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15. Supplementary Notes

Each crash represents a unique sequence of events, and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) 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 a two-vehicle crash involving a 2019 Honda Civic that had crash avoidance technology, including lane departure warning, forward collision warning, a roadway departure mitigation system, and collision mitigating braking. The investigation was intended to determine what role, if any, the lane departure warning and roadway departure mitigation technology played in the crash. The crash occurred in the morning in December 2019 in Arizona. According to the police report, a belted 42-year-old male was driving the Honda when it crossed over into the northbound lane and sideswiped a 2015 Mercedes-Benz E63. The Honda driver's frontal and side air bags deployed. There were no reported injuries, and both vehicles were towed from the scene. The various crash avoidance systems were either on and did not engage because system limitations such as speed were not met, or a particular system was turned off.

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Special Crash Investigations
On-Site Crash Avoidance Technology Investigation
Case Number: DS20001
Vehicle: 2019 Honda Civic
Location: Arizona
Crash Date: December 2019

Background

This report documents the on-site investigation of a two-vehicle crash involving a 2019 Honda Civic (Figure 1) which had crash avoidance technology, including lane departure warning, forward collision warning, and a collision mitigating braking system. The investigation was intended to determine what role, if any, the lane departure warning (LDW) and roadway departure mitigation (RDM) System technology played in the crash. This investigation was initiated by the Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration in response to a notification from the Crash Report Sampling System (CRSS). According to the Honda vehicle owner's manual, lane keeping assist provides steering input to help keep the vehicle in the middle of a detected lane and provides tactile and visual alerts if the vehicle is detected drifting out of its lane. The Honda departed its travel line and drifted into on-coming traffic. SCI assigned the case to Dynamic Science, Inc., in February 2020, and the inspections were completed in the same month. The Honda was supported by the Bosch crash data retrieval (CDR) system, and the vehicle's event data recorder (EDR) was imaged during the inspection.

Figure 1. The 2019 Honda Civic

The crash occurred in the morning in December 2019 in Arizona. Conditions were daylight, clear, and dry. The crash site was a mid-block undivided city roadway. According to the police report, a belted 42-year-old male was driving the Honda southbound. A 2015 Mercedes-Benz E63 was traveling northbound. The Honda crossed into the northbound lane and sideswiped the Mercedes. The driver's frontal, inflatable curtain (IC), and side air bags in the Honda deployed. There were no reported injuries, and both vehicles were towed from the scene.

The various crash avoidance systems were either on and did not engage because system limitations such as speed were not met, or a particular system was turned off.

Summary

Crash Site

The crash site was located on a six-lane north/south urban roadway. The surface was paved with asphalt in traveled and polished condition. There were two southbound travel lanes, a reversible turn lane, and three northbound travel lanes. The second from the right southbound travel lane measured 3.0 m (10.0 ft) wide and was bordered on the left by solid/dashed yellow lines and on the right by dashed white painted lines. The reversible center turn lane measured 3.0 m (10.0 ft) wide and was bordered on both sides by solid/dashed yellow lines. The painted lines were all in good condition. The speed limit was 56 km/h (35 mph). The weather at the nearest reporting station was 15 ºC (63 ºF), 30 percent humidity, fair conditions, and the winds were out of the west at 24 km/h (15 mph). A crash diagram is included at the end of this report.

Pre-Crash

The Honda was traveling southbound in the reversible lane from the right at 60 km/h (37 mph) five seconds prior to impact with an EDR-reported zero degree steer angle. The driver of the Mercedes stated that the Honda drifted into his lane from the reversible turn lane. The EDR-reported steering input angle is recorded in five-degree increments. It is the investigator's opinion that, based on an interview with the driver of the other vehicle and the impact location, there was some left steer input that was less than five degrees. The vehicle gradually drifted to the left and entered the reversible turn lane (Figure 2).

The Honda's pre-crash speeds and distances covered are shown in the table below.

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
5	60	37	NA	NA	NA	NA
4.5	58	36	8.2	26.8	8.2	26.8
4	58	36	8	26.4	16.2	53.2
3.5	56	35	7.9	26	24.1	79.2
3	56	35	7.8	25.7	32	104.9
2.5	56	35	7.8	25.7	39.8	130.6
2	55	34	7.7	25.3	47.5	155.9
1.5	55	34	7.6	24.9	55.1	180.8
1	55	34	7.6	24.9	62.7	205.7
0.5	53	33	7.5	24.6	70.2	230.3
0	53	33	7.4	24.2	77.6	254.5

The Mercedes-Benz was traveling northbound in the third lane from the right (Figure 3).

Figure 2. Southbound approach

Figure 3. Northbound approach

Crash

The front of the Honda struck the left side of the Mercedes-Benz at a shallow angle. The "missing vehicle" algorithm of the WinSMASH program calculated a total delta V of 18 km/h (11 mph) for the Honda. The longitudinal and lateral components were -18 km/h (-11 mph) and 3 km/h (2 mph), respectively. The barrier equivalent speed (BES) was 14 km/h (9 mph). The results fit the collision model and appear reasonable. The EDR reported a maximum longitudinal delta V of -18 km/h (-11 mph) and a maximum lateral delta V of 3 km/h (2 mph). The frontal, side, and IC air bags deployed in the Honda and the driver's pretensioner actuated. The program calculated a total delta V of 13 km/h (8 mph) for the Mercedes-Benz. The longitudinal and lateral components were -13 km/h (-8 mph) and 2 km/h (1 mph), respectively. The BES was 15 km/h (10 mph).

Both vehicles rotated slightly counterclockwise. The Honda continued southbound for approximately two seconds as it crossed the northbound travel lanes and struck a curb. The EDR reported a maximum longitudinal delta V of -6 km/h (-4 mph) and a maximum lateral delta V of 2 km/h (1 mph). The vehicles both came to rest in the roadway.

Post-Crash

There were no reported injuries and both drivers exited the vehicle under their own power. Both vehicles were towed from the scene due to damage and were both later declared to be total losses by their respective insurance companies.

2019 Honda Civic Coupe

Description

The Honda was a 5-passenger, 2-door coupe. The vehicle was identified by the Vehicle Identification Number (VIN) 2HGFC3B3XKHxxxxxx and was manufactured in June 2019. The vehicle mileage was 1,664 km (1,034 miles). The vehicle had a 1.5-liter, 4-cylinder gasoline engine coupled to an automatic transmission, front-wheel drive, variable-ratio, power-assisted rack-and-pinion steering, a steering ratio of 11.77:1, and 4-wheel ABS. The vehicle manufacturer recommended tire size was P215/50R17 for the front and rear. The vehicle had Continental ProContact tires of the recommended size. The vehicle had front bucket seats and second row bench seats.

Exterior Damage

The Honda sustained moderate front plane damage from the impact to the left plane of the Mercedes (Figure 4). The direct damage began at the left front corner of the backing bar and extended to the right 7 cm (2.7 in). The backing bar was reattached for the vehicle inspection. The bumper fascia was not present during the inspection. Based on measurements to an exemplar vehicle, the direct damage would have included an additional 7 cm (2.7 in) on the bumper fascia. The damage extended approximately 50 cm (19.6 in) along the left plane (Figure 5). The left front tire was debeaded and restricted, and the wheelbase was shortened by 19 cm (7.4 in). The Field L extended from backing bar bumper corner to backing bar bumper corner. Sixteen measurements were taken at bumper level by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: C1 = 6 cm (2.3 in), C2 = 0 cm, C3 = 0 cm, C4 = 0 cm, C5 = 0 cm, and C6 = 0 cm. The Collision Deformation Classification (CDC) was 12FLEE3. There was a secondary impact to a curb with the left front wheel. The CDC for that impact was 12FLWN3.

Figure 4. Front plane damage, the 2019 Honda Civic

Figure 5. Left plane damage, the 2019 Honda Civic

Crash Avoidance Technology

The Honda had multiple crash avoidance technology packages as part of its Honda sensing system. Honda Sensing is a driver support system that employs two different kinds of sensors, a radar sensor located in the lower bumper and a front sensor camera mounted to the interior side of the windshield, behind the rearview mirror (Figure 6).

Figure 6. Front sensor camera, the 2019 Honda Civic

Collision Mitigation Braking System

CBMS can assist when there is a possibility of striking a vehicle or pedestrian in front. It is designed to alert the driver when a potential collision is determined, as well as to reduce vehicle speed to help minimize collision severity when a collision is deemed unavoidable. The system initially provides visual and audible alerts of a possible collision and light to heavy brake application as the potential for collision increases. The system is turned on every time the vehicle is started, even if it had been turned off since the last time the vehicle was driven.

According to the EDR report, CMBS was “on” but did not engage. There were no vehicles directly in front of this vehicle.

Road Departure Mitigation System

RDMS alerts and helps to assist when the system detects a possibility of the vehicle unintentionally crossing over detected lane markings and/or leaving the roadway altogether. If the vehicle is getting too close to detected lane markings without a turn signal activated, the system, in addition to a visual alert, applies steering torque and alerts the driver with rapid vibrations on the steering wheel, to help the driver remain in the detected lane. If the system determines that its steering input is insufficient to keep the vehicle on the roadway, it may apply braking. Braking is applied only when the lane markings are solid continuous lines. The system cancels assisting operations when turning the steering wheel to avoid crossing over detected lane markings. The system becomes ready to start searching for lane markings when all the following conditions are met.

- Vehicle is traveling 72 to 145 km/h (45 to 90 mph).
- The vehicle is on a straight or slightly curved road.
- The turn signals are off.
- The brake pedal is not depressed.
- The wipers are not in continuous operation.

- The vehicle is not accelerating or braking, and the steering wheel is not being turned.
- The system makes a determination that the driver is not actively accelerating, braking, or steering.

According to the EDR report, RDMS was “on” but did not engage. The vehicle appears to have drifted into the oncoming lane and the RDMS did not intervene to prevent the vehicle from crossing the lateral lane marking because the travel speed was under the operational speed of 59 km/h (37 mph) for the RDMS activation range specified in the owner's manual.

