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Special Crash Investigations: On-Site Air Bag Non-Deployment Crash Investigation; Vehicle: 2018 Chevrolet Traverse; Location: New York; Crash Date: April 2018

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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 vehicles 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.

16. Abstract

This report documents the on-site investigation of the road departure/fixed object crash of a 2018 Chevrolet Traverse and the non-deployment of its frontal air bag system. The Chevrolet had certified advanced 208-compliant (CAC) frontal air bags, a driver's seat-mounted inboard air bag, front-seat-mounted side impact air bags and dual-sensing inflatable curtain air bags mounted to the roof side rails. None of the air bags deployed in the crash. The 54-year-old belted female driver sustained police-reported C-level (possible) injuries in the crash. Through the course of the investigation it was determined the Chevrolet experienced several closely spaced yielding crash events. The resulting crash pulse had a slowly ramping/long duration reaching a maximum delta V at 420 milliseconds. Absent knowledge of the vehicle manufacturer's air bag deployment strategy, the root cause of the non-deployment remains unknown; however, it was likely that the long duration of the crash pulse played a role.

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non-deployment, event data recorder, crash pulse	This document is available to the public from the DOT, BTS, National Transportation Library, Repository & Open Science Access Portal, rosap.ntl.bts.gov.

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Background

This on-site investigation documents the road departure/fixed object crash of a 2018 Chevrolet Traverse (Figure 1) and the non-deployment of its frontal air bag system. The Chevrolet had certified advanced 208-compliant (CAC) frontal air bags, a driver's seat-mounted inboard air bag, front-seat-mounted side impact air bags, and dual-sensing inflatable curtain (IC) air bags mounted to the roof side rails. None of the air bags deployed in the crash. The 54-year-old belted female driver sustained police-reported C-level (possible) injuries in the crash.

Figure 1. Right front oblique view of the Chevrolet.
Image supplied by the police investigator.

A police investigator notified the Special Crash Investigations team (SCI) at Crash Research & Analysis, Inc., of this non-deployment crash in September 2018. In turn the SCI team forwarded the information to the Crash Investigation Division of the National Highway Traffic Safety Administration, which requested further research and assigned an on-site crash investigation that took place in September 2018. The police investigator informed the SCI investigator that General Motors had inspected the vehicle in May 2018 and had reported to the owner that the vehicle performed as intended.

The crash occurred as the Chevrolet was traveling west on a two-lane roadway approaching a Y-type intersection. The Chevrolet driver intended to turn onto the left leg of the Y-junction. She stated that opposite non-contact traffic at the intersection delayed her turn and resulted in a road departure into the apex of the intersection. The Chevrolet ran over a delineator post, entered a depression, and struck a utility pole with its front plane. The maximum longitudinal delta V,

reported in the event data recorder (EDR) image conducted by the police, was -68 km/h (-42 mph), which occurred at 420 msec.

The on-site investigation included the exterior and interior inspections of the Chevrolet to measure the deformation and intrusion, documentation of the evidence of interior occupant contact, examination of the manual restraint system for use, and an assessment of the supplemental restraint systems. The Chevrolet had an EDR supported by the Bosch Crash Data Retrieval tool and the SCI team imaged the EDR to supplement the inspection. The SCI team also photographed and mapped the crash scene by total station.

Through the course of the investigation it was determined that the Chevrolet experienced several closely spaced crash events with yielding objects. The yielding properties of these crash events resulted in a long duration/extended crash pulse recorded as a singular event by the EDR. Absent the manufacturer's knowledge of the deployment strategy for this vehicle, the root cause of the non-deployment remains unknown. However, it was likely the extended length of the crash pulse experienced by the belted occupant played a role in the frontal air bag non-deployment.

Summary

Crash Site

The crash occurred during an afternoon in April 2018. The environmental conditions reported by the National Weather Service crash included mostly cloudy skies with a temperature of 3 °C (38 °F), a west wind of 14 km/h (9 mph), and a relative humidity of 35 percent. The police-reported conditions were cloudy, daylight, and dry.

This single-vehicle crash occurred on a two-lane, east/west roadway at a Y-intersection (Figure 2). The posted speed limit of the roadway was 64 km/h (40 mph). At the intersection the east/west roadway comprised the vertical and right legs of the Y-junction and curved to the right. The radius of curvature measured 160.0 m (524.9 ft). The width of the westbound lane measured 3.2 m (10.5 ft). The eastbound lane was 3.5 m (11.5 ft) wide. A double yellow centerline separated the traffic lanes. The left leg of the Y-junction was a two-lane, unmarked asphalt roadway. The total width of this roadway was 6.3 m (20.7 ft). The apex of the Y-junction was a depressed grass area with a drainage ditch at its center. The depth of the ditch was approximately 61 cm (24 in). A wood utility pole located within the ditch line, approximately 13 m (43 ft) west of the apex, was the point of impact. The damaged pole was replaced prior to the date of the SCI inspection.

Figure 2. West-facing approach view of the Y-intersection

Pre-Crash

The Chevrolet was traveling westbound, driven by a 54-year-old belted female who was the sole occupant of the vehicle. It was the intention of the driver to turn left onto the left leg of the Y-junction. She was traveling to her home approximately 488 m (1,600 ft) west of the junction. The EDR-reported speed of the Chevrolet 3.0 seconds prior to the algorithm enable (AE) was 75 km/h (47 mph).

As the Chevrolet approached the junction's left leg, two eastbound non-contact vehicles rounded the curve. The travel and relative positions of these non-contact vehicles delayed the ability of the Chevrolet's driver to execute the left turn and altered her intended path of travel. EDR data indicated the driver released the accelerator and applied the brakes, which was recorded 1.5

seconds prior to AE. The driver stated she turned late on the approach to the junction between the two non-contact vehicles and departed the road at the apex. The EDR-recorded speed of the Chevrolet was 70 km/h (43 mph) 1.0 second prior to AE.

Crash

The front of the Chevrolet struck a delineator post (Event 1) located at the apex and its front plane and forward undercarriage struck the ground (Event 2), as the vehicle entered the ditch and grass depression. The undercarriage impact most likely enabled the sensing algorithms (AE) of the vehicle's air bag systems. The Chevrolet traveled along the ditch and struck the utility pole with the right aspect of its front plane (Event 3). The utility pole (Figure 3) partially fractured and was displaced in the ground by the force of the impact. The barrier equivalent speed of the crash calculated by the WinSMASH program was 29 km/h (18 mph). This calculation was considered to be borderline due to the yielding properties of the impact. The maximum EDR-recorded delta-V was -68 km/h (-42 mph) at 420 milliseconds.

Figure 3. North-facing view at the crash site of the struck and fractured utility pole (left) and the replaced utility pole (right). Image supplied by the owner of the Chevrolet.

Post-Crash

The Chevrolet came to rest against the struck utility pole facing in a westerly direction. Although the vehicle had "OnStar," the driver did not report having any communications with an "OnStar" representative. A neighbor who resides near the crash site heard it and responded to the scene. This person assisted the driver from the vehicle. The emergency response system was called via a cellular telephone. Police, fire, and emergency medical services personnel responded to the crash site. EMS evaluated the driver, placed her in an ambulance, and provided transport to the emergency room of a local hospital where she was treated and released.

2018 Chevrolet Traverse

Description

The 2018 Chevrolet Traverse (Figure 4) was manufactured in August 2017 and was identified by the Vehicle Identification Number 1GNEVKKW2JJxxxxxx. The vehicle was manufactured on a 307 cm (121 in) wheelbase and was configured with the High Country trim package. The power train consisted of a 3.6 liter, 6-cylinder gasoline engine linked to a 9-speed shiftable automatic transmission with a console-mounted shifter and all-wheel drive. The gross vehicle weight rating was 2,800 kg (6,173 lb) with gross axle weight ratings of 1,450 kg (3,196 lb) front and 1,600 kg (3,527 lb) rear. Its curb weight was 2132 kg (4,700 lb). The Chevrolet had crash avoidance features that included lane keeping with lane change alert, lane departure warning, blind spot detection, forward collision alert, rear cross traffic alert, and frontal pedestrian braking. The vehicle had Continental Cross Contact LX20 Eco Plus all-season tires of the vehicle manufacturer recommended size of P255/55R20 mounted on multi-spoke OEM alloy wheels. The vehicle manufacturer recommended tire pressure was 240 kPa (35 PSI) at both axle positions. All tires had matching Tire Identification Numbers of A3HH WC4F 3217. The service brakes were power-assisted 4-wheel disc with ABS.

