



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**



DOT HS 812 613

September 2018

**Special Crash Investigations
On-Site SKT Guardrail
End Treatment
Impact Investigation
Vehicle: 2010 Chevrolet
Traverse
Location: Missouri
Crash Date: November 2015**

DISCLAIMER

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof. The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants. Because each crash is a unique sequence of events, 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 published.

Suggested APA Format Citation:

Indiana University Transportation Research Center. (2018, September). *Special Crash Investigations On-Site SKT Guardrail End Treatment Impact Investigation; Vehicle: 2010 Chevrolet Traverse; Location: Missouri; Crash Date: November 2015* (Report No. DOT HS 812 613). Washington, DC: National Highway Traffic Safety Administration.

Technical Report Documentation Page

<i>1. Report No.</i> DOT HS 812 613	<i>2. Government Accession No.</i>	<i>3. Recipient's Catalog No.</i>	
<i>4. Title and Subtitle</i> Special Crash Investigations On-Site SKT Guardrail End Treatment Investigation Vehicle: 2010 Chevrolet Traverse Location: Missouri Crash Date: November 2015		<i>5. Report Date:</i> September 2018	
		<i>6. Performing Organization Code</i>	
<i>7. Author</i> Indiana University Transportation Research Center		<i>8. Performing Organization Report No.</i> IN16001	
<i>9. Performing Organization Name and Address</i> Transportation Research Center Indiana University 501 South Madison Street, Suite 110 Bloomington, Indiana 47403-2452		<i>10. Work Unit No. (TRAVIS)</i>	
		<i>11. Contract or Grant No.</i> DTNH22-12-C-00270	
<i>12. Sponsoring Agency Name and Address</i> National Highway Traffic Safety Administration National Center for Statistics and Analysis 1200 New Jersey Avenue SE. Washington, D.C. 20590-0003		<i>13. Type of Report and Period Covered</i> Technical Report Crash Date: November 2015	
		<i>14. Sponsoring Agency Code</i> NSA-110	
<i>15. Supplementary Notes</i> On-site SKT guardrail end treatment investigation involving a 2010 Chevrolet Traverse.			
<i>16. Abstract</i> This report covers an on-site investigation of a passenger vehicle impact to a “sequential kinking terminal” (SKT) guardrail end treatment that is of interest to the Federal Highway Administration (FHWA). This crash occurred on a nine-lane, divided interstate highway. The Chevrolet was a 4-door sport utility vehicle (SUV) equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, and side impact inflatable curtain (IC) air bags with roll sensing. An unbelted 27-year-old male driver occupied the vehicle. The Chevrolet was traveling north in the right through lane and the front plane struck the back plane of a 1997 Dodge Caravan (event 1), which was also traveling north in the same lane. The Chevrolet departed the right (east) side of the roadway and the front plane struck the SKT end treatment of a blocked-out W-beam guardrail (event 2). The impact damaged and displaced the guardrail and resulted in deployment of the driver’s frontal air bag and both the left and right side IC air bags. The vehicle then rolled over, right side leading (event 3), down an embankment, for seven quarter turns. The vehicle came to final rest on its left side heading north on a retaining wall and with its undercarriage partially against a building. The driver sustained minor injuries and was transported by ambulance to a trauma center, where he was admitted for one night. A restrained 48-year-old male driver occupied the Dodge. He did not sustain any police reported injuries and was not transported for medical treatment. The Chevrolet was towed from the crash scene due to damage. The Dodge was driven from the crash scene by the driver.			
<i>17. Key Words</i> SKT guardrail end, motor vehicle traffic crash treatment, serious injury, rollover		<i>18. Distribution Statement</i> Document is available to the public from the National Technical Information Service, www.ntis.gov.	
<i>19 Security Classif. (of this report)</i> Unclassified	<i>20. Security Classif. (of this page)</i> Unclassified	<i>21. No. of Pages</i> 60	<i>22. Price</i>

TABLE OF CONTENTS

BACKGROUND 1

CRASH SUMMARY 2

 Crash Site 2

 Pre-Crash 2

 Crash 3

 Post-Crash 4

GUARDRAIL DAMAGE..... 4

2010 CHEVROLET TRAVERSE 6

 Description 6

 Exterior Damage 6

EVENT DATA RECORDER..... 8

INTERIOR DAMAGE 9

MANUAL RESTRAINT SYSTEMS..... 9

SUPPLEMENTAL RESTRAINT SYSTEMS..... 10

2010 CHEVROLET TRAVERSE OCCUPANT 10

 Driver Injuries 11

 Driver Kinematics 11

1997 DODGE CARAVAN..... 11

 Description 11

 Exterior Damage 11

 Occupant Data 12

CRASH DIAGRAM..... 13

**APPENDIX A: IN-SERVICE END TREATMENT EVALUATION DATA
COLLECTION FORM A-1**

APPENDIX B: 2010 CHEVROLET TRAVERSE DATA RECORDER REPORT B-1

**Indiana University Transportation Research Center
On-Site SKT Guardrail End Treatment Investigation
Case Number - IN16001
Location - Missouri
Vehicle - 2010 Chevrolet Traverse
Crash Date - December 2015**

BACKGROUND

This report covers an on-site investigation of a passenger vehicle impact to a sequential kinking terminal (SKT) guardrail end treatment (**Figure 1**) that is of interest to the Federal Highway Administration (FHWA). This crash was identified by an engineer with the Missouri Department of Transportation (MoDOT), which submitted photographs of the vehicle and the damaged guardrail end treatment to the FHWA. The FHWA determined that the guardrail end treatment and crash type was of interest. This Special Crash Investigation (SCI) was then initiated by the National Highway Traffic Safety Administration in December 2015 and assigned to the SCI team at the Indiana University Transportation Research Center in January 2016. This crash involved a 2010 Chevrolet Traverse (**Figure 2**) and a 1997 Dodge Caravan. The crash occurred in December 2015 at 1654 hours, in Missouri, and was investigated by a local police agency. The Chevrolet, guardrail, and crash scene were all inspected in January 2016. The Chevrolet driver could not be located and was not interviewed. The involvement of the Dodge was not known at the time of the SCI inspection and there was no inspection of that vehicle.

This crash occurred on a nine-lane, divided, interstate highway. The Chevrolet was a 4-door station wagon, equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, and side impact inflatable curtain (IC) air bags with roll sensing. An unbelted 27-year-old male driver occupied the vehicle. The Chevrolet was traveling north in the right through lane and the



Figure 1: SKT end treatment and guardrail

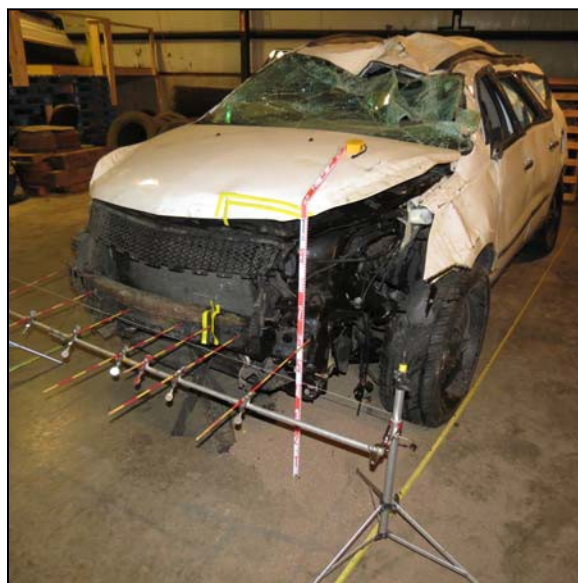


Figure 2: 2010 Chevrolet Traverse

front plane struck the back plane of the Dodge (event 1), which was also traveling north in the same lane. The Chevrolet departed the right (east) side of the roadway and the front plane struck the SKT end treatment of a blocked-out W-beam guardrail (event 2). The impact damaged and displaced the guardrail and resulted in deployment of the driver's frontal air bag and both left and right side IC air bags. The vehicle then rolled over, right side leading (event 3), down an embankment seven quarter turns. The vehicle came to final rest on its left side heading north on a retaining wall and with its undercarriage partially against a building. The driver sustained minor injuries and was transported by ambulance to a trauma center, where he was admitted for one night. A restrained 48-year-old male driver occupied the Dodge. He did not sustain any police reported injuries and was not transported for medical treatment. The Chevrolet was towed from the crash scene due to damage. The Dodge was driven from the crash scene by the driver.

CRASH SUMMARY

Crash Site

This crash occurred during dusk on a nine-lane, divided interstate highway with the roadway illuminated by overhead lighting. The weather conditions were cloudy with 11 kilometers (7 miles) visibility, north winds at 5 km/h (3 mph), a temperature of -2.2 °C (28 °F), and a dew point of -5.6 °C (22 °F), according to local weather reports. The trafficway had four dry, bituminous, northbound through lanes that were separated from the five southbound lanes by a concrete median barrier. The roadway grade in the area of the Chevrolet's approach to the east roadside departure was positive 3 percent. The northbound travel lanes were each 3.6 m (11.8 ft) wide and were bordered by a 1.8 m (6 ft) wide bituminous and concrete outside shoulder. The roadway markings consisted of broken white lane lines, a solid yellow median edge line, and a solid white fog line. A blocked-out W-beam guardrail equipped with an SKT end treatment was located on the east side of the northbound lanes and adjacent to an embankment, the bottom of which was approximately 5.9 m (19.7 ft) below the roadway surface. The speed limit was 72 km/h (45 mph). A crash diagram is included at the end of this report.

Pre-Crash

The Chevrolet was traveling north in the right through lane (**Figure 3**) at an EDR-reported speed of 75 km/h (47 mph) at -2.5 sec prior to algorithm enable (AE) and the driver intended to negotiate the left curve and continue northbound. The Dodge was also traveling north in the right lane, ahead of the Chevrolet. The Chevrolet's EDR-reported percent accelerator pedal, brake switch circuit state, engine speed, throttle position, and vehicle speed are presented in the table below.