Lane Keeping Assist System

LKAS provides steering input to help keep the vehicle in the middle of a detected lane and provides tactile and visual alerts if the vehicle is detected drifting out of its lane. LKAS only alerts when lane drift is detected without a turn signal in use. According to the owner’s manual, the LKAS may not detect all lane markings or lane departures; accuracy will vary based on weather, speed, and lane marker condition. LKAS and adaptive cruise control are both turned on and off by pressing the MAIN button on the steering wheel. According to the EDR report, LKAS was “off” and did not engage.

Event Data Recorder

The Honda had an airbag control module (ACM) that had EDR capability to store deployment and non-deployment events. The ACM typically records only one event but two events can be recorded if the time zero values for each event occur within five seconds of each other, which did occur in this case. The two stored events can both contain pre-crash and crash data. For the pre-crash data there is a 5-second buffer that records vehicle speed, accelerator pedal position, service brake, ABS activity, stability control, steering input, and engine rpm. The buffer also records crash avoidance activity and status for FCW, CMBS, FCW, and LKAS.

The data from the Honda’s EDR were imaged using the Bosch Crash Data Retrieval Tool version 19.3.1 by going through the DLC with vehicle power (augmented with a jump box) and reported using the version 21.2.1. Two events were recovered. The ignition cycle at crash was 178 and the cycle at download was 192.

The first event resulted from impact with the Mercedes-Benz. The maximum longitudinal delta V was -18 km/h (-11 mph) at 97.5 milliseconds (ms). The maximum lateral delta V was 3 km/h (2 mph) at 77.5 ms. The driver’s first stage frontal air bag deployed at 50 ms and the second stage at 90 ms. The driver’s seat-mounted side impact air bag deployed at 74 ms, the IC air bag deployed at 43 ms, and the seat belt pretensioner actuated at 37 ms. The seat belt status for the driver was “on” for the driver and “off” for the front row right seat position.

The pre-crash data for this event were as follows:

Time Stamp (sec)	Vehicle Speed km/h (mph)	Accelerator Pedal Position, %	Service Brake	ABS Activity	Stability Control	Steering Input (deg)	Engine RPM
-5	59 (37)	0	Off	Off	On Non Engaged	0	1,200
-4.5	58 (36)	0	Off	Off	On Non Engaged	0	1,200
-4	58 (36)	0	Off	Off	On Non Engaged	0	1,200
-3.5	57 (35)	0	Off	Off	On Non Engaged	0	1,200
-3	56 (35)	0	Off	Off	On Non Engaged	0	1,200
-2.5	56 (35)	0	Off	Off	On Non Engaged	0	1,200
-2	55 (34)	0	Off	Off	On Non Engaged	0	1,200
-1.5	55 (34)	0	Off	Off	On Non Engaged	0	1,200
-1	54 (34)	0	Off	Off	On Non Engaged	0	1,200
-0.5	53 (33)	0	Off	Off	On Non Engaged	0	1,200
0	53 (33)	0	Off	Off	On Non Engaged	0	1,200

The crash avoidance technology data indicated the following:

- FCW: Not Warning
- CMBS: Not Engaged
- CMBS, FCW: On
- Lane Departure Warning: Not Warning
- Road Departure Warning: Not Warning
- Road Departure Mitigation, LDW: On
- ACC: Off
- Lane Keeping Assist: Off
- Cruise Control: Off

Based on this data, it would appear that the CMBS and RDM/LDW systems were active but no warnings were issued. ACC, LKAS, and CC were not active. It should be noted that the vehicle was traveling at a speed below the RDMS performance envelope.

The second event occurred two seconds after the first event as the vehicle traveled to final rest. The maximum longitudinal delta V was -6 km/h (-4 mph) at 92.5 milliseconds (ms). The

maximum lateral delta V was 2 km/h (1 mph) at 75.0 ms. According to the report, the driver's seat belt pretensioner actuated at 40 ms despite it having actuated during the first event.

The EDR report is included as Appendix A at the end of this report.

Interior Damage

The Honda sustained minor interior damage from occupant contacts and air bag deployments. There were knee contacts to the lower left instrument panel and loading to the seat belt. The deployed air bags had been cut and removed from the vehicle by repair personnel. There was no deformation of the steering wheel rim or compression of the column. There were no deformations to any of the seats. Both doors remained closed and operational. There was no occupant contact-related glazing damage or any intrusion.

Manual Restraint Systems

The front row had driver and front right passenger lap and shoulder seat belts. The driver's belt had continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and a fixed upper anchor. The driver was restrained by the seat belt based on the observations of the SCI vehicle inspection and the EDR report. There was loading on the driver's seat belt that began 26 cm (10.2 in) from the anchorage and measured 23 cm (9.0 in). The seat belt pretensioner actuated and the belt was locked in the spooled-out position.

Supplemental Restraint Systems

The Honda had dual-stage driver's and passenger's frontal air bags, seat-mounted side impact air bags for the front rows, and IC air bags for the front and second rows. The driver's frontal, left seat-mounted side impact, and left IC air bags deployed as a result of the front to side impact with the Mercedes. The air bags were cut and removed by repair personnel.

NHTSA Recalls and Investigations

A search in October 2021 using the Honda's VIN revealed no incomplete recalls.

2019 Honda Civic Occupant

Driver Demographics

Age/sex:	42 years/male
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Unknown track position
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection and EDR report
Air bags:	Driver's frontal, seat-mounted side, and IC air bags deployed
Alcohol/drug data:	None
Egress from vehicle:	Under own power
Transport from scene:	None
Type of medical treatment:	None

Driver Injuries

No reported injuries.

Driver Kinematics

The 42-year-old male driver was seated in an unknown posture. He was wearing the manual 3-point seat belt. His hand and foot positions are unknown. There were no indications of pre-impact braking. At impact with the Mercedes, the driver's frontal air bag deployed and the seat belt actuated. The driver was displaced forward, loaded the seat belt, and probably contacted the deployed frontal air bag. Both knees contacted the lower instrument panel (Figure 7) but there were no reported injuries.

Figure 7. Lower instrument panel contacts, the 2019 Honda Civic

2015 Mercedes-Benz E63

Description

The 2015 Mercedes-Benz E63 was a 4-door sedan identified by the VIN WDDHF7GB2FBxxxxx and was manufactured in November 2014. The vehicle mileage was 174,732 km (108,574 miles). The vehicle had an 8-cylinder, 5.5-liter gasoline engine coupled to an automatic transmission and all-wheel drive.

Exterior Damage

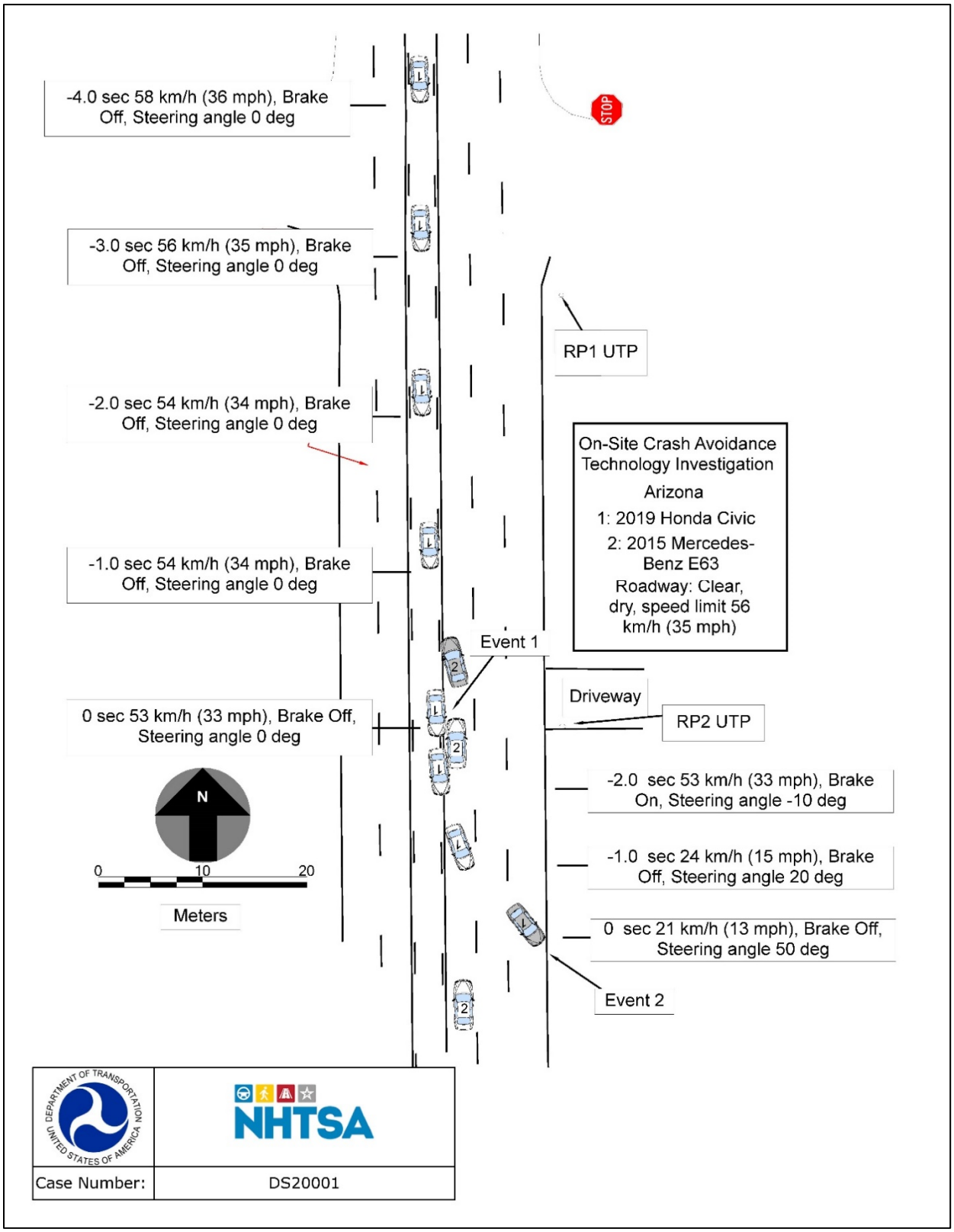
The Mercedes-Benz sustained moderate left plane damage from the impact with the left front of the Honda (Figure 8). The direct damage began at the A-pillar and extended rearward to the left rear tire. The tire was displaced rearward. The estimated CDC was 12LDEW2. The driver's seat-mounted side air bag deployed.

