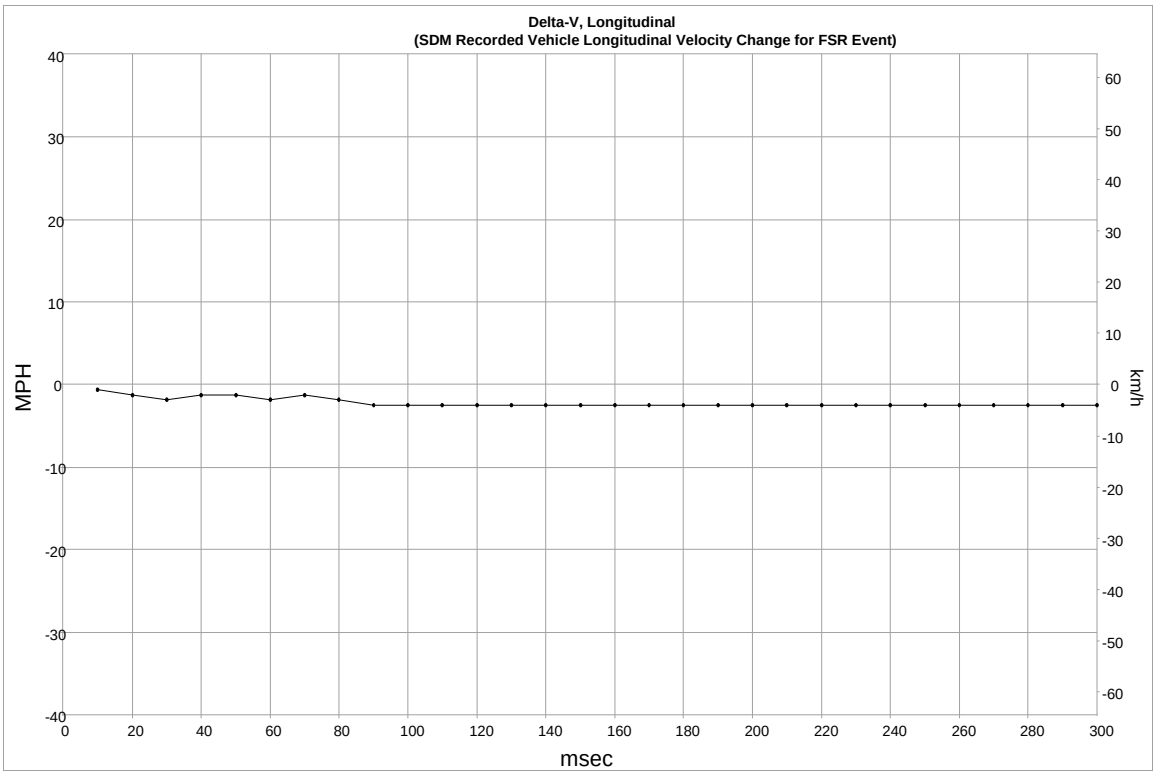
## DTCs Present at Time of Event (Event Record 1)

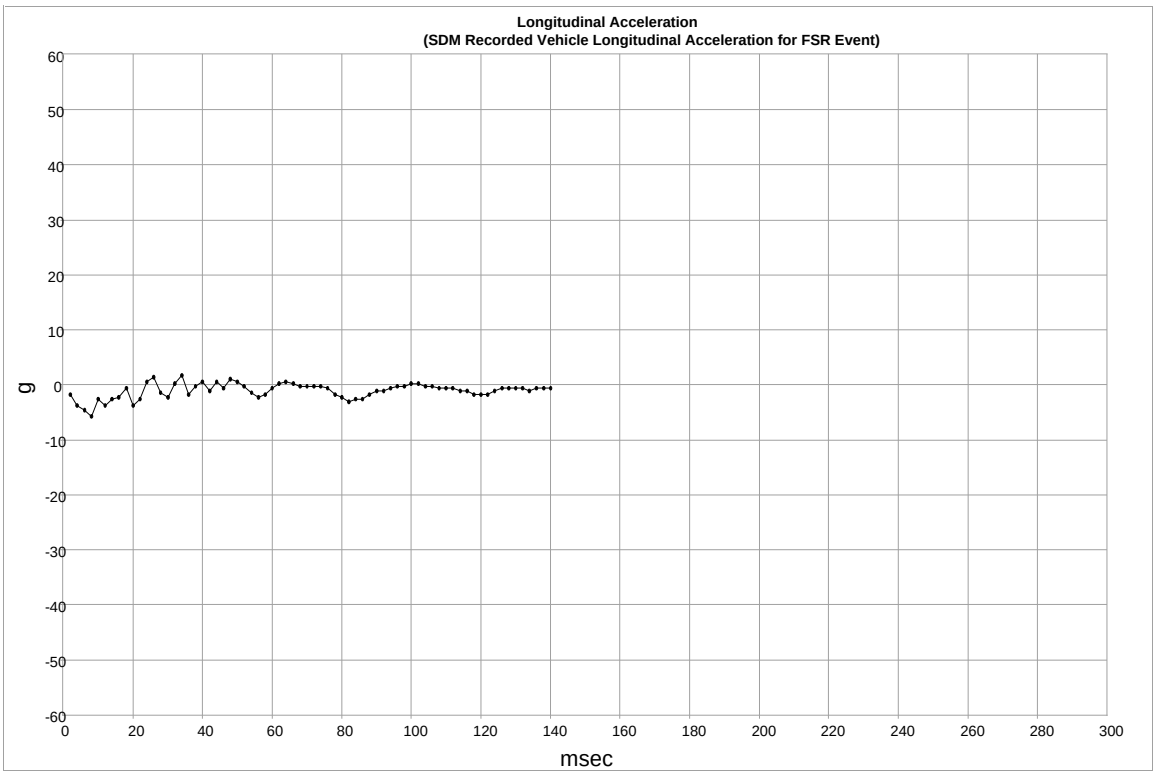
B0052-00

## Event Data (Event Record 1)

| | |
|---|---|
| Driver 1st Stage Deployment Loop Commanded | Yes |
| Passenger 1st Stage Deployment Loop Commanded | Yes |
| Driver 2nd Stage Deployment Loop Commanded | No |
| Passenger 2nd Stage Deployment Loop Commanded | No |
| Driver Pretensioner Deployment Loop #1 Commanded | Yes |
| Passenger Pretensioner Deployment Loop #1 Commanded | Yes |
| Frontal Air Bag Deployment, Time to 1st Stage Deployment, Driver (Driver 1st Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | 8 |
| Frontal Air Bag Deployment, Time to 2nd Stage, Driver (Driver 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Frontal Air Bag Deployment, Time to 1st Stage Deployment, Right Front Passenger (Passenger 1st Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | 8 |
| Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (Passenger 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Side air bag deployment, time to deploy, driver (Driver Thorax/Curtain Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Side air bag deployment, time to deploy, right front passenger (Passenger Thorax/Curtain Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Pretensioner Deployment, Time to Fire, Driver (Driver Pretensioner Time From Time Zero to Deployment Loop #1 or Loop #2 Command Criteria Met) (msec) | 8 |
| Pretensioner Deployment, Time to Fire, Right Front Passenger (Passenger Pretensioner Time From Time Zero to Deployment Loop #1 or Loop #2 Command Criteria Met) (msec) | 8 |

