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**Special Crash Investigations:
On-Site Air Bag Non-Deployment
Investigation;
Vehicle: 2011 Chevrolet Equinox;
Location: Michigan;
Crash Date: March 2019**

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16. Abstract This report documents the investigation of an air bag non-deployment crash involving a 2011 Chevrolet Equinox and six other vehicles in Michigan in March 2019. Four vehicles were stopped in the left lane and two vehicles, a 2010 Ford F-150 and a 1996 Chevrolet C2500, were stopped on the left shoulder due to a prior crash in the lanes ahead. The unbelted 21-year-old female of the Chevrolet Equinox was driving northbound at highway speed and steered left to avoid striking a stopped vehicle. The front of the Equinox struck the back of the Ford, pushing the Ford forward, where it struck the back of the Chevrolet C2500. Two other vehicles were subsequently struck by the Chevrolet C2500, and two more vehicles were struck by either the Equinox, the Ford, or the Chevrolet C2500. The Equinox struck a concrete jersey barrier and came to rest on the left shoulder. The SCI team imaged the Equinox's Event Data Recorder (EDR) during the vehicle inspection, which suggested that the event severity for the frontal crash was sufficient to actuate the seat belt pretensioners but insufficient to deploy the frontal air bags. OEM analysis of the data suggested the SRS functioned as expected in this crash. Based on the EDR data and the full-system scan data, the SCI investigation determined that the SRS functioned appropriately and revealed no evidence of air bag malfunction. The Equinox driver was not injured.			
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**Special Crash Investigations
On-Site Air Bag Non-Deployment Investigation
Office of Defects Investigation
Case Number: DS19008
Vehicle: 2011 Chevrolet Equinox
Location: Michigan
Crash Date: March 2019**

Background

This report documents the investigation of an air bag non-deployment chain-reaction crash involving a 2011 Chevrolet Equinox (Figure 1). The case was initiated in response to a notification sent to the National Highway Traffic Safety Administration reporting that the Chevrolet struck another vehicle at highway speed and sustained total loss damage, but that no air bags deployed. The Special Crash Investigations (SCI) group assigned the case to Dynamic Science, Inc., in April 2019. The investigation was intended to assess the Chevrolet's supplemental restraint system (SRS) performance relative to the crash. The SCI team obtained the police report and permission to inspect the vehicle with representatives from General Motors and their legal team present. During the inspection, the OEM made no specific comments to SCI regarding SRS performance in the crash. The Chevrolet was supported by the Bosch Crash Data Retrieval (CDR) tool, and the vehicle's Event Data Recorder (EDR) was imaged during the inspection in May 2019. The Equinox sustained moderate severity damage to the front plane and the driver's seat belt pretensioner actuated, but no frontal air bags deployed in the crash. The EDR data suggested that the event severity was sufficient to actuate the seat belt pretensioners but insufficient to deploy the frontal air bags. The OEM downloaded full system scan data not found in the EDR report. Following its review of the data, the OEM identified no abnormalities in the data; specifically, no diagnostic trouble codes (DTCs) were associated with the supplemental restraints system (SRS). Its analysis of the data suggested the SRS functioned as expected in this crash. Based on the EDR data and the full-system scan data, the SCI investigation determined that the SRS functioned appropriately and revealed no evidence of air bag malfunction. The Equinox driver was not injured.



Figure 1. The 2011 Chevrolet Equinox

The crash involved seven vehicles on a northbound State highway in Michigan in March 2019. Six of the vehicles were stopped due to a prior crash in the lanes ahead, four in the left lane, and two on the left shoulder. A 2003 Nissan Altima driven by a belted 19-year-old male was in the lead position, a 2016 Buick Encore driven by a belted 40-year-old male was next, then a 2018 Buick Regal driven by a belted 55-year-old female, and a 2004 Toyota Camry driven by a belted 52-year-old female was the fourth. Two vehicles on the shoulder were a 1996 Chevrolet C2500 followed by a 2010 Ford F-150. The unbelted 21-year-old female Equinox driver was traveling northbound at highway speed and steered left to avoid striking a vehicle stopped in the left lane. After the Equinox departed the roadway on the left edge and traveled onto the left shoulder, the vehicle's front struck the back of the Ford, pushing the Ford forward where it struck the back of the C2500. The C2500 subsequently struck the Encore and the Nissan, and the Toyota and Regal were subsequently struck by either the Equinox, the Ford, or the C2500 (the police did not determine the striking vehicles for those two events). The Equinox struck a concrete jersey barrier and came to rest on the left shoulder, and the other vehicles came to rest in the areas of impact. The Equinox driver was not injured or transported. The driver of the Ford sustained a police-reported "C" (possible) injury and was transported. None of the other drivers were injured or transported. The Equinox, Ford, Chevrolet C2500, and Toyota were towed due to damage, and the other three vehicles were driven from the scene.

Summary

Crash Site

The crash site was a two-lane, divided highway in Michigan (Figure 2). The surface was paved with asphalt in traveled and polished condition. The roadway was straight with a slight positive slope measuring approximately 1 percent where it served as an overpass in an interchange area. The lanes measured 3.6 m (12.0 ft) in width and were separated by a dashed white painted stripe. The left roadway edge was bordered by a solid yellow-painted fog line that transitioned to a solid white-painted fog line for approximately 55 m (180 ft) on the overpass before transitioning back to yellow. The left paved shoulder measured 2.0 m (6.6 ft) wide with a rumble strip, and a concrete jersey type barrier separated the northbound and southbound lanes. The right road edge was bordered by a solid white-painted fog line, a paved shoulder with a rumble strip, and a metal beam guardrail. The police report indicated the area of impact was located approximately 30 m (100 ft) south of the east/west roadway passing under the northbound lanes. Conditions at the time of the crash were daylight, clear, and dry. This was a heavily traveled roadway. At the time of this crash, a prior crash had occurred in the lanes ahead and vehicles were stopped. The posted speed limit was 113 km/h (70 mph). A crash diagram is included at the end of this report.



Figure 2. Crash site looking north

Pre-Crash

The Nissan, Encore, Regal, and Toyota were stopped on the left due to a prior crash ahead. To the left of those vehicles, the C2500 was stopped on the left shoulder, and the Ford was stopped approximately 2 m (6 ft) behind the C2500. The Equinox was traveling northbound in the left lane. Event Record 2 of the Equinox EDR report indicated a vehicle speed of 112 km/h (70 mph) at 2.5 seconds prior to algorithm enable (AE). Cruise control was not activated, accelerator pedal was 0 percent, and the brake switch circuit state was “Off.” The Equinox driver apparently observed vehicles stopped ahead and steered left, departing the lane and entering the left shoulder. At T-0.5 seconds, the EDR-reported vehicle speed was 107 km/h (66 mph), and the brake switch circuit state was “On.” The table on the following page documents the calculated pre-crash travel distances based on the EDR-reported vehicle speed.

