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Special Crash Investigations: On-Site Driver's Frontal Air Bag Non-Deployment Crash Investigation; Vehicle: 2019 Ford Fusion; Location: Texas; Date: June 2020

DISCLAIMER

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15. Supplementary Notes

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

16. Abstract

This report documents the on-site investigation of the non-deployment of the driver frontal air bag during the roadside departure and frontal crash of a 2019 Ford Fusion into a culvert drainage pipe. The 32-year-old unbelted female driver sustained minor injuries during the crash. The Ford had certified advanced 208-compliant frontal air bags, a driver knee air bag, front seat-mounted side impact air bags, inflatable curtain (IC) air bags, front row seat belt pretensioners, and crash avoidance features. Only the driver knee air bag deployed.

Through the course of the SCI investigation, it was determined that the driver was not belted. The impact of the lower cross member of the forward engine compartment to the drainage pipe resulted in a crash pulse that was relatively soft and elongated. Due to the unbelted status of the driver, the low severity of the crash most likely warranted the deployment of supplemental restraints, thus the knee air bag deployed. The low severity of the crash likely did not require the deployment of the driver frontal air bag. The possibility of crash scenarios with only the knee air bag deployment is described in the supplemental restraint system section of the Ford Fusion owner's manual. The Ford's supplemental restraint system likely operated as intended.

17. Key Words	18. Distribution Statement
driver frontal air bag, non-deployment, knee air bag, event data recorder	This document is available to the public from the National Highway Traffic Safety Administration, National Center for Statistics and Analysis, crashstats.nhtsa.dot.gov.

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Special Crash Investigations
On-Site Driver's Frontal Air Bag Non-Deployment Crash Investigation
Office of Defect Investigation
Case Number: CR20019
Vehicle: 2019 Ford Fusion
Location: Texas
Crash Date: June 2020

Background

This report documents the onsite investigation of the non-deployment of the driver frontal air bag during the roadside departure and frontal crash of a 2019 Ford Fusion (Figure 1) into a culvert drainage pipe. The 32-year-old unbelted female driver sustained minor injuries during the crash. The Ford had certified advanced 208-compliant frontal air bags, a driver knee air bag, front-seat-mounted side impact air bags, inflatable curtain (IC) air bags, front row seat belt retractor pretensioners, and crash avoidance features. Only the driver knee air bag deployed in the crash, which occurred in June 2020 and was investigated by a local police agency. The driver notified the National Highway Traffic Safety Administration of the crash and an investigation was assigned to the Special Crash Investigations team at Crash Research and Analysis, Inc., in July 2020. The team contacted the driver, tow yard, and driver's insurance company to establish cooperation to inspect the vehicle. The vehicle scene inspections and driver interview were completed in July 2020.

Figure 1. The 2019 Ford Fusion

The crash occurred on the roadside of a one-lane service road to an interstate expressway. The Ford was a 4-door sedan and was occupied only by the unbelted driver. The vehicle was traveling northeast and the driver fell asleep. The vehicle traveled into a long ditch parallel to the roadway and the right side contacted an unknown object (Event 1) that caused minor damage. The Ford's front plane then struck a plastic drainage pipe (Event 2) buried beneath a crossing driveway at the end of the ditch. This impact resulted in deployment of the driver knee air bag. The vehicle vaulted over the driveway and back into the ditch where it came to final rest facing northeast. The driver sustained minor facial injuries but did not seek medical treatment until approximately 2 weeks after the crash. She was referred to a medical specialist for her injuries.

The SCI on-site investigation consisted of inspection of the Ford to measure exterior and interior damage, assess the manual and supplemental restraint systems, and identify points of occupant contact. The Ford's event data recorder (EDR) was supported by the Bosch Crash Data Retrieval tool and was imaged by the SCI investigator. The crash site was photographed and mapped by the Nikon total station during the SCI inspection.

Through the course of the SCI investigation, it was determined that the driver was not belted. The impact of the lower cross member of the forward engine compartment to the drainage pipe resulted in a crash pulse that was relatively soft and elongated. Due to the unbelted status of the driver, the low severity of the crash most likely warranted the deployment of supplemental restraint, thus the knee air bag deployed. The low severity of the crash likely did not require the deployment of the driver frontal air bag. The possibility of crash scenarios with only the knee air bag deployment is described in the supplemental restraint system section of the Ford Fusion owner's manual. The Ford's supplemental restraint system likely operated as intended.

Crash Summary

Crash Site

This crash occurred in morning darkness and the environmental conditions stated by local weather reports were no wind and a temperature of 23 °C (74 °F). The bituminous roadway traversed in a northeast-southeast direction and the travel lane was 3.5 m (11.5 ft) wide. The roadway was unlit, dry, and level with roadway markings consisting of a solid yellow lane line on the left and a solid white edge line on the right. A shallow, watery ditch was located 12.5 m (41.0 ft) from the south road edge. The ditch was oriented parallel to the roadway and extended east and west of the crash location. Periodic gravel or grassy driveways crossed over the ditch. A crash diagram is included at the end of this report.

Pre-Crash

The police crash report stated the Ford was traveling northeast on the service road (Figure 2) and the driver was intending to proceed straight ahead. The driver stated during the SCI interview that the vehicle was traveling 56 km/h (35 mph) and that she fell asleep prior to the incident. The Ford's EDR reported the vehicle was traveling at a speed of 136 km/h (84.6 mph) 5 seconds prior to algorithm enable (AE). The Ford departed the roadway and entered the ditch and continued northeast, traveling parallel to the roadway (Figure 3).

Figure 2. Northeast view of the Ford's travel path prior to roadway departure

Figure 3. Northeast view, travel path in watery ditch

Crash

The Ford traveled in the ditch for approximately 88 m (289 ft) and during this time, the right plane sideswiped an unknown object (Event 1), causing minor damage to both right doors. The imaged EDR data indicated that the brakes were never applied. The speed of the vehicle gradually reduced through rolling resistance in the ditch to 61 km/h (38 mph) at the time of AE.

The lower cross-member of the front plane struck and fractured the end of a 61 cm (24.0 in) diameter, corrugated plastic pipe (Event 2) buried in the sand under a crossing driveway at the end of the ditch (Figure 4). As a result, the driver knee air bag deployed. No other air bags deployed. The vehicle vaulted over the 10 m (32.8 ft) wide sandy driveway. The vault distance was approximately 20 m (66 ft) and the Ford continued northeastward on the other side of the driveway for approximately 20 m (66 ft) before coming to final rest in the ditch facing northeast.

Figure 4. Northeast view, plastic culvert pipe contacted by the front lower plane of the Ford

Post-Crash

During the interview with SCI investigator, the driver stated she exited the Ford via the right front door. A passerby stopped to help her and drove her to her nearby residence. She did not seek medical attention until approximately 2 weeks later and was examined at an outpatient clinic. Because of the injury to her nose, she was referred to an ear, nose, and throat specialist where she received treatment. She was not hospitalized. The Ford was recovered by a local tow agency and transferred to a regional insurance salvage facility.

2019 Ford Fusion

Description

The Ford was a front-wheel-drive, 5-passenger, 4-door sedan manufactured in August 2018 and identified by the Vehicle Identification Number 3FA6P0LU5KRxxxxxx. The vehicle had a 2.0-liter, 4-cylinder hybrid engine, a continuously variable transmission, 4-wheel antilock brakes (ABS), stability control, emergency brake assist, and traction control. The wheelbase was 285 cm (112.2 in) and the curb weight was 1,660 kg (3,660 lb). The Ford also had crash avoidance features including lane departure warning, lane keeping support, forward collision warning, crash imminent braking, dynamic brake support, adaptive cruise control, pedestrian automatic emergency braking, blind spot detection, and advanced lighting. The vehicle's information placard stated the vehicle's gross vehicle weight rating as 2,136 kg (4,710 lb) with gross axle weight ratings of 1,118 kg (2,465) front and 1,039 kg (2,290 lb) rear.

The vehicle manufacturer's recommended tire size was P225/50R17. The vehicle had a Nexen N5000 Plus tire, size P235/50R17 on the right rear wheel and Michelin Energy Saver A/S tires, size P225/50R17 on the other wheels. All tires were in good condition, with more than 5 mm (6/32 in) of tread depth.

The front row had cloth-covered bucket seats with adjustable head restraints. The driver's seat track was adjusted between the middle and forward-most positions and the bottom of the driver's head restraint was flush with the top of the seatback.

Exterior Damage

The Ford sustained minor-severity direct damage to the right doors from an unknown object while it was traveling through the watery ditch. The direct damage (Figure 5) began 193 cm (76.0 in) forward of the right rear axle and extended rearward 93 cm (36.6 in). Lateral deformation was 1 cm (0.4 in) or less. The sideswiping damage properties were out-of-scope for an analysis with the WinSMASH program. The collision deformation classification (CDC) assigned to this damage pattern was 12RPMS1.

The lower cross-member beneath the front bumper of the Ford (Figure 6) was damaged during the Event 2 impact with the plastic drainage pipe and driveway. The front bumper fascia, radiator, and lower support beam were directly damaged. The direct damage began 1 cm (0.4 in) right of the center point and extended 60 cm (23.6 in) to the right. The residual crush profile measured as follows: C1 = 13 cm (5.1 in), C2 = 2 cm (0.8 in), C3 = 0, C4 = 3 cm (1.2 in), C5 = 11 cm (4.3 in), C6 = 14 cm (5.5 in). The WinSMASH program could not be used to determine velocity change because impacts to yielding objects are out of scope for the program. The barrier equivalent speed was 18 km/h (11.2 mph). The CDC for this damage pattern was 12FZLW1 (0 degrees).

Figure 5. Sideswipe damage to the Ford's right doors

Figure 6. Front end damage to the Ford. Note bottom stabilizer bar.

Event Data Recorder

The Ford's EDR was imaged with version 19.4.2 of the Bosch EDR Retrieval software and reported with version 23.0.2 in the Appendix. The data in the restraints control module were imaged via direct connection to the Ford's diagnostic link connector and power was provided by the case vehicle. This EDR was capable of recording both deployment and non-deployment events and had the capacity to store two events. Non-deployment events can be overwritten by subsequent events. Deployment events cannot be overwritten. A locked front event was recorded. The driver's seat belt was reported as "Unbuckled," the air bag warning lamp status was "Off," and her seat track setting was "Rearward."

The image data indicated one event record was completely recorded. No fault codes were stored at the start of the first event. The maximum longitudinal delta V was -39 km/h (-24.23 mph) and occurred 245 msec after AE. The driver knee air bag time to fire was 57 msec after AE. The driver was not belted.

Pre-Crash Data: The EDR recorded 5 seconds of pre-crash data. The Ford's EDR reported speed, percent accelerator pedal, service brake status, ABS activity, engine rpm, steering wheel angle,

and additional parameters. A portion of the recorded variables are presented in the table down below.

Parameter	-5 sec	-4 sec	-3 sec	-2 sec	-1 sec	0 Sec
Vehicle Speed km/h (mph)	136 (84.6)	118 (73.6)	107 (66.2)	88 (54.5)	68 (42.4)	61 (38.0)
Accelerator Pedal Position (percent)	100	0	0	0	0	16
Service Brake Status	Off	Off	Off	Off	Off	Off
Antilock Brake System Activity	Non-Engaged	Non-Engaged	Non-Engaged	Engaged	Engaged	Engaged
Steering Wheel Angle (degrees)	-109.7	35.5	57.0	84.7	56.5	59.5

Analysis of the pre-crash data indicated that the "large driver steering or accelerator pedal input" variable was reported as "Yes" during the duration of the recorded pre-crash period. The data limitations stated that a "Yes" value indicates that the driver is intending to override the collision mitigation by braking (CMbB[1]) feature. According to the pre-crash data (Appendix, p. 11) the left steering input range was 4.9° to 105.3° in the 4.2 seconds prior to AE. It is probable that the driver was steering left, overriding the CMbB, in an attempt to steer the vehicle out of the ditch but was unsuccessful.