# Longitudinal Crash Pulse (Event Record 1)



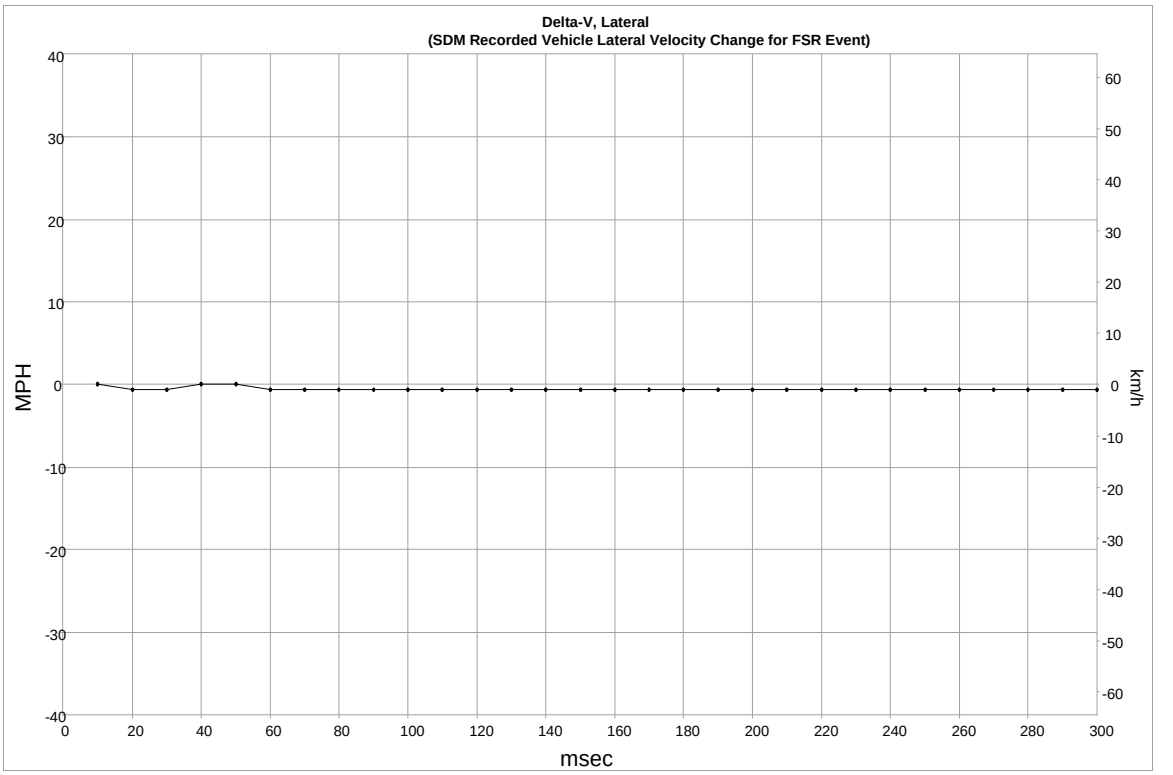
# Longitudinal Crash Pulse (Event Record 1)

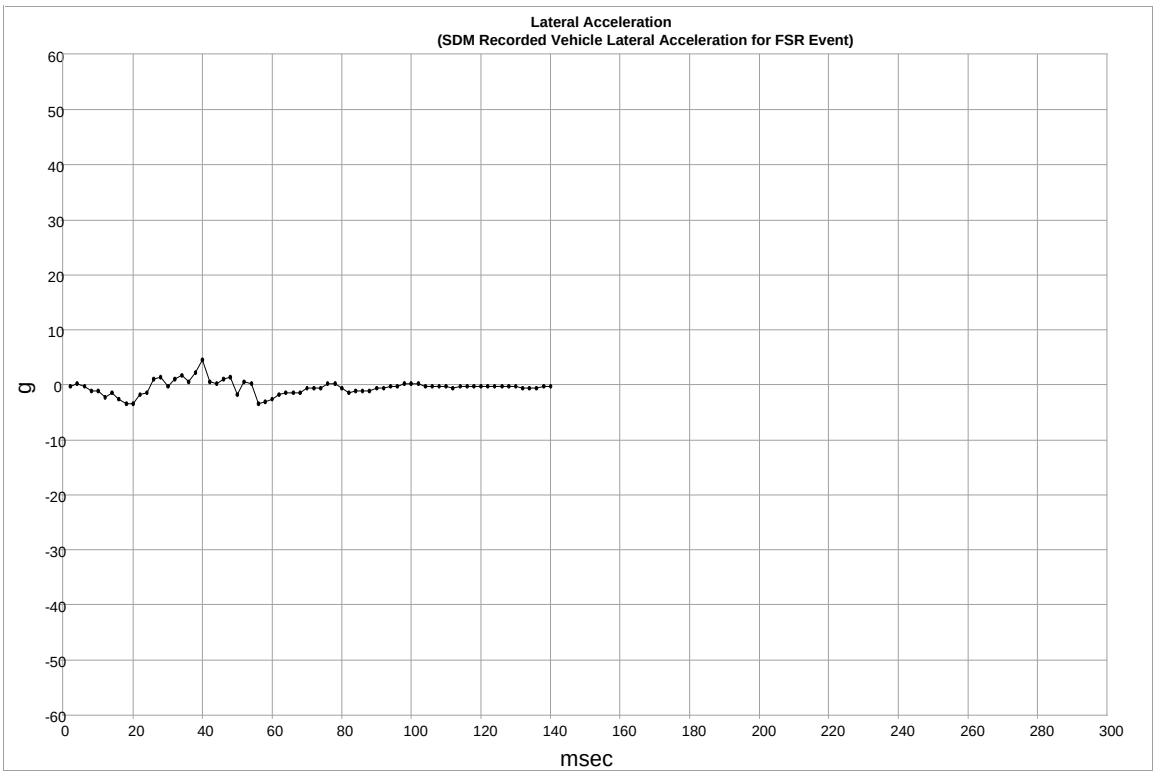
| Time (msec) | Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (MPH) | Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (km/h) |
|---|---|---|
| 10 | -0.6 | -1.0 |
| 20 | -1.2 | -2.0 |
| 30 | -1.9 | -3.0 |
| 40 | -1.2 | -2.0 |
| 50 | -1.2 | -2.0 |
| 60 | -1.9 | -3.0 |
| 70 | -1.2 | -2.0 |
| 80 | -1.9 | -3.0 |
| 90 | -2.5 | -4.0 |
| 100 | -2.5 | -4.0 |
| 110 | -2.5 | -4.0 |
| 120 | -2.5 | -4.0 |
| 130 | -2.5 | -4.0 |
| 140 | -2.5 | -4.0 |
| 150 | -2.5 | -4.0 |
| 160 | -2.5 | -4.0 |
| 170 | -2.5 | -4.0 |
| 180 | -2.5 | -4.0 |
| 190 | -2.5 | -4.0 |
| 200 | -2.5 | -4.0 |
| 210 | -2.5 | -4.0 |
| 220 | -2.5 | -4.0 |
| 230 | -2.5 | -4.0 |
| 240 | -2.5 | -4.0 |
| 250 | -2.5 | -4.0 |
| 260 | -2.5 | -4.0 |
| 270 | -2.5 | -4.0 |
| 280 | -2.5 | -4.0 |
| 290 | -2.5 | -4.0 |
| 300 | -2.5 | -4.0 |