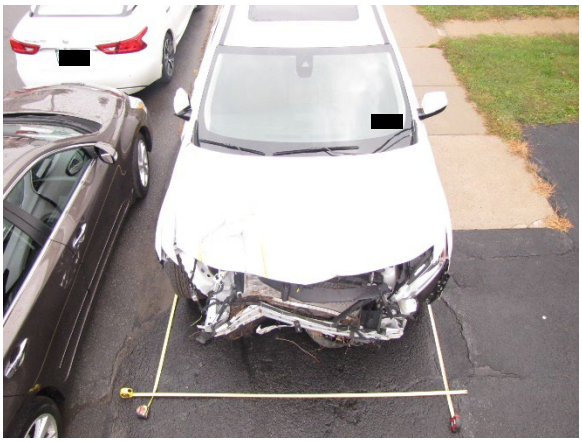


Figure 4. Overhead view of the Chevrolet depicting the frontal deformation

The interior of the Chevrolet was configured with three rows of seats (2/2/3) for seating of seven occupants. All seating surfaces were leather. The front row bucket seats were power adjustable. The second row was configured with two fold flat captain's chairs, while the third row was a fold flat three-passenger bench seat. All seat positions were equipped with adjustable head restraints. Both front row head restraints were adjusted 7 cm (2.8 in) above the seatbacks while the second and third row head restraints were in the full-down positions.

Safety systems consisted of 3-point lap and shoulder seat belts for all seat positions and air bags. The front row was configured with certified advanced 208-complaint (CAC) dual-stage driver's and passenger's frontal air bags, a driver's seat-mounted inboard air bag, front seat-mounted side impact air bags, and dual sensing (side impact and rollover) roof side rail-mounted inflatable curtain (IC) air bags. Additionally, the front row positions were equipped with lower anchor and

retractor pretensioners. None of the air bags deployed and the pretensioners did not actuate in this crash.

Vehicle History

The owner of the Chevrolet reported that the vehicle was purchased in November 2017. The vehicle had been driven for personal use since taking delivery and no record of service or maintenance was located for the vehicle since time of purchase. There were no illuminated maintenance or warning lamps present at the time of the crash. The odometer reading at SCI inspection was 5,378 km (3,342 miles).

NHTSA Recalls and Investigations

A search of the NHTSA database (www.nhtsa.gov/recalls) using the Chevrolet's VIN at the time of the September 2018 investigation and in June 2022 at the time of this report yielded no open recalls, complaints or investigations for this specific vehicle.

Exterior Damage

The front plane of the Chevrolet was involved in three closely spaced impact events. The first event involved a steel delineator post that was positioned at the apex of the Y-junction. Based on its location, the center aspect of the front plane struck and deflected the delineator post as the vehicle overrode it. The bumper fascia separated from the Chevrolet and was discarded prior to the SCI inspection. The exact location of the delineator post impact could not be determined. The estimated collision deformation classification (CDC) for this event was 12FCEN1.

The second event involved the lower aspect of the bumper fascia and forward undercarriage as the vehicle entered the ditch area of the depression. The full width of the lower frontal plane struck and gouged the earthen ditch bank as the Chevrolet continued forward. Contact damage consisted of dirt and grass embedded into the air conditioning condenser with dirt and grass on top of the bumper beam and embedded into the lower radiator support and undercarriage. The CDC for this event was 12UFDW1.

The third event involved damage to the right aspect of the bumper fascia, the right headlamp assembly, hood face and bumper beam from the impact with the utility pole. The direct contact damage projected to the bumper beam began 28 cm (11.0 in) right of the vehicle's centerline and extended an additional 33 cm (13.0 in) to the right. Maximum crush was 28 cm (11.0 in) located 44 cm (17.3 in) right of center. The hood face and upper radiator support were crushed rearward. The residual crush profile measured across the deformed bumper reinforcement beam (Figure 5) was as follows: C1 = 0, C2 = 6 cm (2.4 in), C3 = 15 cm (5.9 in), C4 = 26 cm (10.2 in), C5 = 28 cm (11.0 in), C6 = 12 cm (4.7 in). The right wheelbase was reduced 3 cm (1.2 in). The left wheelbase was unchanged. All the doors remained closed during the crash and were operational at inspection. The body gap at the interface of the right front door and B-pillar was reduced with frictional interference indicative of residual body deformation. The CDC for this Event #3 impact was 12FREN2. For comparative purposes, the barrier equivalent speed of the yielding object crash as calculated by the WinSMASH program was 29 km/h (18 mph).

Figure 5. Close-up view of the Chevrolet's frontal deformation

Event Data Recorder

The Chevrolet had an air bag sensing and diagnostic module (SDM) mounted on the center tunnel between the front seats. The SDM had EDR capabilities to record crash data. The SCI investigator imaged the EDR using the Bosch CDR tool with software version 17.7.2 via a connection to the diagnostic link connector. The imaged data is included at the end of this document and is reported with software version 21.5.1.

The SDM monitored and measured tri-axial acceleration and roll rate data. A frontal (longitudinal), side (lateral), and/or rollover (vertical) crash pulse could trigger the recording of a distinct crash event. The minimum threshold to trigger the recording of an event was a calculated vehicle velocity change of 8 km/h (5 mph). The EDR could record two different event types and store a combination of up to three events. Recognized events were termed “non-deployment” or “deployment,” and up to two different deployment events and one locked non-deployment event could be stored. Non-deployment events could be overwritten after approximately 250 ignition cycles, whereas deployment events became locked and could not be overwritten.

The imaged data contained one record, which was designated a non-deployment event. The ignition cycle counter at the time of the recording was 1029 and 1093 at the time of the SCI inspection. The disparity in the counter considered high based on SCI experience; however, it still may be attributed to the post-crash movement and insurance processing of the vehicle. At the time of the event, the driver seat belt was buckled. The air bag warning lamp was off and there were no diagnostic trouble codes. The maximum recorded longitudinal delta V was -68 km/h (-42 mph) at 420 milliseconds. The maximum lateral delta V was 13 km/h (8 mph). The initial slope of the crash pulse was shallow and then ramped up during the later stage of the recording.

A 5.0-second pre-crash buffer that described various vehicle performance parameters (including vehicle speed, accelerator pedal position, brake status, throttle position, and engine rpm) was recorded for each crash event. These performance parameters were recorded asynchronously in 0.5-second intervals. No data parameters regarding the vehicle’s crash avoidance features were recorded.

Time sec.	Speed km/h (mph)	Accelerator Pedal Percent	Throttle Percent	Engine rpm	Brake switch Circuit Status
-5.0	63 (39)	57	99	4,992	Off
-4.5	68 (42)	53	85	5,440	Off
-4.0	71 (44)	47	55	5,568	Off
-3.5	75 (47)	16	40	4,352	Off
-3.0	75 (47)	55	34	4,288	Off
-2.5	74 (46)	75	99	3,584	Off
-2.0	77 (48)	32	89	4,992	Off
-1.5	75 (47)	0	26	4,096	On
-1.0	70 (43)	0	21	3,200	On
-0.5	61 (38)	0	18	2,688	On

The data trends indicated that the Chevrolet approached the Y-junction with increasing speed. The driver's release of accelerator and an application of the brakes was recorded 1.5 seconds prior to AE. These trends were consistent with the driver's description of the circumstances leading to the crash.

Interior Damage

There was no damage, intrusion, or occupant contact evidence to the interior of the Chevrolet. All glazing remained intact without damage.

Manual Restraints

The Chevrolet was configured with continuous-loop, 3-point lap and shoulder seat belts for the seven seat positions. The front row seat belt systems were configured with light-weight locking latch plates while the remaining systems were configured with sliding latch plates. All D-rings were fixed. The driver's seat belt retracted onto an emergency locking retractor (ELR) while the front passenger and second and third row systems used ELR/automatic locking retractors (ALR). Both front row seat belt systems were equipped with lower anchor and retractor pretensioners, none of which actuated.

The driver used the seat belt system at the time of the crash. There was no loading evidence visible on the seat belt system; however, driver injury patterns, the lack of occupant contact points and the EDR data supported seat belt use.