Time -sec	Vehicle Speed		Distance Traveled			
	km/h	mph	Incremental m	ft	Cumulative m	ft
2.5	112	70	NA	NA	NA	NA
2	112	70	15.6	51.3	15.6	51.3
1.5	111	69	15.5	51	31.2	102.3
1	110	68	15.3	50.2	46.5	152.5
0.5	107	66	15	49.1	61.4	201.6

Crash

The front of the Equinox struck and underrode the back of the Ford (Event 1). None of the Equinox's air bags deployed. The impact pushed the Ford forward, causing its front to strike the back of the C2500 (Event 2). At Event 2, the Equinox was likely engaged with the Ford, and the Equinox driver's seat belt pretensioned at impact with the C2500. The C2500 was pushed forward and right where it struck the back of the Encore (Event 3) and the left plane of the Altima (Event 4). During the crash sequence, the Toyota (Event 5) and the Regal (Event 6) were struck by either the Equinox, the Ford, or the C2500. The police did not determine the striking vehicles for Events 5 and 6. The police report indicated that the damage to the Toyota and the Regal were on the back left corners. The Equinox had contact damage to the right-rear fender, suggesting it likely struck either the Toyota or the Regal. Damage to the left plane of the Equinox indicated that the vehicle's left plane struck the Jersey barrier (Event 7; Figure 3). All seven vehicles came to rest in the area of the crash.

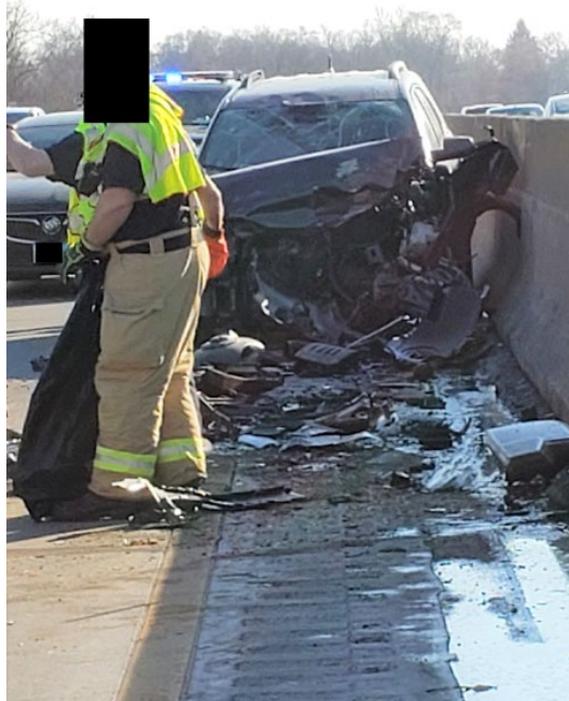


Figure 3. Final rest view looking south, the 2011 Chevrolet Equinox (driver on-scene image)

For the Equinox in Event 1, the missing vehicle algorithm of WinSMASH calculated a total delta V of 34 km/h (21 mph), a longitudinal delta V of -34 km/h (-21 mph), a lateral delta V of 0 km/h, and a barrier equivalent speed (BES) of 33 km/h (20 mph). Event Record 2 of the Equinox EDR report indicated a maximum longitudinal delta V of -24 km/h (-15 mph) and a maximum lateral delta V of 0 km/h. The WinSMASH results appear high compared with the EDR data, and the reconstruction was considered borderline due to the underdrive component of damage to the Equinox.

For the Ford in Event 1, the missing vehicle algorithm of WinSMASH calculated a total delta V of 25 km/h (16 mph), a longitudinal delta V of 25 km/h (16 mph), a lateral delta V of -4 km/h (-3 mph), and a BES of 26 km/h (16 mph). The results appear reasonable, but the reconstruction was considered borderline.

The Equinox EDR Event Record 3 was associated with crash Event 2. The EDR reported a maximum longitudinal delta V of -22 km/h (-14 mph) and a maximum lateral delta V of 0 km/h.

The Equinox EDR Event Record 1 was associated with crash Event 7. The EDR reported a maximum longitudinal delta V of -9 km/h (-6 mph) and a maximum lateral delta V of 2 km/h (1 mph).

Post-Crash

The Equinox driver remained seated in her vehicle until the arrival of emergency responders. She was not injured or transported. The driver of the Ford was transported to a local hospital, where his treatment status is unknown. No other injuries were reported. The Equinox, Ford, Chevrolet C2500, and Toyota were towed due to disabling damage. The Encore, Altima, and Regal were driven from the scene.

2011 Chevrolet Equinox

Description

The 2011 Chevrolet Equinox was a 5-door, 5-passenger SUV identified by the Vehicle Identification Number (VIN) 2CNFLNECXB6xxxxxx. The electronic odometer reading at the time of the vehicle inspection was 181,594 km (112,837 mi). According to a vehicle history report, the vehicle had a total of three previous owners including rental and personal, twenty service history records, a crash without air bag deployments reported in January 2011, and a crash with structural damage and without air bag deployments reported in March 2017. The last reported odometer reading was 14,888 km (92,511 mi) with damage reported in March 2018. The Equinox had a 4-cylinder, 2.4-liter gasoline engine; all-wheel drive; hydraulic brakes; an antilock braking system; daytime running lights; and tilt/telescoping steering column functionality. The front row included a pair of bucket seats with adjustable head restraints. The driver's seat track setting was unknown because the driver was not located for an interview.

Exterior Damage

The Equinox sustained moderate severity crush damage to the front plane caused by the front-to-back impact with the Ford (Figure 4). The front-bumper fascia and bumper backing bar were displaced and absent from the vehicle, and direct damage at bumper level was unknown. The field L extended from the left-frame rail to the right-frame rail and measured 112 cm (44.1 in). Four measurements were taken at bumper level using the Nikon total station. The vehicle underrode the back bumper of the Ford at impact and sustained the above bumper crush. Direct damage was distributed across the hood and upper radiator support measuring 90 cm (35.4 in) in length. Fifteen crush measurements were taken at the upper radiator support and crush averaging was used to calculate crush as follows: C1 = 25 cm (9.8 in), C2 = 26 cm (10.2 in), C3 = 25 cm (9.8 in), C4 = 22 cm (8.7 in), C5 = 21 cm (8.3 in), and C6 = 15 cm (5.9 in). Maximum crush was located at the left aspect of the upper radiator support, and the collision deformation classification (CDC) for the Equinox in Event 1 was 12FDEW2.

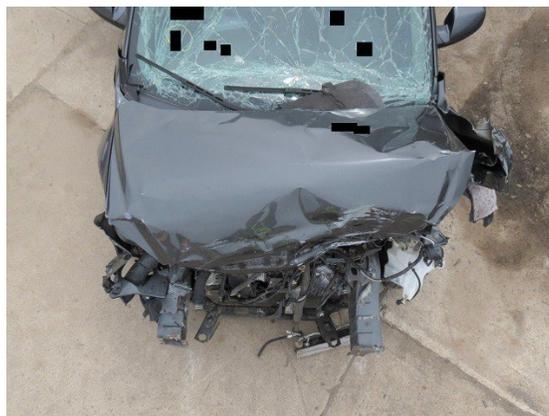


Figure 4. Front-plane damage, the 2011 Chevrolet Equinox

The vehicle had minor crush damage to the left-rear fender caused by contact with the concrete jersey barrier in Event 7 (Figure 5). Direct damage began 10 cm (3.9 in) aft of the left rear axle and extended 64 cm (25.2 in) rearward. This was a swiping type damage pattern. Maximum crush was located 40 cm (15.7 in) aft of the left rear axle and the CDC for the Equinox in Event 7 was 12LBES1.



Figure 5. Left-plane damage, the 2011 Chevrolet Equinox

The vehicle had minor crush damage to the right rear fender likely caused by contact with either the Toyota or the Regal. Direct damage began 59 cm (23.2 in) forward of the right rear axle and extended 124 cm (48.8 in) rearward (Figure 6). There were insufficient data available to link this damage to a specific event.