## Longitudinal Crash Pulse (Event Record 1)

| Time (msec) | Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g) | Time (msec) | Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g) | Time (msec) | Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g) |
|---|---|---|---|---|---|
| 2 | -1.8 | 102 | 0.2 | 202 | Data Not Available |
| 4 | -3.8 | 104 | -0.2 | 204 | Data Not Available |
| 6 | -4.6 | 106 | -0.2 | 206 | Data Not Available |
| 8 | -5.8 | 108 | -0.6 | 208 | Data Not Available |
| 10 | -2.6 | 110 | -0.6 | 210 | Data Not Available |
| 12 | -3.8 | 112 | -0.6 | 212 | Data Not Available |
| 14 | -2.6 | 114 | -1.0 | 214 | Data Not Available |
| 16 | -2.2 | 116 | -1.0 | 216 | Data Not Available |
| 18 | -0.6 | 118 | -1.8 | 218 | Data Not Available |
| 20 | -3.8 | 120 | -1.8 | 220 | Data Not Available |
| 22 | -2.6 | 122 | -1.8 | 222 | Data Not Available |
| 24 | 0.6 | 124 | -1.0 | 224 | Data Not Available |
| 26 | 1.4 | 126 | -0.6 | 226 | Data Not Available |
| 28 | -1.4 | 128 | -0.6 | 228 | Data Not Available |
| 30 | -2.2 | 130 | -0.6 | 230 | Data Not Available |
| 32 | 0.2 | 132 | -0.6 | 232 | Data Not Available |
| 34 | 1.8 | 134 | -1.0 | 234 | Data Not Available |
| 36 | -1.8 | 136 | -0.6 | 236 | Data Not Available |
| 38 | -0.2 | 138 | -0.6 | 238 | Data Not Available |
| 40 | 0.6 | 140 | -0.6 | 240 | Data Not Available |
| 42 | -1.0 | 142 | Data Not Available | 242 | Data Not Available |
| 44 | 0.6 | 144 | Data Not Available | 244 | Data Not Available |
| 46 | -0.6 | 146 | Data Not Available | 246 | Data Not Available |
| 48 | 1.0 | 148 | Data Not Available | 248 | Data Not Available |
| 50 | 0.6 | 150 | Data Not Available | 250 | Data Not Available |
| 52 | -0.2 | 152 | Data Not Available | 252 | Data Not Available |
| 54 | -1.4 | 154 | Data Not Available | 254 | Data Not Available |
| 56 | -2.2 | 156 | Data Not Available | 256 | Data Not Available |
| 58 | -1.8 | 158 | Data Not Available | 258 | Data Not Available |
| 60 | -0.6 | 160 | Data Not Available | 260 | Data Not Available |
| 62 | 0.2 | 162 | Data Not Available | 262 | Data Not Available |
| 64 | 0.6 | 164 | Data Not Available | 264 | Data Not Available |
| 66 | 0.2 | 166 | Data Not Available | 266 | Data Not Available |
| 68 | -0.2 | 168 | Data Not Available | 268 | Data Not Available |
| 70 | -0.2 | 170 | Data Not Available | 270 | Data Not Available |
| 72 | -0.2 | 172 | Data Not Available | 272 | Data Not Available |
| 74 | -0.2 | 174 | Data Not Available | 274 | Data Not Available |
| 76 | -0.6 | 176 | Data Not Available | 276 | Data Not Available |
| 78 | -1.8 | 178 | Data Not Available | 278 | Data Not Available |
| 80 | -2.2 | 180 | Data Not Available | 280 | Data Not Available |
| 82 | -3.0 | 182 | Data Not Available | 282 | Data Not Available |
| 84 | -2.6 | 184 | Data Not Available | 284 | Data Not Available |
| 86 | -2.6 | 186 | Data Not Available | 286 | Data Not Available |
| 88 | -1.8 | 188 | Data Not Available | 288 | Data Not Available |
| 90 | -1.0 | 190 | Data Not Available | 290 | Data Not Available |
| 92 | -1.0 | 192 | Data Not Available | 292 | Data Not Available |
| 94 | -0.6 | 194 | Data Not Available | 294 | Data Not Available |
| 96 | -0.2 | 196 | Data Not Available | 296 | Data Not Available |
| 98 | -0.2 | 198 | Data Not Available | 298 | Data Not Available |
| 100 | 0.2 | 200 | Data Not Available | 300 | Data Not Available |

# Lateral Crash Pulse (Event Record 1)



## Lateral Crash Pulse (Event Record 1)

| Time (msec) | Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (MPH) | Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (km/h) |
|---|---|---|
| 10 | 0.0 | 0.0 |
| 20 | -0.6 | -1.0 |
| 30 | -0.6 | -1.0 |
| 40 | 0.0 | 0.0 |
| 50 | 0.0 | 0.0 |
| 60 | -0.6 | -1.0 |
| 70 | -0.6 | -1.0 |
| 80 | -0.6 | -1.0 |
| 90 | -0.6 | -1.0 |
| 100 | -0.6 | -1.0 |
| 110 | -0.6 | -1.0 |
| 120 | -0.6 | -1.0 |
| 130 | -0.6 | -1.0 |
| 140 | -0.6 | -1.0 |
| 150 | -0.6 | -1.0 |
| 160 | -0.6 | -1.0 |
| 170 | -0.6 | -1.0 |
| 180 | -0.6 | -1.0 |
| 190 | -0.6 | -1.0 |
| 200 | -0.6 | -1.0 |
| 210 | -0.6 | -1.0 |
| 220 | -0.6 | -1.0 |
| 230 | -0.6 | -1.0 |
| 240 | -0.6 | -1.0 |
| 250 | -0.6 | -1.0 |
| 260 | -0.6 | -1.0 |
| 270 | -0.6 | -1.0 |
| 280 | -0.6 | -1.0 |
| 290 | -0.6 | -1.0 |
| 300 | -0.6 | -1.0 |