Supplemental Restraint Systems

The Chevrolet had certified advanced 208-compliant dual-stage frontal air bags, a driver's seat-mounted inboard air bag, front-seat-mounted side impact air bags and roof-side-rail-mounted side impact and rollover-sensing IC air bags. None of the air bag systems deployed in this crash.

Air Bag Non-Deployment Discussion

Based on the driver interview and observations of the SCI inspection it was determined that:

- The driver reported that no service or maintenance was necessary or performed to the air bag systems during the ownership of the vehicle.
- There were no faults or warnings present at the time of the crash that would have affected the air bag deployment.
- The crash involved three closely spaced events.
- The front plane/undercarriage impact with the ground (SCI Event 2) was the likely source of algorithm enable. The ground impact was a yielding impact.
- The impact to the utility pole caused it to partially fracture and become displaced in the ground. This effectively resulted in a yielding impact.
- The yielding properties of these two crash events were considered a singular crash event by the EDR.
- The duration of the impact became extended; the maximum delta V was not achieved until 420 milliseconds.
- Without the knowledge of the vehicle manufacturer's deployment strategy, the root cause of the non-deployment remains unknown. However, it is likely that the slowly ramping/long duration of the crash pulse played a role.

2018 Chevrolet Traverse Occupant Data

Driver Demographics

Age/sex:	54 years/female
Height:	165 cm (65 in)
Weight:	66 kg (145 lb) medical record data
Eyewear:	None
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Unknown track
Manual restraint usage:	3-point lap and shoulder seat belt
Usage source:	SCI vehicle inspection, EDR, PAR
Air bags:	Front, seat-mounted outboard, seat-mounted inboard and IC air bags available, none deployed
Alcohol/drug involvement:	None
Egress from vehicle:	Assisted through the left front door by a neighbor to the crash site
Transport from scene:	Ambulance to the emergency room of a local hospital
Type of medical treatment	Treated and released

Driver Injury

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Skin/subcutaneous/muscle (Thorax) contusion; hematoma, Chest	410402.1	Isolated Interior - Shoulder portion of belt restraint	Certain
2	Skin/subcutaneous/muscle [except closed abdominal muscle injuries] (Abdomen) contusion; hematoma, No Further Specificity	510402.1	Isolated Interior - Lap portion of belt restraint	Certain
3	Skin/subcutaneous/muscle (Thorax) abrasion, Chest	410202.1	Isolated Interior - Shoulder portion of belt restraint	Certain
4	Skin/subcutaneous/muscle abrasion, Left Shoulder	710202.1	Isolated Interior - Shoulder portion of belt restraint	Certain

Source: driver interview (Injuries 1,2), emergency room records (Injuries 3,4)

Driver Kinematics

The 54-year-old female Chevrolet driver was seated in an unknown seat track position with the seatback slightly reclined. She was restrained by the manual 3-point lap and shoulder seat belt system. Although there was no loading evidence on the seat belt system, seat belt use was determined from the lack of occupant contact evidence, the nature and locations of driver injuries, and the EDR data corroborated by the statements of the driver.

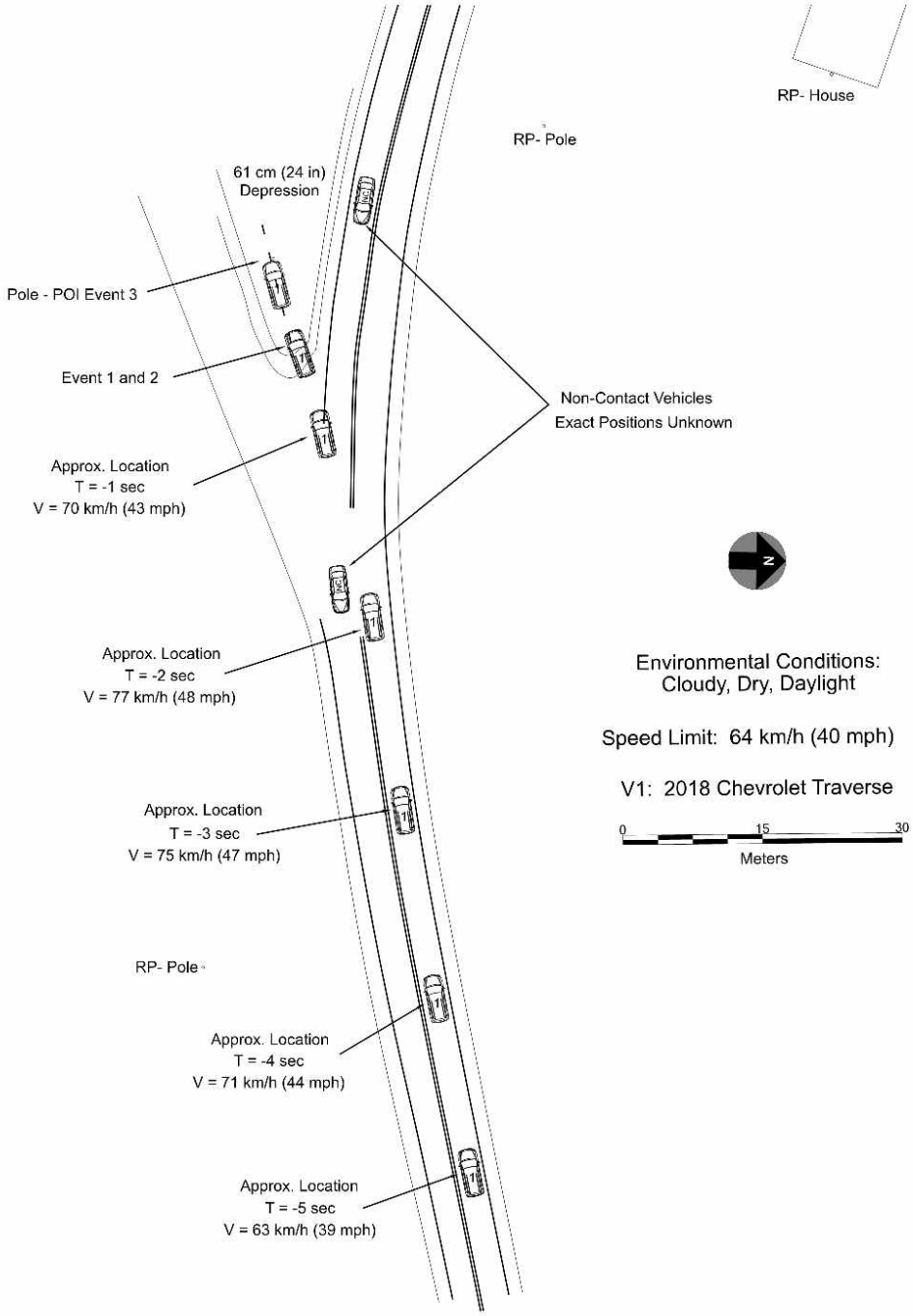
As the vehicle exited the roadway in a tracking mode, frontal plane struck and overrode the delineator post (Event 1) as the undercarriage and lower frontal plane gouged the irregularity of

the ground (Event 2). The front plane right aspect then struck the utility pole, fracturing the pole and displacing its base at ground level. All three closely spaced impacts resulted in directions of force of 12 o'clock.

The driver responded to the 12 o'clock impact forces by initiating a forward and slightly vertical trajectory that loaded the seat cushion. As she translated forward, the driver loaded the seat belt system as the ELR locked due to the crash forces. Her loading of the seat belt prevented her from contact with frontal components. Her soft tissue loading against the belt webbing caused contusions and abrasions of the chest, a contusion of the center lower abdomen, and an abrasion of the left shoulder.

As the Chevrolet came to rest, a neighbor responded and opened the driver's door and assisted her out. She was transported by ambulance to the emergency room of a local hospital, where she was evaluated, treated for her injuries, and released.

Crash Diagram



DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA	NHTSA
Case Number:	CR18026

Appendix A: 2018 Chevrolet Traverse Event Data Recorder Report[1]

[1] The EDR report contained in this technical report was imaged using the current version of the Bosch CDR software at the time of the vehicle inspection. The CDR report contained in the associated Crash Viewer application may differ relative to this report.