Figure 3: Northbound approach of Chevrolet

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit Status	Engine Speed (rpm)	Throttle Position (percent)	Vehicle Speed km/h (mph)
-2.5	26	Off	1664	35	75 (47)
-2.0	26	Off	1664	35	75 (47)
-1.5	26	Off	1664	36	76 (47)
-1.0	28	Off	1664	36	76 (47)
-0.5	23	Off	1792	34	76 (47)



Figure 4: SKT end treatment head

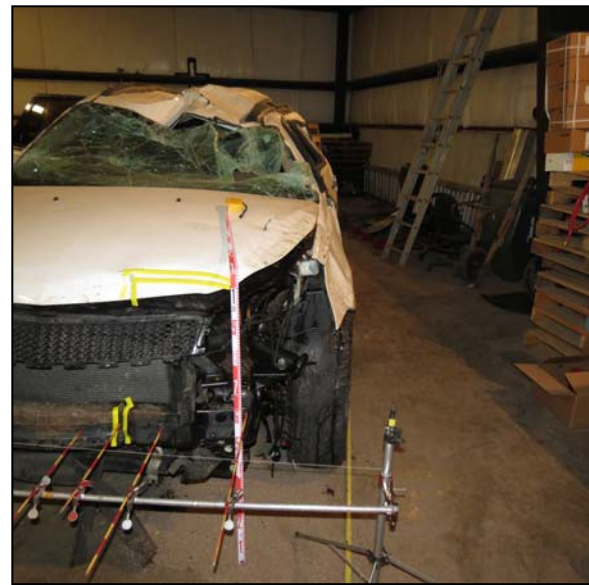


Figure 5: Chevrolet's front end damage

Crash

The front plane of the Chevrolet struck the back plane of the Dodge (event 1). It is unknown why this event occurred. The force direction on the Chevrolet was in the 12 o'clock sector and no frontal air bags deployed as a result of this impact. The vehicle's EDR reported no event related to this impact, suggesting the impact was minor¹ and probably resulted in no residual crush to the Chevrolet's front bumper. The Chevrolet then departed the roadway to the right (east). The roadside was negatively graded 79 percent perpendicular to the roadway and grass was scuffed off the ground prior to the SKT as the vehicle's right wheels traveled along this slope, parallel to the roadway. The front plane then struck the head of the SKT (**Figures 4 and 5**, event 2). The EDR-reported pre-crash speed at -0.5 sec prior to AE was 76 km/h (47 mph), suggesting the

¹ The EDR data limitations state that the minimum velocity change required to record a non-deployment event is 8 km/h (5 mph)

speed at impact with the SKT was approximately 76 km/h (47 mph). The force direction on the Chevrolet was in the 12 o'clock sector and the impact resulted in deployment of the driver's frontal air bag and both IC air bags. The EDR reported the maximum longitudinal and lateral delta Vs as -30 km/h (-19 mph) and 2 km/h (1 mph), respectively. The WinSMASH program could not be used to calculate delta-V since yielding object impacts are out of scope for the program. However, WinSMASH was used to calculate a barrier equivalent speed (BES) of 16 km/h (10 mph) based on the crush to the front bumper. The Chevrolet rotated counterclockwise approximately 20 degrees after its impact with the SKT. The vehicle then rolled over, right side leading (event 3), for seven quarter turns for about 14 m (49.2 ft). The grade along the path of the rollover was negative 41 percent and the rollover was interrupted at the bottom of the embankment when the vehicle's undercarriage struck a building (event 4) adjacent to the embankment retaining wall. The vehicle came to final rest on its left plane heading north on top of the retaining wall with the rear undercarriage partially against the building (**Figure 6**). The distance the vehicle's center of mass (COM) traveled from the SKT impact to the final rest position was 25 m (82.0 ft).



Figure 6: Chevrolet at final rest (image provided by tow operator)

Post-Crash

Police were notified of the crash at 1656 hours and arrived at 1703 hours. Emergency personnel also responded to the crash. A passerby assisted the driver from the vehicle. The driver sustained police reported "B" (non-incapacitating) injuries and was transported by ambulance to a trauma center, where he was treated for minor injuries and admitted for one night for observation. Medical records indicated the driver tested positive for PCP and amphetamine, though the test results were not provided. The Chevrolet was towed from the crash scene due to damage. The Dodge was driven from the crash scene by the driver.

GUARDRAIL DAMAGE

The front plane impact of the Chevrolet to the SKT extruded 4.5 m (14.8 ft) of guardrail (**Figure 7**) toward the field side. The SKT head furrowed the ground adjacent to Post 2 and continued for 2 m (80 in) northward. Post 1 was separated from its base and could not be located. Post 2 collapsed to the ground northward on its



Figure 7: Extruded guardrail from SKT head



Figure 8: Post 2 damage



Figure 9: Post 3 damage

pivot base (**Figure 8**) and was detached from the damaged guardrail. Post 3 was displaced to the ground northward (**Figure 9**) and detached from the damaged guardrail. There was no damage to the block-out. Post 4 was displaced approximately 25 degrees northward and was abutting the damaged guardrail (**Figure 10**). The connecting bolt was still present in the block-out yet had pulled through the bolt hole in the guardrail. There was no damage to the block-out. Post 5 was displaced slightly northward and the damaged guardrail was resting against the block-out at the designated spot, however the connecting bolt had pulled through the bolt hole in the guardrail. Post 6 was the first post to be fully attached to the guardrail. The post was slightly displaced to the north, but there was no damage to the block-out or guardrail. Posts 7 and 8 were also undamaged, as were each block-out and section of guardrail. Post 9 was not installed perpendicular to the guardrail and was positioned at a overlap of two 7.6 m (25 ft) sections of guardrail. Furthermore, the connecting bolt was not inserted through the designated bolt hole. It was inserted through a non-factory drilled hole through both guardrail sections. The post, block-out, and guardrail were not damaged. The length of total damaged guardrail measured 9.1 m (31.1 ft). There were two kinks (**Figure 1**) in the damaged guardrail downstream of the SKT. The “In-Service End Treatment Evaluation Data Collection Form” is attached to the end of this report as **Appendix A**.



Figure 10: Post 4 damage

2010 CHEVROLET TRAVERSE

Description

The Chevrolet was a front-wheel drive, 8-occupant, 4-door station wagon with the VIN 1GNLREED7ASxxxxxx and equipped with a 3.6-liter, V-6 engine, 6-speed automatic transmission, 4-wheel anti-lock brakes with electronic brake force distribution, brake assist, traction control, and electronic stability control (ESC). The vehicle was also equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, side impact IC air bags with roll sensing, an EDR, and a tilt steering column adjusted to the full-up position. The windshield glazing was AS1 laminated. The remainder of the glazing was AS3 tempered with original tinting. The specified wheelbase was 302 cm (118.9 in).

The vehicle manufacturer's recommended tire size was P245/70R17. The vehicle was equipped with Lexani LX Nine tires sized P265/40R22.² The manufacturer's recommended cold tire pressure for the front and rear tires was 241 kPa (35 psi). The tire data for the Chevrolet is presented in the table below.

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	Flat	5 mm (6 /32 in)	No	None
LR	48 kPa (7 psi)	6 mm (8 /32 in)	No	Sidewall abrasions
RR	228 kPa (33 psi)	9 mm (11 /32 in)	No	None
RF	193 kPa (28 psi)	5 mm (6 /32 in)	No	None

The front row was equipped with driver and front right occupant, cloth-covered bucket seats with adjustable head restraints. The second and third rows were equipped with cloth-covered split bench seats with folding backs and adjustable head restraints. The driver's seat track was adjusted to the rear-most position and the seat back was reclined 48 degrees aft of vertical. The top of the driver's head restraint was located 18 cm (7.1 in) above the top of the seat back. The remaining seats were unoccupied at the time of the crash.

Exterior Damage

Exterior Damage Event 1: The Chevrolet sustained direct damage to the front plane, based on the police crash report. The bumper fascia could not be located at the time of SCI inspection and the extent of the direct damage could not be determined.

² It's unlikely that the EDR-reported travel speed would be affected by the presence of non-stock tires on the vehicle since the calculated diameter of the recommended tires was 77.2 cm (30.4 in) and the calculated diameter of the tires on the vehicle was 77.0 cm (30.3 in)

Damage Classification, Event 1: The Collision Deformation Classification (CDC) was 12F9991 (0 degrees). Columns 4 to 6 of the CDC were coded as unknown since the total damaged area on the front plane could not be determined. The severity of the damage was minor.

Exterior Damage Event 2: The Chevrolet sustained direct damage to the bumper, bumper fascia, grille, and left turn and headlamp assemblies. The direct damage from the impact with the SKT began 20 cm (7.9 in) left of the center of the bumper and extended approximately 58 cm (22.8 in) to the left. The undeformed end with was 166 cm (65.4 in) and the Field L was 124 cm (48.8 in). Crush measurements were taken on the front bumper bar and the maximum residual crush was 12 cm (4.7 in), located 37 cm (14.6 in) right of the left front bumper corner. The crush values were $C_1 = 9$ cm (3.5 in), $C_2 = 9$ cm (3.5 in), $C_3 = 10$ cm (3.9 in), $C_4 = 7$ cm (2.8 in), $C_5 = 5$ cm (2 in), $C_6 = 5$ cm (2 in).

Damage Classification Event 2: The (CDC) was 12FYEW1 (0 degrees). The severity of the damage was minor.

Exterior Damage Event 3: The top plane and both side planes sustained direct damage during the rollover. Left plane damage occurred on the fender and roof side rail. Scraping damage to the front door, quarter panel, and D-pillar occurred as the vehicle was removed from the crash scene as suggested by on-scene photographs taken by the tow operator. Right plane damage began at the right front edge of the hood and extended rearward on the A-pillar and roof side rail. The most severe damage during the rollover occurred to the left A-pillar and roof side rail as dirt and foliage deposits were observed in these areas. The top plane sustained moderate damage, beginning at the left front of the hood and extending rearward on the A-pillars, both roof side rails and the full length and width of the roof. The maximum lateral crush was 5 cm (2 in), occurring 36 cm (14.2 in) aft of the B-pillar. The maximum vertical crush was 16 cm (6.3 in), occurring at the right windshield header.

Damage Classification Event 3: The CDC was 00TDDO3. The severity of the damage was moderate.