Interior Damage

The interior of the Ford did not sustain any crash force damage or intrusion during the crash sequence. No side glazing was contacted or damaged and all doors remained closed and operational. The steering wheel assembly was in the full-up tilt and full forward telescoping positions. It was contacted by the driver and the top half of the rim was displaced forward (Figure 7) approximately 1 cm (0.4 in). The driver also contacted and cracked the windshield above the steering wheel, near the header (Figure 8), and scuffs were noted on the left knee bolster (Figure 9).

[1] "CMbB is designed to help drivers avoid collisions or reduce the severity of a crash. Based on speed and relative distance of objects ahead, CMbB assesses the potential for a collision and provides visual and audible alerts. Drivers can adjust the distance and warning settings, but if the CMbB system identifies an imminent threat that is not responded to, it will automatically precharge or even apply brake force to aid the driver."

Lauron, G. (2007, October 1). *Ford keeps drivers alert and away from danger* [Web page]. Automotive Fleet Magazine. www.automotive-fleet.com/Channel/Safety-Accident-Management/Article/Story/2007/10/Ford-Keeps-Drivers-Alert-and-Away-from-Danger.aspx?interstitial=1

Figure 7. Steering wheel rim of the Ford bent slightly forward

Figure 8. The Ford's upper windshield cracked from occupant contact

Figure 9. Left knee bolster contact

Manual Restraint Systems

The Ford had manual 3-point lap and shoulder seat belts for the five seat positions. The driver belt system consisted of continuous loop webbing that retracted onto an emergency locking retractor (ELR) with a sliding latch plate with the plastic D-ring adjusted to the full down position. There was no evidence of usage on the belt webbing, latch plate belt guide, or D-ring and the belt webbing could be smoothly extended and retracted. Furthermore, the EDR reported that the driver safety belt status was "Unbelted."

Supplemental Restraint Systems

The Ford had advanced/dual-stage frontal air bags, front-seat-mounted side impact air bags, a driver knee air bag, and IC air bags. Only the driver knee air bag deployed in this crash.

The knee air bag (Figure 10) was located at the bottom of the knee bolster, behind the vinyl panel. The deflated air bag measured 65 cm (25.6 in) wide and 35 cm (13.8 in) tall. There was no discernable contact or damage to the air bag. The module cover was a two-flap configuration made of semi-rigid vinyl, with a horizontal tear seam across the center. The flaps were 35 cm (13.8 in) wide and 3 cm (1.2 in) in height. The cover flaps opened at the designated tear seam and were undamaged.

Figure 10. Deployed knee air bag

Figure 11. Packed knee air bag with upper flap opened

Driver Frontal Air Bag Non-Deployment Discussion

The Ford's impact to the plastic drainage pipe at the end of the ditch involved the lower engine compartment and undercarriage components. As a result, the longitudinal crash pulse was elongated, with maximum delta V occurring at 245 msec after AE. It is probable that this "soft' impact was assessed by the restraints control module to not require deployment of the driver frontal air bag.

Of note, the Ford Fusion owner's manual described that under certain crash and occupant conditions, the driver and passenger knee air bags may deploy (individually or both) but the corresponding frontal air bag may not activate.

2019 Ford Fusion Occupant

Driver Demographics

Age/sex:	32 years/female
Height:	165 cm (65 in)
Weight:	79 kg (175 lb)
Eyewear:	None
Seat type:	Bucket seat with adjustable head restraint
Seat track position:	Between full forward and middle position (per interview and consistent with driver height); Full rear position at time of SCI inspection
Manual restraint usage:	None
Usage source:	Vehicle inspection, EDR
Air bags:	Knee air bag, deployed; frontal, seat-mounted, and IC air bags not deployed
Alcohol/drug involvement:	Unknown
Egress from vehicle:	Exited under own power through right front door
Transport from scene:	Private vehicle
Treatment	Examined 2 weeks post-crash

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Nose fracture, NFS	251000.1	Isolated Front – Windshield	Certain
2	Lip laceration, NFS	210600.1	Isolated Front – Windshield	Certain
3	Contusion to right breast	410402.1	Isolated Front – Steering wheel rim	Probable
4	Right outer forearm contusion	710402.1	Unknown	Unknown
5	Left outer forearm contusion	710402.1	Unknown	Unknown
6	Right shin contusion	810402.1	Isolated Front – Left lower instrument panel (includes knee bolster)	Certain
7	Left shin contusion	810402.1	Isolated Front – Left lower instrument panel (includes knee bolster)	Certain

Source: Driver interview, nose fracture diagnosed later by doctor.

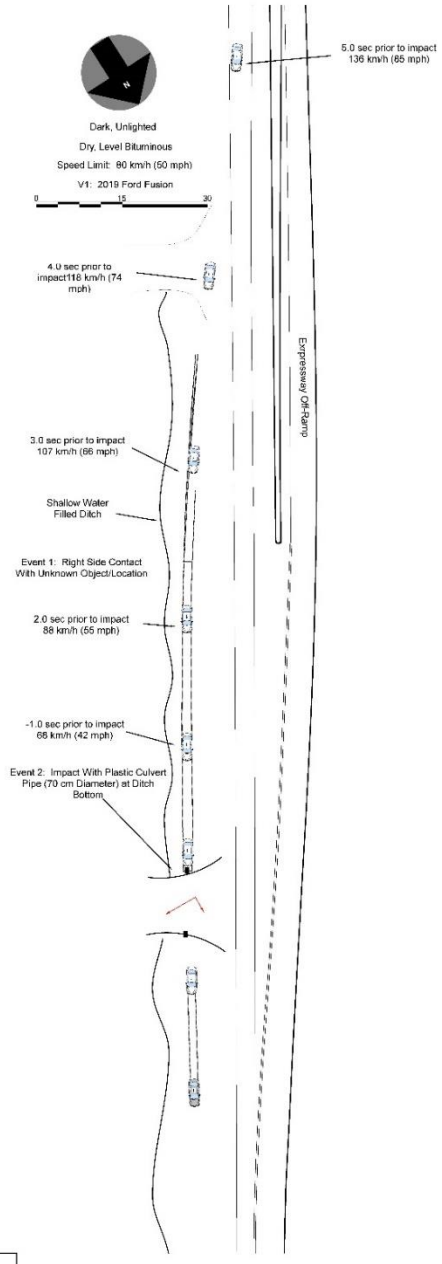
Driver Kinematics

The driver of the Ford was unbelted and seated in an unknown posture. The driver reported during the SCI interview that her seat was adjusted between the full forward and middle track position. It was observed during the SCI vehicle inspection that the seat track was adjusted to the full rear position. It was probable that the seat had been altered during the vehicle's post-crash movement. The seatback was adjusted in a slight recline angle and the bottom of the adjustable head restraint was flush with the top of the seatback.

The vehicle traveled off the roadway at a high rate of speed into a shallow, water-filled ditch. The driver stated during the SCI interview that she had fallen asleep. The EDR did not record a brake application, but the vehicle's speed decelerated from 136 km/h (84.6 mph) at 5 seconds prior to AE to 61 km/h (38.0 mph) at AE. The frontal/undercarriage impact resulted in deployment of the driver knee air bag. The driver sustained bruising on both shins from knee to ankle from loading through the air bag and contacting the knee bolster. She continued forward and sustained an approximate 10 cm (4 in) contusion located from the base of her neck to the top of her right breast due to contact with the steering wheel rim. The driver's face contacted the windshield evidenced by injuries to her nose and mouth. The windshield was fractured approximately 10 cm (4 in) below the header.

The driver stated that she exited the vehicle under her own power through the right front door. A passerby stopped and gave her a ride to her residence. She did not seek medical attention until 2 weeks after the crash and went to an outpatient clinic. There, she was referred to an ear, nose, and throat specialist for her facial injuries.

Crash Diagram



	NHTSA www.nhtsa.gov
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Appendix A: 2019 Ford Fusion Event Data Recorder Report[2]

[2] 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	3FA6P0LU5KR******
User	
Case Number	
EDR Data Imaging Date	07/21/2020
Crash Date	
Filename	CR21019_V1_ACM.CDRX
Saved on	Tuesday, July 21 2020 at 12:50:53
Imaged with CDR version	Crash Data Retrieval Tool 19.4.2
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 23.0.2
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
ACM Adapter Detected During Download	No
Event(s) recovered	Frontal Acceleration Threshold Exceeded Shutdown Request Threshold Exceeded Level 2

Comments

No comments entered.

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a court order or search warrant, as indicated by the CDR tool user on Tuesday, July 21 2020 at 12:50:53.

Data Limitations

Data Imaging:

CAUTION: When imaging data directly from the RCM on a bench top, make sure the RCM is placed on a flat surface without any movement (static) while connected to and powered by the CDR interface. Not following the above guideline for bench top imaging could risk inducing new events to be recorded in the RCM and possibly overwriting a Non airbag deployment.

Note that the RCM Adapter Detected during Download parameter equal to " Yes" indicates that the EDR data was collected directly from the RCM. When equal to "No", it indicates that the EDR data was collected through the OBD II from the vehicle.

Restraints Control Module (RCM) Recorded Crash Event(s):

The RCM can store up to two crash events. Event types are categorized as follow:

1. Non deployment trigger event is an event in which EDR recording trigger threshold is met or exceeded (minimum of 5 mph (8kph) Accumulated Delta Velocity within 150ms interval), but no device(s) have deployed. The data from such event can be overwritten by subsequent events.

2. Airbag deployment event is an event in which frontal, side or curtain airbags have deployed. Note that such event cannot be overwritten or cleared from the Restraints Control Module (RCM). Once the RCM has deployed any airbag device(s), the RCM must be replaced.

3. Some RCM may also categorize Non airbag deployment event. This type is an event in which non airbag devices such as pretentioners, knee bolster etc… have deployed. Note that such event can be overwritten given a subsequent "deployment" event.

"Time zero" or Event Beginning of any event (First Record or Second Record) is defined as the first Algorithm wake up during that event. So all the Pre-Crash, At Event, Delta V Data, deployment times etc… are relative to "Time zero".

It is possible that conditions in a crash may result in an incomplete event data record.

EDR Data Elements Overview/Interpretation in CDR Report:

Under CDR File Information Section

- Event(s) recovered indicates if an event was detected and recorded by RCM. If no event is detected, it will indicate "none". If a trigger or non airbag deployment event is detected, it will indicate "unlocked event". If an airbag deployment is detected, it will indicate "locked frontal event", or "locked side event", or "locked rollover event".

Under System Status at Event Section

- Complete file recorded indicates if data from the recorded event has been fully written to the RCM memory.

- If the RCM detected a peripheral crash sensor was lost during an event, the crash sensor would be identified as well as the time it was lost during that event relative to Time zero. If no loss of a peripheral crash sensor, nothing would be displayed. Note in some vehicles, loss of a peripheral crash sensor may lead to the loss of another peripheral crash sensor due to shared communication

Under Deployment Data Section

- If the RCM commanded a deployment during an event, the deployment device(s) would be identified as well as the time the RCM commanded its deployment relative to Time zero. If no device was commanded to deploy by the RCM, nothing (no deployment device(s)) would be displayed.

Under Pre-Crash Data -5 to 0 sec

- Pre-Crash Data is recorded asynchronously and has a time resolution of 500ms. Therefore, the indicated time in this CDR report means that real time (in reference to T0) when the data point has been recorded is between indicated time and 500ms before.