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	1GNEVKKW2JJ******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR18026_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.7.2
Imaged with Software Licensed to (Company Name)	Company Name information was removed when this file was saved without VIN sequence number
Reported with CDR version	Crash Data Retrieval Tool 21.5.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Record 1 (Non-Deployment)

Comments

No comments entered.

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, pretensioners, or roll bars:

-Head Rest Deployment
-Battery Cut-Off Deployment

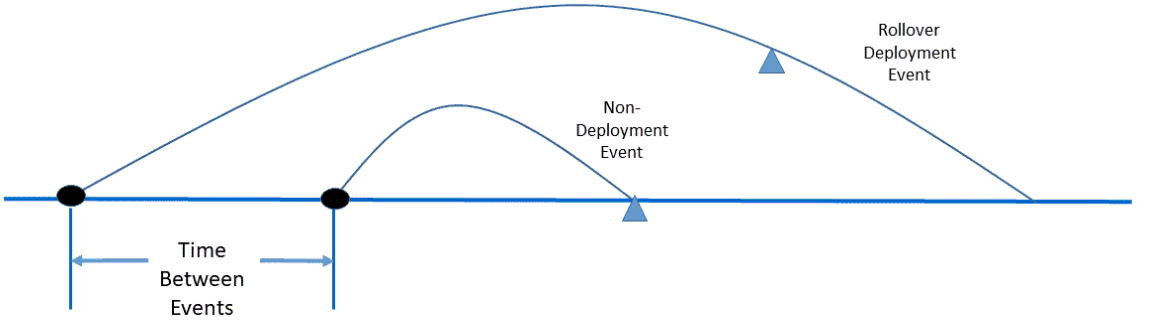
The second type of SDM recorded crash event for FSR Events is the Deployment Event. It also may contain Pre-Crash and Crash data. Deployment Events cannot be overwritten or cleared by the SDM.
Rollover Events contains Pre-Crash and Crash data. Rollover event follow the same rules as FSR Deployment events.
The SDM can store up to three Events.
There are two types of PedPro crash events. The first is the Non-Deployment PedPro Event. A Non-Deployment PedPro Event records data but does not deploy anything. A Non-Deployment PedPro Event may contain Pre-Crash and Crash data. The second type of PedPro recorded crash event is the Deployment PedPro Event. It also may contain Pre-Crash and Crash data. Deployment Events cannot be overwritten or cleared by the SDM.
The SDM can store up to two PedPro 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.
-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.
-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 or the commanded state of the brake lamps.
-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 record a maximum value of 253 cycles and can only be reset by a scan tool.
-Dynamic Deployment Event Counters tracks the number of Deployment events that have occurred during the SDM's lifetime.
-Dynamic Event Counters 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.
-For frontal Deployment Events, only the highest severity event is reported. For example, Stage 2 severity events include Pretensioner severity and Stage 1 severity.
-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.
-The airbag control module may continue to function after the vehicle has been turned off or to accessory, for a set period of time, this is called Prolongation. However, all other vehicle modules may have their functions shut down during Prolongation. For example, if the SIR warning lamp is commanded on by the airbag control module, during Prolongation, and is recorded in the EDR as being commanded on, the actual state of the warning lamp would be off to an observer since the vehicle display cluster would have been in the off state. Vehicle pre-event and system data may be recorded in the EDR as their commanded state, default state, or data invalid state.
-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.
-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.

01059_SDM40-delphi_r010

System Status at Time of Retrieval

ESS # 1 Traceability Data, Component Identifier	AU
ESS # 1 Traceability Data, Part Number/Broadcast Code	8264
ESS # 1 Traceability Data, Supplier Code	D
ESS # 1 Traceability Data, Traceability Number	A00000000
ESS # 1 Verification Data	13,518,264
ESS # 2 Traceability Data, Component Identifier	AT
ESS # 2 Traceability Data, Part Number/Broadcast Code	8264
ESS # 2 Traceability Data, Supplier Code	D
ESS # 2 Traceability Data, Traceability Number	A00000000
ESS # 2 Verification Data	13,518,264
ESS # 3 Traceability Data, Component Identifier	AH
ESS # 3 Traceability Data, Part Number/Broadcast Code	4198
ESS # 3 Traceability Data, Supplier Code	D
ESS # 3 Traceability Data, Traceability Number	A00000000
ESS # 3 Verification Data	13,514,198
ESS # 4 Traceability Data, Component Identifier	AJ
ESS # 4 Traceability Data, Part Number/Broadcast Code	4198
ESS # 4 Traceability Data, Supplier Code	D
ESS # 4 Traceability Data, Traceability Number	A00000000
ESS # 4 Verification Data	13,514,198
ESS # 5 Traceability Data, Traceability Number	A00000000
ESS # 5 Traceability Data, Component Identifier	DA
ESS # 5 Traceability Data, Part Number/Broadcast Code	4198
ESS # 5 Traceability Data, Supplier Code	D
ESS # 5 Verification Data	13,514,198
ESS # 6 Traceability Data, Component Identifier	DB
ESS # 6 Traceability Data, Part Number/Broadcast Code	4198
ESS # 6 Traceability Data, Supplier Code	D
ESS # 6 Traceability Data, Traceability Number	A00000000
ESS # 6 Verification Data	13,514,198
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 # 7 Verification Data	0
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
ESS # 8 Verification Data	0
AOS Data Key	0
SDM Primary Key Definition (Key 1-2)	11
SDM Primary Key Definition (Key 3-4)	81
Dynamic Deployment Event Counter	0
Multi-Event, Number of Events (Dynamic Event Counter)	1
Dynamic OnStar Notification Event Counter	1
Driver Frontal Stage 2 Commanded after Event End for Event Record #1	No
Passenger Frontal Stage 2 Commanded after Event End for Event Record #1	No
Driver Frontal Stage 2 Commanded after Event End for Event Record #2	No
Passenger Frontal Stage 2 Commanded after Event End for Event Record #2	No
Driver Frontal Stage 2 Commanded after Event End for Event Record #3	No
Passenger Frontal Stage 2 Commanded after Event End for Event Record #3	No
Longitudinal Accelerometer Range (g)	113
Lateral Accelerometer Range (g)	113
Dynamic PedPro Deploy Event Counter	0
Dynamic PedPro Event Counter	0
Vehicle Identification Number (VIN)	1GNEVKKW2JJ******
System Type	Delphi SDM40 with integrated IMU
Ignition Cycle, Download (Ignition Cycles at Investigation)	1,093

System Status at Event (Record 1)

Complete File Recorded (Event Recording Complete)	Yes
Event Record Type	Non-Deployment
Crash Record Locked	No
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
High Voltage Disable Notification Sent	Yes
Deployment Commanded in Energy Reserve Mode	No
Deployment Event Counter	0
Multi-Event, Number of Events (Event Counter)	1
OnStar Notification Event Counter	1
Algorithm Active - Frontal	Yes
Algorithm Active - Side	Yes
Algorithm Active - Rollover	Yes
Algorithm Active - Rear	Yes
Ignition Cycle, Crash (Ignition Cycles at Event)	1,029
Time From Event 1 to 2 (Time Between Events) (msec)	Data Not Available
Concurrent Event Flag Set	No
Event Severity Status: Frontal Pretensioner	No
Event Severity Status: Frontal Stage 1	No
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
Event Severity Status: Battery Disconnect Switch - Side Event	No
Safety Belt Status, Driver (Driver Belt Switch Circuit Status)	Buckled
Safety Belt Status, Right Front Passenger (Passenger Belt Switch Circuit Status)	Not Buckled
Center Front Row Belt Switch Circuit Status (If Equipped)	Data Not Available
Center Row 3 Belt Switch Circuit Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Occupant Size Right Front Passenger Child (Passenger Classification Status)	No (Not Applicable)
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
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)	466,280
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	681
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])	-42 [-68]
Time, Maximum Delta-V (Time From FSR Time Zero to Maximum Longitudinal SDM Recorded Vehicle Velocity Change) (msec)	420
Maximum Delta-V, Lateral (Maximum Lateral SDM Recorded Vehicle Velocity Change for FSR Event) (MPH [km/h])	8 [13]
Time Maximum Delta-V, Lateral (Time From FSR Time Zero to Maximum Lateral SDM Recorded Vehicle Velocity Change) (msec)	418
Maximum Resultant Delta-V – Longitudinal Component for FSR Event (MPH [km/h])	-42 [-68]
Maximum Resultant Delta-V – Lateral Component for FSR Event (MPH [km/h])	8 [13]
Time from FSR Time Zero to time of the Maximum Resultant Delta-V (msec)	420
Blended Event FSR 1 Severity Type	Non-deploy FSR (qualified or non-qualified)
Blended Event FSR 2 Severity Type	Data Not Available
Blended Event Time from FSR 1 Time Zero to FSR 2 Time Zero (msec)	Data Not Available