Exterior Damage Event 4: The Chevrolet sustained direct damage to the rear of the undercarriage from contact with the building, based on photographs taken by the towing service. Inspection of the undercarriage was not possible so exact damage location is unknown.

Damage Classification Event 4: The CDC was U99999. The severity of the damage is unknown.

EVENT DATA RECORDER

The Chevrolet's EDR was imaged with version 16.4 and reported with version 17.7.2 of the Bosch Crash Data Retrieval software. Electrical power was supplied from the vehicle's battery and the data was imaged via connection to the Diagnostic Link Connector. The EDR reported a non-deployment and two deployment events and that the records for all three were complete. The driver's seat belt switch circuit status was reported as "Not Buckled" for all three events. The EDR report is attached at the end of this report as **Appendix B**.

The EDR was capable of recording deployment or non-deployment events for front, rear, or side crash types and could store up to three events. A non-deployment event will be recorded if an air bag did not deploy or a pretensioner did not actuate. The oldest non-deployment event could be overwritten by a succeeding deployment event if all three records are full and the non-deployment event is not locked. A non-deployment can also be recorded if one of the following occurs without deployment of any of the frontal air bags, side air bags or rollover air bags: a pretensioner(s) only deployment, a head rest deployment, or a battery cut-off deployment. A deployment event cannot be overwritten by a subsequent event or cleared by the sensing diagnostic module (SDM).

Event Record 1: This event was reported as a non-deployment event and the EDR data suggested that it was recorded shortly after event records 2 and 3. The ignition cycles for this event were reported as 20,239, whereas the ignition cycles for the next two events was 20,238. The data limitations explain that "Ignition Cycles at Event" may be reported higher than "Ignition Cycles at Investigation" by one ignition cycle. Also, the SIR warning lamp status was "On" for this event. The dynamic event counter tracks the number of qualified events (deployments, non-deployments, or rollovers) that have occurred in the SDM's lifetime and reported seven events. The dynamic deployment event counter tracks the number of deployment events that have occurred during the SDM's lifetime and reported two events. The source of this event data could not be determined. Nine date trouble codes (DTCs) were reported for this event. An internet search of these codes was made and is presented below.

B0022-04 Passenger seat belt retractor pretensioner deployment loop open circuit
B0015-04 Driver seat belt retractor pretensioner loop open
B001B-04 Passenger seat belt anchor pretensioner deployment loop open
B001A-04 Driver seat belt anchor pretensioner deployment loop open
B0013-04 Driver frontal deployment loop stage 2 open circuit
B0012-04 Driver frontal deployment loop stage 1 open circuit
B0016-04 Left roof rail air bag deployment loop resistance above threshold
B0023-04 Right roof rail initiation deployment loop open circuit
B0052-00 Deployment commanded

The cause of this event in the EDR could not be determined, though it is noted in Record 2 that "Time Between Events" was 17.15 sec.

Event Record 2: This deployment event was recorded during the Chevrolet's front plane impact with the head of the SKT. The SIR warning lamp status was "Off." The record reported that the first and second stage deployment loops of the driver's frontal air bag and both front seat belt pretensioners were commanded. The left and right IC air bag loops were also commanded to deploy. The first and second stages of the driver's frontal air bag met deployment command criteria at 6 msec and 18 msec after algorithm enable (AE). Both IC air bags met deployment command criteria at 18 msec after AE and actuation of both pretensioners occurred at 3 msec after AE. The maximum longitudinal and lateral velocity changes were -30 km/h (-19 mph) and 2 km/h (1 mph), respectively. The maximum recorded velocity change was recorded 390 msec after AE. One DTC was reported, B0052-00 (deployment commanded).

Event Record 3: This deployment event was recorded during the rollover and occurred 0.82 sec after event record 2 was recorded. The SIR warning lamp status was "Off." The first and second stages of both frontal air bags were commanded to deploy, yet the record reported "Data Not Available" for the times from AE to deployment command criteria met. This indicated a deployment level event since those safety devices were reported as deploying on event record 2. Both IC air bags and pretensioners met the deployment command criteria 759 msec after AE, yet had already deployed as a result of event 2. The maximum recorded roll rate was recorded as 122 degrees/sec and occurred at 30 msec after the deployment criteria was met. One DTC was reported, B0052-00 (Deployment commanded).

INTERIOR DAMAGE

The interior of the Chevrolet sustained moderate intrusion from the rollover. The most severe intrusions into the driver's seating position involved the roof, windshield header, and the roof side rail, which intruded vertically 15 cm (5.9 in), 10 cm (3.9 in), and 9 cm (3.5 in), respectively. A scuff was noted on the left lower instrument panel, probably made by the driver's right knee. There was also a roof scuff above the driver's position made by contact from the driver's head. No other discernable evidence of occupant contact was observed.

Both front doors and the left rear door were jammed shut. The right rear door and rear hatch remained closed and operational. The right front window was fully open at the time of SCI vehicle inspection. Its status at the time of the crash is not known. It is possible the driver opened the window following the crash to exit the vehicle since it was on its left side at final rest. The remaining non-fixed glazing was closed. The windshield glazing was in place and cracked from impact forces, though the windshield was holed due to weathering. All glazing except the right front and second row left glazing disintegrated during the crash.

MANUAL RESTRAINT SYSTEMS

All seating positions were equipped with three-point lap and shoulder seat belts with sliding latch plates. The front row seat belts had adjustable upper anchors and the driver's upper anchor was adjusted to the full-down position. The front row seat belts were also equipped with retractor-mounted pretensioners, both of which actuated during the crash. The vehicle's EDR reported both pretensioners to be actuated.

The driver was not restrained by the lap and shoulder seat belt. There were no discernable load marks on the seat belt webbing, latch plate, or D-ring. The vehicle's EDR also reported the driver's "Buckle Switch" status as "Not Buckled."

SUPPLEMENTAL RESTRAINT SYSTEMS

The Chevrolet was equipped with multi-stage frontal air bags, front seat-mounted side impact air bags, and side impact IC air bags. The driver's frontal air bag and both IC air bags deployed as a result of the impact with the SKT.

The IC air bags were located along the roof side rails behind the headliner and the deflated left IC air bag extended from the A-pillar to the D-pillar. The IC air bags were undamaged and no discernable contacts were observed.

2010 CHEVROLET TRAVERSE OCCUPANT

Driver Demographics

Age/Sex:	27-year-old/male
Height:	180 cm (70 in)
Weight:	78 kg (173 lbs)
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Rear-most
Manual restraint usage:	None
Usage source:	Vehicle inspection, EDR
Air bags	Driver frontal and both IC air bags, deployed; seat mounted side impact air bag, not deployed
Alcohol/drug involvement:	Positive for PCP and amphetamine, no values recorded
Egress from vehicle:	Exited with assistance
Transport from scene:	Ambulance
Medical treatment:	Hospitalized one night at trauma center

Driver Injuries

Injury No.	Injury	AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Abrasion left forehead, not further specified	210202.1	Air bag, driver's frontal	Probable
2	Abrasion lateral left eye, not further specified	210202.1	Air bag, driver's frontal	Probable
3	Abrasion, small, over left flank, not further specified	510202.1	Left front door panel, rear upper quadrant	Probable
4 5	Abrasions, small, over hands, not further specified	710202.1 710202.1	Noncontact injury: flying glass, left front glazing	Probable

Sources: Emergency room records and hospitalization records. Injury Numbers 3 to 5 came only from emergency room records. Injury Numbers 1 and 2 came from a combination of emergency room and hospitalization records.

Driver Kinematics

The driver was not restrained by the lap and shoulder seat belt. The seat track was adjusted to the rear-most position and the seat back was reclined 46 degrees aft of vertical. The top of the head restraint was located 18 cm (7.1 in) above the top of the seat back. The impact with the Dodge displaced the driver forward. The driver's frontal and both IC air bags deployed as a result of the impact with the SKT. The impact with the SKT also displaced the driver forward. He sustained abrasions on his left forehead and left eye from loading the frontal air bag. He was then redirected in multiple directions as the vehicle rolled over seven quarter turns and sustained abrasions on his left flank from contact with the left door. He also sustained abrasions on both hands, likely due to flying glass from the disintegrated left front window glazing. A passerby assisted the driver out of the vehicle. He was transported by ambulance to a trauma center where he was treated for minor injuries and admitted for one night for observation.

1997 DODGE CARAVAN

Description

The Dodge was a front-wheel drive, 7-passenger, 4-door mini-van with VIN 1B4GP44R6VBxxxxxx, and was equipped with a 3.3 liter, V-6 engine, a 4-speed automatic transmission, and dual frontal air bags.