- The “oldest” data set of Pre-Crash data, which is out of the 5sec window, has a low probability to be inexplicit, a plausibility check is recommended

- Steering Wheel Angle if Applicable: positive value indicates left turn, and negative value would indicate right turn.

- Stability Control Lateral Acceleration if Applicable: Lateral Acceleration (Y-direction) is the acceleration along the lateral axis of the vehicle, reported as positive when accelerating to the left.

- Stability Control Longitudinal Acceleration if Applicable: Longitudinal Acceleration (X-direction) is the acceleration along the longitudinal axis of the vehicle, reported as positive when accelerating in a forward direction.

- Stability Control Yaw Rate if Applicable: The Yaw Axis is the vertical axis of the vehicle, generally perpendicular to the plane of the road. A positive Yaw Rate is counter-clockwise when observing the vehicle from above.

- Stability Control Roll Rate if Applicable: The Roll Axis is the longitudinal axis of the vehicle, generally aligned with the primary axis of motion of the vehicle. A positive Roll Rate is counter-clockwise when observing the vehicle from the front.

- Quality Factors: Describe the status of signals that RCM receives by the vehicle network.

- Wheel Torque Requested: The calculated torque currently being delivered to all the axles at wheel level. It includes gear ratio, final drive ratio, and friction effects, but inertia effects are ignored.

- Total Arbitrated Brake Torque: Total torque applied by foundation brakes (not parking brake).

- ABS Activity: Indicates when ABS is active (engaged) or non-active (non-engaged).

- Extended Power Status: Indicates the status of the Extended Power Module.

- Large Driver Steering or Accelerator Pedal Input: Indicates that driver is intending to override Collision Mitigation by Braking (CMbB) feature.

Under Pre-Crash -1 Second Section

- Global Real Time: Time line generally begins with first key cycle at production facility on fully assembled vehicle after initialization.

Post-Crash Data

- Impact Event Feedback Status: Reflects the vehicle response to the RCM event notification.

Under Longitudinal Crash Pulse

- Delta-V, longitudinal: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with

other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

- Second Delta-V, longitudinal: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from the first deployment. It is not the speed the vehicle was traveling. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V. The data sample points for the Second Delta-V, longitudinal may not match the data sample points for Delta-V, longitudinal, due to different sample timing.

Under Longitudinal (High G) Acceleration

- **Longitudinal (High G) Acceleration:** SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

Under Lateral Crash Pulse

- Delta-V, lateral: SAE J211 sign convention, Positive value generally indicates a driver side crash and negative value generally indicates a passenger side crash. For Right Hand Drive (RHD) vehicles, the driver is on the right side of the vehicle. For RHD vehicles, positive value generally indicates a passenger side crash and negative value generally indicates a driver side crash.

- Second Delta-V, lateral: SAE J211 sign convention, Positive value generally indicates a driver side crash and negative value generally indicates a passenger side crash. The data sample points for the Second Delta-V, lateral may not match the data sample points for Delta-V, lateral, due to different sample timing.

Under Lateral (High G) Acceleration

- Lateral (High G) Acceleration: SAE J211 sign convention, negative value generally indicates a front crash and positive value generally indicates a rear crash. Longitudinal delta-V reflects the change in forward velocity that the sensing system experienced from Time zero. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle longitudinal delta-V.

Under Rollover Sensor Data (if Applicable)

- Vehicle roll angle if applicable: The Roll Axis is the longitudinal axis of the vehicle, generally aligned with the primary axis of motion of the vehicle. A positive Roll Angle is counter-clockwise when observing the vehicle from the front.

Data Sources:

The Restraints Control Module (RCM) contains all recorded data on any event. Data collected from the RCM comes from multiple sources:

1. Internal to the RCM such as internal sensors for delta Velocity data, rollover angle data if applicable, etc… which are measured, calculated and stored internally.

2. External to the RCM but with a direct connection such as buckle switches, peripheral crash sensors, seat track switch(s) etc… which are measured, calculated and stored internally.

3. External Modules to the RCM such as Powertrain Control Module, Brake Control Module, etc… These modules communicate to the RCM via Vehicle Communication Network. The RCM stores the received data internally.

02017_RCM-AB12_r004

System Status at Time of Retrieval

VIN As Programmed into RCM at Factory	3FA6P0LU5KR******
Current VIN (From PCM)	3FA6P0LU5KR******
Ignition Cycle, Download (First Record)	2,772
Ignition Cycle, Download (Second Record)	N/A
Restraints Control Module Part Number	HS7T-14B321-AH
Restraints Control Module Serial Number	6F20489167BF
Restraints Control Module Software Part Number (Version)	JS7T-14C028-AA
Restraints Control Module Calibration Part Number (Version)	HS7T-14C098-FD
Driver Side/Center Frontal Restraints Sensor Serial Number	C32B0ECA2F26
Driver, Row 1, Side Restraint Sensor 1 Serial Number	C32845252C0F
Driver, Row 2, Side Restraint Sensor 2 Serial Number	9F2AC15D223D
Passenger Frontal Restraints Sensor Serial Number	C72B0ECA5106
Passenger, Row 1, Side Restraint Sensor 1 Serial Number	C32845250B44
Passenger, Row 2, Side Restraint Sensor 2 Serial Number	C529521B120A
Steering Wheel Location	Left Hand Drive
Occupant Classification Sensor (OCS) Serial Number	2XD6286025918078

System Status at Event (First Record)

Complete File Recorded (Yes,No)	Yes
Multi-Event, Number of Events	1
Time From Event 1 to 2 (msec)	N/A
Lifetime Operating Timer at Event Time Zero (sec)	3,286,243
Key-On Timer at Event Time Zero (sec)	2,157
Vehicle Voltage at Time Zero (V)	14.2
Energy Reserve Mode Entered During Event (Yes, No)	No
Time RCM longitudinal acceleration reached maximum sensor range (i.e. 100g) (msec)	maximum not reached
Time RCM lateral acceleration reached maximum sensor range (i.e. 100g) (msec)	maximum not reached
Time from Time zero to Frontal Algorithm Wake Up (msec)	Wake up threshold reached at Time Zero
Time from Time zero to Side Algorithm Wake Up (msec)	34
Time from Time zero to Rear Algorithm Wake Up (msec)	Wake up threshold not reached
Time from Time zero to Frontal Algorithm Reset (msec)	167
Time from Time zero to Side Algorithm Reset (msec)	204
Time from Time zero to Rear Algorithm Reset (msec)	Reset threshold not reached
Time from Time zero to Rollover Algorithm Reset (msec)	Reset threshold not reached
RCM number	1E25079B9F2A
RCM internal flag	0000000F
Fuel Cutoff Algorithm Decision Time (msec)	101

Faults Present at Start of Event (First Record)

No Faults Recorded

Deployment Data (First Record)

Inflatable Knee Bolster Deployment, Time to Fire, Front Driver (msec)	57.0
Maximum Delta-V, Longitudinal (MPH [km/h])	-24.23 [-39.00]
Time, Maximum Delta-V (msec)	245.0
RCM, side Driver (lateral), Safing Deployment	Yes
RCM, side Passenger (lateral), Safing Deployment	Yes
Driver or center, front satellite sensor, Safing Deployment	Yes
Passenger, front satellite sensor, Safing Deployment	Yes
RCM front(longitudinal), Discriminating Deployment	Yes
RCM front(longitudinal), Safing Deployment	Yes
RCM, rollover, Safing Deployment	Yes

Pre-Crash Data -1 sec (First Record)

Ignition cycle, Crash	2,762
Frontal Air Bag Warning Lamp, On/Off	Off
Safety Belt Status, Driver	Unbelted
Seat Track Position Switch, Foremost, Status, Driver	Rearward
Seat Track Position Switch, Foremost, Status, Front Passenger	Rearward
Safety Belt Status, Front Passenger	Unbelted
Brake Telltale	Off
ABS Telltale	Off
ESC/TC Telltale	Fast flash
ESC/TC Off Telltale	Default Mode
Powertrain Wrench Telltale	Off
Powertrain Malfunction Indicator Lamp (MIL) Telltale	Unchanged Off
Global Real Time (seconds)	57,425,920.8

Pre-Crash Data -5 to 0 sec [2 samples/sec] (First Record)

Time (sec)	Driver Gear Selection (Auto Trans)	Wheel Torque Requested (Nm)	Total Arbitrated Brake Torque (Nm)	Ignition Status	Speed Control Status
- 5.0	Drive	-224	628	Run	Standby
- 4.5	Drive	536	1,960	Run	Standby
- 4.0	Drive	-132	852	Run	Standby
- 3.5	Drive	132	436	Run	Standby
- 3.0	Drive	-352	532	Run	Standby
- 2.5	Drive	88	996	Run	Standby
- 2.0	Drive	212	684	Run	Standby
- 1.5	Drive	368	680	Run	Standby
- 1.0	Drive	156	216	Run	Standby
- 0.5	Drive	-136	60	Run	Standby
0.0	Drive	108	860	Run	Standby

Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record) - Table 1 of 2

Time (sec)	ABS Activity (Engaged, Non-Engaged)	Brake Powertrain Torque Request 1	Brake Powertrain Torque Request 2	Traction Control via Brakes	Stability Control Lateral Acceleration (g)	Stability Control Longitudinal Acceleration (g)
- 5.0	Non-engaged	Yes	Inactive	No	-0.05	0.04
- 4.9	Non-engaged	Yes	Inactive	No	-0.62	-0.57
- 4.8	Non-engaged	Yes	Active	No	-0.53	-0.28
- 4.7	Non-engaged	Yes	Active	No	-0.35	0.01
- 4.6	Non-engaged	Yes	Inactive	No	-0.24	0.20
- 4.5	Non-engaged	Yes	Inactive	No	-0.87	-0.51
- 4.4	Non-engaged	Yes	Inactive	No	-1.12	-0.20
- 4.3	Engaged	Yes	Inactive	No	-1.15	-0.17
- 4.2	Engaged	Yes	Inactive	No	-0.67	-0.15
- 4.1	Engaged	Yes	Inactive	No	-0.73	-0.34
- 4.0	Non-engaged	Yes	Inactive	No	-0.35	-0.09
- 3.9	Non-engaged	Yes	Inactive	No	-0.45	-0.26
- 3.8	Non-engaged	Yes	Inactive	No	0.39	-0.19
- 3.7	Non-engaged	Yes	Inactive	No	0.47	-0.36
- 3.6	Non-engaged	Yes	Inactive	No	-0.29	-0.32
- 3.5	Non-engaged	Yes	Inactive	No	0.12	-0.02
- 3.4	Non-engaged	Yes	Inactive	No	0.07	-0.24
- 3.3	Non-engaged	Yes	Inactive	No	0.20	-0.07
- 3.2	Non-engaged	Yes	Inactive	No	0.29	0.05
- 3.1	Non-engaged	Yes	Inactive	No	0.79	-1.70
- 3.0	Non-engaged	Yes	Inactive	No	-0.44	0.04
- 2.9	Non-engaged	Yes	Inactive	No	0.77	-0.67
- 2.8	Non-engaged	Yes	Active	No	0.18	-0.30
- 2.7	Engaged	Yes	Inactive	No	-0.09	-0.08
- 2.6	Engaged	Yes	Inactive	No	1.03	-0.06
- 2.5	Engaged	Yes	Inactive	No	-0.01	-1.29
- 2.4	Engaged	Yes	Inactive	No	-0.25	-1.00
- 2.3	Engaged	Yes	Inactive	No	0.11	-0.08
- 2.2	Engaged	Yes	Inactive	No	0.68	0.09
- 2.1	Engaged	Yes	Inactive	No	0.45	-0.25
- 2.0	Engaged	Yes	Inactive	No	0.14	-0.49
- 1.9	Engaged	Yes	Inactive	No	0.09	-0.42
- 1.8	Engaged	Yes	Inactive	No	0.08	0.05
- 1.7	Engaged	Yes	Inactive	No	-0.27	-0.77
- 1.6	Engaged	Yes	Inactive	No	0.80	-0.83
- 1.5	Engaged	Yes	Inactive	No	-0.84	0.08
- 1.4	Engaged	Yes	Inactive	No	0.03	-0.13
- 1.3	Engaged	Yes	Inactive	No	0.21	-0.62
- 1.2	Engaged	Yes	Inactive	No	0.27	-0.53
- 1.1	Engaged	Yes	Inactive	No	0.33	-0.68
- 1.0	Engaged	Yes	Inactive	No	-0.21	-0.18
- 0.9	Engaged	Yes	Inactive	No	0.51	-0.27
- 0.8	Engaged	Yes	Inactive	No	-0.21	-0.40
- 0.7	Engaged	Yes	Inactive	No	0.14	-0.29
- 0.6	Engaged	Yes	Inactive	No	0.32	-0.08
- 0.5	Engaged	Yes	Inactive	No	0.11	-0.34
- 0.4	Engaged	Yes	Inactive	No	0.06	-0.76
- 0.3	Engaged	Yes	Inactive	No	-0.07	-0.33
- 0.2	Engaged	Yes	Inactive	No	-0.01	-0.55
- 0.1	Engaged	Yes	Inactive	No	-0.06	-0.62
0.0	Engaged	Yes	Inactive	No	0.57	-0.64