Figure 8. The 2015 Mercedes-Benz E63 (insurance image)

Occupant Data

According to the police report, the 32-year-old driver was belted. He was able to exit under his own power and did not report any injuries.

Crash Diagram



Appendix A: Event Data Recorder Report for 2019 Honda Civic[1]

[1] The EDR report contained in this technical report was imaged using the current version of the Bosch CDR software at the time of the vehicle inspection. The CDR report contained in the associated Crash View 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	2HGFC3B3XKH******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS20001 ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 19.3.1
Imaged with Software Licensed to (Company Name)	Company Name information was removed when this file was saved without VIN sequence number
Reported with CDR version	Crash Data Retrieval Tool 21.2.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	2

Comments

No comments entered.

Data Limitations

General Information:

These limitations are intended to assist you in reading the event data that has been imaged from the vehicle's SRS control unit. They contain general information and are not specific to this particular event. Event data should be considered in conjunction with other available physical evidence from the vehicle and scene.

Honda and Acura passenger vehicles designated as 2013 or later model year production are designed to be compatible with the Bosch CDR tool. Only some 2012 model year vehicles are compatible with the Bosch CDR tool.

Recorded Crash Events:

Data for front, side, rear and rollover events can be recorded as either non-deployment or deployment events. Both types of events can contain pre-crash and crash data.

- A non-deployment event is recorded if the change in longitudinal or lateral velocity equals or exceeds 8km/h over a 150ms timeframe or another type of non-reversible deployable restraint device other than a front, side, or side curtain airbag (e.g. seatbelt pretensioner) is commanded to deploy. Except as indicated below, non-deployment events are not locked into memory and can be over-written by subsequent non-deployment or deployment events.
- A deployment event is recorded if front airbag(s), side airbag(s), or side curtain airbag(s) are commanded to deploy. Deployment events are locked into memory and cannot be over-written.

The SRS control unit typically records only one event. Two events can be recorded if the T0 (time zero) values for each event occur within 5 seconds of each other. Therefore, a non-deployment event can be recorded and locked if it occurs within 5 seconds of a deployment event.

T0 is established by whichever of the following occurs first: (1) the change in longitudinal velocity at the SRS control unit equals or exceeds 0.8km/h over a 20ms timeframe; or (2) the change in lateral velocity at the SRS control unit equals or exceeds 0.8km/h over a 5ms timeframe; or (3) the occupant restraint control algorithm is activated; or (4) a commanded deployment of any type of non-reversible deployable restraint device (e.g. airbag or seatbelt pretensioner). If the time to deploy equals 0, then the command to deploy occurred at T0 or the device was not commanded to deploy during the event.

TEnd (end of event) is established by whichever of the following occurs first: (1) the change in longitudinal and lateral Delta V equals or falls below 0.8km/h over a 20ms timeframe; or (2) the occupant restraint control algorithm resets; or (3) time from T0 exceeds 300ms.

Data:

- Data recorded by the SRS control unit and imaged by the CDR tool is displayed relative to T0, not the time at which the vehicle made contact with another vehicle or object.
- Pre-crash data is recorded at 2 samples per second within the 5 seconds before T0. The sampling point at 0.0 is taken at T0 and is asynchronous with the other sample points. The time between -0.5 and 0.0 is not recorded and is between 1 and 500ms.
- Delta V data is recorded at 100 samples per second from T0 to 250ms or T0 to TEnd plus 30ms.
- Acceleration data is recorded at 100 samples per second from T0 to 250ms.
- Delta V, longitudinal reflects the change in velocity that the SRS control unit experienced in the longitudinal direction during the recorded portion of the event and is not the speed the vehicle was traveling before the event.
- Depending on the severity of the event and the accelerometer characteristics, saturation of the SRS control unit longitudinal or lateral accelerometers may occur, decreasing the recorded Delta V value.

- Time, accelerometer range exceeded is recorded if saturation of the SRS control unit longitudinal, lateral and/or normal (vertical) accelerometer occurs. The recorded data is the time at which the sensor range is first exceeded.
- The maximum recording capability of Deployment Command Data is 254ms or 255ms depending on vehicle model. A recorded value of 254ms or 255ms may indicate that the recording maximum was exceeded. In this case, the deployment command may have occurred between the recorded time and TEnd.
- Speed, vehicle indicated data is the speed indicated to the driver by the speedometer, not actual vehicle ground speed. Data accuracy can be affected by various factors, including but not limited to the following:
    - Significant changes in tire size from the factory setting
    - Wheel lockup or spin
    - Data latency or filtering and hysteresis within the speedometer module
- Accelerator pedal position, percent full is the ratio of accelerator pedal position compared to the fully depressed position.
- PCM (Powertrain Control Module) derived accelerator pedal position, percent full may differ from the accelerator pedal position, percent full under circumstances such as brake override activation or cruise control system engagement. These circumstances are based on vehicle equipment application and vary by model.
- Steering input angle is recorded in 5 degree increments.
- Side air bag suppression system status, right front passenger is recorded when the vehicle is equipped with the Occupant Position Detection System (OPDS).
- Occupant size classification, right front passenger airbag suppressed data is recorded as yes (suppressed) if the front passenger seat weight sensor system determined the passenger seat was empty or occupied by a child-size occupant.
- EV mode data records the vehicle powertrain status, not a driver selected operation mode. EV mode is recorded as On when the vehicle is moving and the internal combustion engine is not operating. EV mode may be recorded as On or Off when the vehicle is stopped.
- If power to the SRS control unit is lost during an event, all or part of the data may not be recorded.

Roll Rate Data:
- Vehicle roll rate data is recorded separately from the non-deployment and deployment events as described above. Therefore, the T0 for the roll rate data may differ from the T0 for the other data in this report.
- Roll rate recording trigger (T0) is established by whichever of the following occurs first: (1) a rollover algorithm ON judgment (SRS control unit decision to command deployment);, or (2) a change in relative roll angle at the SRS control unit equal to or exceeding 30 degrees (roll angle is not measured, but is calculated from the roll rate data); or (3) the rollover algorithm is activated.
- Once a recording trigger has been met, roll rate data is recorded for one rollover event at 10 samples per second from 1 second before to 2 seconds after T0. If a roll angle trigger is satisfied without a rollover algorithm ON judgment, the recorded roll rate data is unlocked and can be over-written by a subsequent rollover event. Roll rate data triggered by or recorded during a rollover algorithm ON judgment is locked into memory and cannot be over-written.
- If roll rate is detected at the SRS control unit during a non-deployment or deployment event but the recording trigger has not been satisfied, no roll rate data will be recorded. A graph of roll rate data will only be present in this report if roll rate data is recorded.

Data Element Sign Convention:
Except as noted below, all data is displayed in SAE J211 sign convention. The following table provides an explanation of the sign notation for data elements that may be included in this CDR report. All directional references to sign notation are from the perspective of the driver when seated in the vehicle facing the direction of forward vehicle travel.

Data element name	Positive sign indicates
Longitudinal Acceleration	Forward direction acceleration
Delta-V, Longitudinal	Forward direction acceleration
Lateral Acceleration	Left to right direction acceleration
Delta-V, Lateral	Left to right direction acceleration
Normal (Vertical) Acceleration	Downward direction acceleration
Vehicle Roll Rate*	See roll rate graph and data (if recorded)
Steering Input Angle*	Left Turn

*Not SAE J211 sign convention

Data Source:
All recorded data is measured and calculated within the SRS control unit except for the following parameters (if applicable) which are transmitted via the vehicle's communication network to the SRS control unit:
- Speed, vehicle indicated
- Accelerator pedal position, percent full
- Service brake
- ABS activity
- Stability control
- Steering input angle
- Engine RPM
- PCM derived accelerator pedal position, percent full
- EV mode
- Forward Collision Warning
- Collision Mitigation Braking System information
- Lane Keeping Assist System information
- Lane Departure Warning
- Road Departure Mitigation information
- Cruise Control status
- Adaptive Cruise Control status

Depending on vehicle feature content, capability, or conditions described above, the following items may not be recorded. If these items are not recorded, they will not be present in this document.
- EV mode

- Forward Collision Warning
- Collision Mitigation Braking System information
- Lane Keeping Assist System information
- Lane Departure Warning
- Road Departure Mitigation information
- Cruise Control status
- Adaptive Cruise Control status

Hexadecimal Data:
All data that has been specified for imaging is shown in the hexadecimal data section of this report. However, not all of this data is translated by the CDR tool. The SRS control unit may contain additional data that is not retrievable by the CDR tool.

Data Imaging:
If the SRS control unit is imaged outside of the vehicle, ensure that it is not moved, tilted or turned while connected to the CDR tool. Also, after imaging is complete, wait 3 minutes after removing the CDR tool before moving the SRS control unit. Not following this guideline could cause current non-deployment event data to be overwritten and a new event to be recorded. Current fault status could also be altered if the SRS control unit is imaged outside of the vehicle.