## Lateral Crash Pulse (Event Record 1)

| Time (msec) | Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g) | Time (msec) | Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g) | Time (msec) | Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g) |
|---|---|---|---|---|---|
| 2 | -0.2 | 102 | 0.2 | 202 | Data Not Available |
| 4 | 0.2 | 104 | -0.2 | 204 | Data Not Available |
| 6 | -0.2 | 106 | -0.2 | 206 | Data Not Available |
| 8 | -1.0 | 108 | -0.2 | 208 | Data Not Available |
| 10 | -1.0 | 110 | -0.2 | 210 | Data Not Available |
| 12 | -2.2 | 112 | -0.6 | 212 | Data Not Available |
| 14 | -1.4 | 114 | -0.2 | 214 | Data Not Available |
| 16 | -2.6 | 116 | -0.2 | 216 | Data Not Available |
| 18 | -3.4 | 118 | -0.2 | 218 | Data Not Available |
| 20 | -3.4 | 120 | -0.2 | 220 | Data Not Available |
| 22 | -1.8 | 122 | -0.2 | 222 | Data Not Available |
| 24 | -1.4 | 124 | -0.2 | 224 | Data Not Available |
| 26 | 1.0 | 126 | -0.2 | 226 | Data Not Available |
| 28 | 1.4 | 128 | -0.2 | 228 | Data Not Available |
| 30 | -0.2 | 130 | -0.2 | 230 | Data Not Available |
| 32 | 1.0 | 132 | -0.6 | 232 | Data Not Available |
| 34 | 1.8 | 134 | -0.6 | 234 | Data Not Available |
| 36 | 0.6 | 136 | -0.6 | 236 | Data Not Available |
| 38 | 2.2 | 138 | -0.2 | 238 | Data Not Available |
| 40 | 4.6 | 140 | -0.2 | 240 | Data Not Available |
| 42 | 0.6 | 142 | Data Not Available | 242 | Data Not Available |
| 44 | 0.2 | 144 | Data Not Available | 244 | Data Not Available |
| 46 | 1.0 | 146 | Data Not Available | 246 | Data Not Available |
| 48 | 1.4 | 148 | Data Not Available | 248 | Data Not Available |
| 50 | -1.8 | 150 | Data Not Available | 250 | Data Not Available |
| 52 | 0.6 | 152 | Data Not Available | 252 | Data Not Available |
| 54 | 0.2 | 154 | Data Not Available | 254 | Data Not Available |
| 56 | -3.4 | 156 | Data Not Available | 256 | Data Not Available |
| 58 | -3.0 | 158 | Data Not Available | 258 | Data Not Available |
| 60 | -2.6 | 160 | Data Not Available | 260 | Data Not Available |
| 62 | -1.8 | 162 | Data Not Available | 262 | Data Not Available |
| 64 | -1.4 | 164 | Data Not Available | 264 | Data Not Available |
| 66 | -1.4 | 166 | Data Not Available | 266 | Data Not Available |
| 68 | -1.4 | 168 | Data Not Available | 268 | Data Not Available |
| 70 | -0.6 | 170 | Data Not Available | 270 | Data Not Available |
| 72 | -0.6 | 172 | Data Not Available | 272 | Data Not Available |
| 74 | -0.6 | 174 | Data Not Available | 274 | Data Not Available |
| 76 | 0.2 | 176 | Data Not Available | 276 | Data Not Available |
| 78 | 0.2 | 178 | Data Not Available | 278 | Data Not Available |
| 80 | -0.6 | 180 | Data Not Available | 280 | Data Not Available |
| 82 | -1.4 | 182 | Data Not Available | 282 | Data Not Available |
| 84 | -1.0 | 184 | Data Not Available | 284 | Data Not Available |
| 86 | -1.0 | 186 | Data Not Available | 286 | Data Not Available |
| 88 | -1.0 | 188 | Data Not Available | 288 | Data Not Available |
| 90 | -0.6 | 190 | Data Not Available | 290 | Data Not Available |
| 92 | -0.6 | 192 | Data Not Available | 292 | Data Not Available |
| 94 | -0.2 | 194 | Data Not Available | 294 | Data Not Available |
| 96 | -0.2 | 196 | Data Not Available | 296 | Data Not Available |
| 98 | 0.2 | 198 | Data Not Available | 298 | Data Not Available |
| 100 | 0.2 | 200 | Data Not Available | 300 | Data Not Available |

## Rollover Crash Pulse (Event Record 1)
## SDM Recorded Vehicle Roll Rate

Contains No Recorded Data

## Rollover Crash Pulse (Event Record 1)
## Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for Rollover Event)

Contains No Recorded Data

## Vertical Crash Pulse (Event Record 1)
## Normal Acceleration (SDM Recorded Vehicle Vertical Acceleration for Rollover Event)

Contains No Recorded Data

## Pre-Crash Data -5.0 to -0.5 sec (Event Record 1)

| Times (sec) | Accelerator Pedal, % Full (Accelerator Pedal Position) | Service Brake (Brake Switch Circuit State) | Engine RPM (Engine Speed) | Engine Throttle, % Full (Throttle Position) | Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h]) |
|---|---|---|---|---|---|
| -5.0 | 32 | Off | 1856 | 0 | 76 [ 122] |
| -4.5 | 31 | Off | 1856 | 0 | 76 [ 122] |
| -4.0 | 28 | Off | 1856 | 0 | 76 [ 122] |
| -3.5 | 18 | Off | 1856 | 0 | 76 [ 122] |
| -3.0 | 18 | Off | 1856 | 0 | 76 [ 122] |
| -2.5 | 19 | Off | 1856 | 0 | 76 [ 122] |
| -2.0 | 19 | Off | 1856 | 0 | 76 [ 123] |
| -1.5 | 22 | Off | 1856 | 0 | 76 [ 122] |
| -1.0 | 0 | Off | 1856 | 0 | 76 [ 122] |
| -0.5 | 0 | On | 1792 | 0 | 75 [ 121] |

## Pre-Crash Data -2.0 to -0.5 sec (Event Record 1)

| Times (sec) | Cruise Control Active | Cruise Control Resume Switch Active | Cruise Control Set Switch Active | Engine Torque (lb-ft [N-m]) | Reduced Engine Power Mode Indicator |
|---|---|---|---|---|---|
| -2.0 | No | No | No | 214 [ 290] | Off |
| -1.5 | No | No | No | 215 [ 292] | Off |
| -1.0 | No | No | No | 1 [ 2] | Off |
| -0.5 | No | No | No | -95 [-129] | Off |