Figure 6. Right-plane damage, the 2011 Chevrolet Equinox

Event Data Recorder

The Equinox had an SDM with EDR capability. The SCI investigator imaged the EDR during the vehicle inspection using a battery jump box power source and the data link connector (DLC) method with Bosch CDR software version 18.0.2. The complete EDR report using software version 21.5 is included in Appendix A. The EDR report included three non-deployment event

records. Each event record included event data, diagnostic trouble codes (DTCs) present at the time of the event, pre-crash data -2.5 to -0.5 seconds, and 300 milliseconds (ms) of post-crash velocity change. The EDR report did not reveal any evidence of frontal air bag malfunction.

The Equinox EDR captured three event records. Event Record 2 was the front-to-back impact with the Ford (Event 1). The record indicated that no DTCs were present at the time of the event, and the number of ignition cycles since DTCs were last cleared at event enable was 253.

Event Record 3 was the front-to-back impact between the Ford and the Chevrolet C2500, where the Equinox was still engaged with the Ford in an underride. This was determined based on the following: The Equinox and Ford had corresponding underride/override damage; the EDR report indicated Record 3 followed Record 2 chronologically; for the Equinox, both events were frontal impacts with similar longitudinal delta V and 0 lateral delta V; the Equinox and Ford traveled post-impact on the narrow, left shoulder between a jersey barrier to the left and a line of stopped vehicles on the right. Event Record 3 indicated that the driver and passenger's seat belt pretensioners actuated at 21 ms after AE. The pretensioner command flagged DTC B0052-00. According to an online source, this DTC follows an air bag or seat belt pretensioner deployment command.¹

Event Record 1 was the left plane impact to the jersey barrier (Event 7). The SIR warning lamp remained "Off," and DTC B0052-00 was present.

OEM Diagnostic Log

The attending GM representatives conducted a full-system scan using the GM Global Diagnostic System 2 tool, designed to diagnose and repair onboard automotive electronic systems. Additional features and functions include module, vehicle, and system diagnostics, as well as DTC, identification, and data displays; operate control functions; perform configuration and/or reset functions; and read vehicle-wide DTC and ID information. The purpose of the scan was to identify any outstanding DTCs associated with the claimed air bag non-deployment issue. No abnormalities associated with the supplemental restraint systems were discovered in the DTC display. Following a review of its full system data scans of the Equinox the OEM indicated that the SRS appeared to have functioned as intended. In its post-crash state, the SDM stored 7 DTCs as follows: driver seat belt retractor pretensioner deployment loop, open (5), control module power circuit, low voltage (1), and passenger presence module, malfunction (1).

Interior Damage

The Equinox's interior sustained damage caused by impact forces. The windshield was fractured. The doors remained closed and operational, and the vehicle did not sustain any integrity loss or intrusion.

Manual Restraint Systems

The Equinox had three-point continuous lap and shoulder seat belts for the driver and front right occupant. The belts had retractor pretensioners that actuated during the crash. The Equinox

¹ <https://www.dtcdecode.com/Chevrolet/B0052-00>

driver was not belted and both seat belts were locked in the stowed position by the pretensioned retractors. The EDR report stated that the front-row belts were “Not Buckled.”

Supplemental Restraint Systems

The Equinox had advanced frontal air bags and seat-mounted side impact air bags for the driver and the front-right occupant, as well as combination side impact/roll-sensing IC air bags for both rows. None of the air bags deployed during the crash. Given the 12 o'clock direction of force and moderate severity of the crash, it is reasonable that the side air bags did not deploy. The frontal air bags are discussed further in the Air Bag Non-Deployment Discussion section of this report.

Air Bag Non-Deployment Discussion

According to the Equinox owner's manual, frontal air bags are designed to inflate in moderate to severe frontal or near-frontal crashes and are only designed to inflate if the impact exceeds a predetermined deployment threshold. The manual did not include velocity change parameters associated with the threshold. It stated various crash configurations which may cause frontal air bags to deploy at different impact speeds including whether the struck object was stationary or moving, whether the struck object deformed, if it was narrow (pole) or wide (wall), and the vehicle heading angle relative to the struck object. The manual states that deployment criteria depend largely on the struck object, the angle at which it is struck, and how quickly the striking vehicle decelerates. The seat-mounted side impact air bags are not designed to deploy in frontal impacts; IC air bags are designed to deploy in severe frontal impacts, or in side impact and rollovers.

The Equinox's SRS had two front-mounted frontal air bag sensors. The sensors were identified during the vehicle inspection as GM OEM part number 13502577. They were located 60 cm (23.6 in) apart on the left and right aspects of the vehicle's upper radiator support. The sensors and connecting wiring harness assemblies appeared unremarkable. The Equinox's SRS commanded deployment of the driver's seat belt, indicating that the front sensors and air bag control module (ACM) were functional at the time of the crash. The EDR data indicated that the frontal impact was a long duration crash (200 ms to maximum delta V) and that the damage flow revealed an underride component caused by striking a taller vehicle. The damage was distributed laterally from bumper corner to bumper corner and vertically from bumper to hood. The EDR data limitations indicated that the minimum SDM recorded vehicle velocity change that is needed to record a non-deployment event is 8 km/h (5 mph). The EDR captured three events each having longitudinal delta V above the minimum threshold. At impact with the Ford, the EDR report indicated that the frontal algorithm was active.

The EDR captured three non-deployment events. The SRS appears to have determined that the event severity in Event Record 3 was sufficient to actuate the seat belt pretensioners but insufficient to deploy the frontal air bags. Event Record 2 had a slightly higher longitudinal delta V and Event Record 1 had a lower longitudinal delta V than Event Record 3.

The EDR report Event Records 1 and 3 included DTC B0052-00 present at the time of the event. According to an online source, this DTC follows an air bag or seat belt pretensioner deployment command. For EDR Event Record 2 (crash Event 1), no DTC was present, and no deployment was commanded. For EDR Event Record 3, the driver's and front passenger's seat belt

pretensioners actuated at 21 ms, and the DTC was present. It was also present in Event Record 1, which, according to the event counter,² followed Event Record 3. Following their review of the full-system scan data, the OEM identified no abnormalities in the data; specifically, no DTCs were associated with the SRS. Their analysis of the data suggested that the SRS functioned as expected in this crash. Based on the EDR data and the full-system scan data, the SCI investigation determined that the SRS appeared to function as expected.

NHTSA Recalls and Investigations

A query using the vehicle's VIN revealed no open recalls as of May 2022. A query using the vehicle's year/make/model revealed two open investigations related to steering and visibility/windshield wiper issues, and one closed investigation related to visibility/windshield wiper issues.

² According to the Data Limitations, the dynamic deployment event counter tracks the number of deployment events that have occurred during the SDM's lifetime. The dynamic event counter tracks the number of qualified events (either deployments, non-deployments, or rollover events) that have occurred during the SDM's lifetime.

2011 Chevrolet Equinox Occupant

Driver Demographics

Age/sex:	21 years/female
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Bucket with adjustable head restraint
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt not used
Usage source:	Vehicle inspection, EDR report
Air bags:	Frontal, seat-mounted side impact, and IC air bags not deployed
Alcohol/drug data:	None suspected, according to police report
Egress from vehicle:	Unknown
Transport from scene:	None
Type of medical treatment:	None

Driver Injuries

According to the police, the Equinox driver was not injured or transported from the scene.