Pre-Crash Data -5 to 0 sec [10 samples/sec] (First Record) - Table 2 of 2

Time (sec)	Stability Control Yaw Rate (deg/sec)	Stability Control Roll Rate (deg/sec)	Steering Wheel Angle (deg)	Steering Wheel Angle Quality Factor
- 5.0	-38.28	-63.77	-109.7	OK
- 4.9	-36.07	2.30	-91.1	OK
- 4.8	-28.66	26.82	-49.5	OK
- 4.7	-23.79	38.64	-30.8	OK
- 4.6	-26.93	-24.63	-34.8	OK
- 4.5	-22.72	-15.48	-51.9	OK
- 4.4	-13.21	25.29	-5.8	OK
- 4.3	-2.10	27.51	-7.2	OK
- 4.2	-0.82	4.15	4.9	OK
- 4.1	2.35	-41.32	16.5	OK
- 4.0	12.19	-12.50	35.5	OK
- 3.9	18.10	20.17	52.9	OK
- 3.8	14.99	1.45	45.2	OK
- 3.7	17.31	-7.50	48.5	OK
- 3.6	19.30	-2.11	62.8	OK
- 3.5	16.94	-14.42	71.3	OK
- 3.4	16.18	-12.17	73.9	OK
- 3.3	17.70	11.91	75.4	OK
- 3.2	20.30	42.81	63.8	OK
- 3.1	32.76	62.17	50.1	OK
- 3.0	28.80	-36.41	57.0	OK
- 2.9	13.60	16.60	95.1	OK
- 2.8	-2.51	34.43	105.3	OK
- 2.7	-7.09	5.94	82.1	OK
- 2.6	-4.38	-18.96	63.0	OK
- 2.5	14.06	78.87	62.3	OK
- 2.4	1.00	-22.00	89.4	OK
- 2.3	0.39	-56.93	87.9	OK
- 2.2	-1.14	-45.62	76.6	OK
- 2.1	2.04	-21.01	81.1	OK
- 2.0	3.59	9.58	84.7	OK
- 1.9	1.30	24.12	88.8	OK
- 1.8	-7.89	-45.66	83.4	OK
- 1.7	-10.23	-62.33	77.0	OK
- 1.6	-9.00	-17.47	70.0	OK
- 1.5	-5.46	14.32	72.9	OK
- 1.4	-5.06	0.87	76.1	OK
- 1.3	-3.26	-6.77	72.5	OK
- 1.2	-3.08	-2.62	58.3	OK
- 1.1	-2.06	7.28	51.9	OK
- 1.0	-0.81	3.51	56.5	OK
- 0.9	1.34	3.72	63.7	OK
- 0.8	2.58	11.05	67.9	OK
- 0.7	4.78	43.64	72.5	OK
- 0.6	3.33	56.85	71.8	OK
- 0.5	-2.21	45.71	54.1	OK
- 0.4	-5.12	18.49	36.0	OK
- 0.3	-4.50	5.55	30.9	OK
- 0.2	-4.27	8.71	37.5	OK
- 0.1	-0.88	-11.55	54.8	OK
0.0	0.39	-44.69	59.5	OK

Pre-Crash Data -5 to 0 sec [5 samples/sec] (First Record) - Table 1 of 2

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, on/off Quality Factor	Engine RPM	Cruise Control Driver Accelerator Pedal Override
- 5.0	84.6 [136]	OK	100	OK	Off	OK	3,742	Cruise_Overridden
- 4.8	85.4 [137]	OK	84	OK	Off	OK	4,086	Cruise_Overridden
- 4.6	85.9 [138]	OK	0	OK	Off	OK	4,334	Cruise_Reg_Not_Overridden
- 4.4	79.0 [127]	OK	0	OK	On	OK	4,092	Cruise_Reg_Not_Overridden
- 4.2	75.2 [121]	OK	0	OK	Off	OK	3,802	Cruise_Reg_Not_Overridden
- 4.0	73.6 [118]	OK	0	OK	Off	OK	3,500	Cruise_Reg_Not_Overridden
- 3.8	76.4 [123]	OK	0	OK	Off	OK	3,020	Cruise_Reg_Not_Overridden
- 3.6	77.4 [125]	OK	0	OK	Off	OK	2,552	Cruise_Reg_Not_Overridden
- 3.4	74.9 [121]	OK	0	OK	Off	OK	1,972	Cruise_Reg_Not_Overridden
- 3.2	69.8 [112]	OK	0	OK	Off	OK	1,616	Cruise_Reg_Not_Overridden
- 3.0	66.2 [107]	OK	0	OK	Off	OK	1,618	Cruise_Reg_Not_Overridden
- 2.8	65.9 [106]	OK	0	OK	Off	OK	1,588	Cruise_Reg_Not_Overridden
- 2.6	57.6 [93]	OK	0	OK	Off	OK	1,494	Cruise_Reg_Not_Overridden
- 2.4	57.9 [93]	OK	46	OK	Off	OK	1,448	Cruise_Overridden
- 2.2	55.3 [89]	OK	0	OK	Off	OK	1,318	Cruise_Reg_Not_Overridden
- 2.0	54.5 [88]	OK	4	OK	Off	OK	1,298	Cruise_Overridden
- 1.8	53.2 [86]	OK	50	OK	Off	OK	1,298	Cruise_Overridden
- 1.6	51.9 [84]	OK	0	OK	Off	OK	1,218	Cruise_Reg_Not_Overridden
- 1.4	46.2 [74]	OK	0	OK	Off	OK	1,104	Cruise_Reg_Not_Overridden
- 1.2	43.7 [70]	OK	0	OK	Off	OK	1,056	Cruise_Reg_Not_Overridden
- 1.0	42.4 [68]	OK	0	OK	Off	OK	1,012	Cruise_Reg_Not_Overridden

Time (sec)	Speed, Vehicle Indicated (MPH [km/h])	Speed, Vehicle Indicated, Quality Factor	Accelerator Pedal, % Full	Accelerator Pedal, % Full, Quality Factor	Service Brake, On/Off	Service brake, on/off Quality Factor	Engine RPM	Cruise Control Driver Accelerator Pedal Override
- 0.8	40.2 [65]	OK	0	OK	Off	OK	1,010	Cruise_Reg_Not_Overridden
- 0.6	40.2 [65]	OK	22	OK	Off	OK	1,058	Cruise_Overridden
- 0.4	43.3 [70]	OK	3	OK	Off	OK	1,118	Cruise_Overridden
- 0.2	42.2 [68]	OK	10	OK	Off	OK	1,072	Cruise_Overridden
0.0	38.0 [61]	OK	16	OK	Off	OK	984	Cruise_Overridden

Pre-Crash Data -5 to 0 sec [5 samples/sec] (First Record) - Table 2 of 2

Time (sec)	Brake Pre-Charge Request	Brake Assist Sensitivity Level	Brake Deceleration Request (m/s^2)	Brake Deceleration Request Enable	Large Driver Steering or Accel Pedal Input	Collision Mitigation System Fault	Collision Mitigation System Enabled
- 5.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 4.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 3.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 2.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.4	No PreCharge Request	Normal	0	No	Yes	No	Yes

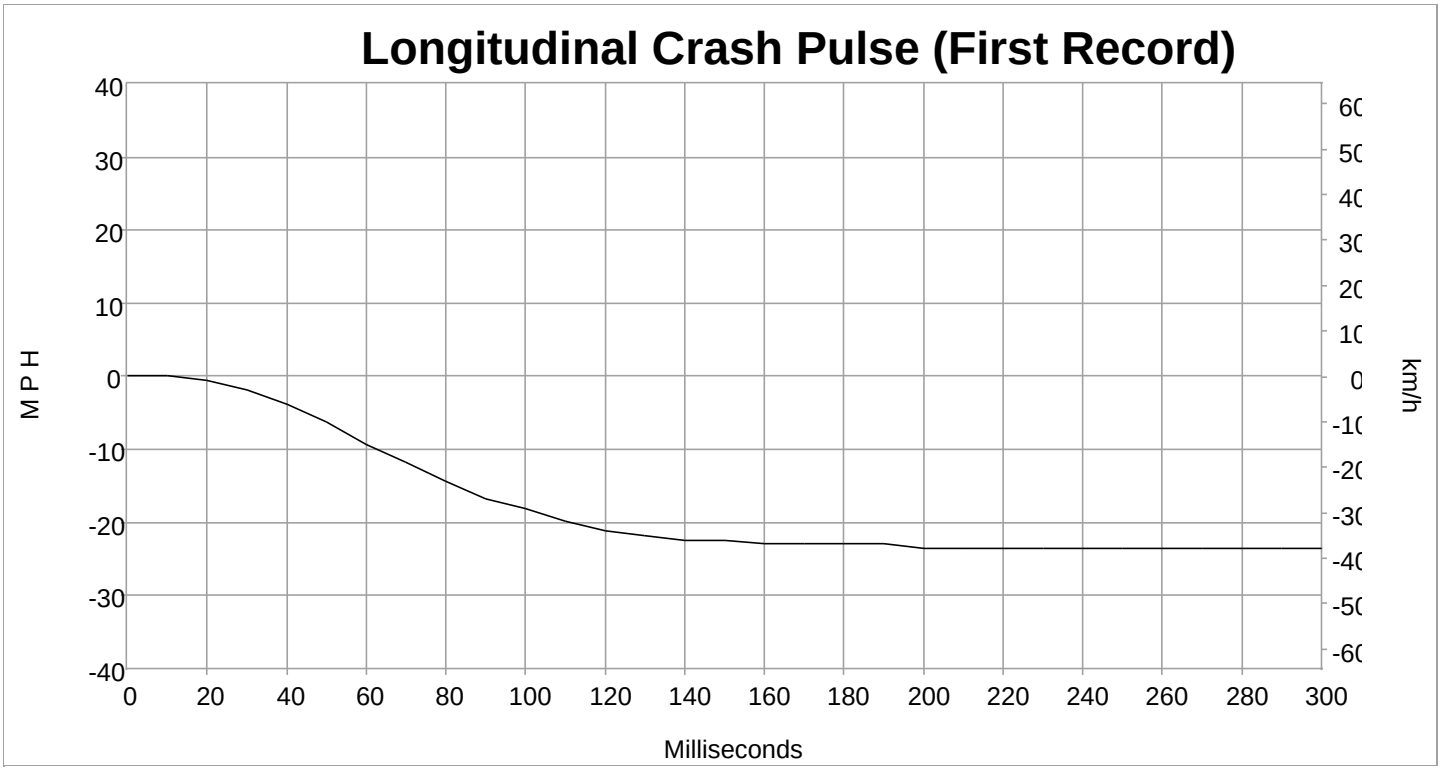
Time (sec)	Brake Pre-Charge Request	Brake Assist Sensitivity Level	Brake Deceleration Request (m/s^2)	Brake Deceleration Request Enable	Large Driver Steering or Accel Pedal Input	Collision Mitigation System Fault	Collision Mitigation System Enabled
- 1.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 1.0	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.8	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.6	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.4	No PreCharge Request	Normal	0	No	Yes	No	Yes
- 0.2	No PreCharge Request	Normal	0	No	Yes	No	Yes
0.0	No PreCharge Request	Normal	0	No	Yes	No	Yes