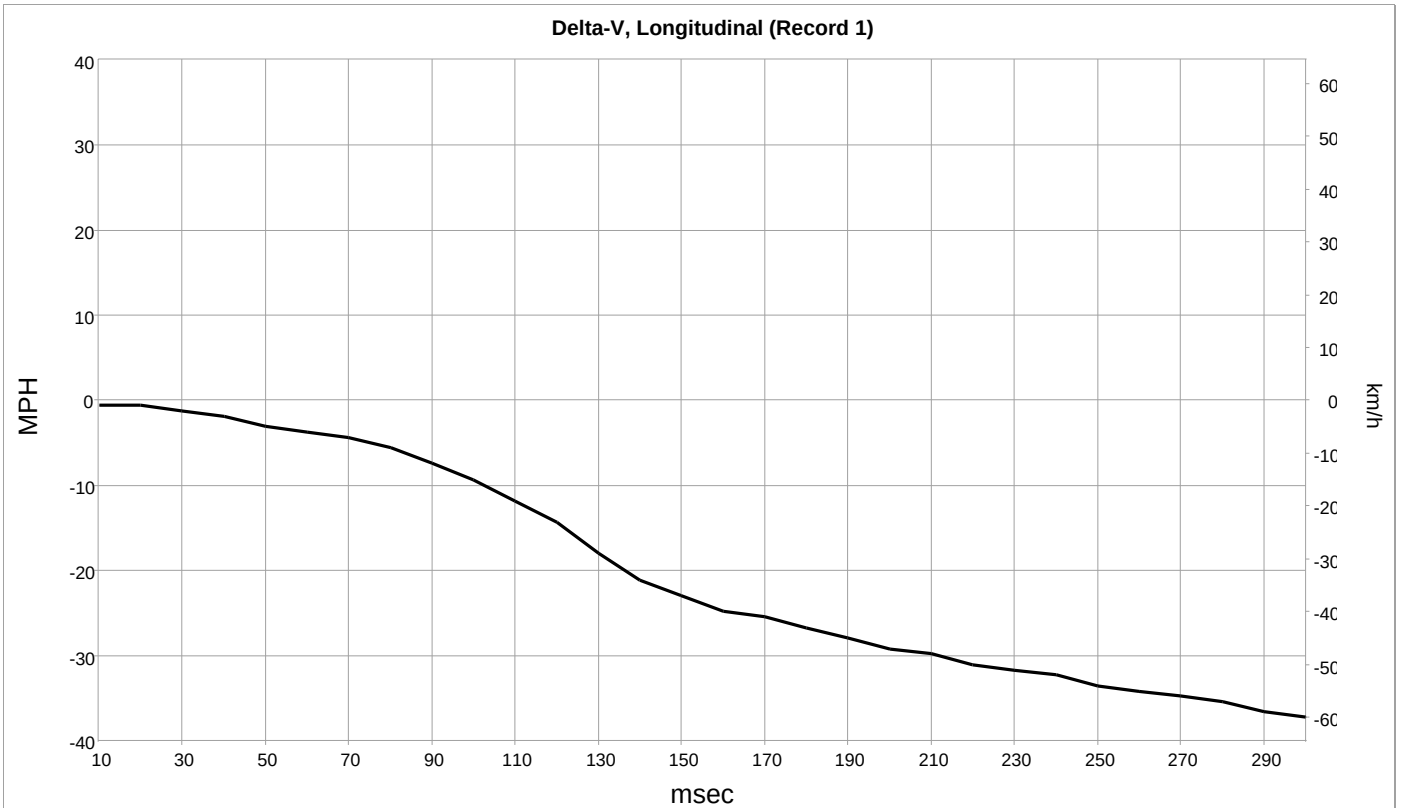
Blended Event FSR 3 Severity Type	Data Not Available
Blended Event Time from FSR 1 Time Zero to FSR 3 Time Zero (msec)	Data Not Available

Diagnostic Trouble Codes 0.5 Seconds Prior to Time Zero (Record 1)

DTC 1	N/A
DTC 2	N/A
DTC 3	N/A
DTC 4	N/A
DTC 5	N/A
DTC 6	N/A
DTC 7	N/A
DTC 8	N/A
DTC 9	N/A

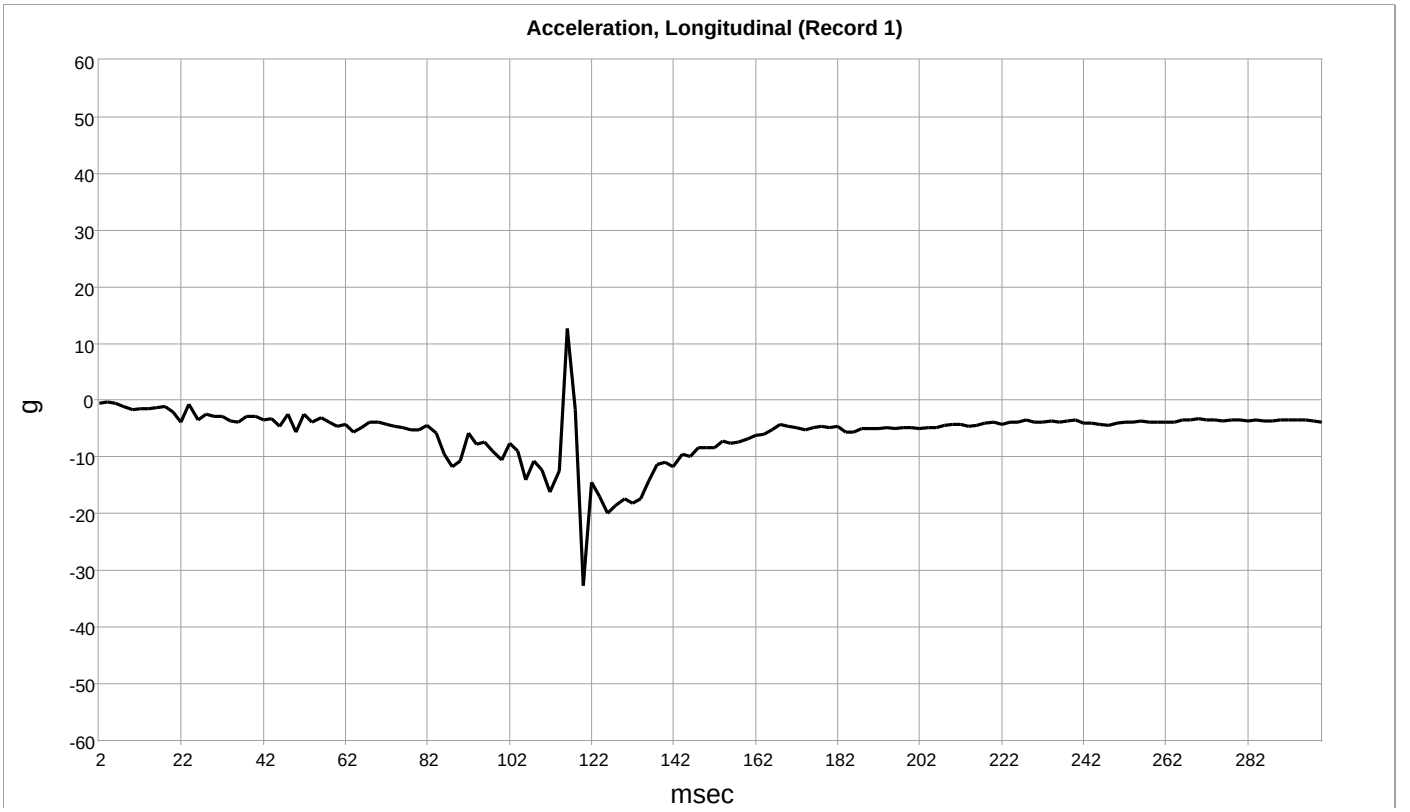
Deployment Command Data (Record 1)