Driver Kinematics

The unbelted 21-year-old female driver was seated in an unknown posture and departed the roadway on the left edge while actively braking and steering. At impact with the Ford, the driver was displaced forward in response to the 12 o'clock direction of force. Her chest likely contacted the steering wheel. The Equinox likely remained engaged with the Ford while both vehicles traveled a short distance in a forward trajectory before the Ford struck the Chevrolet C2500 and the driver was again displaced forward. After the Equinox came to rest the driver remained seated until the arrival of emergency responders at which time she exited in an unknown manner. According to the police report, the driver was neither injured nor transported.

2010 Ford F-150

Description

The police identified the 2010 Ford F-150 using the VIN 1FTEX1E88AFxxxxxx. The Ford was a full-size light truck with an extended cab and a regular bed. It had an 8-cylinder, 4.6-liter gasoline engine; 4-wheel drive; and hydraulic brakes.

Exterior Damage

Images obtained online were used to conduct a partial exterior inspection. The Ford sustained direct damage to the back plane caused in the Event 1 impact with the 2011 Chevrolet Equinox (Figure 7) and direct damage to the front plane caused by the Event 2 impact with the 1996 Chevrolet C2500 (Figure 8). The estimated CDC for the Ford in Event 1 was 06B9EW01 and the estimated CDC for Event 2 was 12FDEW01. The vehicle was towed due to disabling damage and declared to be a total loss.



Figure 7. Back- and right-plane damage, the 2010 Ford F-150 (salvage lot image)



Figure 8. Front- and right-plane damage, the 2010 Ford F-150 (salvage lot image)

Occupant Data

According to the police, the 47-year-old male driver sustained an unspecified, non-incapacitating injury and was transported to a local hospital, where his treatment status is unknown.

1996 Chevrolet C2500

Description

The police identified the 1996 Chevrolet C2500 using the VIN 1GCGC24F1TExxxxxx. The Chevrolet was a full-size light truck with a regular cab and a long bed. It had an 8-cylinder, 6.5-liter, turbo-charged diesel engine and hydraulic brakes.

Exterior Damage

This vehicle was not inspected. According to the police, it was involved in at least three events. The most severe damage was on the back plane and less severe damage was on the front plane. It was towed due to disabling damage.

Occupant Data

According to the police, the belted 52-year-old male driver was not injured or transported from the scene.

2016 Buick Encore

Description

The police identified the 2016 Buick Encore using the VIN KL4CJHSB2GBxxxxxx. The Buick was a 4-door compact SUV with a 4-cylinder, 1.4-liter gasoline engine; all-wheel drive; and hydraulic brakes.

Exterior Damage

This vehicle was not inspected. According to the police, the Buick sustained non-disabling damage to the back-left corner area caused by the impact with the 1996 Chevrolet C2500. The Buick was driven from the scene, and its repair status is unknown.

Occupant Data

According to the police, the belted 40-year-old male driver was not injured or transported from the scene.

2003 Nissan Altima

Description

The police identified the 2003 Nissan Altima using the VIN 1N4BL11E53Cxxxxxx. The Nissan was a 4-door, full-size sedan with a 6-cylinder, 3.5-liter gasoline engine and front-wheel drive.

Exterior Damage

This vehicle was not inspected. According to the police and a driver interview, the Nissan sustained non-disabling damage to the back-left corner area (Figure 9) caused by the impact with the 1996 Chevrolet C2500. The Nissan was driven from the scene, and the left-rear tail lamp assembly was replaced.



Figure 9. Impact damage, the 2004 Nissan Altima (driver image)

Occupant Data

According to the police and a driver interview, the belted 19-year-old male driver was not injured or transported from the scene.

2018 Buick Regal

Description

The police identified the 2018 Buick Regal using the VIN W04GP6SX3J1xxxxxx. The Buick was a 4-door, full-size sedan with a 4-cylinder, 2.0-liter gasoline/ethanol (E85) engine and front-wheel drive.

Exterior Damage

This vehicle was not inspected. According to the police, the Buick sustained non-disabling damage to the back-left corner area caused by an impact with either the 2011 Chevrolet Equinox, the 2010 Ford F-50, or the 1996 Chevrolet Chevrolet C2500. The Nissan was driven from the scene, and its repair status is unknown.

Occupant Data

According to the police, the belted 55-year-old female driver was not injured or transported from the scene.

2004 Toyota Camry

Description

The police identified the 2004 Toyota Camry using the VIN 4T1BE32K84Uxxxxxx. The Toyota was a 4-door, intermediate size sedan with a 4-cylinder, 2.4-liter gasoline engine and front-wheel drive.