## System Status at Event (Event Record 2)

| | |
|---|---|
| Event Record Type | Deployment |
| OnStar Deployment Status Data Sent | No |
| Complete file recorded (Event Recording Complete) | Yes |
| Crash Record Locked | Yes |
| OnStar SDM Recorded Vehicle Velocity Change Data Sent | No |
| Deployment Event Counter | 2 |
| Multi-Event, Number of Events (Event Counter) | 2 |
| OnStar Notification Event Counter | 2 |
| Time From Event 1 to 2 (Time Between Events) (seconds) | Data Not Available |
| Ignition Cycle, Crash (Ignition Cycles at Event) | 16551 |
| Algorithm Active: Frontal | Yes |
| Algorithm Active: Side | No |
| Algorithm Active: Rollover | No |
| Algorithm Active: Rear | Yes |
| Concurrent Event Flag Set | No |
| Event Severity Status: Frontal Pretensioner | Yes |
| Event Severity Status: Frontal Stage 1 | Yes |
| Event Severity Status: Frontal Stage 2 | No |
| Event Severity Status: Left Side | No |
| Event Severity Status: Right Side | No |
| Event Severity Status: Rear | No |
| Event Severity Status: Rollover | No |
| Safety Belt Status, Driver (Driver Belt Switch Circuit Status) | Not Buckled |
| Frontal air bag suppression switch status (Passenger SIR Suppression Switch Circuit Status) | On (Enabled) |
| Passenger Air Bag ON Indicator Status | On |
| Passenger Air Bag OFF Indicator Status | Off |
| Low Tire Pressure Warning Lamp Status 0.5 Seconds Prior to Time Zero | Off |
| Frontal Air Bag Warning Lamp (SIR Warning Lamp Status 0.5 Seconds Prior to Time Zero) | Off |
| SIR Warning Lamp ON/OFF Time Continuously (seconds) | 655330 |
| Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously | 3859 |
| Ignition Cycles Since DTCs Were Last Cleared 0.5 Seconds Prior to Time Zero | 253 |
| Maximum Delta-V, Longitudinal (Maximum Longitudinal SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h] | -45 [-73] |
| Time, Maximum Delta-V (Time From FSR Time Zero to Maximum Longitudinal SDM Recorded Vehicle Velocity Change)(msec) | 298 |
| Maximum Delta-V, Lateral (Maximum Lateral SDM Recorded Vehicle Velocity Change for FSR Event) MPH [km/h] | -11 [-17] |
| Time Maximum Delta-V, Lateral (Time From FSR Time Zero to Maximum Lateral SDM Recorded Vehicle Velocity Change)(msec) | 216 |
| High Voltage Disable Notification Sent | Yes |
| Deployment Commanded in Energy Reserve Mode | Yes |

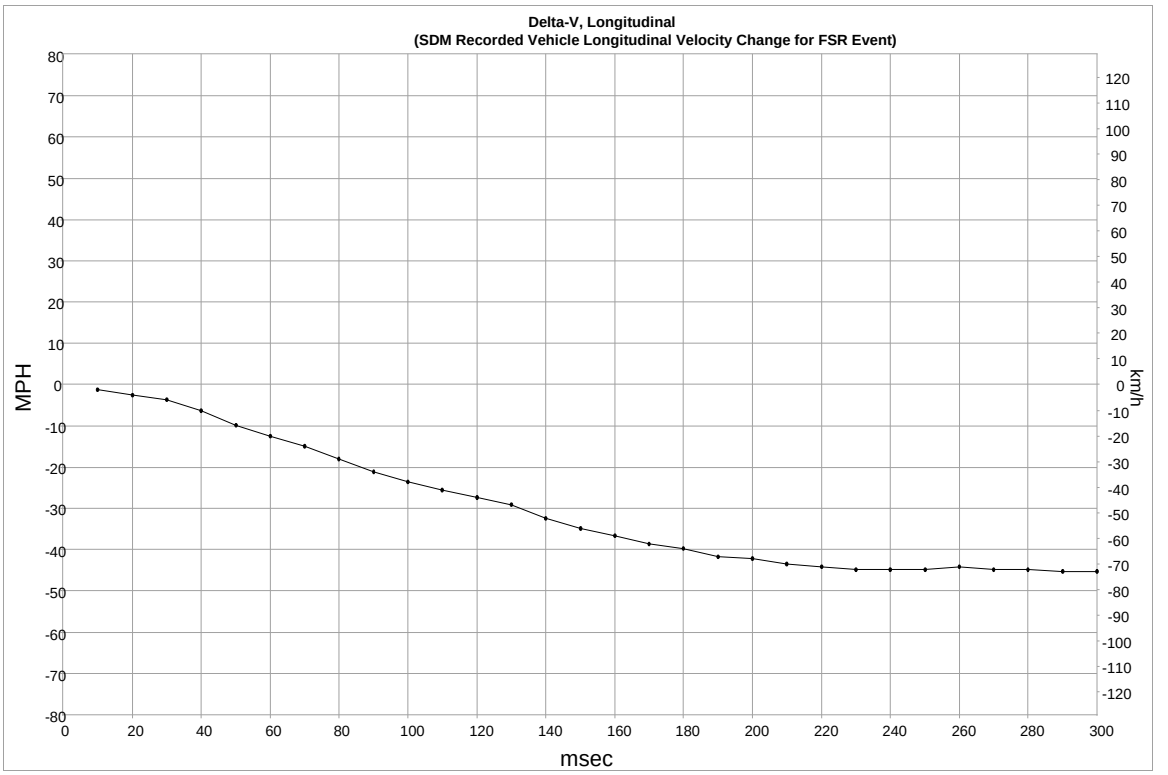
## DTCs Present at Time of Event (Event Record 2)