04002_HondaSRS_GEN2_r002

System Status at Retrieval

EDR Version	1.3.2.0

System Status at Event (Event Record 1)

Multi-Event, Number of Events (1, 2)	1
Complete File Recorded (Yes/No)	Yes
Ignition Cycle, Download	192
Maximum Delta-V, Longitudinal (MPH [km/h])	-11 [-18]
Time, Maximum Delta-V, Longitudinal (msec)	97.5
Maximum Delta-V, Lateral (MPH [km/h])	2 [3]
Time, Maximum Delta-V, Lateral (msec)	77.5
Time, Maximum Delta-V, Resultant (msec)	97.5
Time, Accelerometer Range Exceeded, Longitudinal (msec)	0
Time, Accelerometer Range Exceeded, Lateral (msec)	44.5
Time, Accelerometer Range Exceeded, Normal (msec)	0

Deployment Command Data (Event Record 1)

Pretensioner Deployment, Time to Fire, Driver (msec)	37
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to Deploy First Stage, Driver (msec)	50
Frontal Air Bag Deployment, Time to Deploy First Stage, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (msec)	90
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (msec)	0
Side Air Bag Deployment, Time to Deploy, Driver (msec)	74
Side Air Bag Deployment, Time to Deploy, Right Front Passenger (msec)	0
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Driver Side (msec)	43
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Right Side (msec)	0
Frontal Air Bag Deployment, 2nd Stage Disposal, Driver (Yes/No)	No
Frontal Air Bag Deployment, 2nd Stage Disposal, Right Front Passenger (Yes/No)	No

Pre-Crash Data -1 sec (Event Record 1)

Safety Belt Status, Driver	On
Safety Belt Status, Right Front Passenger	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Occupant Size Classification, Right Front Passenger Airbag Suppressed (Yes/No)	Yes
Frontal Air Bag Warning Lamp (On, Off)	Off
Ignition Cycle, Crash	178

Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 1) - Table 1 of 3

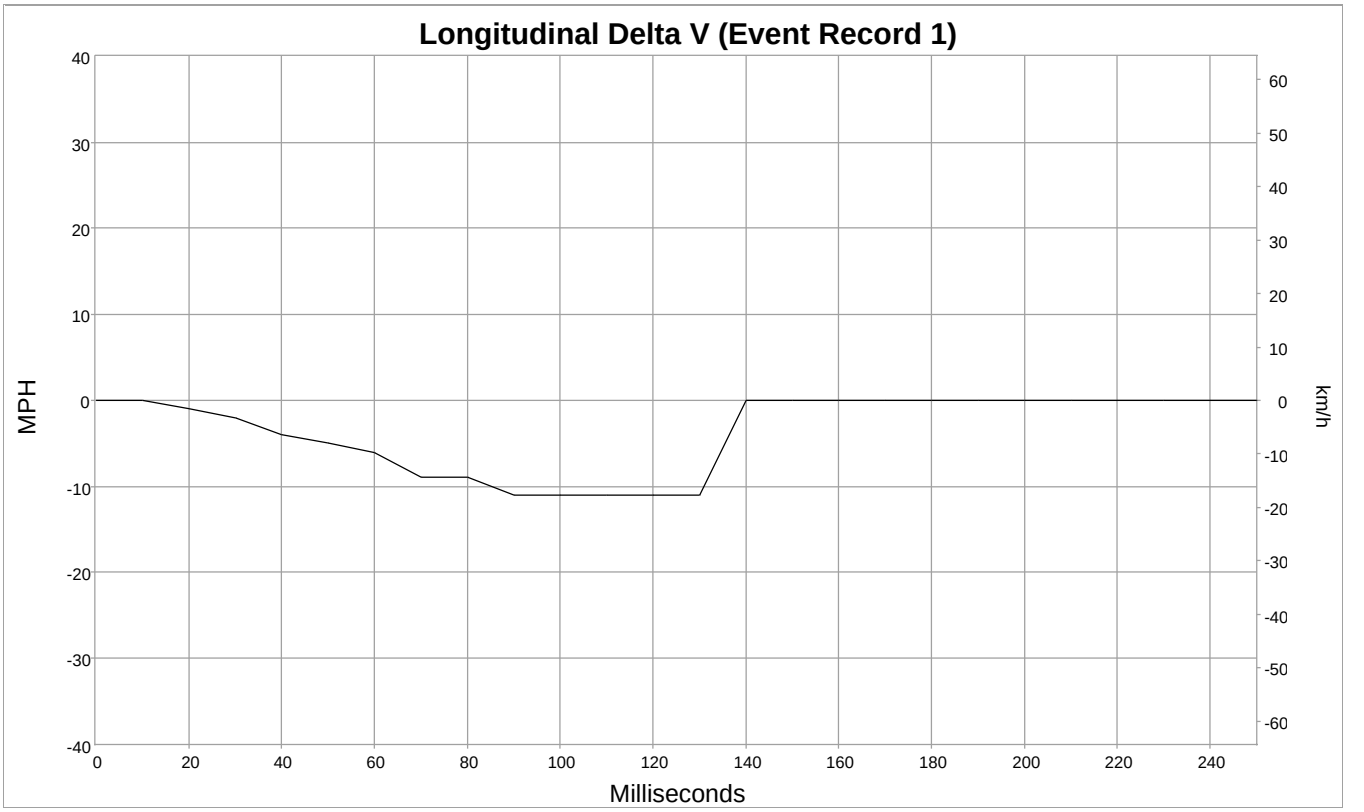
Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal Position, % full	Service Brake (On, Off)	ABS Activity (On, Off)	Stability Control (On, Off, Engaged)	Steering Input (deg)	Engine RPM
-5.0	37 [59]	0	Off	Off	On Non-Engaged	0	1,200
-4.5	36 [58]	0	Off	Off	On Non-Engaged	0	1,200
-4.0	36 [58]	0	Off	Off	On Non-Engaged	0	1,200
-3.5	35 [57]	0	Off	Off	On Non-Engaged	0	1,200
-3.0	35 [56]	0	Off	Off	On Non-Engaged	0	1,200
-2.5	35 [56]	0	Off	Off	On Non-Engaged	0	1,200
-2.0	34 [55]	0	Off	Off	On Non-Engaged	0	1,200
-1.5	34 [55]	0	Off	Off	On Non-Engaged	0	1,200
-1.0	34 [54]	0	Off	Off	On Non-Engaged	0	1,200
-0.5	33 [53]	0	Off	Off	On Non-Engaged	0	1,200
0.0	33 [53]	0	Off	Off	On Non-Engaged	0	1,200

Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 1) - Table 2 of 3

Time Stamp (sec)	PCM Derived Accelerator Pedal Position, % full	Forward Collision Warning (Not Warning/ Warning)	Collision Mitigation Braking System (Not Engaged/ Engaged)	Collision Mitigation Braking System, Forward Collision Warning (On/Off)	Lane Departure Warning (Not Warning/ Warning)	Road Departure Mitigation (Not Engaged/ Engaged)	Road Departure Mitigation, Lane Departure Warning (On/Off)
-5.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-4.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-4.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-3.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-3.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-2.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-2.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-1.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-1.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-0.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
0.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On

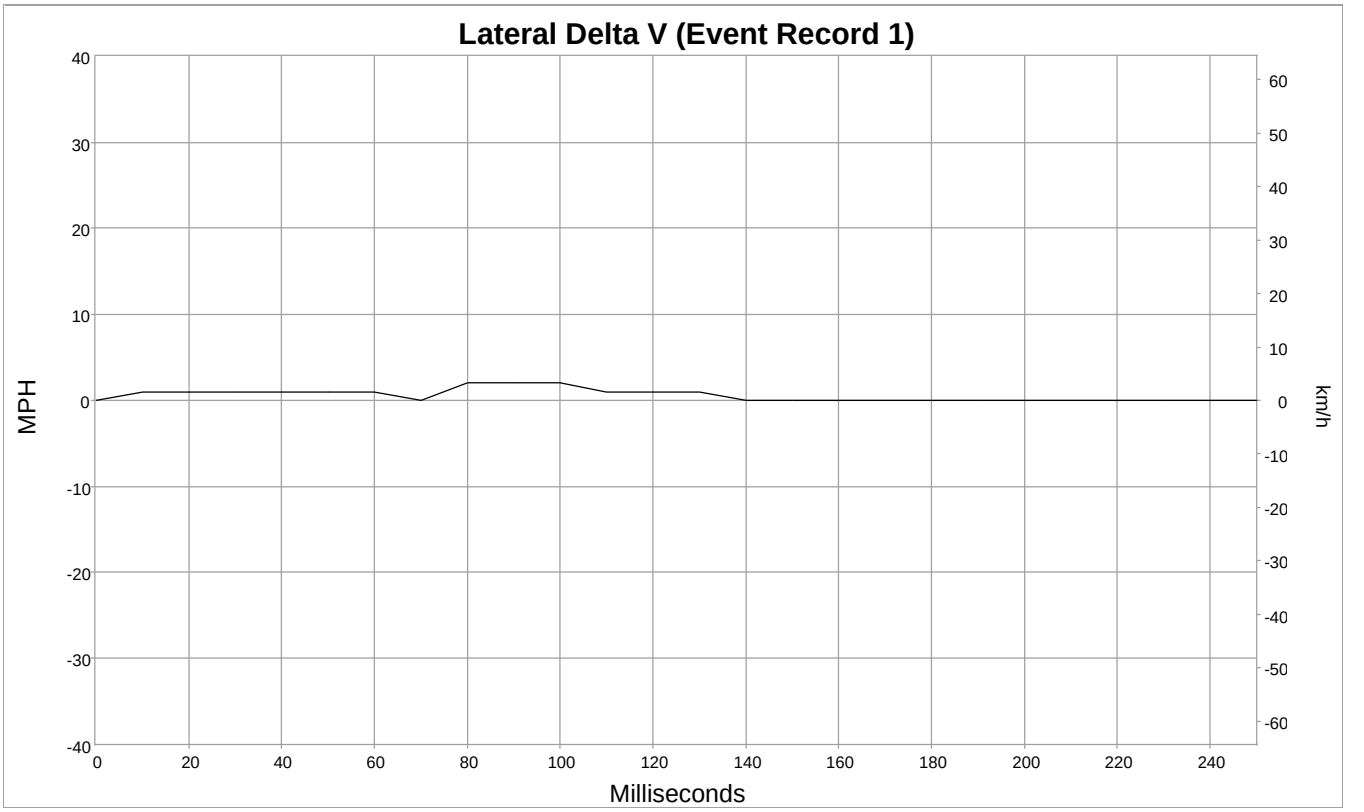
Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 1) - Table 3 of 3