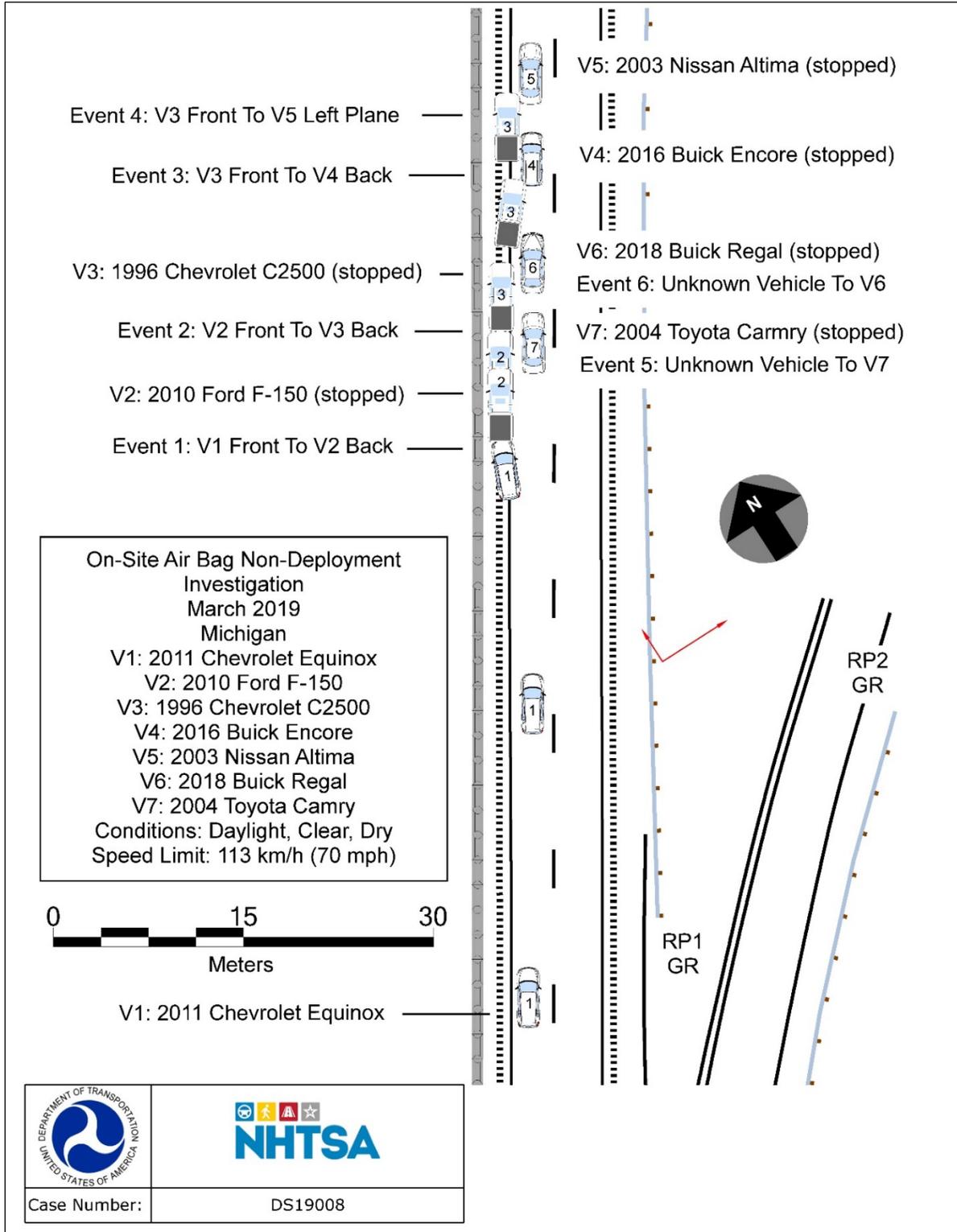
Exterior Damage

This vehicle was not inspected. According to the police, the Toyota sustained disabling damage to the back left corner area caused by an impact with either the 2011 Chevrolet Equinox, the 2010 Ford F-50, or the 1996 Chevrolet Chevrolet C2500. The Nissan was towed from the scene, and its repair status is unknown.

Occupant Data

According to the police, the belted 52-year-old female driver was not injured or transported from the scene.

Crash Diagram



Appendix A: Event Data Recorder Report for 2011 Chevrolet Equinox³

³ 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	2CNFLNECXB6*****
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS19008_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 18.0.2
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 21.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Non-Deployment, Non-Deployment, 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, 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 Non-Deployment (Non-rollover) Events, the SDM will record 750 milliseconds of data before a calibrated angle threshold is reached. 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 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. 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.

01038_SDM10_SDM10i-autoliv_r027

Event Data (General)

Ignition Cycles At Investigation	13763
ESS # 1 Traceability Data	AU2577E012CECE54
ESS # 2 Traceability Data	DA2577E00CDAEF6C
ESS # 3 Traceability Data	AH2577E012D1E63E
ESS # 4 Traceability Data	AJ2577E012D211EF
ESS # 5 Traceability Data	AT2577E00CDACBC2
ESS # 6 Traceability Data	DB2577E012D1F50E
ESS # 7 Traceability Data	000000E000000000
ESS # 8 Traceability Data	000000E000000000
Dynamic Deployment Event Counter	0
Dynamic Event Counter	4
Dynamic OnStar Notification Event Counter	2
Vehicle Identification Number	2CNFLNECXB6*****
System Type	Autoliv
Manufacturing Traceability Data	AS4893E050067013
Software Module Identifier 1	00CF22EB
Software Module Identifier 2	0140467E
Software Module Identifier 3	0189ECCF
End Model Part Number	00CF22ED

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	0
Event Counter	4
OnStar Notification Event Counter	2
Algorithm Active: Rear	No
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	13757
Time Between Events (sec)	0.71
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	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
Driver Belt Switch Circuit Status	Not Buckled
Passenger Belt Switch Circuit Status	Not Buckled
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	Off
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	421
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	140
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-6 [-9]
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)	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
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DTCs Present at Time of Event (Event Record 1)

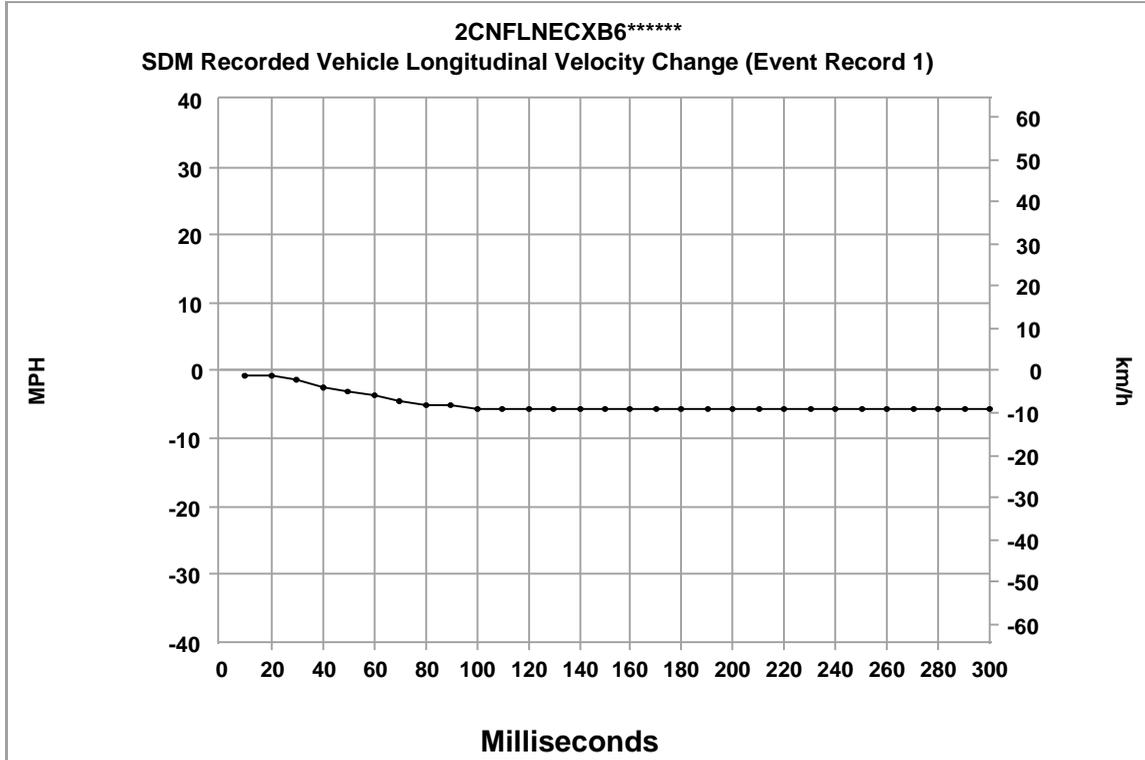
B0052-00

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	Data Not Available	Off
-0.5	No	No	No	Data Not Available	Off