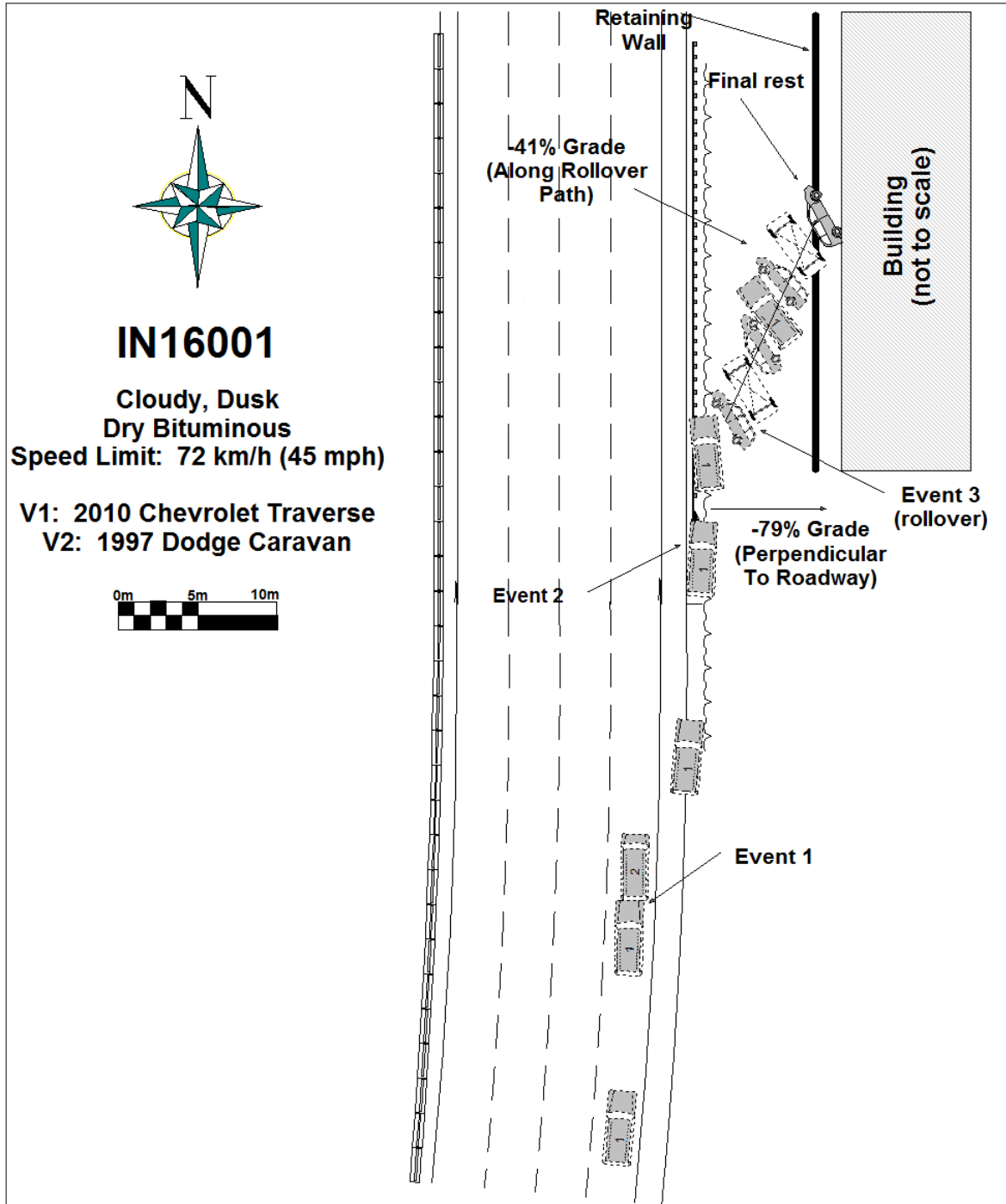
Exterior Damage

The Dodge was not inspected. It sustained damage to the back plane according to the police crash report.

Occupant Data

The driver, a 48-year-old male, was restrained by a lap and shoulder seat belt, according to the police crash report. The driver did not sustain any police reported injury and was not transported for medical treatment.

CRASH DIAGRAM



Appendix A:
In-Service End Treatment Evaluation Data Collection Form

Prepopulated Data (by others)			
Date of Crash	12/2016	Time of Crash (Military)	Early Evening
Case Number	IN16001	State	Missouri
Traffic Route	9-lane divided Interstate Hwy	Direction (southbound = SB)	SB
Ambient Conditions (at time of crash)			
Temperature (°F)	28	Lighting	Dusk
Atmospheric	Cloudy		

KEY: COM-Center of Mass of Vehicle

SCI Team Number: 2	
Scene Information	
Type of area where crash occurred	<input checked="" type="checkbox"/> Urban <input type="checkbox"/> Rural <input type="checkbox"/> Suburban
Terminal on a horizontal curve?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Curve/LT <input type="checkbox"/> Curve/RT
Estimated or Reconstructed Speed at Impact (MPH)	47 mph (Source: EDR)
Est. distance from terminal impact to COM final resting location (ft.)	82 ft
Est. distance (normal) from either 1. the white paint line; or, 2. edge roadway shoulder pavement to COM resting position normal to shoulder (ft.)	39.4 feet from white line
Super elevation	<input type="checkbox"/> +2% <input checked="" type="checkbox"/> -2% NONE or FLAT?
Curve Radius (ft.)	

On-Scene Information															
End Treatment Type	<input type="checkbox"/> Extruder		<input type="checkbox"/> ET2000 <input type="checkbox"/> ET-PLUS 4in <input type="checkbox"/> ET-PLUS 5in <input checked="" type="checkbox"/> SKT <input type="checkbox"/> FLEAT												
	<input type="checkbox"/> Telescope		<input type="checkbox"/> X-LITE <input type="checkbox"/> X-TENSION												
Curb?	<input type="checkbox"/> No AASHTO Type A <input type="checkbox"/> AASHTO Type B <input checked="" type="checkbox"/> AASHTO Type C <input type="checkbox"/> AASHTO Type D <input type="checkbox"/> AASHTO Type E <input type="checkbox"/> AASHTO Type F														
	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> AASHTO Type G <input type="checkbox"/> AASHTO Type H														
Curb Height:															
Post No.	Post				Offset Block			PRE-Existing Damage					Offset to post or post hole (ft.)		Spacing to next post (ft. in.)
	Type		Dim.		Type		Dim.	Unknown	No	Yes	Describe	Travel way	Curb		
	Steel	Wood	DxW (in.)	Dia. (in.)	Steel	Wood	DxW (in.)								
1	X		6x4					X				7.3	1.5	0	
2	X		6x 4					X				7.2	1.3	6' 7"	
3	X		6x4		Compo siti e		7.75 x 4	X				7.6	1.8	6' 0"	

4	X		6x4		Com po sit e		8x4	X				7.8	1.7	6' 6"
5	X		6x4		Com po sit e	N/A	7.75x4	X				7.6	1.5	6' 2"
6	X		6x4		Com po sit e		8x4	X				7.6	1.5	6' 2"
7	X		6x4		Com po sit e		8.5x4	X				7.5	1.3	6' 2"
8	X		6x4		Com po sit e		8x4	X				7.4	1.1	6' 3"
9	X		6x4		Com po sit e		8x4	X			Post is installed rotated 10-15° CCW in relation to guardrail.	7.3	1	6' 1"

Additional Comments

Extruder	
Feeder Channel Width at impact head	<input type="checkbox"/> 4 inches <input type="checkbox"/> 5 inches <input checked="" type="checkbox"/> Other <u>4.5"</u>
Guide Chute Exit Height (in.)	13.5
Connection of feeder channels to head damaged?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
Are Welds Broken?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
Anchor Cable Present?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
Connected?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
Rail Extrusion?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
Length (ft. in.)	14' 10"
Rail Extrusion Direction	Traffic Side <input type="checkbox"/> Field Side <input checked="" type="checkbox"/>
Total Length of Rail Damaged (ft.) [total length would include extruded rail plus damaged rail downstream from head.]	31'1"

Telescope			
Rail Displacement	<input type="checkbox"/> No	<input type="checkbox"/> Yes; Length:	No of Panels Displaced
			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6

All-System Performance	
Railkinks Downstream of Head?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes; No. of Kinks in Rail: 2
Was there intrusion into the Occupant Compartment by foreign object (guardrail)?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes
Did vehicle impact other objects after impact with terminal?	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes
Object Contacted	Roadside foliage

All-System Performance Environment	
Sideslope 50' in advance of Post 1	70%
Sideslope at post 1	79%
Sideslope 50' past Post 1	67%
Adjacent Lane Width	11.8 ft
Lane Type (NAS EDS Variable: SurType)	Bituminous

Shoulder Type	Concrete/asphalt
Shoulder Width	72 in
Guardrail Height	28.25"

Vehicle Information	
Vehicle Type (NHTSA Input)	
Vehicle orientation upon impact	<input checked="" type="checkbox"/> Case Type 1 <input type="checkbox"/> Case Type 2 <input type="checkbox"/> Case Type 3 <input type="checkbox"/> Case Type 4 <input type="checkbox"/> Case Type 5 <input type="checkbox"/> Case Type 6 <input type="checkbox"/> Case Type 7 <input type="checkbox"/> Case Type 8 <input type="checkbox"/> Other
If 'Other', describe	
Collision Deformation Classification	12FYEW1
Delta-v	-19 mph (Longitudinal)
Occupant Compartment Penetration of rail	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes; Describe:
Quarter Turns (NASS EDS variable: Rollover)	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> 13 <input type="checkbox"/> 14 <input type="checkbox"/> 15 <input type="checkbox"/> 16 <input type="checkbox"/> 17+
Object Precipitating Rollover, where possible (NASS EDS variable: Rollobj)	Guardrail
Rollover Type, (Kenneth) Terhune Scale, (NASS EDS variable: rolintyp)	Fall Over
Vehicle Identification Number (NASS EDS variable: VIN)	1GNLREED7ASxxxxxx
Vehicle Mass (NASS ED variable: vehwgt)	4860 lbs.

Appendix B: 2010 Chevrolet Traverse Data Recorder Report³

³ The EDR report published as part of this technical report comes from the latest software version of the Bosch CDR Tool 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	1GNLREED7AS*****
User	
Case Number	
EDR Data Imaging Date	01/07/2016
Crash Date	
Filename	IN15001_V1_ACM.CDRX
Saved on	Thursday, January 7 2016 at 10:38:33
Imaged with CDR version	Crash Data Retrieval Tool 16.4
Reported with CDR version	Crash Data Retrieval Tool 17.7.2
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Non-Deployment, Deployment, 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, 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 Events, the SDM will record 220 milliseconds of data after the Deployment criteria is met and up to 70 milliseconds before the Deployment criteria is met. For Non-Deployment Events, the SDM will record the first 300 milliseconds of data after algorithm enable.

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 Deployment Events, the SDM will record up to 490 milliseconds of data before the Deployment criteria is met and 250 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 CDR tool displays time from Algorithm Enable (AE) to time of Deployment command in a Deployment event and AE to time of maximum SDM recorded vehicle velocity change in a Non-Deployment event. Time from AE begins when the first air bag system enable threshold is met and ends when Deployment command criteria is met or at maximum SDM recorded vehicle velocity change. Any air bag systems may be a source of an enable.

-Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change is captured when the largest, absolute value of either the Longitudinal or Lateral Recorded Vehicle Velocity Change occurs. The Maximum may occur between the recorded 10

- millisecond sample points.
- 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 AE. That is to say, the last data point may have been captured just before AE but no more than 0.5 second before AE. 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 engines.
- 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 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-Deployments, 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 deployment times for subsequent deployment type events, during the same ignition cycle, will not be recorded. Also, forced timer loops, will not be shown as being commanded to deploy. Loops without their own independent deployment calibration are called "forced timer loops." Examples of a forced timer loops are Pretensioner Deployment Loop #2 and Knee Deployment Loop.
- Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously may be reported higher than Ignition Cycles At Event because the Ignition Cycles SIR Warning Lamp was ON/OFF counter is not cleared during the vehicle build process.
- Ignition Cycles At Event may be reported higher than Ignition Cycles At Investigation by one ignition cycle. This is due to the way Ignition Cycles At Investigation is written during a vehicle power loss situation.
- The reported range of the longitudinal and lateral acceleration values is approximately ± 50 g.
- 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 to the SDM, by 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 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.

01040_SDM11-autoliv_r021

Event Data (General)

Ignition Cycles At Investigation	20241
ESS # 1 Traceability Data	AU2577E0121B8880
ESS # 2 Traceability Data	DA2577E0121BF130
ESS # 3 Traceability Data	AH2577E012210AB7
ESS # 4 Traceability Data	AJ2577E0121EDAC2
ESS # 5 Traceability Data	AT2577E0121A643B
ESS # 6 Traceability Data	DB2577E0121BA3E1
ESS # 7 Traceability Data	000000E000000000
ESS # 8 Traceability Data	000000E000000000
Dynamic Deployment Event Counter	2
Dynamic Event Counter	7
Dynamic OnStar Notification Event Counter	2
Vehicle Identification Number	?????????*****
System Type	Autoliv
Manufacturing Traceability Data	AS4982E050229902
Software Module Identifier 1	013E86EF
Software Module Identifier 2	013EADB7
End Model Part Number	013E86E6

Event Data (Event Record 1)

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
Deployment Event Counter	2
Event Counter	7
OnStar Notification Event Counter	2
Algorithm Active: Rear	No
Algorithm Active: Rollover	No
Algorithm Active: Side	No
Algorithm Active: Frontal	No
Ignition Cycles At Event	20239
Time Between Events (sec)	Data Not Available
Concurrent Event Flag Set	No
Event Severity Status: Rollover	No
Event Severity Status: Rear	No
Event Severity Status: Right Side	No
Event Severity Status: Left Side	No
Event Severity Status: Frontal Stage 2	No
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Pretensioner	No
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 (If Equipped)	No
Passenger Pretensioner Deployment Loop #2 Commanded (If Equipped)	No
Driver Thorax Loop Commanded (If Equipped)	No
Passenger Thorax Loop Commanded (If Equipped)	No
Left Row 2 Thorax Loop Commanded (If Equipped)	No
Right Row 2 Thorax Loop Commanded (If Equipped)	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Left Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Right Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Center Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Battery Cutoff Loop Commanded (If Equipped)	No
Driver Roll Bar Loop Commanded (If Equipped)	No
Passenger Roll Bar Loop Commanded (If Equipped)	No
Steering Column Energy Absorbing Loop Commanded (If Equipped)	No
Driver Head Rest Loop Commanded (If Equipped)	No
Passenger Head Rest Loop Commanded (If Equipped)	No
Left Row 2 Head Rest Loop Commanded (If Equipped)	No
Right Row 2 Head Rest Loop Commanded (If Equipped)	No
Center Row 2 Head Rest Loop Commanded (If Equipped)	No
Driver Belt Switch Circuit Status (If Equipped)	Not Buckled
Passenger Belt Switch Circuit Status (If Equipped)	Not Buckled
Driver Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	On
SIR Warning Lamp Status	On
SIR Warning Lamp ON/OFF Time Continuously (seconds)	6620

Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	1
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	130
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	0 [0]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-5 [-8]
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	Data Not Available
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	Data Not Available

DTCs Present at Time of Event (Event Record 1)

B0022-04
B0015-04
B001B-04
B001A-04
B0013-04
B0012-04
B0016-04
B0023-04
B0052-00

Pre-Crash Data -1 to -.5 sec (Event Record 1)

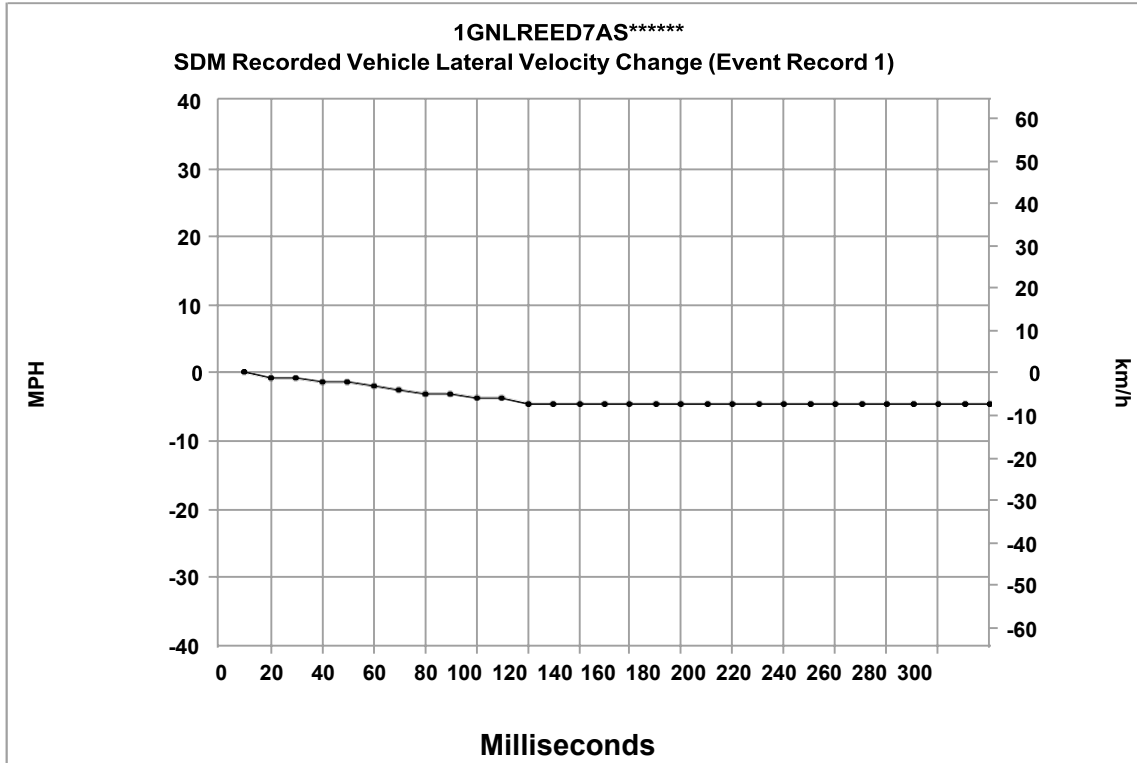
Times (sec)	Cruise Control Active	Cruise Control Resume Switch Active	Cruise Control Set Switch Active	Engine Torque (lb-ft [N-m])	Reduced Engine Power Mode Indicator
-1.0	No	No	No	-45 [-60]	Off
-0.5	No	No	No	-45 [-60]	Off

Pre-Crash Data -2.5 to -.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	0	Off	0	27	0 [0]
-2.0	0	Off	0	27	0 [0]
-1.5	0	Off	0	27	0 [0]
-1.0	0	Off	0	27	0 [0]
-0.5	0	Off	0	27	0 [0]

SDM Recorded Vehicle Longitudinal Velocity (Event Record 1)

Contains No Recorded Data



Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
10	0.0	0.0
20	-0.6	-1.0
30	-0.6	-1.0
40	-1.2	-2.0
50	-1.2	-2.0
60	-1.9	-3.0
70	-2.5	-4.0
80	-3.1	-5.0
90	-3.1	-5.0
100	-3.7	-6.0
110	-3.7	-6.0
120	-4.3	-7.0
130	-4.3	-7.0
140	-4.3	-7.0
150	-4.3	-7.0
160	-4.3	-7.0
170	-4.3	-7.0
180	-4.3	-7.0
190	-4.3	-7.0
200	-4.3	-7.0
210	-4.3	-7.0

Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
220	-4.3	-7.0
230	-4.3	-7.0
240	-4.3	-7.0
250	-4.3	-7.0
260	-4.3	-7.0
270	-4.3	-7.0
280	-4.3	-7.0
290	-4.3	-7.0
300	-4.3	-7.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 1)

Contains No Recorded Data

SDM Recorded Vehicle Vertical Acceleration (Event Record 1)

Contains No Recorded Data

SDM Recorded Vehicle Roll Rate (Event Record 1)

Contains No Recorded Data

Event Data (Event Record 2)

Event Recording Complete	Yes
Event Record Type	Deployment
Crash Record Locked	Yes
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	1
Event Counter	2
OnStar Notification Event Counter	1
Algorithm Active: Rear	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	20238
Time Between Events (sec)	17.15
Concurrent Event Flag Set	No
Event Severity Status: Rollover	No
Event Severity Status: Rear	No
Event Severity Status: Right Side	No
Event Severity Status: Left Side	No
Event Severity Status: Frontal Stage 2	Yes
Event Severity Status: Frontal Stage 1	Yes
Event Severity Status: Frontal Pretensioner	Yes
Driver 1st Stage Deployment Loop Commanded	Yes
Passenger 1st Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded	Yes
Passenger 2nd Stage Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop #1 Commanded	Yes
Passenger Pretensioner Deployment Loop #1 Commanded	Yes
Driver Pretensioner Deployment Loop #2 Commanded (If Equipped)	Yes
Passenger Pretensioner Deployment Loop #2 Commanded (If Equipped)	Yes
Driver Thorax Loop Commanded (If Equipped)	No
Passenger Thorax Loop Commanded (If Equipped)	No
Left Row 2 Thorax Loop Commanded (If Equipped)	No
Right Row 2 Thorax Loop Commanded (If Equipped)	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	Yes
Right Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	Yes
Left Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Left Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Right Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Center Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Battery Cutoff Loop Commanded (If Equipped)	No
Driver Roll Bar Loop Commanded (If Equipped)	No
Passenger Roll Bar Loop Commanded (If Equipped)	No
Steering Column Energy Absorbing Loop Commanded (If Equipped)	No
Driver Head Rest Loop Commanded (If Equipped)	No
Passenger Head Rest Loop Commanded (If Equipped)	No
Left Row 2 Head Rest Loop Commanded (If Equipped)	No
Right Row 2 Head Rest Loop Commanded (If Equipped)	No
Center Row 2 Head Rest Loop Commanded (If Equipped)	No
Driver Belt Switch Circuit Status (If Equipped)	Not Buckled
Passenger Belt Switch Circuit Status (If Equipped)	Not Buckled
Driver Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	On
SIR Warning Lamp Status	Off
SIR Warning Lamp ON/OFF Time Continuously (seconds)	655330

Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	1026
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	390
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-19 [-30]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	1 [2]
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	6
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	18
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	18
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	18
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	3
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	3

DTCs Present at Time of Event (Event Record 2)

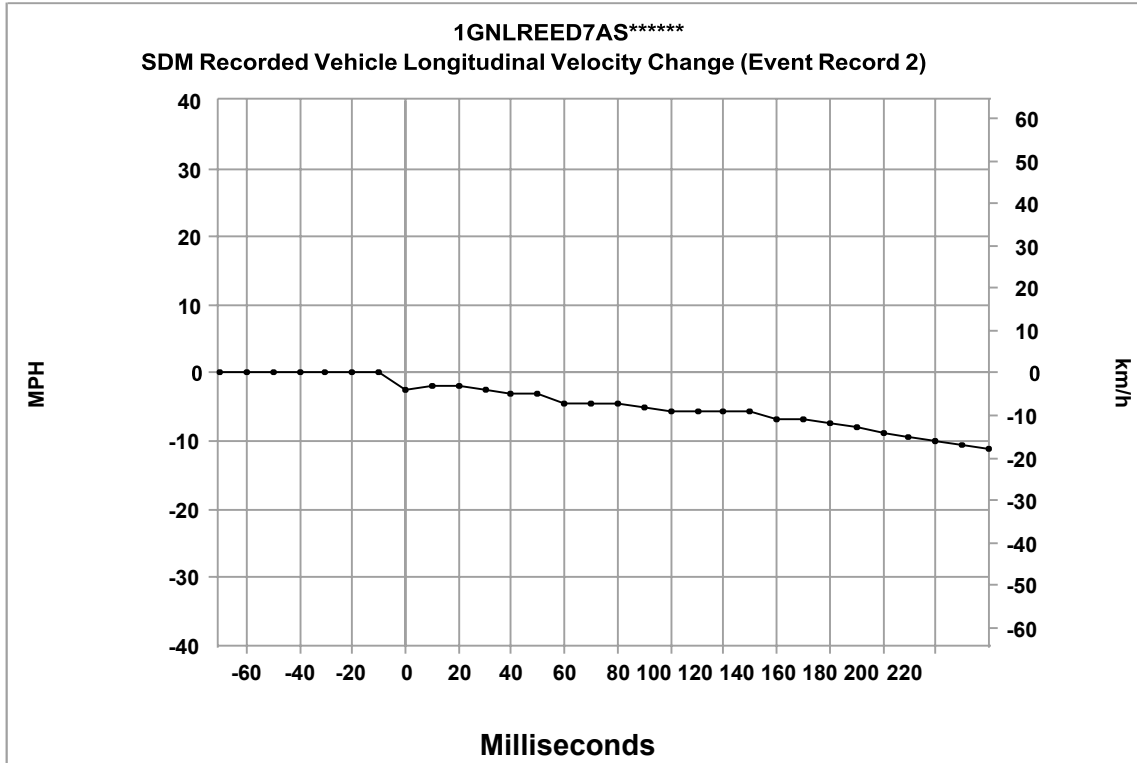
B0052-00

Pre-Crash Data -1 to -.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
-1.0	No	No	No	155 [210]	Off
-0.5	No	No	No	144 [195]	Off

Pre-Crash Data -2.5 to -.5 sec (Event Record 2)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	26	Off	1664	35	47 [75]
-2.0	26	Off	1664	35	47 [75]
-1.5	26	Off	1664	36	47 [76]
-1.0	28	Off	1664	36	47 [76]
-0.5	23	Off	1792	34	47 [76]



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
-70	0.0	0.0
-60	0.0	0.0
-50	0.0	0.0
-40	0.0	0.0
-30	0.0	0.0
-20	0.0	0.0
-10	0.0	0.0
0	-2.5	-4.0
10	-1.9	-3.0
20	-1.9	-3.0
30	-2.5	-4.0
40	-3.1	-5.0
50	-3.1	-5.0
60	-4.3	-7.0
70	-4.3	-7.0
80	-4.3	-7.0
90	-5.0	-8.0
100	-5.6	-9.0
110	-5.6	-9.0
120	-5.6	-9.0
130	-5.6	-9.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
140	-6.8	-11.0
150	-6.8	-11.0
160	-7.5	-12.0
170	-8.1	-13.0
180	-8.7	-14.0
190	-9.3	-15.0
200	-9.9	-16.0
210	-10.6	-17.0
220	-11.2	-18.0

SDM Recorded Vehicle Lateral Velocity Change (Event Record 2)

Contains No Recorded Data

SDM Recorded Vehicle Lateral Acceleration (Event Record 2)

Contains No Recorded Data

SDM Recorded Vehicle Vertical Acceleration (Event Record 2)

Contains No Recorded Data

SDM Recorded Vehicle Roll Rate (Event Record 2)

Contains No Recorded Data

Event Data (Event Record 3)

Event Recording Complete	Yes
Event Record Type	Deployment
Crash Record Locked	Yes
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	2
Event Counter	3
OnStar Notification Event Counter	2
Algorithm Active: Rear	Yes
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	20238
Time Between Events (sec)	0.82
Concurrent Event Flag Set	Yes
Event Severity Status: Rollover	Yes
Event Severity Status: Rear	No
Event Severity Status: Right Side	No
Event Severity Status: Left Side	No
Event Severity Status: Frontal Stage 2	No
Event Severity Status: Frontal Stage 1	No
Event Severity Status: Frontal Pretensioner	No
Driver 1st Stage Deployment Loop Commanded	Yes
Passenger 1st Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded	Yes
Passenger 2nd Stage Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop #1 Commanded	Yes
Passenger Pretensioner Deployment Loop #1 Commanded	Yes
Driver Pretensioner Deployment Loop #2 Commanded (If Equipped)	Yes
Passenger Pretensioner Deployment Loop #2 Commanded (If Equipped)	Yes
Driver Thorax Loop Commanded (If Equipped)	No
Passenger Thorax Loop Commanded (If Equipped)	No
Left Row 2 Thorax Loop Commanded (If Equipped)	No
Right Row 2 Thorax Loop Commanded (If Equipped)	No
Left Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	Yes
Right Row 1 Roof Rail/Head Curtain Loop Commanded (If Equipped)	Yes
Left Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 2 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Left Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Right Row 3 Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Left Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Right Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Center Row 2 Pretensioner Deployment Loop Commanded (If Equipped)	No
Battery Cutoff Loop Commanded (If Equipped)	No
Driver Roll Bar Loop Commanded (If Equipped)	No
Passenger Roll Bar Loop Commanded (If Equipped)	No
Steering Column Energy Absorbing Loop Commanded (If Equipped)	No
Driver Head Rest Loop Commanded (If Equipped)	No
Passenger Head Rest Loop Commanded (If Equipped)	No
Left Row 2 Head Rest Loop Commanded (If Equipped)	No
Right Row 2 Head Rest Loop Commanded (If Equipped)	No
Center Row 2 Head Rest Loop Commanded (If Equipped)	No
Driver Belt Switch Circuit Status (If Equipped)	Not Buckled
Passenger Belt Switch Circuit Status (If Equipped)	Not Buckled
Driver Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Position Status (If Equipped)	Data Not Available
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger SIR Suppression Switch Circuit Status (If Equipped)	Data Not Available
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	On
SIR Warning Lamp Status	Off
SIR Warning Lamp ON/OFF Time Continuously (seconds)	655330

Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	1026
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	Data Not Available
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	Data Not Available
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	Data Not Available
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Data Not Available
Driver Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	759
Passenger Thorax/Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	759
Driver Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	759
Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	759

DTCs Present at Time of Event (Event Record 3)

B0052-00

Pre-Crash Data -1 to -.5 sec (Event Record 3)

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
-1.0	No	No	No	142 [193]	Off
-0.5	No	No	No	150 [204]	Off

Pre-Crash Data -2.5 to -.5 sec (Event Record 3)

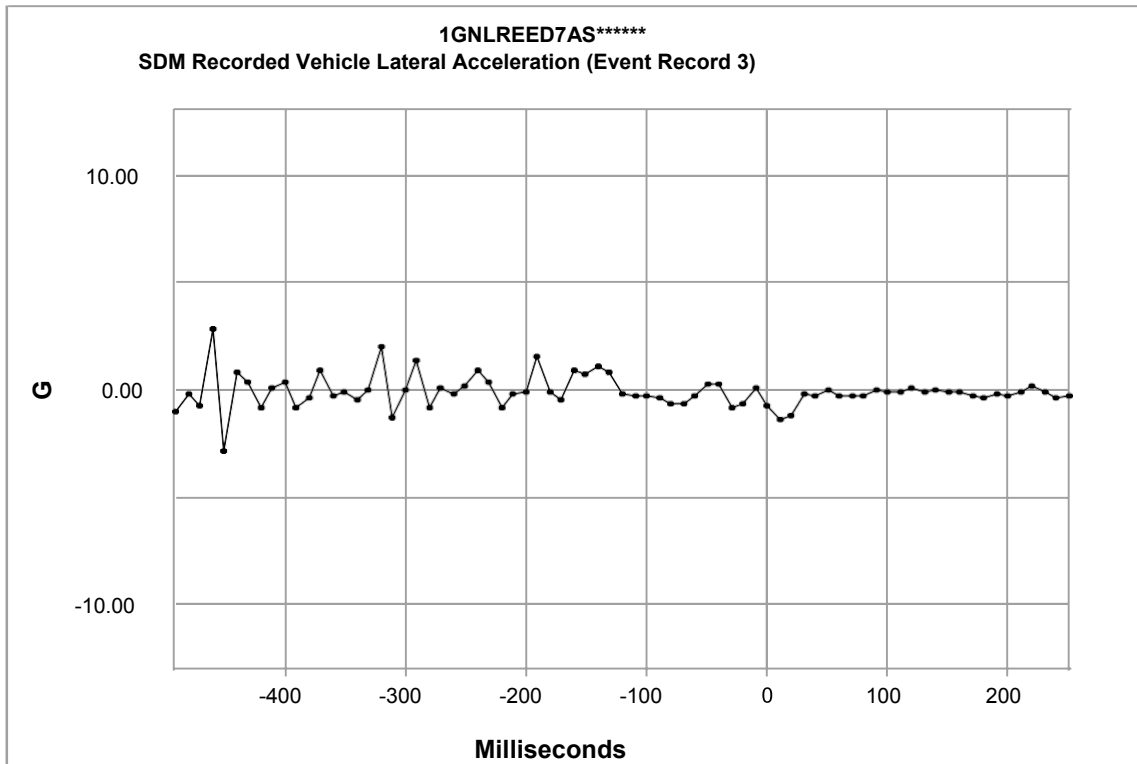
Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	26	Off	1664	35	47 [75]
-2.0	26	Off	1664	35	47 [75]
-1.5	26	Off	1664	35	47 [75]
-1.0	26	Off	1664	35	47 [75]
-0.5	26	Off	1664	36	47 [76]