Time Stamp (sec)	Adaptive Cruise Control (Not Engaged/ Engaged)	Adaptive Cruise Control (On/Off)	Lane Keeping Assist (Not Engaged/ Engaged)	Lane Keeping Assist (On/Off)	Cruise Control (Not Engaged/ Engaged)	Cruise Control (On/Off)
-5.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-4.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-4.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-3.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-3.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-2.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-2.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-1.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-1.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-0.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
0.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off



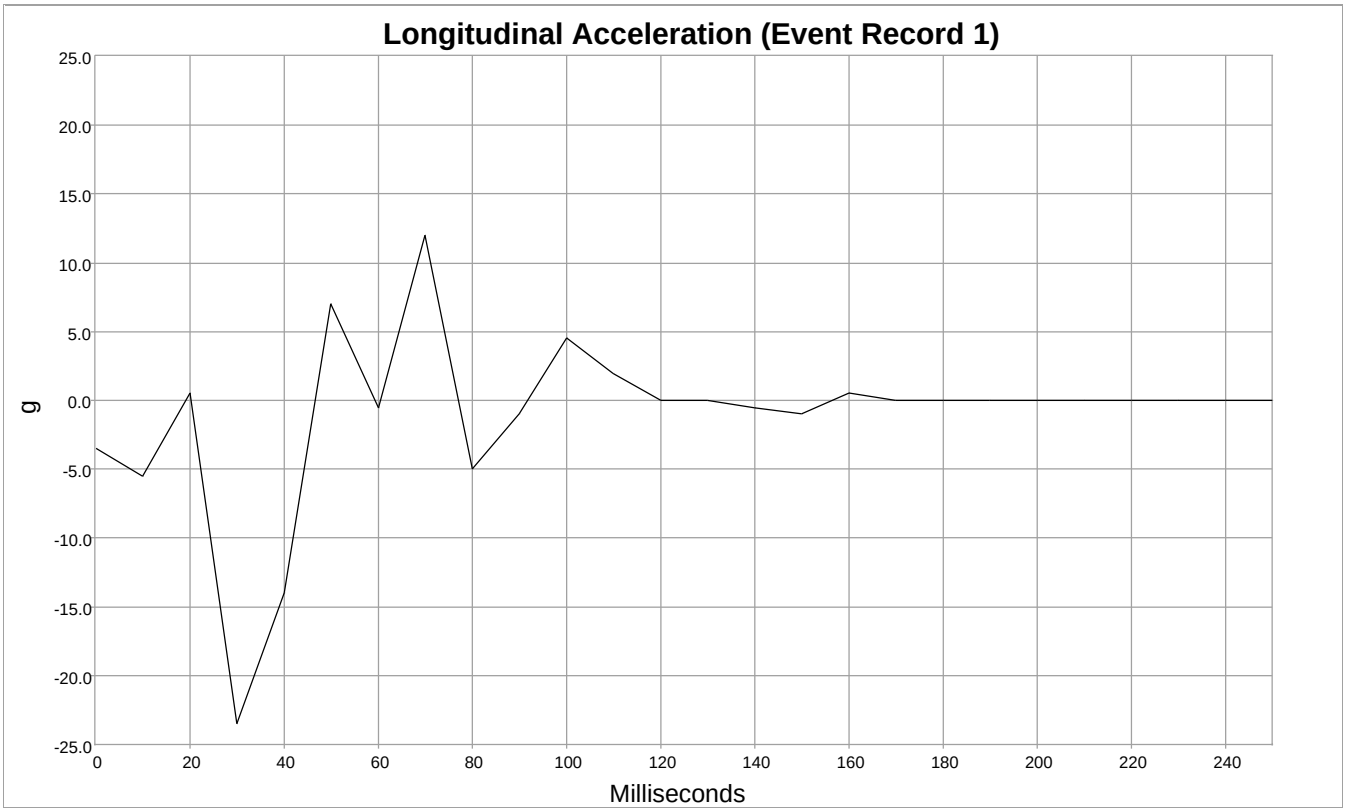
Longitudinal Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	0 [0]
20	-1 [-1]
30	-2 [-3]
40	-4 [-7]
50	-5 [-8]
60	-6 [-9]
70	-9 [-14]
80	-9 [-15]
90	-11 [-17]
100	-11 [-17]
110	-11 [-17]
120	-11 [-17]
130	-11 [-17]
140	0 [0]
150	0 [0]
160	0 [0]
170	0 [0]
180	0 [0]
190	0 [0]
200	0 [0]
210	0 [0]
220	0 [0]
230	0 [0]
240	0 [0]
250	0 [0]



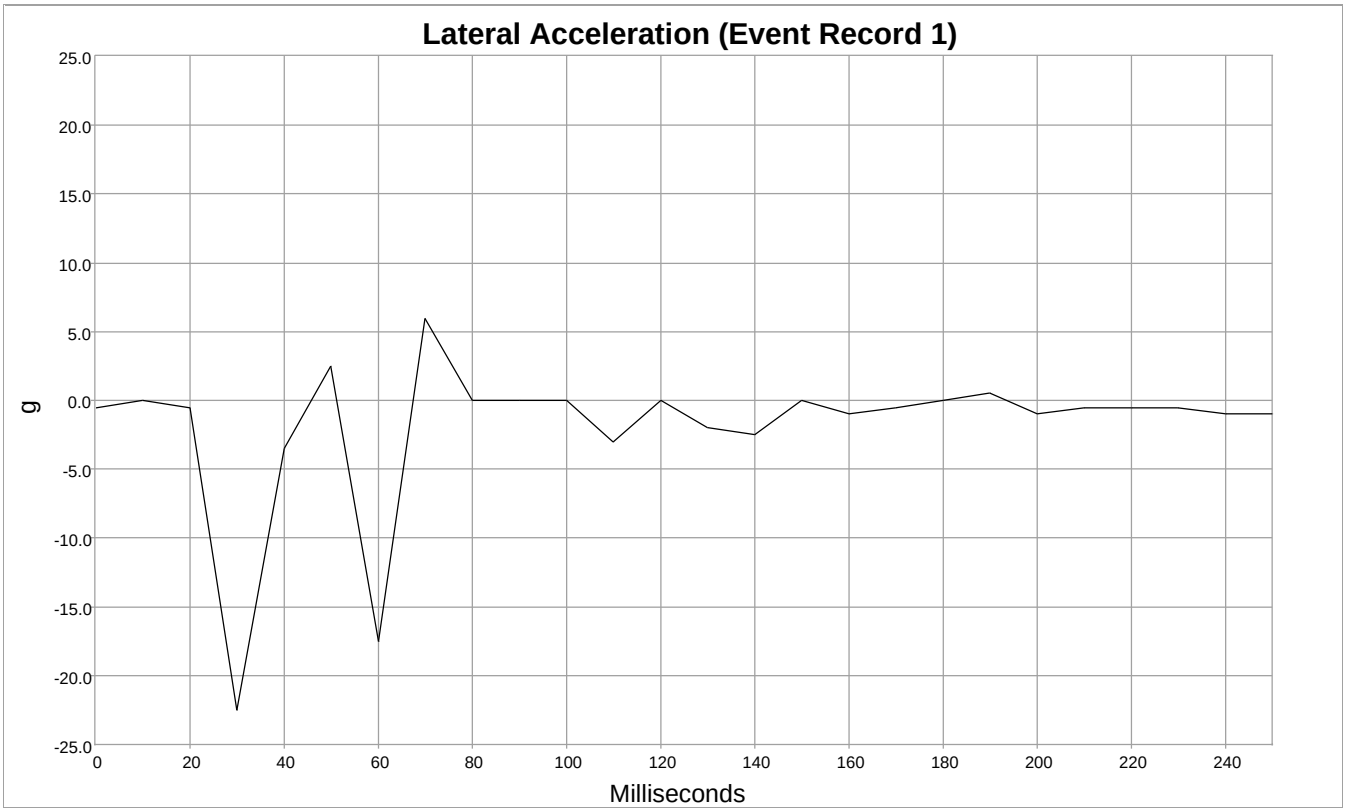
Lateral Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	1 [2]
20	1 [2]
30	1 [2]
40	1 [1]
50	1 [1]
60	1 [1]
70	0 [0]
80	2 [3]
90	2 [3]
100	2 [3]
110	1 [2]
120	1 [1]
130	1 [1]
140	0 [0]
150	0 [0]
160	0 [0]
170	0 [0]
180	0 [0]
190	0 [0]
200	0 [0]
210	0 [0]
220	0 [0]
230	0 [0]
240	0 [0]
250	0 [0]