Pre-Crash Data -5 to 0 sec [1 sample/sec] (First Record)

Time (sec)	Occupant Size Classification, Front Passenger (Child size Yes/No [Hex value])	Extended Power Status
- 5.0	No [$00]	No Fault
- 4.0	No [$00]	No Fault
- 3.0	No [$00]	No Fault
- 2.0	No [$00]	No Fault
- 1.0	No [$00]	No Fault
0.0	No [$00]	No Fault

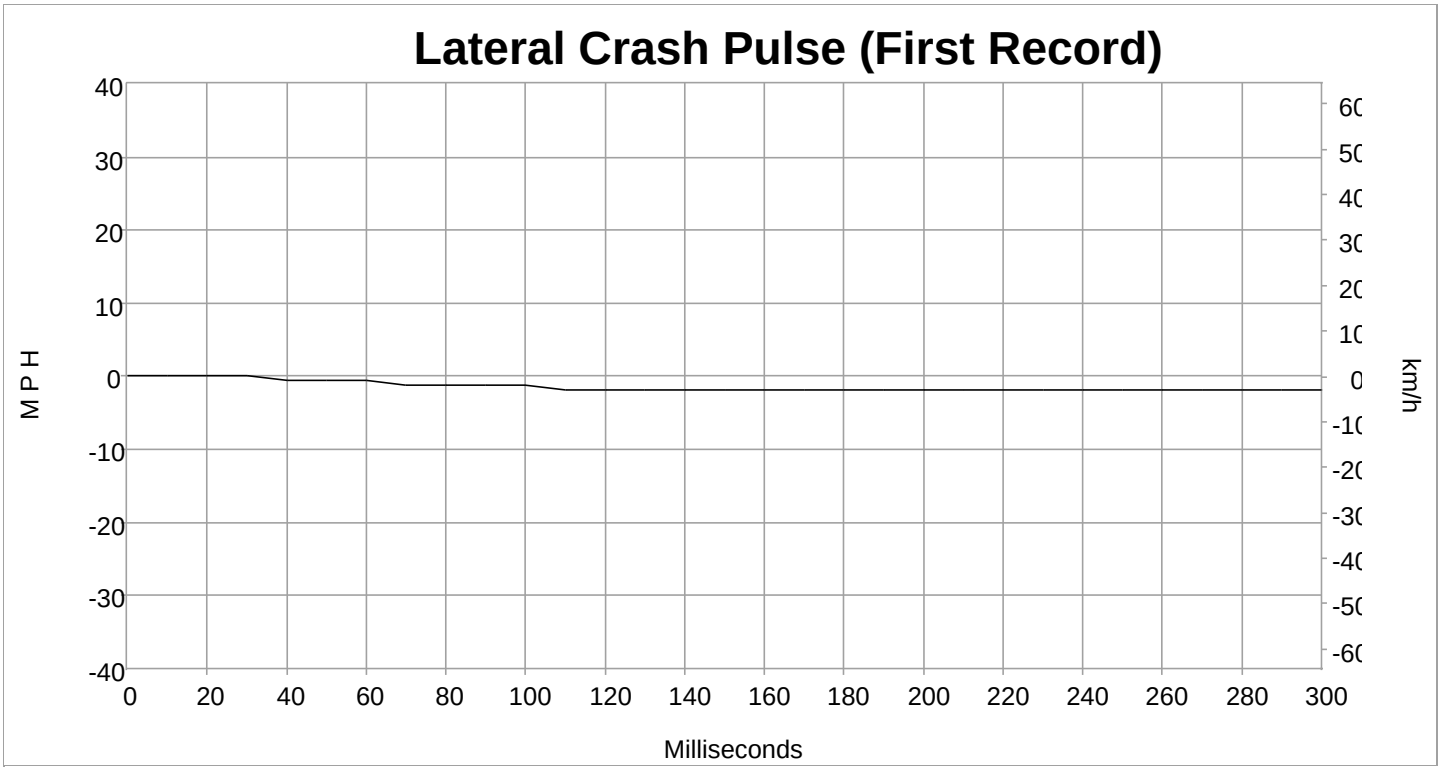
Post-Crash Data 0 to 5 sec [4 samples/sec] (First Record)

Time (sec)	Impact Event Feedback Status
0.00	Normal
0.25	EventInProgress
0.50	EventInProgress
0.75	EventInProgress
1.00	EventInProgress
1.25	EventInProgress
1.50	EventInProgress
1.75	EventInProgress
2.00	EventInProgress
2.25	EventInProgress
2.50	EventInProgress
2.75	EventInProgress
3.00	EventInProgress
3.25	EventInProgress
3.50	EventInProgress
3.75	EventInProgress
4.00	EventInProgress
4.25	EventInProgress
4.50	EventInProgress
4.75	EventInProgress
5.00	EventInProgress


Longitudinal Crash Pulse (First Record)
M P H
km/h
Milliseconds
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

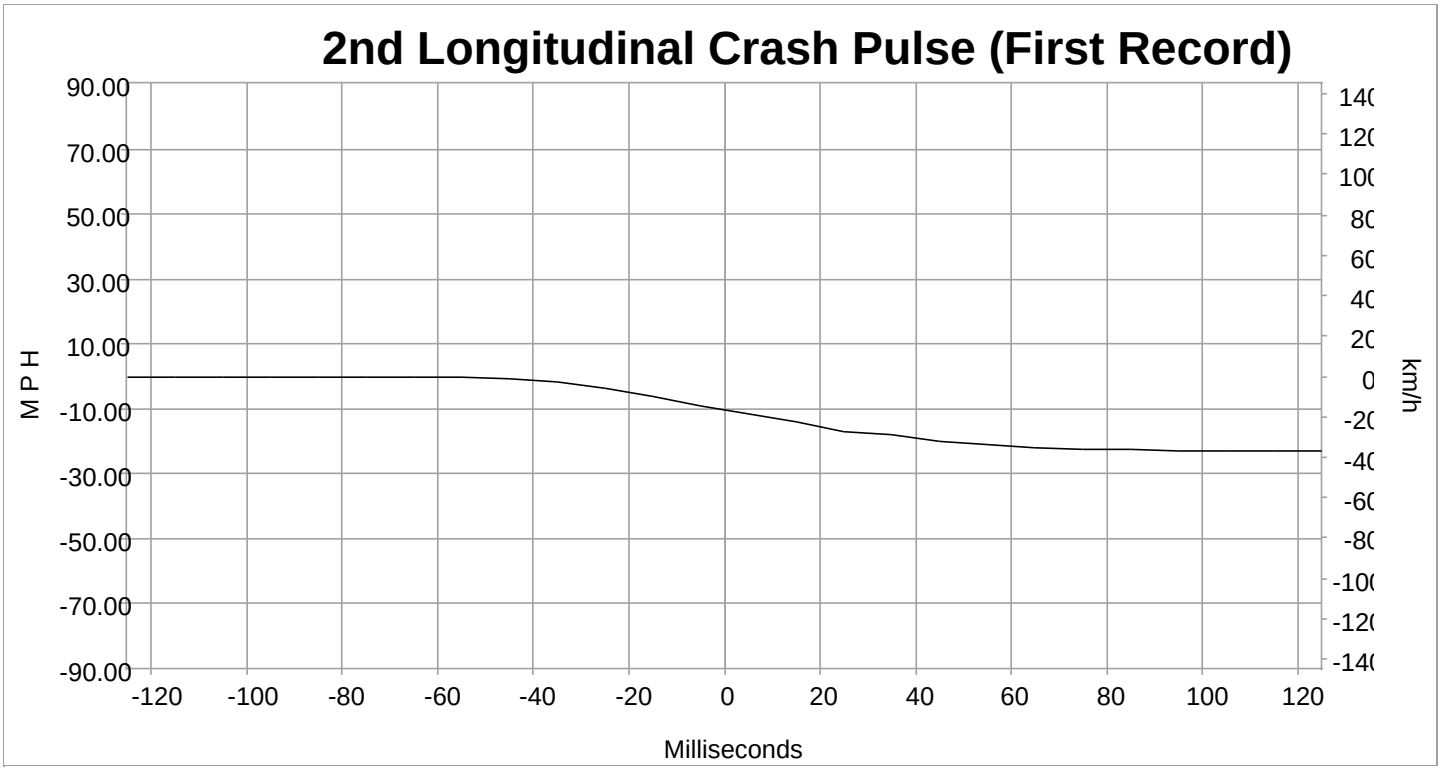
Longitudinal Crash Pulse (First Record)

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
0	0.00	0.00
10	0.00	0.00
20	-0.62	-1.00
30	-1.86	-3.00
40	-3.73	-6.00
50	-6.21	-10.00
60	-9.32	-15.00
70	-11.81	-19.00
80	-14.29	-23.00
90	-16.78	-27.00
100	-18.02	-29.00
110	-19.88	-32.00
120	-21.13	-34.00
130	-21.75	-35.00
140	-22.37	-36.00
150	-22.37	-36.00
160	-22.99	-37.00
170	-22.99	-37.00
180	-22.99	-37.00
190	-22.99	-37.00
200	-23.61	-38.00
210	-23.61	-38.00
220	-23.61	-38.00
230	-23.61	-38.00
240	-23.61	-38.00
250	-23.61	-38.00
260	-23.61	-38.00
270	-23.61	-38.00
280	-23.61	-38.00
290	-23.61	-38.00
300	-23.61	-38.00


Lateral Crash Pulse (First Record)
M P H
40
30
20
10
0
-10
-20
-30
-40
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
km/h
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Milliseconds