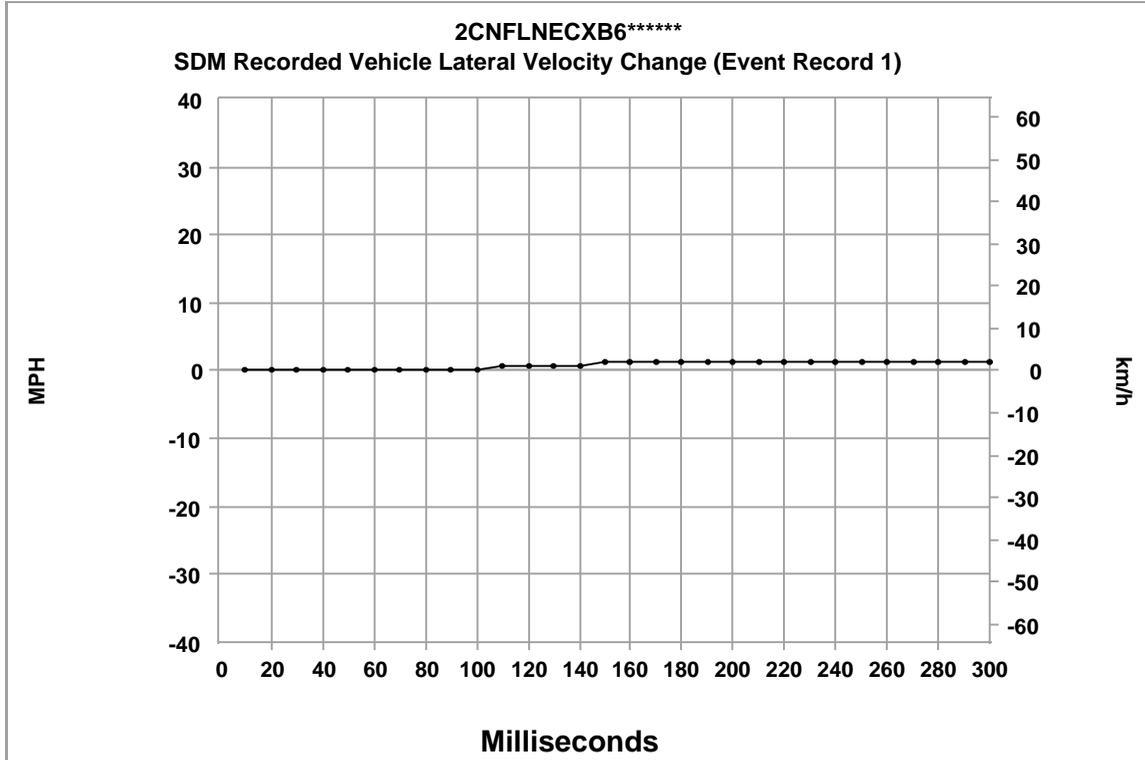
Pre-Crash Data -2.5 to -.5 sec (Event Record 1)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	0	On	1984	14	66 [107]
-2.0	Data Not Available	On	Data Not Available	Data Not Available	Data Not Available
-1.5	Data Not Available	Off	Data Not Available	Data Not Available	Data Not Available
-1.0	Data Not Available	On	Data Not Available	Data Not Available	Data Not Available
-0.5	Data Not Available	On	Data Not Available	Data Not Available	Data Not Available



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
10	-0.6	-1.0
20	-0.6	-1.0
30	-1.2	-2.0
40	-2.5	-4.0
50	-3.1	-5.0
60	-3.7	-6.0
70	-4.3	-7.0
80	-5.0	-8.0
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
140	-5.6	-9.0
150	-5.6	-9.0
160	-5.6	-9.0
170	-5.6	-9.0
180	-5.6	-9.0
190	-5.6	-9.0
200	-5.6	-9.0
210	-5.6	-9.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
220	-5.6	-9.0
230	-5.6	-9.0
240	-5.6	-9.0
250	-5.6	-9.0
260	-5.6	-9.0
270	-5.6	-9.0
280	-5.6	-9.0
290	-5.6	-9.0
300	-5.6	-9.0



Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
10	0.0	0.0
20	0.0	0.0
30	0.0	0.0
40	0.0	0.0
50	0.0	0.0
60	0.0	0.0
70	0.0	0.0
80	0.0	0.0
90	0.0	0.0
100	0.0	0.0
110	0.6	1.0
120	0.6	1.0
130	0.6	1.0
140	0.6	1.0
150	1.2	2.0
160	1.2	2.0
170	1.2	2.0
180	1.2	2.0
190	1.2	2.0
200	1.2	2.0
210	1.2	2.0

Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
220	1.2	2.0
230	1.2	2.0
240	1.2	2.0
250	1.2	2.0
260	1.2	2.0
270	1.2	2.0
280	1.2	2.0
290	1.2	2.0
300	1.2	2.0

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	Non-Deployment
Crash Record Locked	No
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	0
Event Counter	2
OnStar Notification Event Counter	1
Algorithm Active: Rear	No
Algorithm Active: Rollover	No
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	13757
Time Between Events (sec)	655.33
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	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
Driver Belt Switch Circuit Status	Not Buckled
Passenger Belt Switch Circuit Status	Not Buckled
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	Off
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	421
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	170
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-15 [-24]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	0 [0]
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
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DTCs Present at Time of Event (Event Record 2)

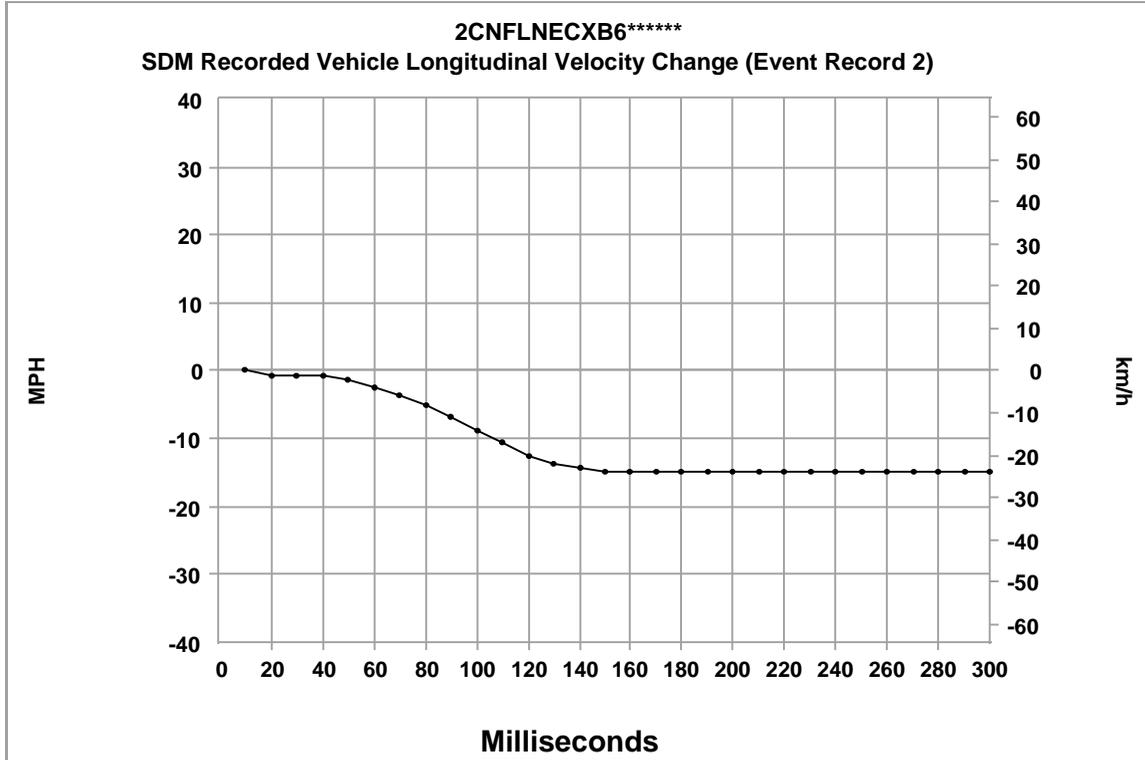
No Diagnostic Trouble Codes

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	-5 [-7]	Off
-0.5	No	No	No	-5 [-7]	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	0	Off	2240	14	70 [112]
-2.0	1	Off	2176	15	70 [112]
-1.5	2	Off	2176	15	69 [111]
-1.0	2	Off	2176	15	68 [110]
-0.5	0	On	1984	14	66 [107]