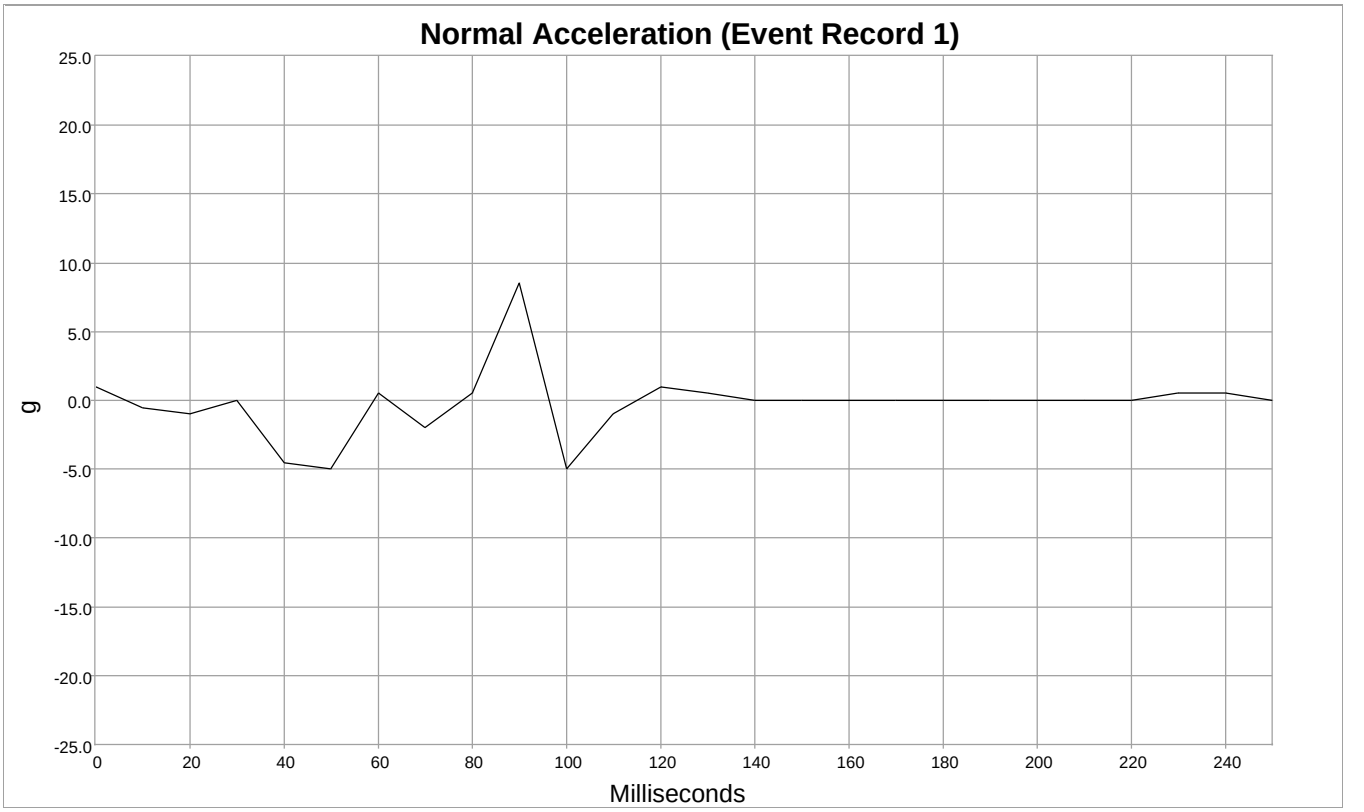
Longitudinal Acceleration (Event Record 1)

Time (msec)	g
0	-3.5
10	-5.5
20	0.5
30	-23.5
40	-14.0
50	7.0
60	-0.5
70	12.0
80	-5.0
90	-1.0
100	4.5
110	2.0
120	0.0
130	0.0
140	-0.5
150	-1.0
160	0.5
170	0.0
180	0.0
190	0.0
200	0.0
210	0.0
220	0.0
230	0.0
240	0.0
250	0.0



Lateral Acceleration (Event Record 1)

Time (msec)	g
0	-0.5
10	0.0
20	-0.5
30	-22.5
40	-3.5
50	2.5
60	-17.5
70	6.0
80	0.0
90	0.0
100	0.0
110	-3.0
120	0.0
130	-2.0
140	-2.5
150	0.0
160	-1.0
170	-0.5
180	0.0
190	0.5
200	-1.0
210	-0.5
220	-0.5
230	-0.5
240	-1.0
250	-1.0



Normal Acceleration (Event Record 1)

Time (msec)	g
0	1.0
10	-0.5
20	-1.0
30	0.0
40	-4.5
50	-5.0
60	0.5
70	-2.0
80	0.5
90	8.5
100	-5.0
110	-1.0
120	1.0
130	0.5
140	0.0
150	0.0
160	0.0
170	0.0
180	0.0
190	0.0
200	0.0
210	0.0
220	0.0
230	0.5
240	0.5
250	0.0

System Status at Event (Event Record 2)

Multi-Event, Number of Events (1, 2)	2
Complete File Recorded (Yes/No)	Yes
Ignition Cycle, Download	192
Time from Event 1 to 2 (sec)	2.0
Maximum Delta-V, Longitudinal (MPH [km/h])	-4 [-6]
Time, Maximum Delta-V, Longitudinal (msec)	92.5
Maximum Delta-V, Lateral (MPH [km/h])	1 [1]
Time, Maximum Delta-V, Lateral (msec)	75.0
Time, Maximum Delta-V, Resultant (msec)	92.5
Time, Accelerometer Range Exceeded, Longitudinal (msec)	0
Time, Accelerometer Range Exceeded, Lateral (msec)	0
Time, Accelerometer Range Exceeded, Normal (msec)	0

Deployment Command Data (Event Record 2)

Pretensioner Deployment, Time to Fire, Driver (msec)	40
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to Deploy First Stage, Driver (msec)	0
Frontal Air Bag Deployment, Time to Deploy First Stage, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (msec)	0
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (msec)	0
Side Air Bag Deployment, Time to Deploy, Driver (msec)	0
Side Air Bag Deployment, Time to Deploy, Right Front Passenger (msec)	0
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Driver Side (msec)	0
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Right Side (msec)	0
Frontal Air Bag Deployment, 2nd Stage Disposal, Driver (Yes/No)	No
Frontal Air Bag Deployment, 2nd Stage Disposal, Right Front Passenger (Yes/No)	No

Pre-Crash Data -1 sec (Event Record 2)

Safety Belt Status, Driver	On
Safety Belt Status, Right Front Passenger	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Occupant Size Classification, Right Front Passenger Airbag Suppressed (Yes/No)	Yes
Frontal Air Bag Warning Lamp (On, Off)	On
Ignition Cycle, Crash	178

Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 2) - Table 1 of 3

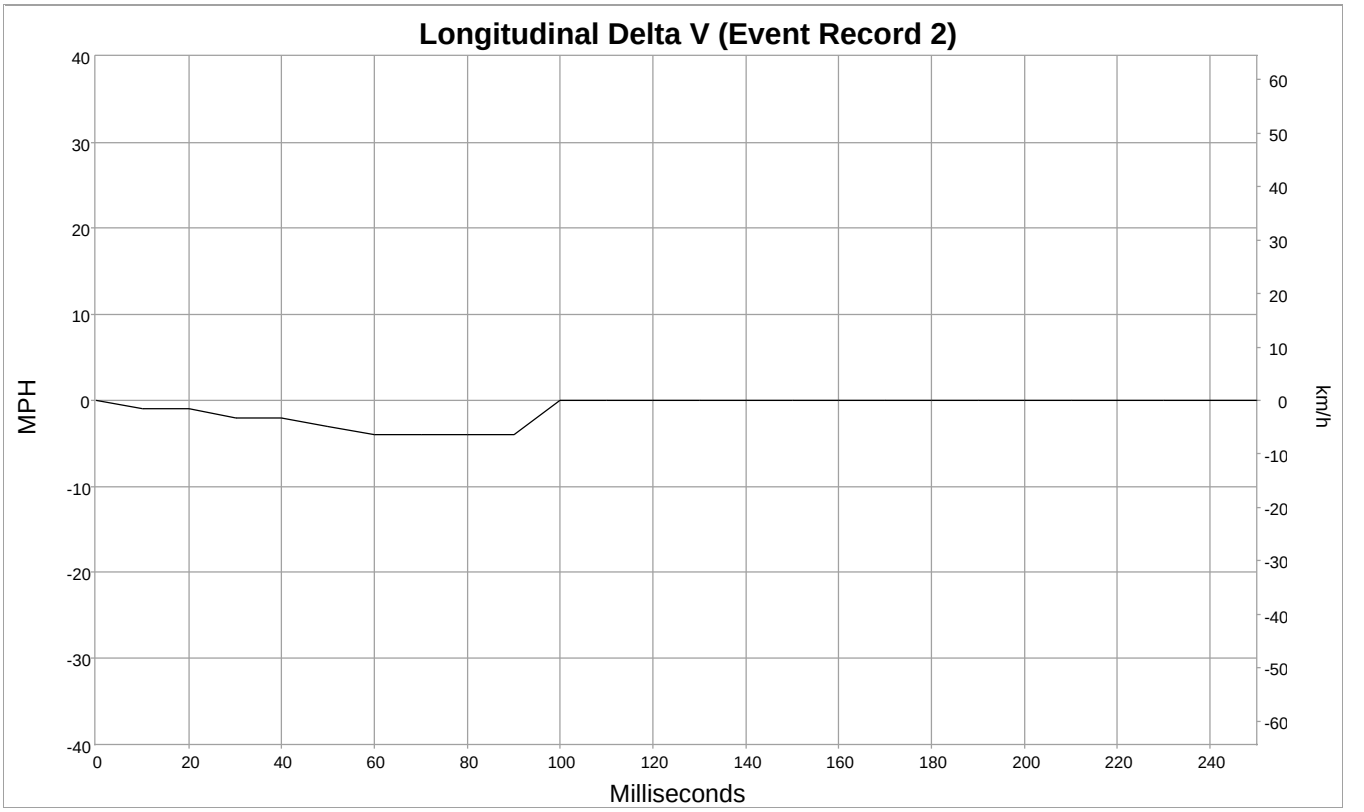
Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal Position, % full	Service Brake (On, Off)	ABS Activity (On, Off)	Stability Control (On, Off, Engaged)	Steering Input (deg)	Engine RPM
-5.0	35 [56]	0	Off	Off	On Non-Engaged	0	1,200
-4.5	35 [56]	0	Off	Off	On Non-Engaged	0	1,200
-4.0	34 [55]	0	Off	Off	On Non-Engaged	0	1,200
-3.5	34 [55]	0	Off	Off	On Non-Engaged	0	1,200
-3.0	34 [54]	0	Off	Off	On Non-Engaged	0	1,200
-2.5	33 [53]	0	Off	Off	On Non-Engaged	0	1,200
-2.0	33 [53]	0	On	On	On Engaged	-10	700
-1.5	11 [18]	0	Off	On	On Engaged	-20	900
-1.0	15 [24]	2	Off	Off	On Engaged	20	1,000
-0.5	13 [21]	17	Off	Off	On Non-Engaged	55	1,000
0.0	13 [21]	7	Off	On	On Non-Engaged	50	1,100

Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 2) - Table 2 of 3

Time Stamp (sec)	PCM Derived Accelerator Pedal Position, % full	Forward Collision Warning (Not Warning/ Warning)	Collision Mitigation Braking System (Not Engaged/ Engaged)	Collision Mitigation Braking System, Forward Collision Warning (On/Off)	Lane Departure Warning (Not Warning/ Warning)	Road Departure Mitigation (Not Engaged/ Engaged)	Road Departure Mitigation, Lane Departure Warning (On/Off)
-5.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-4.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-4.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-3.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-3.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-2.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-2.0	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-1.5	0	Not warning	Not engaged	On	Not warning	Not engaged	On
-1.0	2	Not warning	Not engaged	On	Not warning	Not engaged	On
-0.5	17	Not warning	Not engaged	On	Not warning	Not engaged	On
0.0	7	Not warning	Not engaged	On	Not warning	Not engaged	On

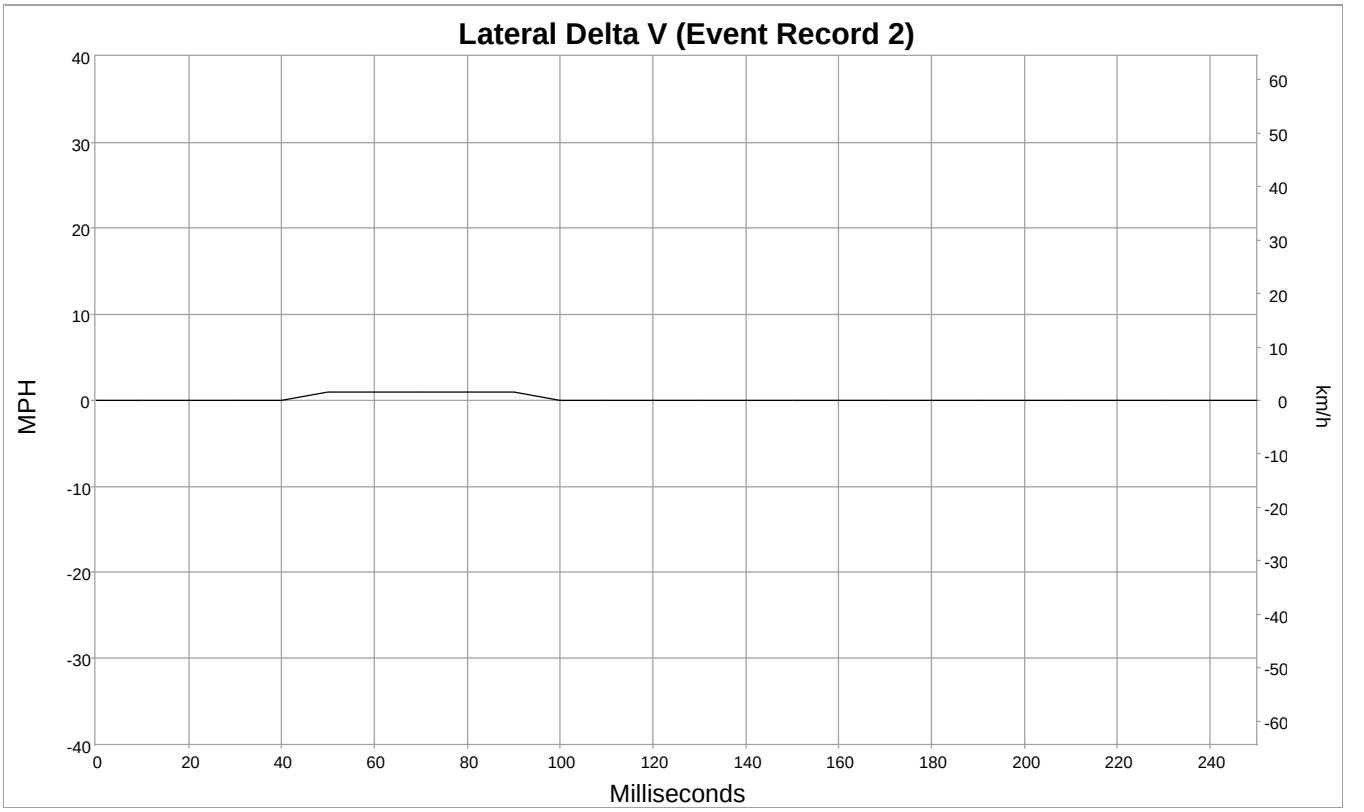
Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 2) - Table 3 of 3

Time Stamp (sec)	Adaptive Cruise Control (Not Engaged/ Engaged)	Adaptive Cruise Control (On/Off)	Lane Keeping Assist (Not Engaged/ Engaged)	Lane Keeping Assist (On/Off)	Cruise Control (Not Engaged/ Engaged)	Cruise Control (On/Off)
-5.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-4.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-4.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-3.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-3.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-2.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-2.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-1.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-1.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off
-0.5	Not engaged	Off	Not engaged	Off	Not Engaged	Off
0.0	Not engaged	Off	Not engaged	Off	Not Engaged	Off



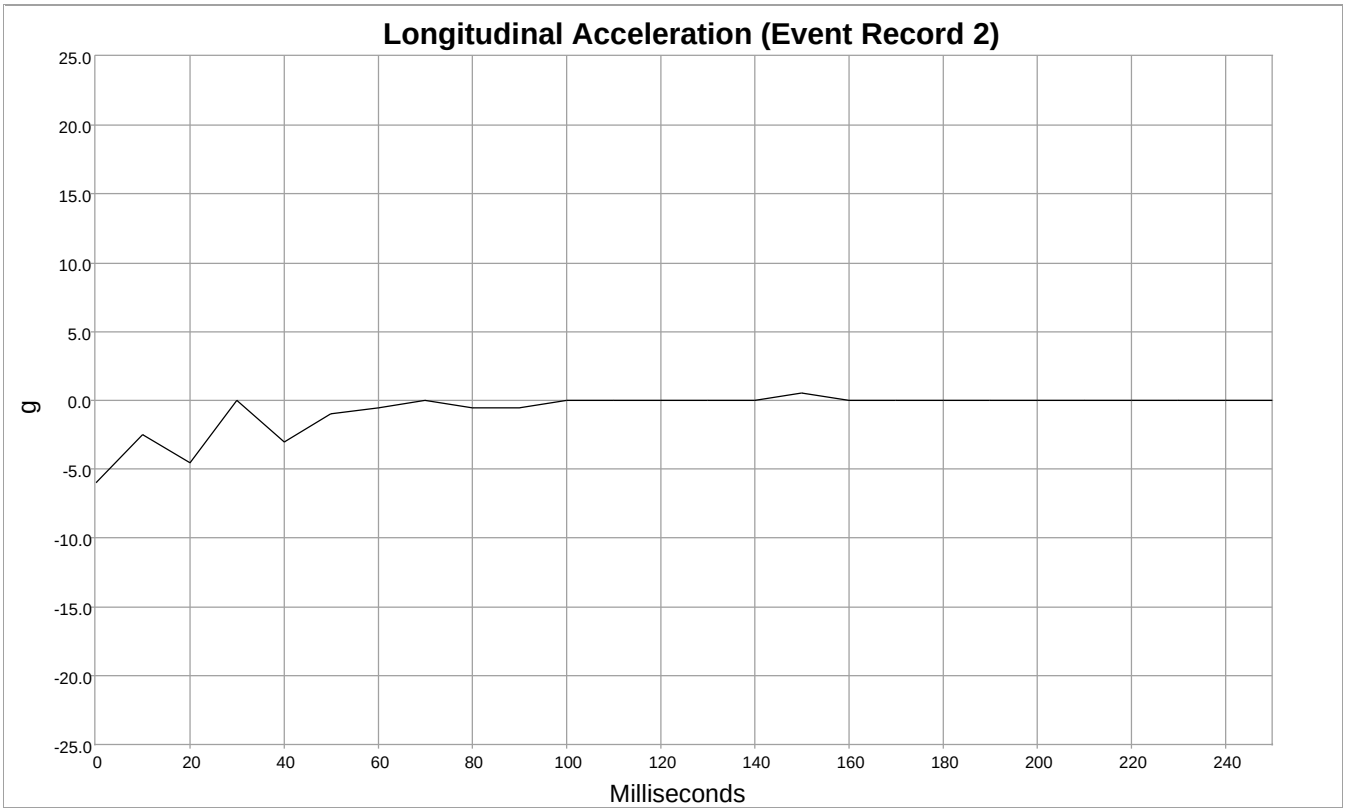
Longitudinal Delta V (Event Record 2)

Time (msec)	MPH [km/h]
0	0 [0]
10	-1 [-1]
20	-1 [-1]
30	-2 [-4]
40	-2 [-4]
50	-3 [-5]
60	-4 [-6]
70	-4 [-6]
80	-4 [-6]
90	-4 [-6]
100	0 [0]
110	0 [0]
120	0 [0]
130	0 [0]
140	0 [0]
150	0 [0]
160	0 [0]
170	0 [0]
180	0 [0]
190	0 [0]
200	0 [0]
210	0 [0]
220	0 [0]
230	0 [0]
240	0 [0]
250	0 [0]