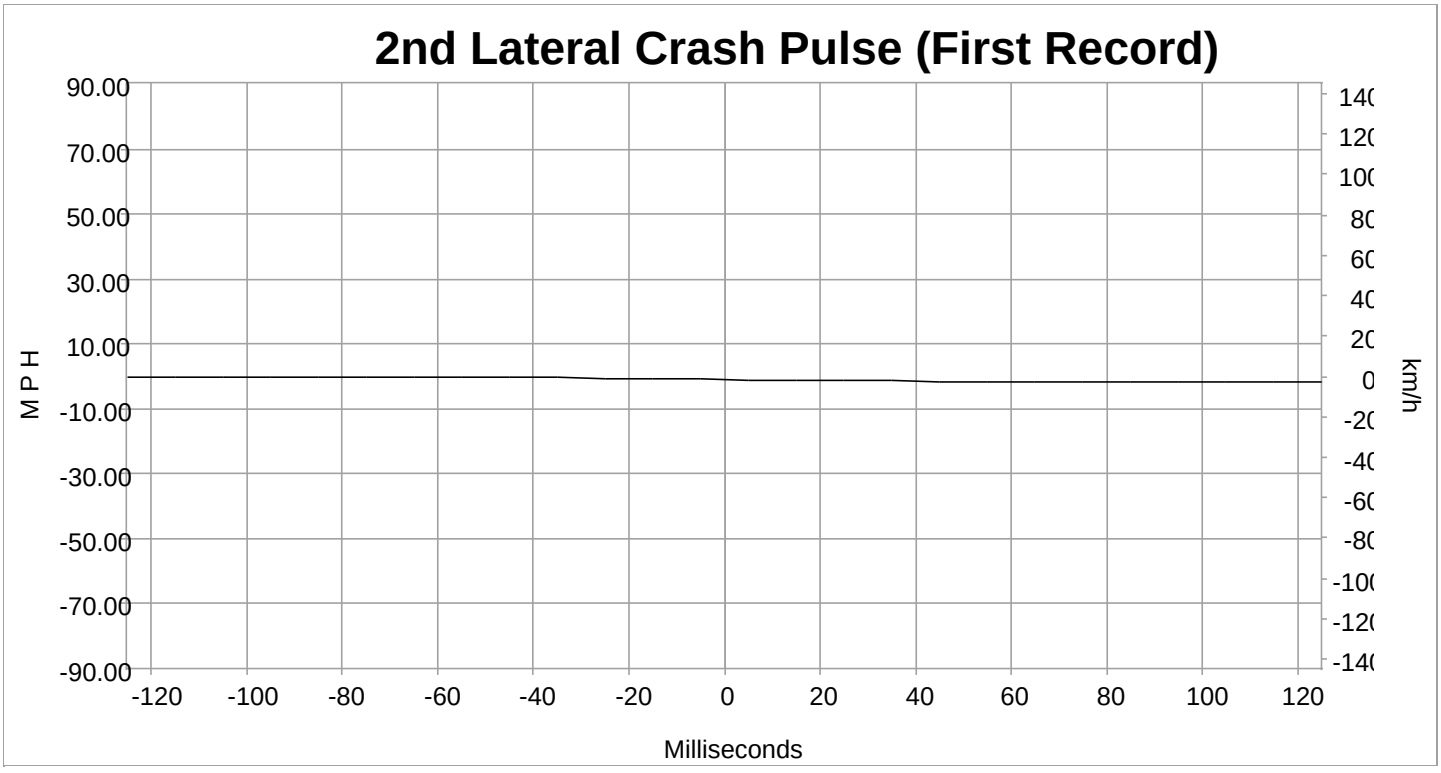
Lateral Crash Pulse (First Record)

Time (msec)	Delta-V, Lateral (MPH)	Delta-V, Lateral (km/h)
0	0.00	0.00
10	0.00	0.00
20	0.00	0.00
30	0.00	0.00
40	-0.62	-1.00
50	-0.62	-1.00
60	-0.62	-1.00
70	-1.24	-2.00
80	-1.24	-2.00
90	-1.24	-2.00
100	-1.24	-2.00
110	-1.86	-3.00
120	-1.86	-3.00
130	-1.86	-3.00
140	-1.86	-3.00
150	-1.86	-3.00
160	-1.86	-3.00
170	-1.86	-3.00
180	-1.86	-3.00
190	-1.86	-3.00
200	-1.86	-3.00
210	-1.86	-3.00
220	-1.86	-3.00
230	-1.86	-3.00
240	-1.86	-3.00
250	-1.86	-3.00
260	-1.86	-3.00
270	-1.86	-3.00
280	-1.86	-3.00
290	-1.86	-3.00
300	-1.86	-3.00



2nd Longitudinal Crash Pulse (First Record)

Time (msec)	2nd Delta-V, longitudinal (MPH)	2nd Delta-V, longitudinal (km/h)
-125	0.00	0.00
-115	0.00	0.00
-105	0.00	0.00
-95	0.00	0.00
-85	0.00	0.00
-75	0.00	0.00
-65	0.00	0.00
-55	0.00	0.00
-45	-0.62	-1.00
-35	-1.86	-3.00
-25	-3.73	-6.00
-15	-6.21	-10.00
-5	-9.32	-15.00
5	-11.81	-19.00
15	-14.29	-23.00
25	-16.78	-27.00
35	-18.02	-29.00
45	-19.88	-32.00
55	-21.13	-34.00
65	-21.75	-35.00
75	-22.37	-36.00
85	-22.37	-36.00
95	-22.99	-37.00
105	-22.99	-37.00
115	-22.99	-37.00
125	-22.99	-37.00



2nd Lateral Crash Pulse (First Record)

Time (msec)	2nd Delta-V, Lateral (MPH)	2nd Delta-V, Lateral (km/h)
-125	0.00	0.00
-115	0.00	0.00
-105	0.00	0.00
-95	0.00	0.00
-85	0.00	0.00
-75	0.00	0.00
-65	0.00	0.00
-55	0.00	0.00
-45	0.00	0.00
-35	0.00	0.00
-25	-0.62	-1.00
-15	-0.62	-1.00
-5	-0.62	-1.00
5	-1.24	-2.00
15	-1.24	-2.00
25	-1.24	-2.00
35	-1.24	-2.00
45	-1.86	-3.00
55	-1.86	-3.00
65	-1.86	-3.00
75	-1.86	-3.00
85	-1.86	-3.00
95	-1.86	-3.00
105	-1.86	-3.00
115	-1.86	-3.00
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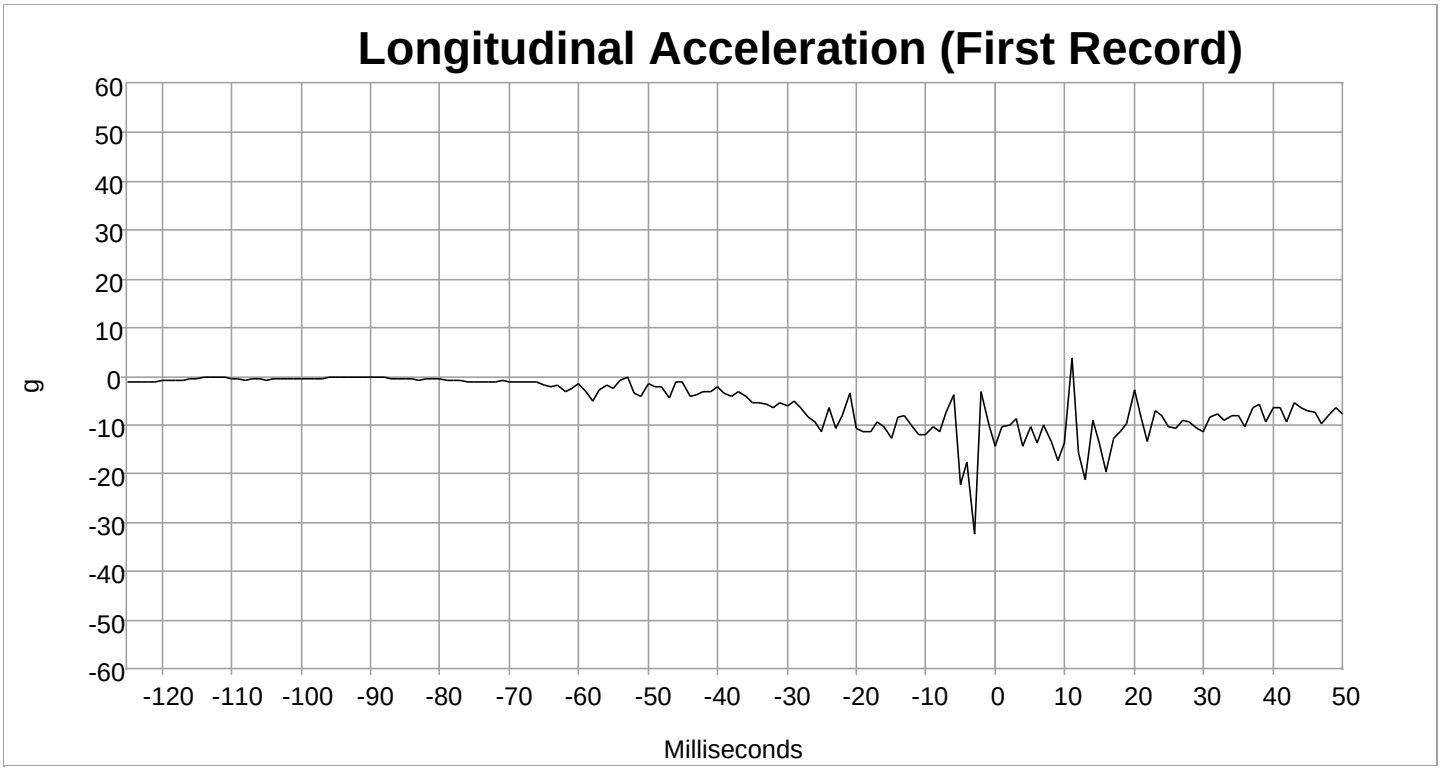

Longitudinal Acceleration (First Record)
g
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50
Milliseconds

Time (msec)	Longitudinal Acceleration (g)
-125	-1.00
-124	-1.00
-123	-1.00
-122	-1.00
-121	-1.00
-120	-0.75
-119	-0.75
-118	-0.75
-117	-0.75
-116	-0.50
-115	-0.50
-114	-0.25
-113	-0.25
-112	-0.25
-111	-0.25
-110	-0.50
-109	-0.50
-108	-0.75
-107	-0.50
-106	-0.50
-105	-0.75
-104	-0.50
-103	-0.50
-102	-0.50
-101	-0.50
-100	-0.50
-99	-0.50
-98	-0.50
-97	-0.50
-96	-0.25
-95	-0.25
-94	-0.25
-93	-0.25
-92	-0.25
-91	-0.25
-90	-0.25
-89	-0.25
-88	-0.25
-87	-0.50
-86	-0.50
-85	-0.50
-84	-0.50
-83	-0.75
-82	-0.50
-81	-0.50
-80	-0.50
-79	-0.75
-78	-0.75
-77	-0.75
-76	-1.00
-75	-1.00
-74	-1.00
-73	-1.25
-72	-1.00
-71	-0.75
-70	-1.25
-69	-1.00
-68	-1.00