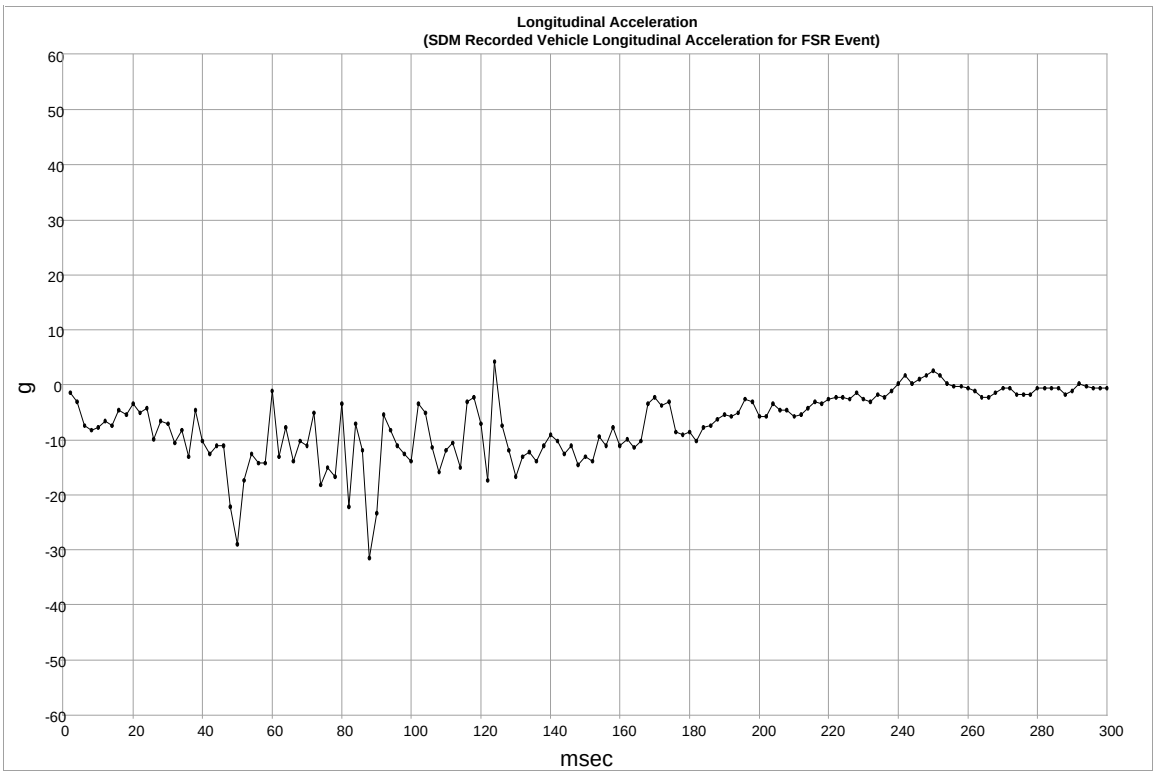
B0052-00

## Event Data (Event Record 2)

| | |
|---|---|
| Driver 1st Stage Deployment Loop Commanded | Yes |
| Passenger 1st Stage Deployment Loop Commanded | Yes |
| Driver 2nd Stage Deployment Loop Commanded | No |
| Passenger 2nd Stage Deployment Loop Commanded | No |
| Driver Pretensioner Deployment Loop #1 Commanded | Yes |
| Passenger Pretensioner Deployment Loop #1 Commanded | Yes |
| Frontal Air Bag Deployment, Time to 1st Stage Deployment, Driver (Driver 1st Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | 9 |
| Frontal Air Bag Deployment, Time to 2nd Stage, Driver (Driver 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Frontal Air Bag Deployment, Time to 1st Stage Deployment, Right Front Passenger (Passenger 1st Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | 9 |
| Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (Passenger 2nd Stage Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Side air bag deployment, time to deploy, driver (Driver Thorax/Curtain Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Side air bag deployment, time to deploy, right front passenger (Passenger Thorax/Curtain Time From Time Zero to Deployment Command Criteria Met) (msec) | Data Not Available |
| Pretensioner Deployment, Time to Fire, Driver (Driver Pretensioner Time From Time Zero to Deployment Loop #1 or Loop #2 Command Criteria Met) (msec) | 9 |
| Pretensioner Deployment, Time to Fire, Right Front Passenger (Passenger Pretensioner Time From Time Zero to Deployment Loop #1 or Loop #2 Command Criteria Met) (msec) | 9 |

# Longitudinal Crash Pulse (Event Record 2)



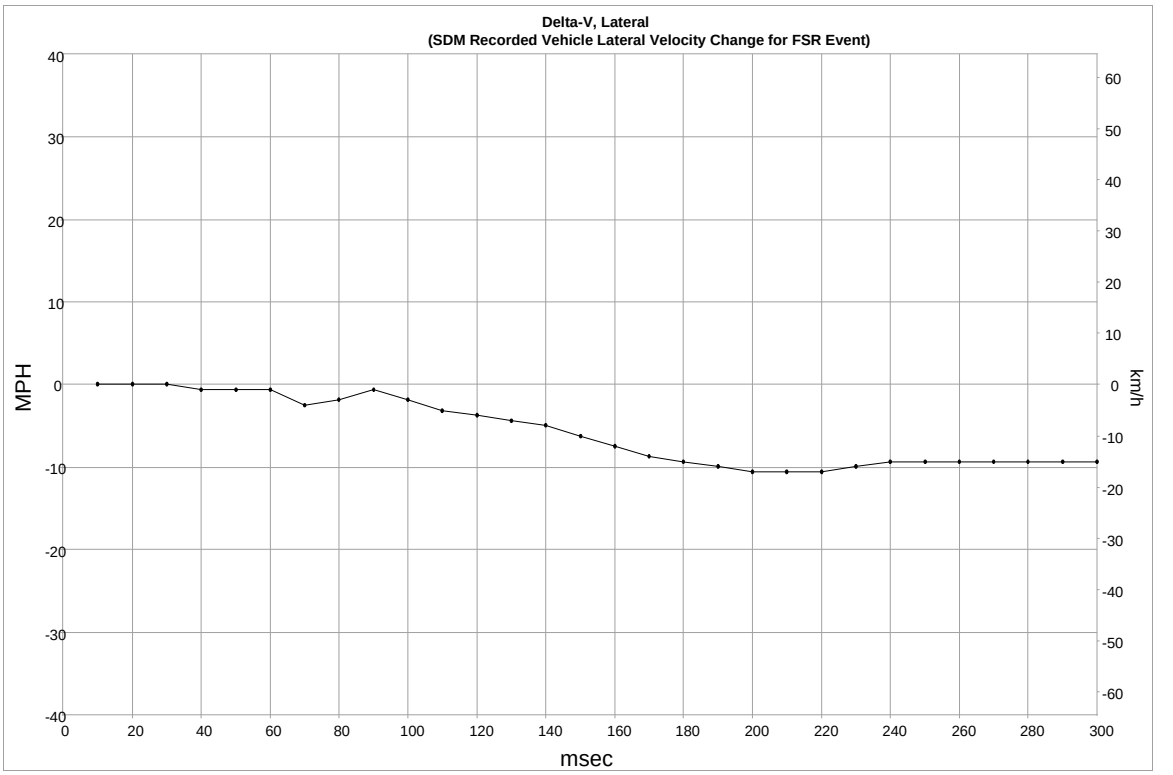
## Longitudinal Crash Pulse (Event Record 2)

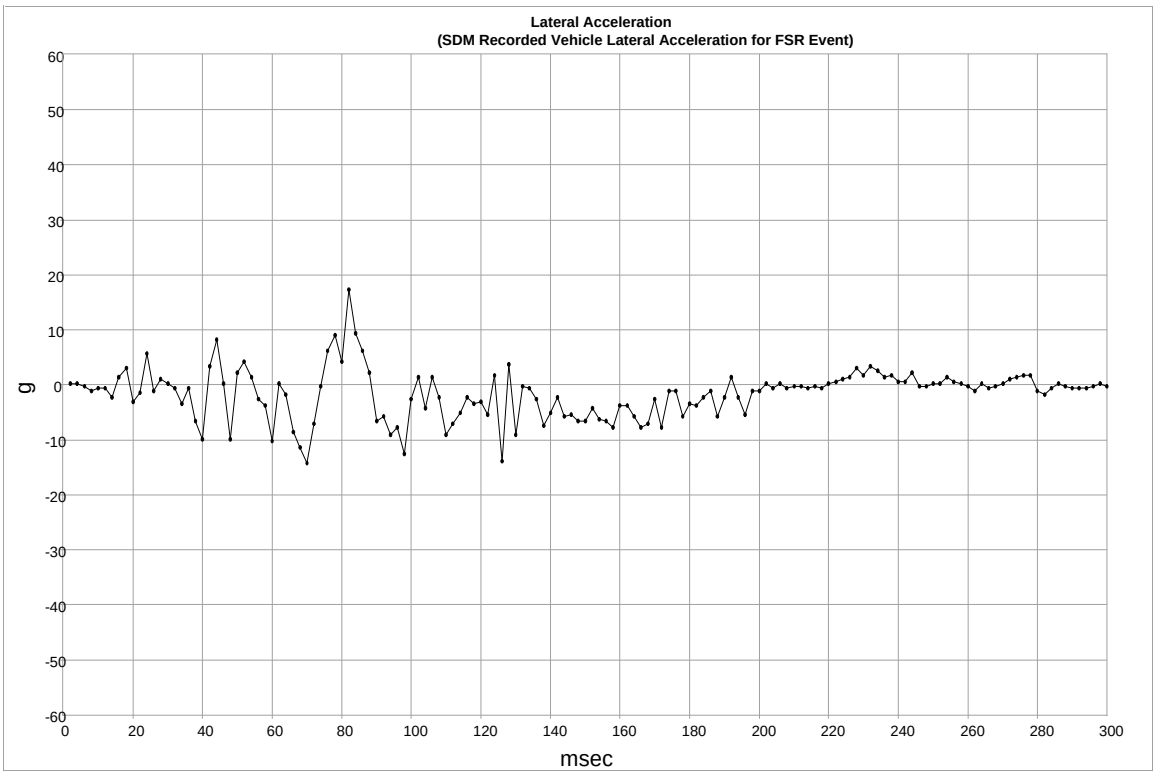
| Time (msec) | Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (MPH) | Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (km/h) |
|---|---|---|
| 10 | -1.2 | -2.0 |
| 20 | -2.5 | -4.0 |
| 30 | -3.7 | -6.0 |
| 40 | -6.2 | -10.0 |
| 50 | -9.9 | -16.0 |
| 60 | -12.4 | -20.0 |
| 70 | -14.9 | -24.0 |
| 80 | -18.0 | -29.0 |
| 90 | -21.1 | -34.0 |
| 100 | -23.6 | -38.0 |
| 110 | -25.5 | -41.0 |
| 120 | -27.3 | -44.0 |
| 130 | -29.2 | -47.0 |
| 140 | -32.3 | -52.0 |
| 150 | -34.8 | -56.0 |
| 160 | -36.7 | -59.0 |
| 170 | -38.5 | -62.0 |
| 180 | -39.8 | -64.0 |
| 190 | -41.6 | -67.0 |
| 200 | -42.3 | -68.0 |
| 210 | -43.5 | -70.0 |
| 220 | -44.1 | -71.0 |
| 230 | -44.7 | -72.0 |
| 240 | -44.7 | -72.0 |
| 250 | -44.7 | -72.0 |
| 260 | -44.1 | -71.0 |
| 270 | -44.7 | -72.0 |
| 280 | -44.7 | -72.0 |
| 290 | -45.4 | -73.0 |
| 300 | -45.4 | -73.0 |