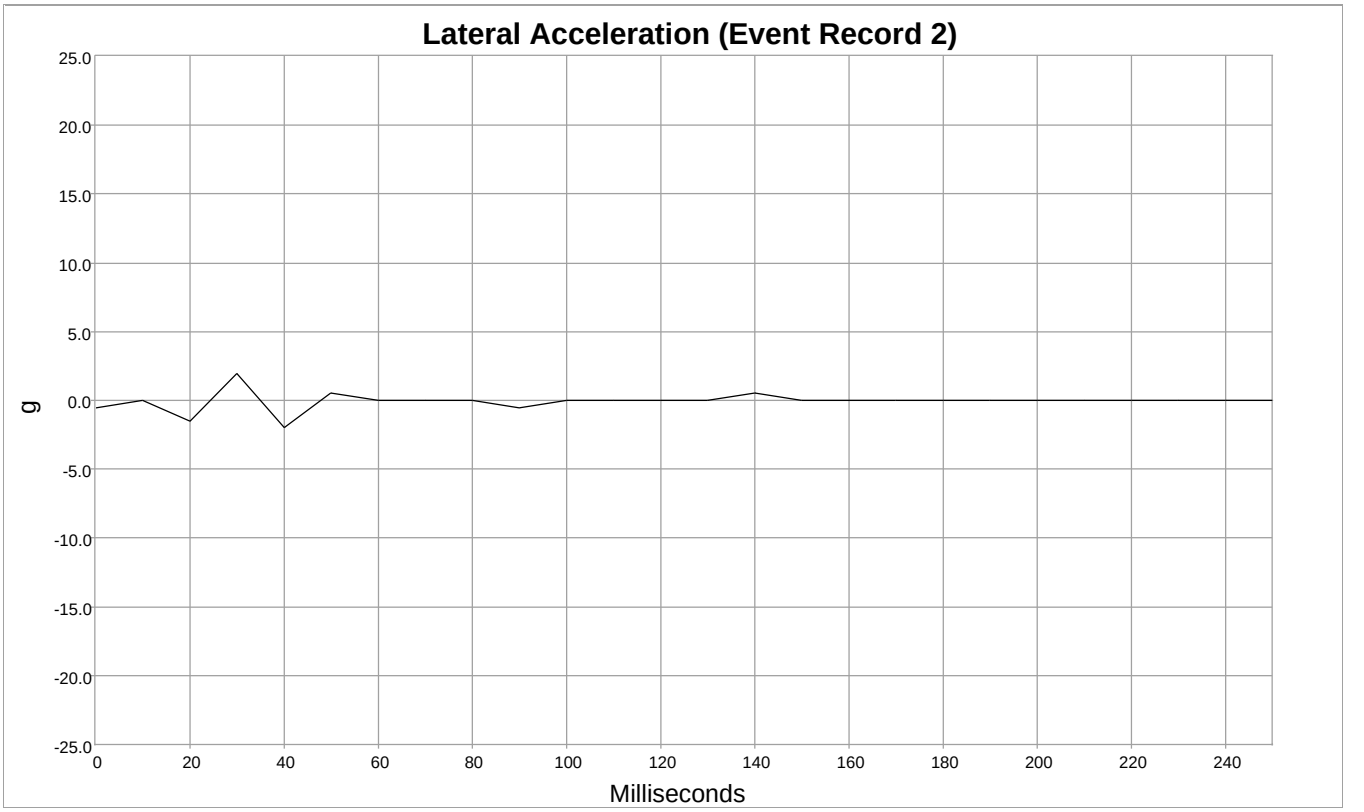
Lateral Delta V (Event Record 2)

Time (msec)	MPH [km/h]
0	0 [0]
10	0 [0]
20	0 [0]
30	0 [0]
40	0 [0]
50	1 [1]
60	1 [1]
70	1 [1]
80	1 [1]
90	1 [1]
100	0 [0]
110	0 [0]
120	0 [0]
130	0 [0]
140	0 [0]
150	0 [0]
160	0 [0]
170	0 [0]
180	0 [0]
190	0 [0]
200	0 [0]
210	0 [0]
220	0 [0]
230	0 [0]
240	0 [0]
250	0 [0]



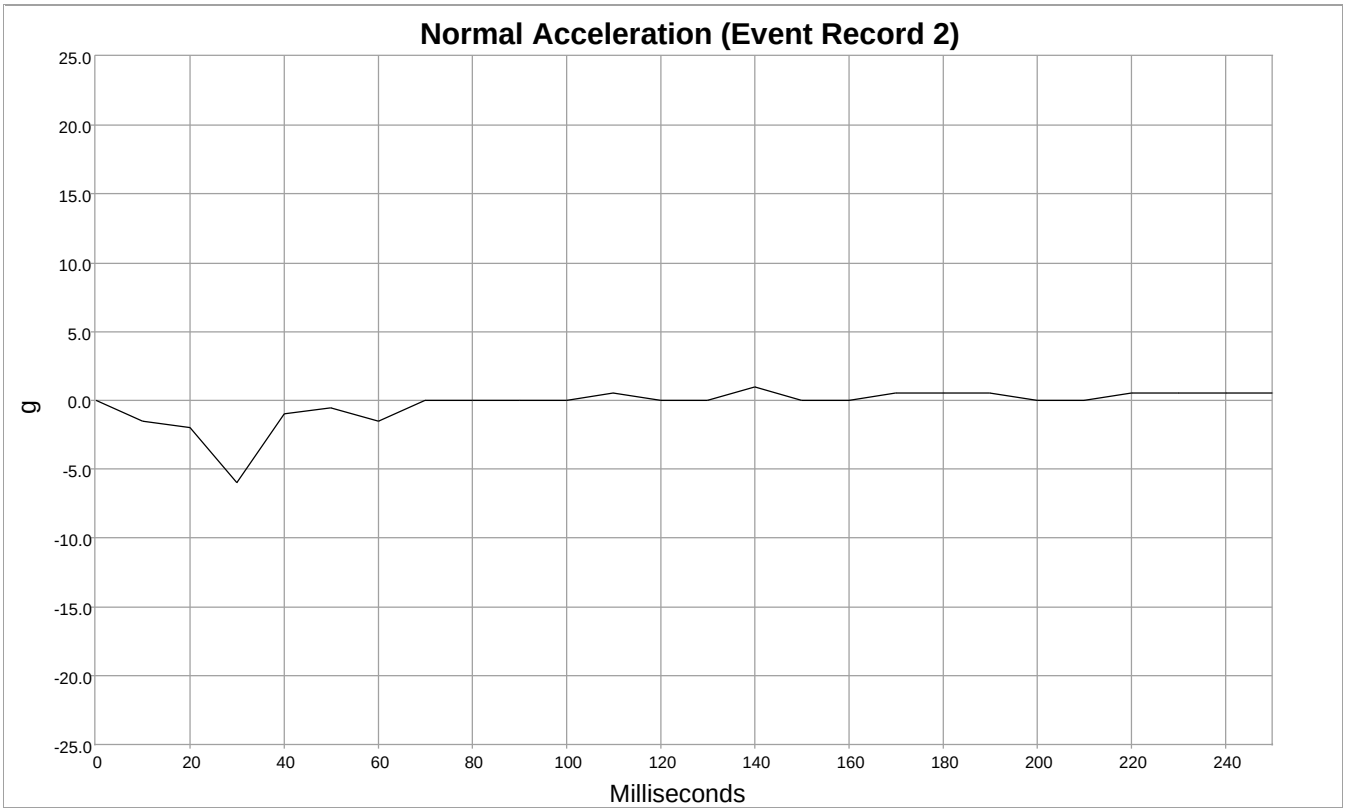
Longitudinal Acceleration (Event Record 2)

Time (msec)	g
0	-6.0
10	-2.5
20	-4.5
30	0.0
40	-3.0
50	-1.0
60	-0.5
70	0.0
80	-0.5
90	-0.5
100	0.0
110	0.0
120	0.0
130	0.0
140	0.0
150	0.5
160	0.0
170	0.0
180	0.0
190	0.0
200	0.0
210	0.0
220	0.0
230	0.0
240	0.0
250	0.0



Lateral Acceleration (Event Record 2)

Time (msec)	g
0	-0.5
10	0.0
20	-1.5
30	2.0
40	-2.0
50	0.5
60	0.0
70	0.0
80	0.0
90	-0.5
100	0.0
110	0.0
120	0.0
130	0.0
140	0.5
150	0.0
160	0.0
170	0.0
180	0.0
190	0.0
200	0.0
210	0.0
220	0.0
230	0.0
240	0.0
250	0.0



Normal Acceleration (Event Record 2)

Time (msec)	g
0	0.0
10	-1.5
20	-2.0
30	-6.0
40	-1.0
50	-0.5
60	-1.5
70	0.0
80	0.0
90	0.0
100	0.0
110	0.5
120	0.0
130	0.0
140	1.0
150	0.0
160	0.0
170	0.5
180	0.5
190	0.5
200	0.0
210	0.0
220	0.5
230	0.5
240	0.5
250	0.5

Hexadecimal Data

DID #	Data
$8000	21 4D 37 36 01 33 00 11 00 55 00 00 11 33 00 00 20 0F 00 E9 02 06 22 00 00 00 00 00 00 00 00 00 11 11 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 E3
$8020	01 03 00 00 00 00 00 00 00 00 00 00 00 00 00 FC
$8021	AA 00 01 02 00 14 00 00 00 00 00 3F 00 C0 AA AA
$8022	AA 00 C0 78 66 00 00 00 25 00 00 00 00 00 00 00 00 32 00 5A 00 00 00 00 00 4A 00 00 00 2B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 11 00 00 00 00 00 00 00 00 00 00 00 00 00 00 81
$8023	AA 00 C0 78 66 00 00 00 28 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 11 00 00 00 00 00 00 00 00 00 00 00 00 00 00 7F
$8024	AA 00 FF 00 00 40 43 02 12 12 11 00 00 B2 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 EB
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$8026	AA 01 FC D0 35 00 00 77 33 00 30 00 00 00 00 00 3B 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 3A 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 3A 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 39 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 38 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 38 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 37 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 37 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 36 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 35 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 00 35 00 00 0C 00 00 00 00 00 11 00 10 00 00 00 25
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$802A	AA 00 00 02 02 02 01 01 01 00 03 03 03 02 01 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

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                20 0F 00 0B 11 00 00 00 00 00 00 00 00 00 00 00
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January 2022

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of Transportation

**National Highway
Traffic Safety
Administration**

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