SDM Recorded Vehicle Longitudinal Velocity (Event Record 3)

Contains No Recorded Data

SDM Recorded Vehicle Lateral Velocity Change (Event Record 3)

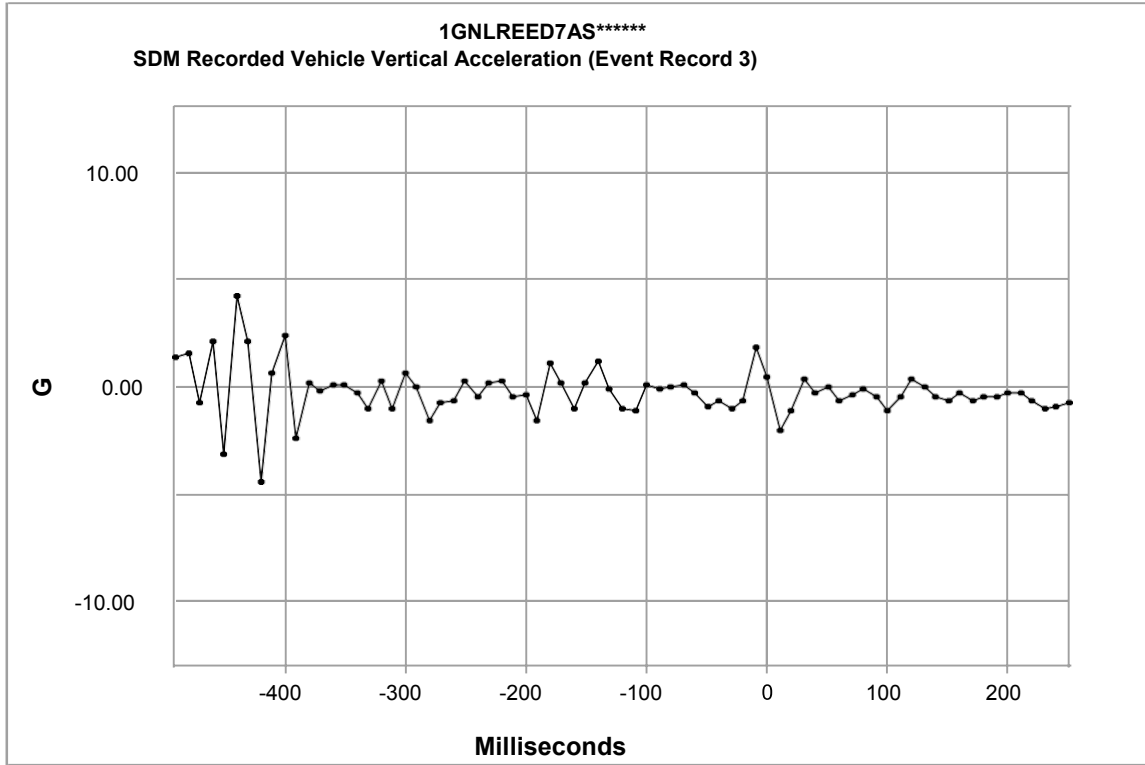
Contains No Recorded Data



Time	g
-490	-1.0
-480	-0.2
-470	-0.7
-460	2.8
-450	-2.8
-440	0.8
-430	0.4
-420	-0.8
-410	0.1
-400	0.4
-390	-0.8
-380	-0.4
-370	0.9
-360	-0.3
-350	-0.1
-340	-0.5
-330	0.0
-320	2.0
-310	-1.3
-300	0.0
-290	1.4
-280	-0.8
-270	0.1
-260	-0.2
-250	0.2

Time	g
-240	0.9
-230	0.4
-220	-0.8
-210	-0.2
-200	-0.1
-190	1.6
-180	-0.1
-170	-0.5
-160	0.9
-150	0.7
-140	1.1
-130	0.8
-120	-0.2
-110	-0.3
-100	-0.3
-90	-0.4
-80	-0.6
-70	-0.6
-60	-0.3
-50	0.3
-40	0.3
-30	-0.8
-20	-0.6
-10	0.1
0	-0.7

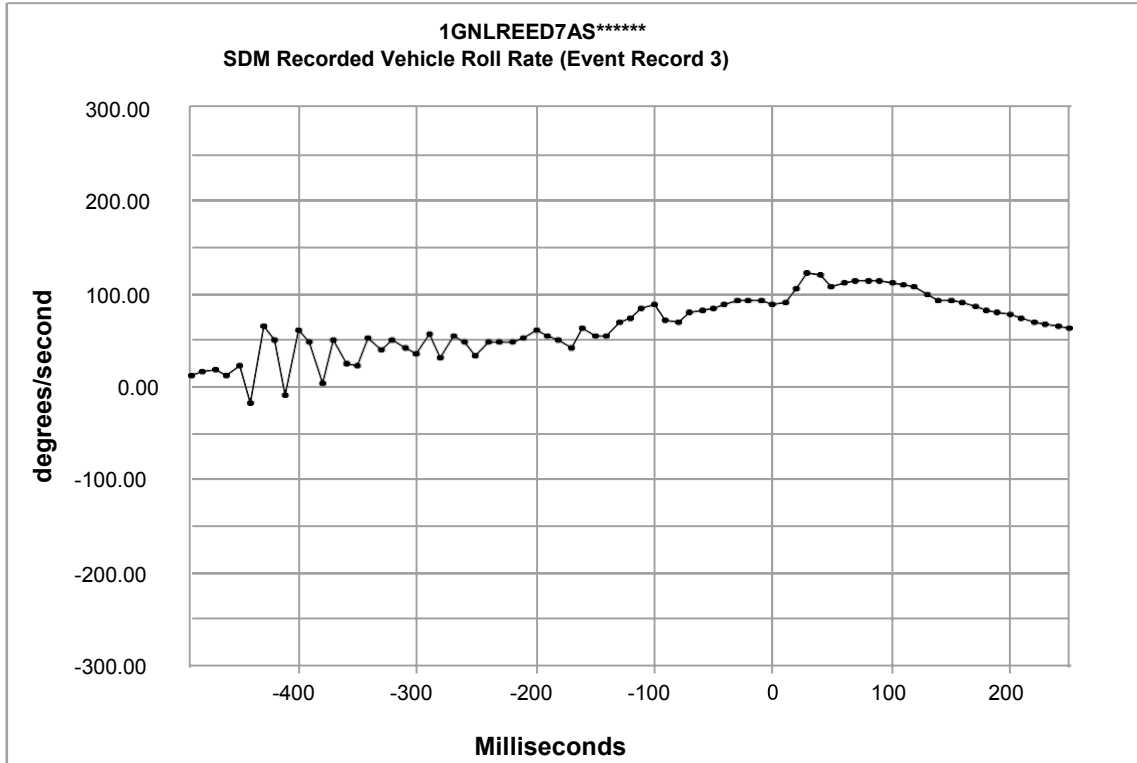
Time	g
10	-1.4
20	-1.2
30	-0.2
40	-0.3
50	0.0
60	-0.3
70	-0.3
80	-0.3
90	0.0
100	-0.1
110	-0.1
120	0.1
130	-0.1
140	0.0
150	-0.1
160	-0.1
170	-0.3
180	-0.4
190	-0.2
200	-0.3
210	-0.1
220	0.2
230	-0.1
240	-0.4
250	-0.3



Time	g
-490	1.4
-480	1.6
-470	-0.7
-460	2.1
-450	-3.1
-440	4.2
-430	2.1
-420	-4.4
-410	0.6
-400	2.4
-390	-2.4
-380	0.2
-370	-0.2
-360	0.1
-350	0.1
-340	-0.3
-330	-1.0
-320	0.3
-310	-1.0
-300	0.6
-290	0.0
-280	-1.6
-270	-0.7
-260	-0.6
-250	0.3

Time	g
-240	-0.5
-230	0.2
-220	0.3
-210	-0.5
-200	-0.4
-190	-1.6
-180	1.1
-170	0.2
-160	-1.0
-150	0.2
-140	1.2
-130	-0.1
-120	-1.0
-110	-1.1
-100	0.1
-90	-0.1
-80	0.0
-70	0.1
-60	-0.3
-50	-0.9
-40	-0.6
-30	-1.0
-20	-0.6
-10	1.8
0	0.5

Time	g
10	-2.0
20	-1.1
30	0.4
40	-0.3
50	0.0
60	-0.6
70	-0.4
80	-0.1
90	-0.5
100	-1.1
110	-0.5
120	0.4
130	0.0
140	-0.5
150	-0.6
160	-0.3
170	-0.6
180	-0.5
190	-0.5
200	-0.3
210	-0.3
220	-0.6
230	-1.0
240	-0.9
250	-0.7



Time	deg/sec
-490	12
-480	16
-470	20
-460	12
-450	24
-440	-16
-430	66
-420	50
-410	-8
-400	62
-390	48
-380	4
-370	50
-360	26
-350	24
-340	52
-330	40
-320	50
-310	42
-300	36
-290	56
-280	32
-270	54
-260	48
-250	34