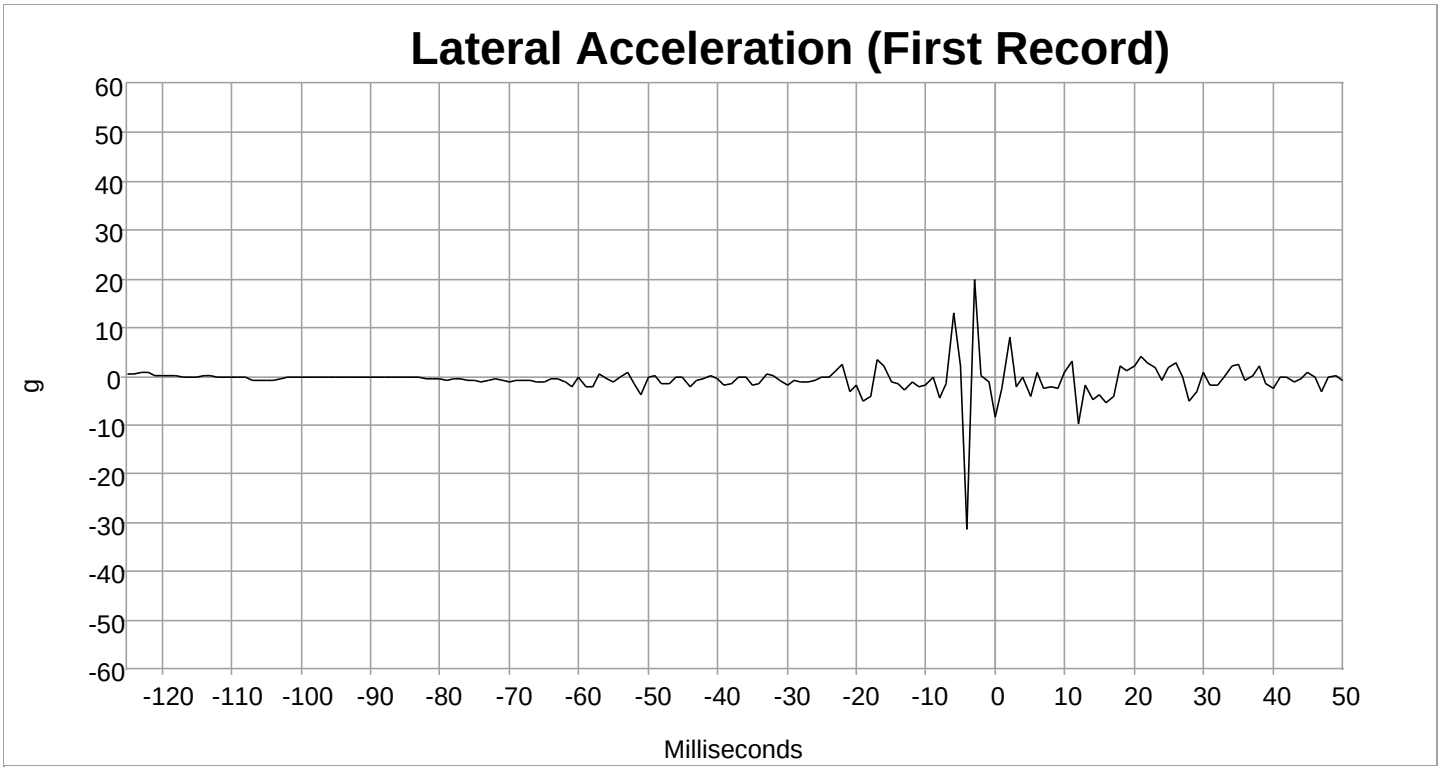
Time (msec)	Longitudinal Acceleration (g)
-67	-1.00

Longitudinal Acceleration (First Record)

Time (msec)	Longitudinal Acceleration (g)
-66	-1.25
-65	-1.75
-64	-2.00
-63	-1.75
-62	-3.25
-61	-2.50
-60	-1.50
-59	-3.00
-58	-5.00
-57	-2.75
-56	-1.75
-55	-2.50
-54	-0.75
-53	0.00
-52	-3.50
-51	-4.00
-50	-1.50
-49	-2.25
-48	-2.00
-47	-4.50
-46	-1.00
-45	-1.25
-44	-4.25
-43	-3.75
-42	-3.00
-41	-3.25
-40	-2.00
-39	-3.50
-38	-4.00
-37	-3.25
-36	-4.25
-35	-5.50
-34	-5.50
-33	-5.75
-32	-6.25
-31	-5.50
-30	-6.00
-29	-5.25
-28	-6.50
-27	-8.25
-26	-9.50
-25	-11.50
-24	-6.25
-23	-10.75
-22	-8.00
-21	-3.50
-20	-10.75
-19	-11.25
-18	-11.25
-17	-9.50
-16	-10.50
-15	-12.50
-14	-8.50
-13	-8.00
-12	-10.50
-11	-12.00
-10	-12.00
-9	-10.50

Time (msec)	Longitudinal Acceleration (g)
-8	-11.50

Time (msec)	Longitudinal Acceleration (g)
-7	-7.50
-6	-3.75
-5	-22.25
-4	-17.75
-3	-32.50
-2	-3.25
-1	-10.00
0	-14.25
1	-10.25
2	-10.00
3	-8.75
4	-14.25
5	-10.50
6	-13.75
7	-10.00
8	-13.25
9	-17.25
10	-13.75
11	3.75
12	-15.50
13	-21.25
14	-9.00
15	-13.75
16	-19.50
17	-12.75
18	-11.50
19	-9.75
20	-2.75
21	-8.25
22	-13.25
23	-7.00
24	-8.00
25	-10.25
26	-10.75
27	-9.00
28	-9.25
29	-10.75
30	-11.25
31	-8.25
32	-7.75
33	-9.00
34	-8.00
35	-8.00
36	-10.25
37	-6.50
38	-5.75
39	-9.50
40	-6.25
41	-6.50
42	-9.25
43	-5.50
44	-6.50
45	-7.00
46	-7.50
47	-9.75
48	-8.00
49	-6.50
50	-7.75


Lateral Acceleration (First Record)
g
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50
Milliseconds

Time (msec)	Lateral Acceleration (g)
-125	0.50
-124	0.50
-123	0.75
-122	0.75
-121	0.25
-120	0.25
-119	0.25
-118	0.25
-117	0.00
-116	0.00
-115	0.00
-114	0.25
-113	0.25
-112	0.00
-111	0.00
-110	0.00
-109	-0.25
-108	-0.25
-107	-0.75
-106	-0.75
-105	-0.75
-104	-0.75
-103	-0.50
-102	-0.25
-101	0.00
-100	0.00
-99	0.00
-98	0.00
-97	0.00
-96	0.00
-95	0.00
-94	0.00
-93	0.00
-92	0.00
-91	0.00
-90	0.00
-89	0.00
-88	0.00
-87	0.00
-86	-0.25
-85	-0.25
-84	-0.25
-83	-0.25
-82	-0.50
-81	-0.50
-80	-0.50
-79	-0.75
-78	-0.50
-77	-0.50
-76	-0.75
-75	-0.75
-74	-1.00
-73	-0.75
-72	-0.50
-71	-0.75
-70	-1.00
-69	-0.75
-68	-0.75

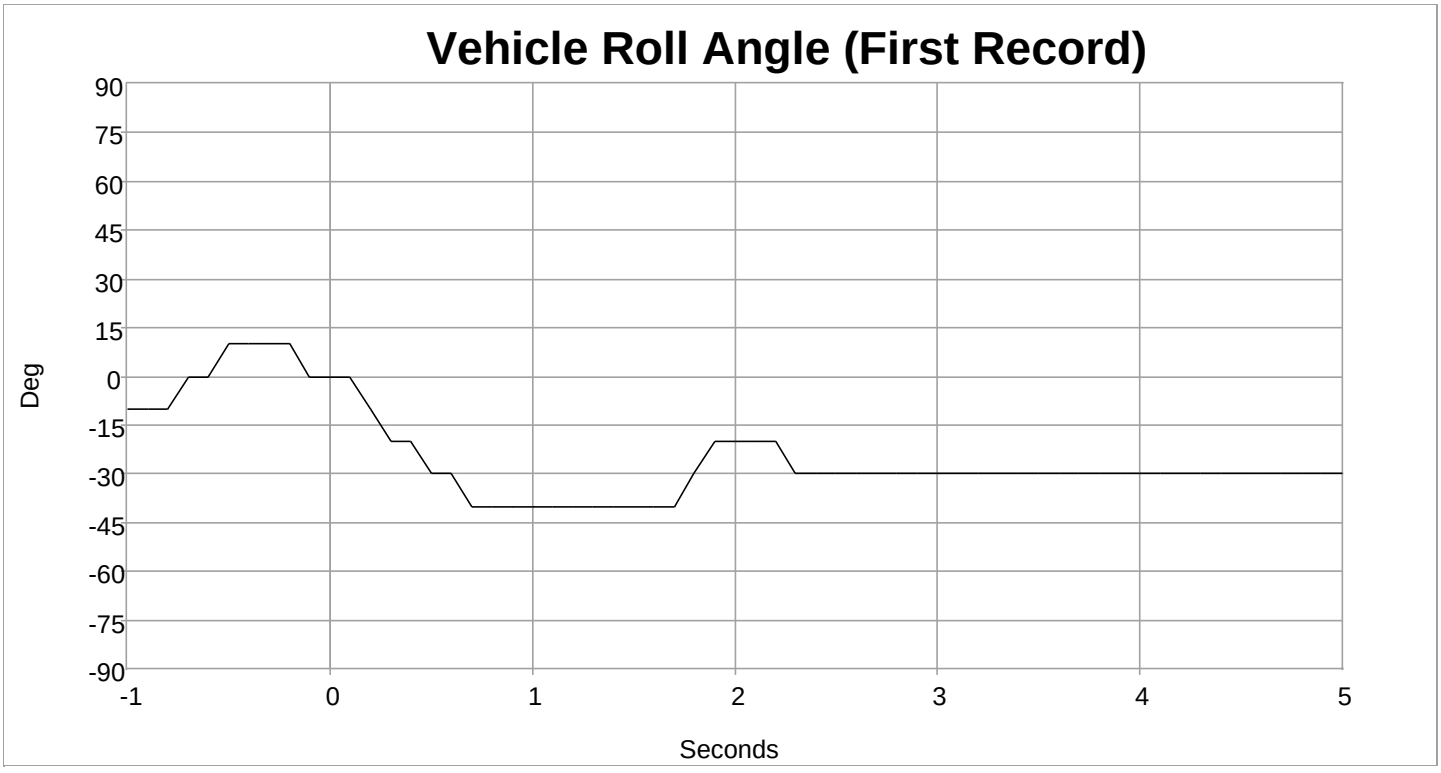
Time (msec)	Lateral Acceleration (g)
-67	-0.75

Lateral Acceleration (First Record)

Time (msec)	Lateral Acceleration (g)
-66	-1.00
-65	-1.00
-64	-0.50
-63	-0.50
-62	-1.00
-61	-2.00
-60	0.00
-59	-2.25
-58	-2.00
-57	0.50
-56	-0.50
-55	-1.00
-54	0.00
-53	0.75
-52	-1.50
-51	-3.75
-50	-0.25
-49	0.25
-48	-1.50
-47	-1.50
-46	0.00
-45	0.00
-44	-2.00
-43	-0.75
-42	-0.50
-41	0.25
-40	-0.50
-39	-1.75
-38	-1.50
-37	0.00
-36	0.00
-35	-1.75
-34	-1.50
-33	0.50
-32	0.25
-31	-0.75
-30	-1.75
-29	-0.75
-28	-1.00
-27	-1.00
-26	-0.75
-25	0.00
-24	0.00
-23	1.25
-22	2.50
-21	-3.25
-20	-1.75
-19	-5.25
-18	-4.25
-17	3.50
-16	2.00
-15	-1.00
-14	-1.50
-13	-2.75
-12	-1.25
-11	-2.25
-10	-1.75
-9	-0.25

Time (msec)	Lateral Acceleration (g)
-8	-4.50

Time (msec)	Lateral Acceleration (g)
-7	-1.50
-6	13.00
-5	2.00
-4	-31.50
-3	20.00
-2	0.25
-1	-1.00
0	-8.25
1	-2.50
2	8.00
3	-2.25
4	-0.25
5	-4.00
6	0.75
7	-2.50
8	-2.25
9	-2.50
10	0.75
11	3.00
12	-9.75
13	-1.75
14	-4.75
15	-3.75
16	-5.50
17	-4.00
18	2.25
19	1.00
20	2.00
21	4.00
22	2.75
23	1.75
24	-0.75
25	1.75
26	2.75
27	-0.25
28	-5.25
29	-3.00
30	0.75
31	-1.75
32	-1.75
33	-0.25
34	2.00
35	2.50
36	-0.75
37	0.25
38	2.00
39	-1.50
40	-2.50
41	0.00
42	-0.25
43	-1.00
44	-0.50
45	0.75
46	-0.25
47	-3.00
48	-0.25
49	0.25
50	-0.75