Driver 1st Stage Deployment Loop Commanded	No
Passenger 1st Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop #1 Commanded	No
Passenger Pretensioner Deployment Loop #1 Commanded	No
Driver Pretensioner Deployment Loop #2 Commanded	No
Passenger Pretensioner Deployment Loop #2 Commanded	No
Driver Thorax Loop Commanded	No
Passenger Thorax Loop Commanded	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded	No
Right Row 1 Roof Rail/Head Curtain Loop Commanded	No
Frontal Air Bag Deployment, Time to 1st Stage Deployment, Driver (Driver 1st 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)	Data Not Available
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 2nd Stage, Right Front Passenger (Passenger 2nd Stage 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 Command Criteria Met) (msec)	Data Not Available
Pretensioner Deployment, Time to Fire, Right Front Passenger (Passenger Pretensioner Time From Time Zero to Deployment Loop #1 Command Criteria Met) (msec)	Data Not Available
Pretensioner Deployment, Time to Fire, Driver (Driver Pretensioner Time From Time Zero to Deployment Loop #2 Command Criteria Met) (msec)	Data Not Available
Pretensioner Deployment, Time to Fire, Right Front Passenger (Passenger Pretensioner Time From Time Zero to Deployment Loop #2 Command Criteria Met) (msec)	Data Not Available
Side Air Bag Deployment, Time to Deploy, Driver (Driver Thorax 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 Time From Time Zero to Deployment Command Criteria Met) (msec)	Data Not Available
Left Row 1 Curtain Time From Time Zero to Deployment Command Criteria Met (msec)	Data Not Available
Right Row 1 Curtain Time From Time Zero to Deployment Command Criteria Met (msec)	Data Not Available
Driver Center Inboard Loop Commanded	No
Driver Center Inboard Time From Time Zero to Deployment Loop Command Criteria Met (msec)	Data Not Available


Delta-V, Longitudinal (Record 1)
MPH
km/h
msec
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
10
30
50
70
90
110
130
150
170
190
210
230
250
270
290

Longitudinal Delta-V (Record 1)

Time (msec)	Delta-V, Longitudinal (SDM Recorded Vehicle Longitudinal Velocity Change for FSR Event) (MPH [km/h])
10	-1 [-1]
20	-1 [-1]
30	-1 [-2]
40	-2 [-3]
50	-3 [-5]
60	-4 [-6]
70	-4 [-7]
80	-6 [-9]
90	-7 [-12]
100	-9 [-15]
110	-12 [-19]
120	-14 [-23]
130	-18 [-29]
140	-21 [-34]
150	-23 [-37]
160	-25 [-40]
170	-25 [-41]
180	-27 [-43]
190	-28 [-45]
200	-29 [-47]
210	-30 [-48]
220	-31 [-50]
230	-32 [-51]
240	-32 [-52]
250	-34 [-54]
260	-34 [-55]
270	-35 [-56]
280	-35 [-57]
290	-37 [-59]
300	-37 [-60]

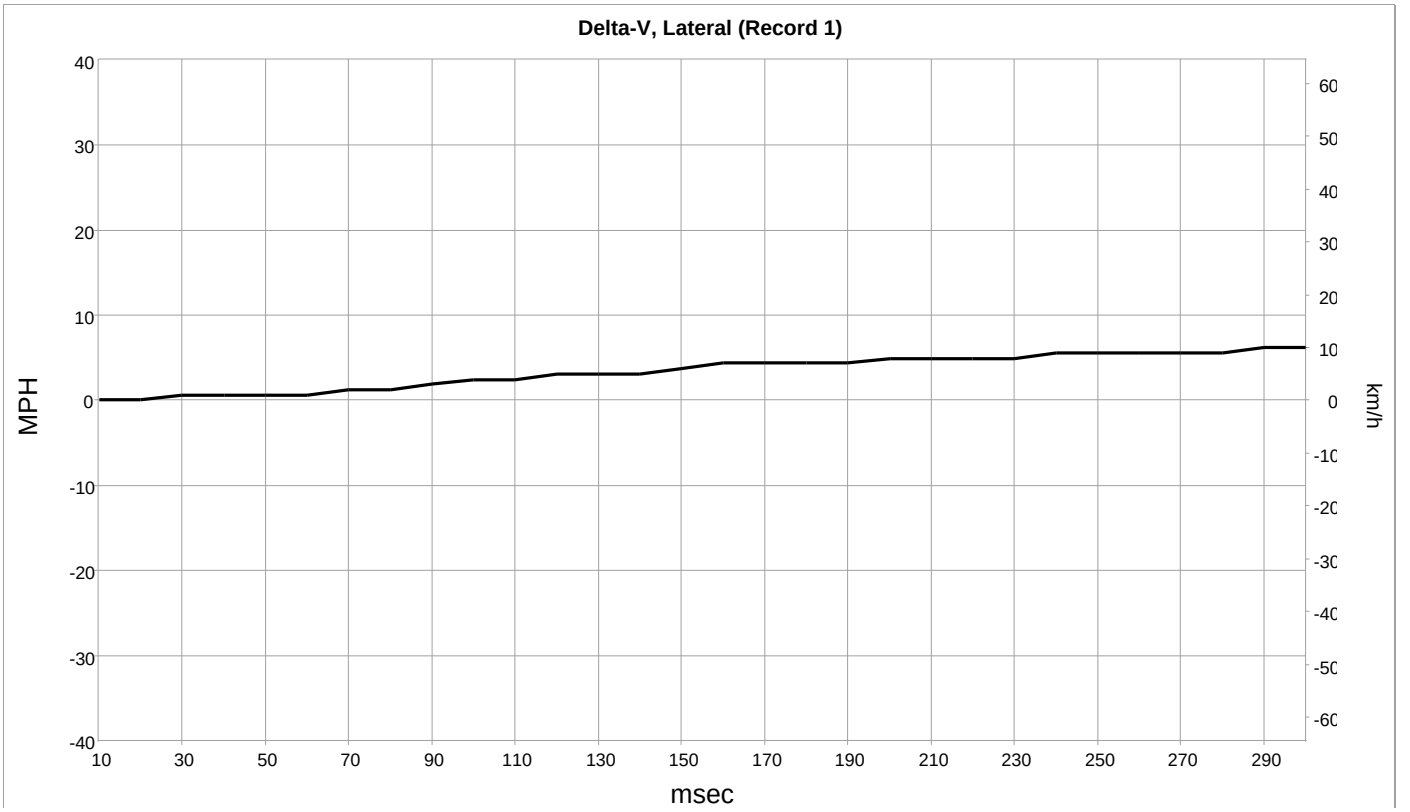

Acceleration, Longitudinal (Record 1)
g
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
2
22
42
62
82
102
122
142
162
182
202
222
242
262
282
msec

Longitudinal Acceleration (Record 1)

Time (msec)	Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g)
2	-0.50
4	-0.25
6	-0.50
8	-1.00
10	-1.63
12	-1.38
14	-1.38
16	-1.25
18	-1.13
20	-2.00
22	-3.75
24	-0.75
26	-3.50
28	-2.50
30	-2.88
32	-2.88
34	-3.63
36	-3.88
38	-2.75
40	-2.88
42	-3.50
44	-3.25
46	-4.63
48	-2.38
50	-5.63
52	-2.38
54	-3.88
56	-3.13
58	-3.88
60	-4.63
62	-4.13
64	-5.50
66	-4.88
68	-3.75
70	-3.88
72	-4.13
74	-4.63
76	-4.75
78	-5.13
80	-5.25
82	-4.38
84	-5.75
86	-9.50
88	-11.63
90	-10.75
92	-5.88
94	-7.75
96	-7.38
98	-9.00
100	-10.50
102	-7.63
104	-8.88
106	-14.13
108	-10.63
110	-12.25
112	-16.25