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
10	0.0	0.0
20	-0.6	-1.0
30	-0.6	-1.0
40	-0.6	-1.0
50	-1.2	-2.0
60	-2.5	-4.0
70	-3.7	-6.0
80	-5.0	-8.0
90	-6.8	-11.0
100	-8.7	-14.0
110	-10.6	-17.0
120	-12.4	-20.0
130	-13.7	-22.0
140	-14.3	-23.0
150	-14.9	-24.0
160	-14.9	-24.0
170	-14.9	-24.0
180	-14.9	-24.0
190	-14.9	-24.0
200	-14.9	-24.0
210	-14.9	-24.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
220	-14.9	-24.0
230	-14.9	-24.0
240	-14.9	-24.0
250	-14.9	-24.0
260	-14.9	-24.0
270	-14.9	-24.0
280	-14.9	-24.0
290	-14.9	-24.0
300	-14.9	-24.0

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	Non-Deployment
Crash Record Locked	No
OnStar Deployment Status Data Sent	Yes
OnStar SDM Recorded Vehicle Velocity Change Data Sent	Yes
Deployment Event Counter	0
Event Counter	3
OnStar Notification Event Counter	2
Algorithm Active: Rear	No
Algorithm Active: Rollover	Yes
Algorithm Active: Side	Yes
Algorithm Active: Frontal	Yes
Ignition Cycles At Event	13757
Time Between Events (sec)	1.49
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	Yes
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	Yes
Passenger Pretensioner Deployment Loop #1 Commanded	Yes
Driver Pretensioner Deployment Loop #2 Commanded	Yes
Passenger Pretensioner Deployment Loop #2 Commanded	Yes
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
Driver Belt Switch Circuit Status	Not Buckled
Passenger Belt Switch Circuit Status	Not Buckled
Passenger Seat Occupancy Status	Empty
Passenger Classification Status	Not Applicable
Passenger Air Bag ON Indicator Status	Off
Passenger Air Bag OFF Indicator Status	On
Low Tire Pressure Warning Lamp	Off
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	421
Ignition Cycles Since DTCs Were Last Cleared at Event Enable	253
Time From Algorithm Enable to Maximum SDM Recorded Vehicle Velocity Change (msec)	200
Longitudinal SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	-14 [-22]
Lateral SDM Recorded Vehicle Velocity Change at time of Maximum SDM Recorded Vehicle Velocity Change MPH [km/h]	0 [0]
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)	21

Passenger Pretensioner Time From Algorithm Enable to Deployment Loop #1 or Loop #2 Command Criteria Met (msec)	21
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DTCs Present at Time of Event (Event Record 3)

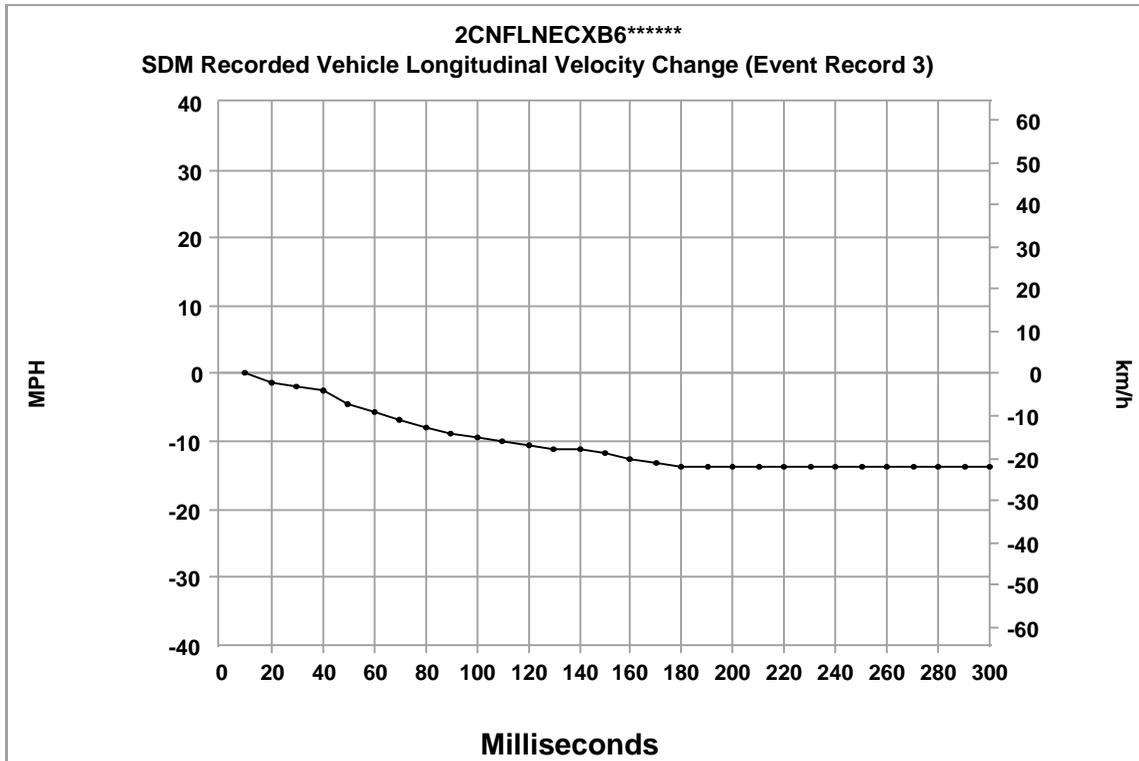
B0052-00

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	Data Not Available	Off
-0.5	No	No	No	Data Not Available	Off

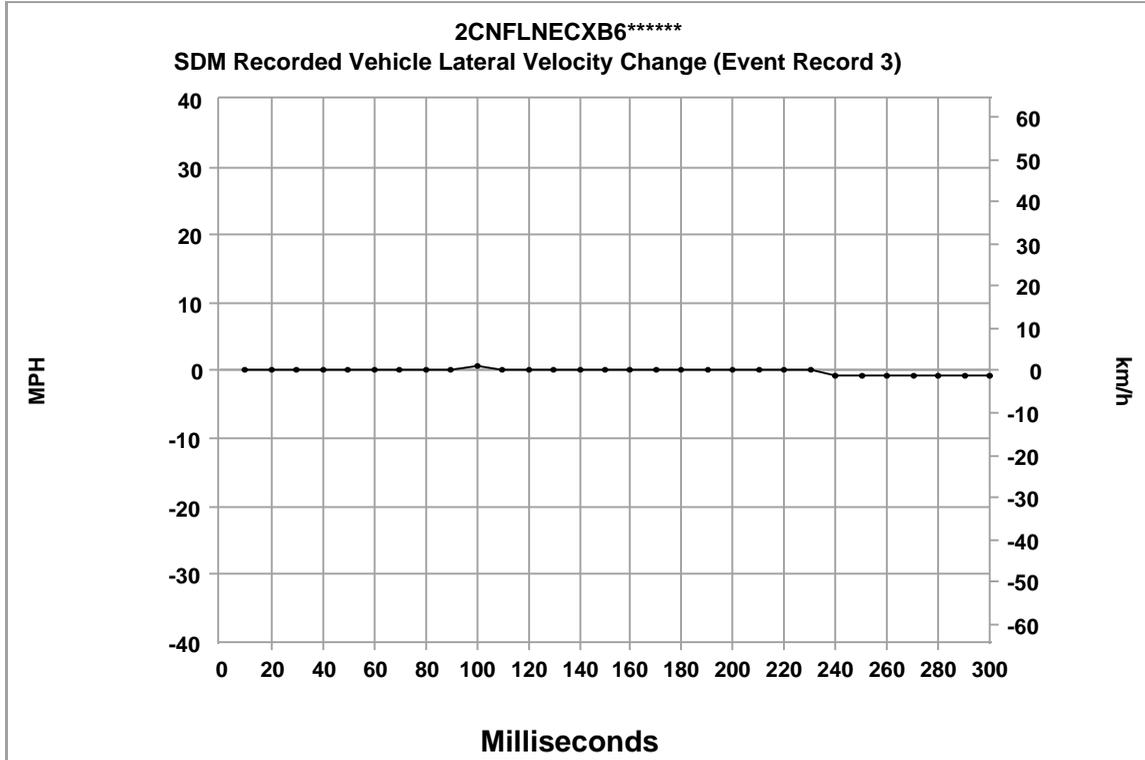
Pre-Crash Data -2.5 to -.5 sec (Event Record 3)