## Longitudinal Crash Pulse (Event Record 2)

| Time (msec) | Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g) | Time (msec) | Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g) | Time (msec) | Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g) |
|---|---|---|---|---|---|
| 2 | -1.4 | 102 | -3.4 | 202 | -5.8 |
| 4 | -3.0 | 104 | -5.0 | 204 | -3.4 |
| 6 | -7.4 | 106 | -11.4 | 206 | -4.6 |
| 8 | -8.2 | 108 | -15.8 | 208 | -4.6 |
| 10 | -7.8 | 110 | -11.8 | 210 | -5.8 |
| 12 | -6.6 | 112 | -10.6 | 212 | -5.4 |
| 14 | -7.4 | 114 | -15.0 | 214 | -4.2 |
| 16 | -4.6 | 116 | -3.0 | 216 | -3.0 |
| 18 | -5.4 | 118 | -2.2 | 218 | -3.4 |
| 20 | -3.4 | 120 | -7.0 | 220 | -2.6 |
| 22 | -5.0 | 122 | -17.4 | 222 | -2.2 |
| 24 | -4.2 | 124 | 4.2 | 224 | -2.2 |
| 26 | -9.8 | 126 | -7.4 | 226 | -2.6 |
| 28 | -6.6 | 128 | -11.8 | 228 | -1.4 |
| 30 | -7.0 | 130 | -16.6 | 230 | -2.6 |
| 32 | -10.6 | 132 | -13.0 | 232 | -3.0 |
| 34 | -8.2 | 134 | -12.2 | 234 | -1.8 |
| 36 | -13.0 | 136 | -13.8 | 236 | -2.2 |
| 38 | -4.6 | 138 | -11.0 | 238 | -1.0 |
| 40 | -10.2 | 140 | -9.0 | 240 | 0.2 |
| 42 | -12.6 | 142 | -10.2 | 242 | 1.8 |
| 44 | -11.0 | 144 | -12.6 | 244 | 0.2 |
| 46 | -11.0 | 146 | -11.0 | 246 | 1.0 |
| 48 | -22.2 | 148 | -14.6 | 248 | 1.8 |
| 50 | -29.0 | 150 | -13.0 | 250 | 2.6 |
| 52 | -17.4 | 152 | -13.8 | 252 | 1.8 |
| 54 | -12.6 | 154 | -9.4 | 254 | 0.2 |
| 56 | -14.2 | 156 | -11.0 | 256 | -0.2 |
| 58 | -14.2 | 158 | -7.8 | 258 | -0.2 |
| 60 | -1.0 | 160 | -11.0 | 260 | -0.6 |
| 62 | -13.0 | 162 | -9.8 | 262 | -1.0 |
| 64 | -7.8 | 164 | -11.4 | 264 | -2.2 |
| 66 | -13.8 | 166 | -10.2 | 266 | -2.2 |
| 68 | -10.2 | 168 | -3.4 | 268 | -1.4 |
| 70 | -11.0 | 170 | -2.2 | 270 | -0.6 |
| 72 | -5.0 | 172 | -3.8 | 272 | -0.6 |
| 74 | -18.2 | 174 | -3.0 | 274 | -1.8 |
| 76 | -15.0 | 176 | -8.6 | 276 | -1.8 |
| 78 | -16.6 | 178 | -9.0 | 278 | -1.8 |
| 80 | -3.4 | 180 | -8.6 | 280 | -0.6 |
| 82 | -22.2 | 182 | -10.2 | 282 | -0.6 |
| 84 | -7.0 | 184 | -7.8 | 284 | -0.6 |
| 86 | -11.8 | 186 | -7.4 | 286 | -0.6 |
| 88 | -31.4 | 188 | -6.2 | 288 | -1.8 |
| 90 | -23.4 | 190 | -5.4 | 290 | -1.0 |
| 92 | -5.4 | 192 | -5.8 | 292 | 0.2 |
| 94 | -8.2 | 194 | -5.0 | 294 | -0.2 |
| 96 | -11.0 | 196 | -2.6 | 296 | -0.6 |
| 98 | -12.6 | 198 | -3.0 | 298 | -0.6 |
| 100 | -13.8 | 200 | -5.8 | 300 | -0.6 |

# Lateral Crash Pulse (Event Record 2)



## Lateral Crash Pulse (Event Record 2)

| Time (msec) | Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (MPH) | Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (km/h) |
|---|---|---|
| 10 | 0.0 | 0.0 |
| 20 | 0.0 | 0.0 |
| 30 | 0.0 | 0.0 |
| 40 | -0.6 | -1.0 |
| 50 | -0.6 | -1.0 |
| 60 | -0.6 | -1.0 |
| 70 | -2.5 | -4.0 |
| 80 | -1.9 | -3.0 |
| 90 | -0.6 | -1.0 |
| 100 | -1.9 | -3.0 |
| 110 | -3.1 | -5.0 |
| 120 | -3.7 | -6.0 |
| 130 | -4.3 | -7.0 |
| 140 | -5.0 | -8.0 |
| 150 | -6.2 | -10.0 |
| 160 | -7.5 | -12.0 |
| 170 | -8.7 | -14.0 |
| 180 | -9.3 | -15.0 |
| 190 | -9.9 | -16.0 |
| 200 | -10.6 | -17.0 |
| 210 | -10.6 | -17.0 |
| 220 | -10.6 | -17.0 |
| 230 | -9.9 | -16.0 |
| 240 | -9.3 | -15.0 |
| 250 | -9.3 | -15.0 |
| 260 | -9.3 | -15.0 |
| 270 | -9.3 | -15.0 |
| 280 | -9.3 | -15.0 |
| 290 | -9.3 | -15.0 |
| 300 | -9.3 | -15.0 |