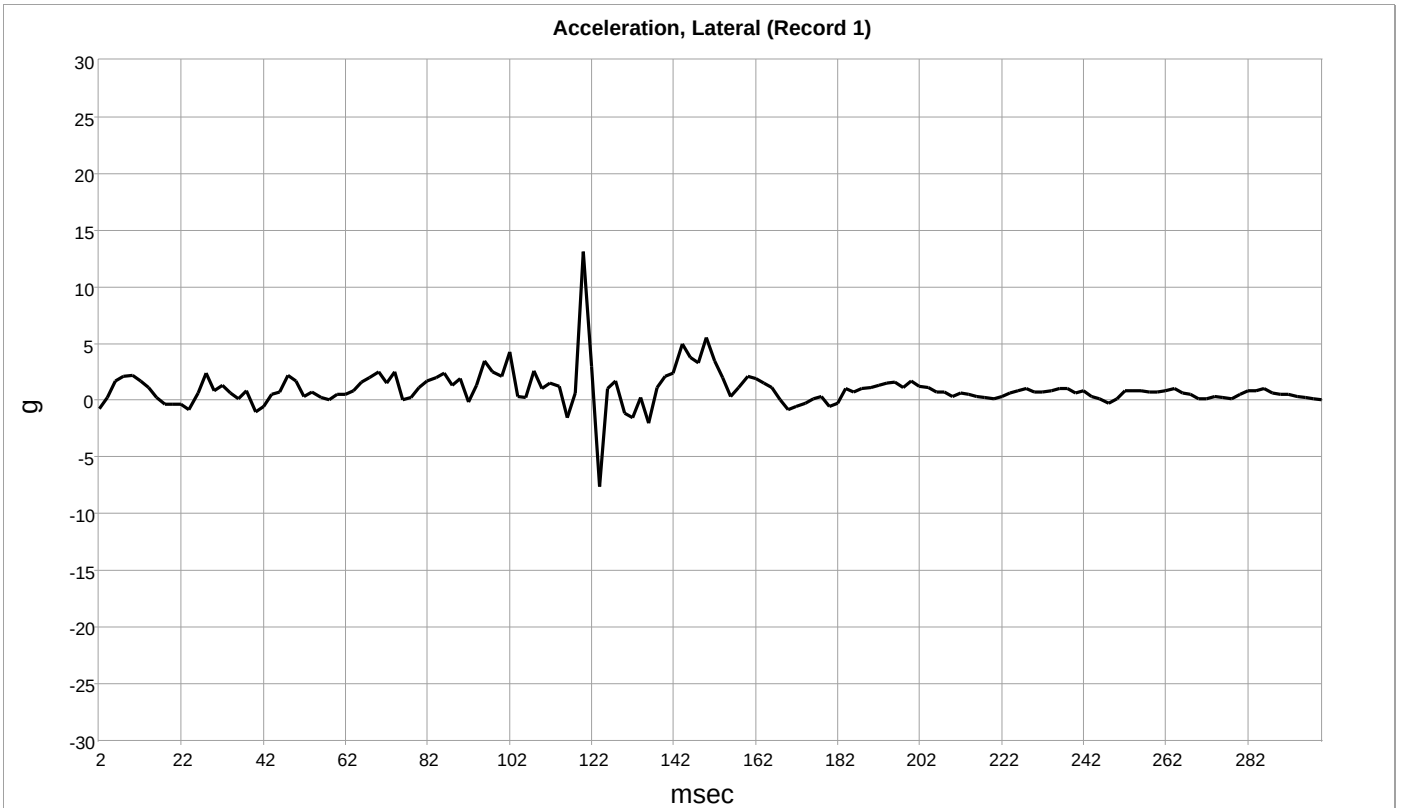
Time (msec)	Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g)
114	-12.50
116	12.75
118	-1.63
120	-32.75
122	-14.50
124	-17.00
126	-20.00
128	-18.63
130	-17.38
132	-18.25
134	-17.38
136	-14.25
138	-11.25
140	-10.88
142	-11.75
144	-9.50
146	-9.88
148	-8.38
150	-8.25
152	-8.38
154	-7.25
156	-7.63
158	-7.38
160	-6.75
162	-6.13
164	-6.00
166	-5.25
168	-4.25
170	-4.63
172	-4.75
174	-5.25
176	-4.88
178	-4.63
180	-4.88
182	-4.63
184	-5.63
186	-5.63
188	-5.00
190	-5.00
192	-5.00
194	-4.88
196	-5.00
198	-4.88
200	-4.88
202	-5.00
204	-4.88
206	-4.88
208	-4.50
210	-4.13
212	-4.13
214	-4.63
216	-4.50
218	-4.00
220	-3.88
222	-4.13
224	-3.88
226	-3.75

Time (msec)	Longitudinal Acceleration (SDM Recorded Vehicle Longitudinal Acceleration for FSR Event) (g)
228	-3.50
230	-3.75
232	-3.75
234	-3.63
236	-3.75
238	-3.63
240	-3.50
242	-4.00
244	-4.00
246	-4.13
248	-4.38
250	-4.00
252	-3.75
254	-3.88
256	-3.63
258	-3.88
260	-3.75
262	-3.75
264	-3.75
266	-3.50
268	-3.50
270	-3.25
272	-3.38
274	-3.50
276	-3.63
278	-3.50
280	-3.50
282	-3.63
284	-3.50
286	-3.63
288	-3.63
290	-3.50
292	-3.50
294	-3.50
296	-3.50
298	-3.63
300	-3.75


Delta-V, Lateral (Record 1)
MPH
km/h
msec
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
10
30
50
70
90
110
130
150
170
190
210
230
250
270
290

Lateral Delta-V (Record 1)

Time (msec)	Delta-V, Lateral (SDM Recorded Vehicle Lateral Velocity Change for FSR Event) (MPH [km/h])
10	0 [0]
20	0 [0]
30	1 [1]
40	1 [1]
50	1 [1]
60	1 [1]
70	1 [2]
80	1 [2]
90	2 [3]
100	2 [4]
110	2 [4]
120	3 [5]
130	3 [5]
140	3 [5]
150	4 [6]
160	4 [7]
170	4 [7]
180	4 [7]
190	4 [7]
200	5 [8]
210	5 [8]
220	5 [8]
230	5 [8]
240	6 [9]
250	6 [9]
260	6 [9]
270	6 [9]
280	6 [9]
290	6 [10]
300	6 [10]


Acceleration, Lateral (Record 1)
g
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
2
22
42
62
82
102
122
142
162
182
202
222
242
262
282
msec

Lateral Acceleration (Record 1)

Time (msec)	Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g)
2	-0.75
4	0.25
6	1.75
8	2.12
10	2.25
12	1.75
14	1.12
16	0.25
18	-0.38
20	-0.38
22	-0.38
24	-0.88
26	0.62
28	2.37
30	0.87
32	1.37
34	0.62
36	0.12
38	0.87
40	-1.00
42	-0.50
44	0.50
46	0.75
48	2.25
50	1.75
52	0.37
54	0.75
56	0.25
58	0.00
60	0.50
62	0.50
64	0.87
66	1.62
68	2.00
70	2.50
72	1.50
74	2.50
76	0.00
78	0.25
80	1.12
82	1.75
84	2.00
86	2.37
88	1.37
90	1.87
92	-0.13
94	1.37
96	3.50
98	2.50
100	2.12
102	4.25
104	0.37
106	0.25
108	2.62
110	1.00
112	1.50
114	1.25

Time (msec)	Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g)
116	-1.50
118	0.62
120	13.12
122	3.00
124	-7.63
126	1.00
128	1.75
130	-1.13
132	-1.50
134	0.25
136	-2.00
138	1.12
140	2.12
142	2.37
144	5.00
146	3.75
148	3.25
150	5.50
152	3.50
154	2.00
156	0.37
158	1.12
160	2.12
162	1.87
164	1.50
166	1.12
168	0.00
170	-0.88
172	-0.50
174	-0.25
176	0.12
178	0.37
180	-0.50
182	-0.25
184	1.00
186	0.75
188	1.00
190	1.12
192	1.37
194	1.50
196	1.62
198	1.12
200	1.75
202	1.25
204	1.12
206	0.75
208	0.75
210	0.37
212	0.62
214	0.50
216	0.37
218	0.25
220	0.12
222	0.37
224	0.62
226	0.87
228	1.00
230	0.75

Time (msec)	Lateral Acceleration (SDM Recorded Vehicle Lateral Acceleration for FSR Event) (g)
232	0.75
234	0.87
236	1.00
238	1.00
240	0.62
242	0.87
244	0.37
246	0.12
248	-0.25
250	0.12
252	0.87
254	0.87
256	0.87
258	0.75
260	0.75
262	0.87
264	1.00
266	0.62
268	0.50
270	0.12
272	0.12
274	0.37
276	0.25
278	0.12
280	0.50
282	0.87
284	0.87
286	1.00
288	0.62
290	0.50
292	0.50
294	0.37
296	0.25
298	0.12
300	0.00