Times (sec)	Accelerator Pedal Position (percent)	Brake Switch Circuit State	Engine Speed	Throttle Position (%)	Vehicle Speed (MPH [km/h])
-2.5	2	Off	2176	15	68 [110]
-2.0	0	On	1984	14	66 [107]
-1.5	Data Not Available	On	Data Not Available	Data Not Available	Data Not Available
-1.0	Data Not Available	Off	Data Not Available	Data Not Available	Data Not Available
-0.5	Data Not Available	On	Data Not Available	Data Not Available	Data Not Available



Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
10	0.0	0.0
20	-1.2	-2.0
30	-1.9	-3.0
40	-2.5	-4.0
50	-4.3	-7.0
60	-5.6	-9.0
70	-6.8	-11.0
80	-8.1	-13.0
90	-8.7	-14.0
100	-9.3	-15.0
110	-9.9	-16.0
120	-10.6	-17.0
130	-11.2	-18.0
140	-11.2	-18.0
150	-11.8	-19.0
160	-12.4	-20.0
170	-13.0	-21.0
180	-13.7	-22.0
190	-13.7	-22.0
200	-13.7	-22.0
210	-13.7	-22.0

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
220	-13.7	-22.0
230	-13.7	-22.0
240	-13.7	-22.0
250	-13.7	-22.0
260	-13.7	-22.0
270	-13.7	-22.0
280	-13.7	-22.0
290	-13.7	-22.0
300	-13.7	-22.0



Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
10	0.0	0.0
20	0.0	0.0
30	0.0	0.0
40	0.0	0.0
50	0.0	0.0
60	0.0	0.0
70	0.0	0.0
80	0.0	0.0
90	0.0	0.0
100	0.6	1.0
110	0.0	0.0
120	0.0	0.0
130	0.0	0.0
140	0.0	0.0
150	0.0	0.0
160	0.0	0.0
170	0.0	0.0
180	0.0	0.0
190	0.0	0.0
200	0.0	0.0
210	0.0	0.0

Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
220	0.0	0.0
230	0.0	0.0
240	-0.6	-1.0
250	-0.6	-1.0
260	-0.6	-1.0
270	-0.6	-1.0
280	-0.6	-1.0
290	-0.6	-1.0
300	-0.6	-1.0

SDM Recorded Vehicle Lateral Acceleration (Event Record 3)

Contains No Recorded Data

SDM Recorded Vehicle Vertical Acceleration (Event Record 3)

Contains No Recorded Data

SDM Recorded Vehicle Roll Rate (Event Record 3)

Contains No Recorded Data

Hexadecimal Data

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

DPID \$15
01 02 03 04 05 06 07

DPID \$16
08 09 0A 0D 0E 00 00

DPID \$17
00 00 00 00 00 00 00

DPID \$32
00 FD 35 C3 00 00 00

DPID \$35
78 00 00 00 00 00 00

DID \$01
41 55 32 35 37 37 45 30 31 32 43 45 43 45 35 34

DID \$03
44 41 32 35 37 37 45 30 30 43 44 41 45 46 36 43

DID \$05
41 48 32 35 37 37 45 30 31 32 44 31 45 36 33 45

DID \$07
41 4A 32 35 37 37 45 30 31 32 44 32 31 31 45 46

DID \$09
41 54 32 35 37 37 45 30 30 43 44 41 43 42 43 32

DID \$0B
44 42 32 35 37 37 45 30 31 32 44 31 46 35 30 45

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
00 00 04 02

DID \$90
32 43 4E 46 4C 4E 45 43 58 42 36 2A 2A 2A 2A 2A 2A

DID \$9A
04 01

DID \$B4
41 53 34 38 39 33 45 30 35 30 30 36 37 30 31 33

DID \$C1
00 CF 22 EB

DID \$C2
01 40 46 7E

DID \$C3
01 89 EC CF

DID \$CB
00 CF 22 ED

DID \$31

```
0000 A5 30 00 00 04 02 07 35 BD 00
0010 47 00 00 00 00 00 00 00 00 00
0020 0C FC FC F0 00 00 C0 10 FF FF
0030 FF FF 00 51 40 00 00 FF FF FF
0040 FF 1F 0F FF 0F FF FF FF FF FF
0050 0E FF FF FF FF 6B 00 FF FD 01
0060 A5 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 0E
0090 76 81 FF FF FF FF FF FF FF FF
0100 7E 7F 7E 7F 7D 7F 7B 7F 7A 7F
0110 79 7F 78 7F 77 7F 77 7F 76 7F
0120 76 80 76 80 76 80 76 80 76 81
0130 76 81 76 81 76 81 76 81 76 81
0140 76 81 76 81 76 81 76 81 76 81
0150 76 81 76 81 76 81 76 81 76 81
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 30 00 00 02 01 03 35 BD FF
0010 FD 00 00 00 00 00 00 00 00 00
0020 0C FC FC F0 00 00 C0 10 00 02
0030 02 01 00 40 00 00 00 1F 22 22
0040 22 23 06 92 06 92 0E 0F 0F 0F
0050 0E 6B 6E 6F 70 70 00 FF FD 01
0060 A5 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 00 00 00 11
```

```
0090 67 7F FF FF FF FF FF FF FF FF
0100 7F 7F 7E 7F 7E 7F 7E 7F 7D 7F
0110 7B 7F 79 7F 77 7F 74 7F 71 7F
0120 6E 7F 6B 7F 69 7F 68 7F 67 7F
0130 67 7F 67 7F 67 7F 67 7F 67 7F
0140 67 7F 67 7F 67 7F 67 7F 67 7F
0150 67 7F 67 7F 67 7F 67 7F 67 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 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 §33

```
0000 A5 30 00 00 03 02 07 35 BD 00
0010 95 00 00 00 02 03 C0 00 00 00
0020 0C FC FC F0 00 00 C0 10 FF FF
0030 FF 00 02 45 00 00 00 FF FF FF
0040 1F 22 0F FF 0F FF FF FF FF 0E
0050 0F FF FF FF 6B 6E 00 FF FD 01
0060 A5 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 14
0090 69 7F FF FF FF FF FF FF 07 07
0100 7F 7F 7D 7F 7C 7F 7B 7F 78 7F
0110 76 7F 74 7F 72 7F 71 7F 70 80
0120 6F 7F 6E 7F 6D 7F 6D 7F 6C 7F
0130 6B 7F 6A 7F 69 7F 69 7F 69 7F
0140 69 7F 69 7F 69 7F 69 7E 69 7E
0150 69 7E 69 7E 69 7E 69 7E 69 7E
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

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August 2022



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