## Lateral Crash Pulse (Event Record 2)

| Time (msec) | Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g) | Time (msec) | Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g) | Time (msec) | Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g) |
|---|---|---|---|---|---|
| 2 | 0.2 | 102 | 1.4 | 202 | 0.2 |
| 4 | 0.2 | 104 | -4.2 | 204 | -0.6 |
| 6 | -0.2 | 106 | 1.4 | 206 | 0.2 |
| 8 | -1.0 | 108 | -2.2 | 208 | -0.6 |
| 10 | -0.6 | 110 | -9.0 | 210 | -0.2 |
| 12 | -0.6 | 112 | -7.0 | 212 | -0.2 |
| 14 | -2.2 | 114 | -5.0 | 214 | -0.6 |
| 16 | 1.4 | 116 | -2.2 | 216 | -0.2 |
| 18 | 3.0 | 118 | -3.4 | 218 | -0.6 |
| 20 | -3.0 | 120 | -3.0 | 220 | 0.2 |
| 22 | -1.4 | 122 | -5.4 | 222 | 0.6 |
| 24 | 5.8 | 124 | 1.8 | 224 | 1.0 |
| 26 | -1.0 | 126 | -13.8 | 226 | 1.4 |
| 28 | 1.0 | 128 | 3.8 | 228 | 3.0 |
| 30 | 0.2 | 130 | -9.0 | 230 | 1.8 |
| 32 | -0.6 | 132 | -0.2 | 232 | 3.4 |
| 34 | -3.4 | 134 | -0.6 | 234 | 2.6 |
| 36 | -0.6 | 136 | -2.6 | 236 | 1.4 |
| 38 | -6.6 | 138 | -7.4 | 238 | 1.8 |
| 40 | -9.8 | 140 | -5.0 | 240 | 0.6 |
| 42 | 3.4 | 142 | -2.2 | 242 | 0.6 |
| 44 | 8.2 | 144 | -5.8 | 244 | 2.2 |
| 46 | 0.2 | 146 | -5.4 | 246 | -0.2 |
| 48 | -9.8 | 148 | -6.6 | 248 | -0.2 |
| 50 | 2.2 | 150 | -6.6 | 250 | 0.2 |
| 52 | 4.2 | 152 | -4.2 | 252 | 0.2 |
| 54 | 1.4 | 154 | -6.2 | 254 | 1.4 |
| 56 | -2.6 | 156 | -6.6 | 256 | 0.6 |
| 58 | -3.8 | 158 | -7.8 | 258 | 0.2 |
| 60 | -10.2 | 160 | -3.8 | 260 | -0.2 |
| 62 | 0.2 | 162 | -3.8 | 262 | -1.0 |
| 64 | -1.8 | 164 | -5.8 | 264 | 0.2 |
| 66 | -8.6 | 166 | -7.8 | 266 | -0.6 |
| 68 | -11.4 | 168 | -7.0 | 268 | -0.2 |
| 70 | -14.2 | 170 | -2.6 | 270 | 0.2 |
| 72 | -7.0 | 172 | -7.8 | 272 | 1.0 |
| 74 | -0.2 | 174 | -1.0 | 274 | 1.4 |
| 76 | 6.2 | 176 | -1.0 | 276 | 1.8 |
| 78 | 9.0 | 178 | -5.8 | 278 | 1.8 |
| 80 | 4.2 | 180 | -3.4 | 280 | -1.0 |
| 82 | 17.4 | 182 | -3.8 | 282 | -1.8 |
| 84 | 9.4 | 184 | -2.2 | 284 | -0.6 |
| 86 | 6.2 | 186 | -1.0 | 286 | 0.2 |
| 88 | 2.2 | 188 | -5.8 | 288 | -0.2 |
| 90 | -6.6 | 190 | -2.2 | 290 | -0.6 |
| 92 | -5.8 | 192 | 1.4 | 292 | -0.6 |
| 94 | -9.0 | 194 | -2.2 | 294 | -0.6 |
| 96 | -7.8 | 196 | -5.4 | 296 | -0.2 |
| 98 | -12.6 | 198 | -1.0 | 298 | 0.2 |
| 100 | -2.6 | 200 | -1.0 | 300 | -0.2 |

## Rollover Crash Pulse (Event Record 2)
## SDM Recorded Vehicle Roll Rate

Contains No Recorded Data

## Rollover Crash Pulse (Event Record 2)
## Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for Rollover Event)

Contains No Recorded Data

## Vertical Crash Pulse (Event Record 2)
## Normal Acceleration (SDM Recorded Vehicle Vertical Acceleration for Rollover Event)

Contains No Recorded Data

## Pre-Crash Data -5.0 to -0.5 sec (Event Record 2)

| Times (sec) | Accelerator Pedal, % Full (Accelerator Pedal Position) | Service Brake (Brake Switch Circuit State) | Engine RPM (Engine Speed) | Engine Throttle, % Full (Throttle Position) | Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h]) |
|---|---|---|---|---|---|
| -5.0 | 32 | Off | 2176 | 0 | 88 [ 142] |
| -4.5 | 33 | Off | 2176 | 0 | 88 [ 142] |
| -4.0 | 33 | Off | 2176 | 0 | 88 [ 142] |
| -3.5 | 33 | Off | 2176 | 0 | 88 [ 142] |
| -3.0 | 33 | Off | 2176 | 0 | 88 [ 142] |
| -2.5 | 0 | Off | 2176 | 0 | 88 [ 142] |
| -2.0 | 0 | On | 2112 | 0 | 88 [ 141] |
| -1.5 | 0 | On | 1856 | 0 | 83 [ 133] |
| -1.0 | 0 | On | 1536 | 0 | 66 [ 106] |
| -0.5 | 0 | On | 1344 | 0 | 67 [ 108] |

## Pre-Crash Data -2.0 to -0.5 sec (Event Record 2)

| Times (sec) | Cruise Control Active | Cruise Control Resume Switch Active | Cruise Control Set Switch Active | Engine Torque (lb-ft [N-m]) | Reduced Engine Power Mode Indicator |
|---|---|---|---|---|---|
| -2.0 | No | No | No | -88 [-119] | Off |
| -1.5 | No | No | No | -80 [-108] | Off |
| -1.0 | No | No | No | -84 [-114] | Off |
| -0.5 | No | No | No | -77 [-104] | Off |

## Hexadecimal Data

Hexadecimal data deleted due to the possible presence of personally identifiable information

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**National Highway
Traffic Safety
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