Roll Rate (Record 1)

Contains No Recorded Data

Acceleration, Lateral, Rollover (Record 1)

Contains No Recorded Data

Acceleration, Normal, Rollover (Record 1)

Contains No Recorded Data

Pre-Crash Data -5.0 to -0.5 sec (Record 1) - Table 1 of 2

Time (sec)	Service Brake (Brake Switch Circuit State)	Accelerator Pedal Position, % Full (Accelerator Pedal Position) (%)	Engine RPM (Engine Speed) (RPM)	Engine Throttle, % Full (Throttle Position) (%)	Speed, Vehicle Indicated (Vehicle Speed) (MPH [km/h])	System Power Mode Status	System Backup Power Mode Status
-5.0	Off	57	4,992	99	39 [63]	Run	Run
-4.5	Off	53	5,440	85	42 [68]	Run	Run
-4.0	Off	47	5,568	55	44 [71]	Run	Run
-3.5	Off	16	4,352	40	47 [75]	Run	Run
-3.0	Off	55	4,288	34	47 [75]	Run	Run
-2.5	Off	75	3,584	99	46 [74]	Run	Run
-2.0	Off	32	4,992	89	48 [77]	Run	Run
-1.5	On	0	4,096	26	47 [75]	Run	Run
-1.0	On	0	3,200	21	43 [70]	Run	Run
-0.5	On	0	2,688	18	38 [61]	Run	Run

Pre-Crash Data -5.0 to -0.5 sec (Record 1) - Table 2 of 2

Time (sec)	System Backup Power Mode Enabled	CommEnable Status	SDM Power Mode Status	Ignition Prolongation Timer (seconds)
-5.0	No	Active	Run	0.0
-4.5	No	Active	Run	0.0
-4.0	No	Active	Run	0.0
-3.5	No	Active	Run	0.0
-3.0	No	Active	Run	0.0
-2.5	No	Active	Run	0.0
-2.0	No	Active	Run	0.0
-1.5	No	Active	Run	0.0
-1.0	No	Active	Run	0.0
-0.5	No	Active	Run	0.0

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

Time (sec)	Cruise Control Active	Cruise Control Resume Switch Active	Cruise Control Set Switch Active	Reduced Engine Power Mode Indicator	Engine Torque (N-m)
-2.0	No	No	No	Off	315
-1.5	No	No	No	Off	-7
-1.0	No	No	No	Off	-16
-0.5	No	No	No	Off	-26

Hexadecimal Data

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DPID $11
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DPID $15
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DPID $16
08 09 0A 0D 0E 27 27

DPID $17
27 27 27 27 22 27 00

DPID $1F
01 01 02 02 00 00 00

DPID $20
00 00 00 00 00 00 00

DPID $30
00 FF 00 00 00 00 00

DPID $32
03 FF 04 45 00 00 00

DPID $51
0B 00 00 00 00 00 00

DID $01
41 55 38 32 36 34 44 41 30 30 30 30 30 30 30 30

DID $02
00 CE 45 B8

DID $03
41 54 38 32 36 34 44 41 30 30 30 30 30 30 30 30

DID $04
00 CE 45 B8

DID $05
41 48 34 31 39 38 44 41 30 30 30 30 30 30 30 30

DID $06
00 CE 35 D6

DID $07
41 4A 34 31 39 38 44 41 30 30 30 30 30 30 30 30

DID $08
00 CE 35 D6

DID $09
44 41 34 31 39 38 44 41 30 30 30 30 30 30 30 30

DID $0A
00 CE 35 D6

DID $0B
44 42 34 31 39 38 44 41 30 30 30 30 30 30 30 30

DID $0C
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00 CE 35 D6

DID $0D
00 00 30 30 30 30 44 41 30 30 30 30 30 30 30 30

DID $0E
00 00 00 00

DID $0F
00 00 30 30 30 30 44 41 30 30 30 30 30 30 30 30

DID $10
00 00 00 00

DID $11
00 00

DID $22
11 81

DID $30
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DID $31
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0040   00 00 00 00 00 00 2A 32 40 4E
0050   38 43 44 57 55 4E 06 6D 06 81
0060   06 93 09 15 12 15 1A 59 63 22
0070   28 37 55 63 3D 46 4B 4D 4A 4B
0080   4B 47 44 3F 00 B6 24 02 A9 FD
0090   FF FF FF FF FF FF FF FF FF FF
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0120   D1 3B 8C D2 60 E0 FF E0 FF FF
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0160   00 00 FF FF FF FF FF 00 00 00
0170   00 00 00 00 00 00 00 7E 7F 7E
0180   7F 7D 80 7C 80 7A 80 79 80 78
0190   81 76 81 73 82 70 83 6C 83 68
0200   84 62 84 5D 84 5A 85 57 86 56
0210   86 54 86 52 86 50 87 4F 87 4D
0220   87 4C 87 4B 88 49 88 48 88 47
0230   88 46 88 44 89 43 89 7F CD 7F
0240   B4 7F E6 80 18 7F CD 80 AE 7F
0250   9B 80 D3 7F 5C 80 E0 7F 75 80
0260   AE 7F 75 80 6F 7F 82 80 18 7F
0270   8E 7F D9 7F 37 7F D9 7E 88 7F
0280   D9 7F B4 7F A7 7E A1 80 3D 7F
0290   05 80 EC 7E DF 80 56 7E DF 80
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0310   EC 80 56 7E DF 7F 9B 7E A1 7F
0320   CD 7E BA 80 31 7E 30 80 4A 7F
0330   11 80 E0 7D CC 80 AE 7F 11 80
0340   24 7E 7B 80 4A 7E C6 80 18 7E
0350   7B 7F FF 7E 30 80 31 7E 62 80
0360   31 7D D9 80 56 7E 17 80 A1 7E
0370   88 80 C7 7E 7B 80 F9 7E 62 80
0380   95 7E 30 80 F9 7E 24 7F FF 7D
0390   FE 80 18 7D F2 80 6F 7E 49 80
0400   AE 7D C0 80 C7 7C 49 80 EC 7B
0410   74 80 88 7B CC 80 BA 7D B3 7F
0420   F2 7C F8 80 88 7D 1D 81 5D 7C
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0480   2B 79 5B 7D 04 78 2F 80 63 78
0490   B8 80 AE 79 35 7F 8E 78 DE 7F
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0590   30 80 24 7E 17 7F CD 7E 30 7F
0600   E6 7D CC 80 63 7D CC 80 4A 7E
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0640   7C 7E 17 80 6F 7E 17 80 4A 7E
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0790   A1 80 0B 7E A1 80 31 7E 94 80
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0820   31 7E A1 80 24 7E A1 80 18 7E
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1090   FF FF FF FF FF FF FF FF FF FF
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1170   00 00 00 00 00 00 00 00 00 00
1180   00 00 00 00 00 00 00 1A 5E FF
1190   00 00 A5 01 00 05 04 00 00 FF
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1310   02 FF FF 19 A1 01 00 0F A0 FF
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1760   00 00 00 FF FF FF FF FF FF FF
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1970   13 00 17 00 07 00 0E A5 FF FF
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1990   01 00 16 00 07 00 17 00 F8 FF
2000   1C 00 FC FF 1A 00 04 00 25 00
2010   06 00 13 00 12 00 2D 00 0E 00
2020   13 00 03 00 1F 00 06 00 19 00
2030   02 00 1F 00 00 00 25 00 04 00
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2060   1F 00 14 00 21 00 0C 00 25 00
2070   14 00 26 00 00 00 29 00 02 00
2080   2A 00 09 00 23 00 0E 00 2E 00
2090   10 00 4C 00 13 00 5D 00 0B 00
2100   56 00 0F 00 0E A5 FF FF 2F 00
2110   FF FF 3E 00 0B 00 3B 00 1C 00
2120   48 00 14 00 54 00 11 00 3D 00
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2190   F7 FF 92 00 F4 FF 8B 00 02 00
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0260   FF FF FF FF FF FF FF FF FF FF
0270   FF FF FF FF FF FF FF FF FF FF
0280   FF FF FF FF FF FF FF FF FF FF
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DOT HS 813 365
September 2022

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

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