Time	deg/sec
-240	48
-230	48
-220	48
-210	52
-200	62
-190	54
-180	50
-170	42
-160	64
-150	54
-140	54
-130	70
-120	74
-110	84
-100	88
-90	72
-80	70
-70	80
-60	82
-50	84
-40	88
-30	92
-20	92
-10	92
0	88

Time	deg/sec
10	90
20	106
30	122
40	120
50	108
60	112
70	114
80	114
90	114
100	112
110	110
120	108
130	100
140	94
150	94
160	90
170	86
180	82
190	80
200	78
210	74
220	70
230	68
240	66
250	64

Hexadecimal Data

DPID \$11
FF F0 00 FC C0 7C 00

DPID \$15
01 02 03 04 07 08 05

DPID \$16
06 09 0A 0D 0E 00 00

DPID \$17
00 00 00 00 00 00 00

DPID \$32
00 FD 4F 11 00 00 00

DPID \$35
78 00 00 00 00 00 00

DID \$01
41 55 32 35 37 37 45 30 31 32 31 42 38 38 38 30

DID \$03
44 41 32 35 37 37 45 30 31 32 31 42 46 31 33 30

DID \$05
41 48 32 35 37 37 45 30 31 32 32 31 30 41 42 37

DID \$07
41 4A 32 35 37 37 45 30 31 32 31 45 44 41 43 32

DID \$09
41 54 32 35 37 37 45 30 31 32 31 41 36 34 33 42

DID \$0B
44 42 32 35 37 37 45 30 31 32 31 42 41 33 45 31

DID \$0D
30 30 30 30 30 30 45 30 30 30 30 30 30 30 30 30

DID \$0F
30 30 30 30 30 30 45 30 30 30 30 30 30 30 30 30

DID \$30
02 00 07 02

DID \$90
FF FF FF FF FF FF FF FF FF FF FF 2A 2A 2A 2A 2A 2A

DID \$9A
04 01

DID \$B4
41 53 34 39 38 32 45 30 35 30 32 32 39 39 30 32

DID \$C1
01 3E 86 EF

DID \$C2
01 3E AD B7

DID \$CB
01 3E 86 E6

DID \$31
1GNLREED7AS*****

```
0000 A5 30 02 00 07 02 00 4F 0F FF
0010 FF 00 00 00 00 00 00 00 00 00
0020 0C FC FC F0 00 00 C0 10 00 00
0030 00 00 00 00 00 00 00 00 00 00
0040 00 00 06 27 06 27 1B 1B 1B 1B
0050 1B 00 00 00 00 00 05 02 96 00
0060 01 FD 80 22 04 80 15 04 80 1B
0070 04 80 1A 04 80 13 04 80 12 04
0080 80 16 04 80 23 04 80 52 00 0D
0090 7F 77 FF FF FF FF FF FF FF FF
0100 7F 7F 7F 7E 7F 7E 7F 7D 7F 7D
0110 7F 7C 7F 7B 7F 7A 7F 7A 7F 79
0120 7F 79 7F 78 7F 78 7F 78 7F 78
0130 7F 78 7F 78 7F 78 7F 78 7F 78
0140 7F 78 7F 78 7F 78 7F 78 7F 78
0150 7F 78 7F 78 7F 78 7F 78 7F 78
0160 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0170 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0180 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0190 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0200 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0210 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0220 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0230 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0240 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0250 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0260 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0270 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0280 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0290 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0300 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0310 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0320 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0330 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0340 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0350 7D 7F 7D 7D 7F 7D 7D 7F 7D 7D
0360 7F 7D 7D 7F 7D 7D 7F 7D 7D 7F
0370 7D 7D 7F 7D 7D 7F 7D 7D 7F 7D
0380 7D 7F 7D 7D 7F 00 00 00 00 00
0390 00 00 00 00 00 00 00 00 00 00
0400 00 00 00 00 00 00 00 00 00 00
0410 00 00 00 00 00 00 00 00 00 00
0420 00 00 00 00 00 00 00 00 00 00
0430 00 00 00 00 00 00 00 00 00 00
0440 00 00 00 00 00 00 00 00 00 00
0450 00 00 00 00 00 00 00 00 00 00
0460 00 00 00 00 00 00 00 00 00 00
0470 00 00 00 00 00 00 00 00 00 00
0480 00 00 00 00 00 00 00 00 00 00
0490 00 00 00 00 00 00 00 00 DB 19
```

DID \$32

```
0000 A5 F0 01 00 02 01 0F 4F 0E 06
0010 B3 00 00 00 0E A3 C3 00 00 00
0020 0C FC FC F0 00 00 C0 10 17 1C
0030 1A 1A 1A 00 00 00 00 1C 1A 1A
0040 1A 1A 08 26 08 43 22 24 24 23
0050 23 4C 4C 4C 4B 4B 04 FF FD 04
0060 02 FD 00 00 00 00 00 00 00 00
0070 00 00 00 00 00 00 00 00 00 00
0080 00 00 00 00 00 00 80 52 00 27
0090 61 81 02 06 FF FF 06 06 01 01
0100 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
0110 7F 7F 7F 7F 7B 7F 7C 7F 7C 7F
0120 7B 7F 7A 7F 7A 7F 78 7F 78 7F
0130 78 7F 77 7F 76 7F 76 7F 76 7F
```

0140	76	7F	74	7F	74	7F	73	7F	72	7F
0150	71	7F	70	7F	6F	7F	6E	7F	6D	7F
0160	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0170	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0180	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0190	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0200	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0210	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0220	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0230	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0240	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0250	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0260	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0270	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0280	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0290	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0300	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0310	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0320	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0330	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0340	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0350	7D	7F	7D	7D	7F	7D	7D	7F	7D	7D
0360	7F	7D	7D	7F	7D	7D	7F	7D	7D	7F
0370	7D	7D	7F	7D	7D	7F	7D	7D	7F	7D
0380	7D	7F	7D	7D	7F	00	10	00	00	00
0390	31	00	11	70	04	01	03	00	11	00
0400	0E	00	00	00	20	00	00	00	31	00
0410	11	70	04	01	03	00	11	00	0E	00
0420	00	00	31	00	00	00	31	00	12	70
0430	14	01	13	00	11	00	24	00	00	00
0440	41	00	00	00	31	00	12	70	00	00
0450	00	00	00	00	00	00	00	00	00	00
0460	00	00	00	00	00	00	00	00	00	00
0470	00	00	00	00	00	00	00	00	00	00
0480	00	00	00	00	00	00	00	00	00	00
0490	00	00	00	00	00	00	00	00	CC	19

DID \$33

0000	A5	F0	02	00	03	02	0F	4F	0E	00
0010	52	01	00	00	80	A3	C3	00	00	00
0020	0C	FC	FC	F0	00	00	C0	10	1A	1A
0030	1A	1A	1A	00	00	00	00	1A	1A	1A
0040	1A	1A	08	37	08	22	24	23	23	23
0050	23	4C	4B	4B	4B	4B	04	FF	FD	04
0060	02	FD	00	00	00	00	00	00	00	00
0070	00	00	00	00	00	00	00	00	00	00
0080	00	00	00	00	00	00	80	52	00	00
0090	7F	7F	FF	FF	FF	FF	FD	FD	FD	FD
0100	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0110	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0120	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0130	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0140	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0150	7F	7F	7F	7F	7F	7F	7F	7F	7F	7F
0160	73	8B	79	7B	8D	77	76	76	75	99
0170	92	79	61	5E	73	85	A7	87	81	92
0180	5E	75	51	66	7E	83	83	81	95	60
0190	75	65	67	79	7F	7D	86	7B	66	7A
0200	7E	72	7C	7E	73	78	7A	65	7D	73
0210	6B	91	80	66	70	73	6A	7D	83	6D
0220	8B	7D	63	75	6D	6F	7E	76	64	7B
0230	77	67	7F	80	6E	86	78	67	81	7F
0240	67	75	80	67	7B	78	65	7C	79	60
0250	8D	6D	64	7C	88	66	78	7F	6A	86
0260	73	5F	84	7F	64	88	89	64	85	7C
0270	5C	7B	73	5A	7A	72	55	7A	7E	53
0280	79	7C	5B	77	7D	5C	77	7E	57	7A

1GNLREED7AS*****

```
0290 7A 56 80 74 55 80 77 53 75 73
0300 51 77 77 51 7E 8F 51 76 82 53
0310 6F 69 52 71 72 4A 7B 81 42 7A
0320 7A 43 7D 7D 49 7A 77 47 7A 79
0330 46 7A 7C 46 7D 78 46 7C 72 47
0340 7C 78 48 7E 81 49 7C 7D 4D 7D
0350 78 50 7C 77 50 7C 7A 52 7A 77
0360 54 79 78 56 7B 78 57 7A 7A 58
0370 7C 7A 5A 7F 77 5C 7C 73 5D 79
0380 74 5E 7A 76 5F 4E 00 00 00 00
0390 00 00 00 00 00 00 00 00 00 00
0400 00 00 00 00 00 00 00 00 00 00
0410 00 00 00 00 00 00 00 00 00 00
0420 00 00 00 00 00 00 00 00 00 00
0430 00 00 00 00 00 00 00 00 00 00
0440 00 00 00 00 00 00 00 00 00 00
0450 00 00 00 00 00 00 00 00 00 00
0460 00 00 00 00 00 00 00 00 61 05
0470 0E 02 20 00 80 04 5B 13 0E 00
0480 00 00 00 00 00 00 00 00 00 00
0490 00 00 00 00 00 00 00 00 CC 19
```

Disclaimer of Liability

The users of the CDR product and reviewers of the CDR reports and exported data shall ensure that data and information supplied is applicable to the vehicle, vehicle's system(s) and the vehicle ECU. Robert Bosch LLC and all its directors, officers, employees and members shall not be liable for damages arising out of or related to incorrect, incomplete or misinterpreted software and/or data. Robert Bosch LLC expressly excludes all liability for incidental, consequential, special or punitive damages arising from or related to the CDR data, CDR software or use thereof.

DOT HS 812 613
September 2018



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