Vehicle Roll Angle (First Record)

Time (sec)	Vehicle Roll Angle (deg)
-1.0	-10.00
-0.9	-10.00
-0.8	-10.00
-0.7	0.00
-0.6	0.00
-0.5	10.00
-0.4	10.00
-0.3	10.00
-0.2	10.00
-0.1	0.00
0.0	0.00
0.1	0.00
0.2	-10.00
0.3	-20.00
0.4	-20.00
0.5	-30.00
0.6	-30.00
0.7	-40.00
0.8	-40.00
0.9	-40.00
1.0	-40.00

Time (sec)	Vehicle Roll Angle (deg)
1.1	-40.00
1.2	-40.00
1.3	-40.00
1.4	-40.00
1.5	-40.00
1.6	-40.00
1.7	-40.00
1.8	-30.00
1.9	-20.00
2.0	-20.00
2.1	-20.00
2.2	-20.00
2.3	-30.00
2.4	-30.00
2.5	-30.00
2.6	-30.00
2.7	-30.00
2.8	-30.00
2.9	-30.00
3.0	-30.00
3.1	-30.00

Time (sec)	Vehicle Roll Angle (deg)
3.2	-30.00
3.3	-30.00
3.4	-30.00
3.5	-30.00
3.6	-30.00
3.7	-30.00
3.8	-30.00
3.9	-30.00
4.0	-30.00
4.1	-30.00
4.2	-30.00
4.3	-30.00
4.4	-30.00
4.5	-30.00
4.6	-30.00
4.7	-30.00
4.8	-30.00
4.9	-30.00
5.0	-30.00

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 system.

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$5B17 - Event Type
32 00 00 00

$F113 - RCM Part Number
48 53 37 54 2D 31 34 42 33 32 31 2D 41 48 00 00 00 00 00 00 00 00 00 00

$F18C - RCM Serial Number
36 46 32 30 34 38 39 31 36 37 42 46 00 00 00 00

$F188 - RCM Software Part Number
4A 53 37 54 2D 31 34 43 30 32 38 2D 41 41 00 00 00 00 00 00 00 00 00 00

$F143 - Left/Center Frontal Restraints Sensor Serial Number
43 33 32 42 30 45 43 41 32 46 32 36 00 00 00 00

$F141 - Left Side Restraints Sensor One Serial Number
43 33 32 38 34 35 32 35 32 43 30 46 00 00 00 00

$F145 - Left Side Restraints Sensor Two Serial Number
39 46 32 41 43 31 35 44 32 32 33 44 00 00 00 00

$F144 - Right Frontal Restraints Sensor Serial Number
43 37 32 42 30 45 43 41 35 31 30 36 00 00 00 00

$F142 - Right Side Restraints Sensor One Serial Number
43 33 32 38 34 35 32 35 30 42 34 34 00 00 00 00

$F146 - Right Side Restraints Sensor Two Serial Number
43 35 32 39 35 32 31 42 31 32 30 41 00 00 00 00

$DE00 - Original VIN
33 46 41 36 50 30 4C 55 35 4B 52 2A 2A 2A 2A 2A 2A

$F190 - Current VIN
33 46 41 36 50 30 4C 55 35 4B 52 2A 2A 2A 2A 2A 2A 00 00 00 00 00 00 00

$DE01 - RCM Option Content
C7 6A EF 3B 10 0C 66 08 00 00 00 00
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$5817 - Event Record 1

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40 65 40 F4 41 49 41 63 41 72 40 FE 40 75 40 BA 42 37 42 9D 41 B5 40 F6 40 EF 41 FE 41 EF 41
7E 41 AB 41 CF 41 F8 41 C2 41 82 41 3C 41 59 41 79 41 55 40 C7 40 87 40 B5 40 FD 41 27 41 55
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9E CF 77 68 69 C3 6E 2E 77 CB 83 BE 89 6C 6E 2A 67 A7 79 2D 85 98 80 57 7D 5B 7E FA 82 D8 81
5F 81 74 84 51 91 0C 96 35 91 DB 87 39 82 2B 83 67 7B 7D 6E 8B 8E F4 8E 17 8B 32 89 4B 8A 85
88 E0 85 29 80 D2 80 52 7F 15 7B 3D 78 EE 7A 25 79 3D 78 76 79 62 79 AE 79 16 78 12 73 34 74
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5C 80 35 7C FF 7C C0 80 4F 7F 7C 7D 96 7D EB 7D 56 7F 4C 7E F6 7E 6D 7E E2 7F AF 7E AD 7D 06
7E B7 7D D7 7D 98 7D 85 80 33 82 67 82 15 81 5E 80 EC 83 68 84 64 84 7C 82 9E 82 DA 81 5A 81
BD 7E 77 7E 2B 81 26 7F 8C 7F B7 7F 37 7E DD 7C EA 81 B7 7C FA 7F 4F 80 57 7B F8 80 07 80 FE
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D1 7F 76 7E BC 7F 95 7F C7 80 42 80 06 80 3A 7D C5 47 00 00 00 00 00 00 00 00 00 00 00 00 00
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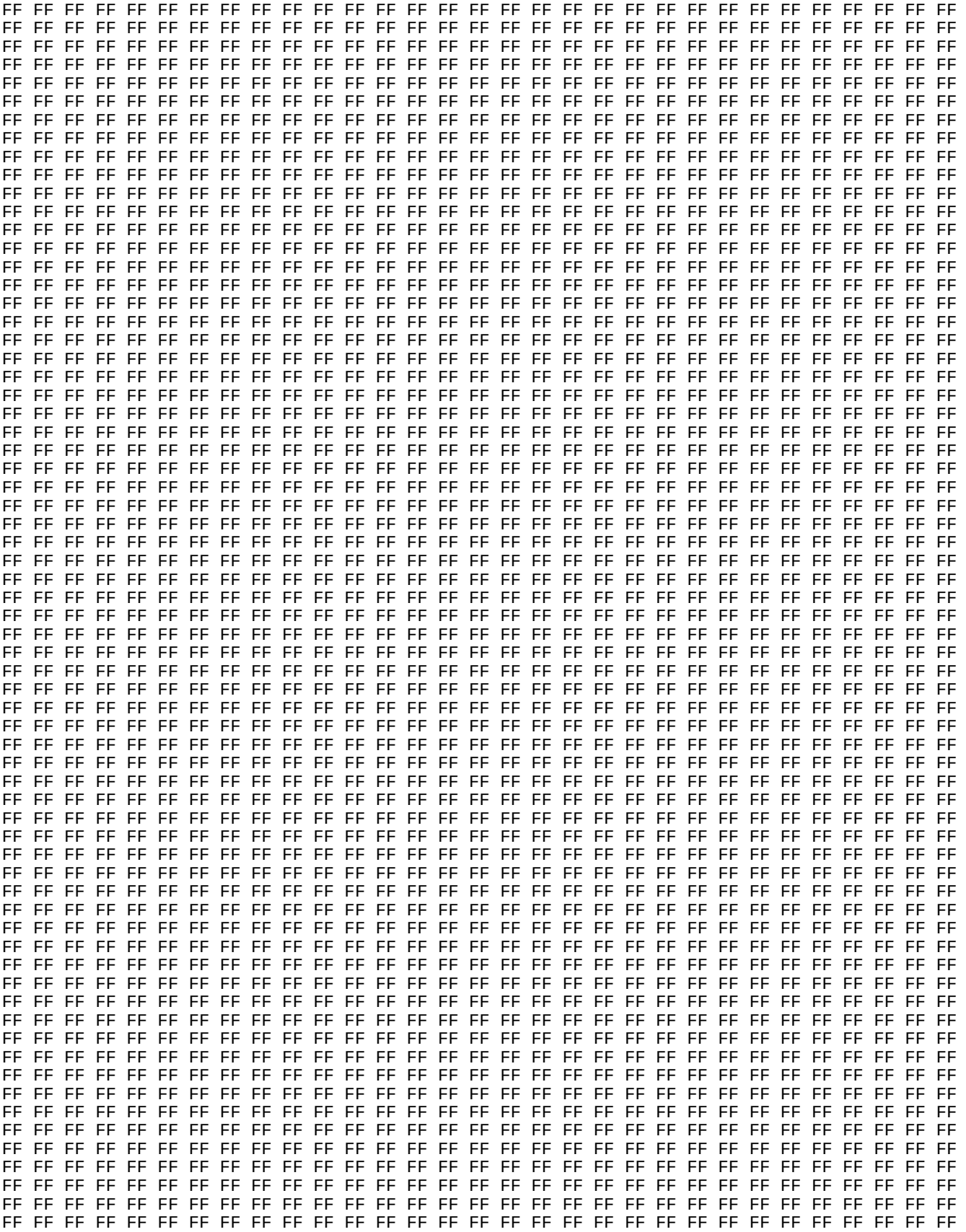
$5818 - Event Record 2



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$EE00 - Decoder DID

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80 00 00 00 00 00 00 00 00 18 0A 64 03 00 0E 00 00 00 04 3F 80 00 00 00 00 00 00 00 00 17 0A
91 01 00 05 00 06 00 04 3F 80 00 00 01 00 00 00 00 07 DB 0A 97 01 00 00 00 00 00 04 3F 80 00
00 00 00 00 00 00 07 DA 0A 98 01 00 00 00 00 00 04 3F 80 00 00 00 00 00 00 00 07 D0 0A 99 01
00 00 00 00 00 04 3F 80 00 00 00 00 00 00 00 07 D3 0A 9A 01 00 00 00 00 00 04 3F 80 00 00 00
00 00 00 00 07 D2 0A 9B 01 00 00 00 00 00 04 3F 80 00 00 00 00 00 00 00 00 16 0A 9C 01 00 00
00 00 00 00 3F 80 00 00 00 00 00 00 00 00 13 0A 9D 01 00 00 00 00 00 00 3F 80 00 00 00 00 00
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00 05 0A D3 01 00 19 00 1A 00 04 3F 80 00 00 03 00 00 00 00 1F 40 0A ED 1D 00 00 00 00 00 00
3F 80 00 00 00 00 00 00 00 1F 41 0B 0A 05 00 00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 42
0B 0F 3D 00 00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 43 0B 4C 2E 00 00 00 00 00 00 3F 80
00 00 00 00 00 00 00 1F 44 0B 7A 45 00 00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 45 0B BF
04 00 00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 46 0B C3 1F 00 00 00 00 00 00 3F 80 00 00
00 00 00 00 00 1F 47 0B E2 34 00 00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 47 0C 16 34 00
00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 47 0C 4A 34 00 00 00 00 00 00 3F 80 00 00 00 00
00 00 00 1F 47 0C 7E 34 00 00 00 00 00 00 3F 80 00 00 00 00 00 00 00 1F 47 0C B2 2F 00 00 00
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$F18C - OCS Serial Number

32 58 44 36 32 38 36 30 32 35 39 31 38 30 37 38

$F124 - RCM Calibration Part Number
48 53 37 54 2D 31 34 43 30 39 38 2D 46 44 00 00 00 00 00 00 00 00 00 00

$F14B - Internal Sensor Serial Number
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

$F14D - Driver Side Restraints Sensor 3 Serial Number
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$F14E - Passenger Side Restraints Sensor 3 Serial Number
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$F14F - Driver Side Restraints Sensor 4 Serial Number
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$F150 - Passenger Side Restraints Sensor 4 Serial Number
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**National Highway
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