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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 investigation of the crash of a 2018 Honda CR-V with standard crash avoidance technology during the day in wet conditions in January 2020 in a rural area in the State of Washington. The investigation was intended to determine what role, if any, the crash avoidance technology played in the crash. The driver was negotiating a right curve when, for unknown reasons, the Honda departed the roadway on the right edge before returning to the roadway, crossing over both lanes, and departing the roadway on the left edge. After the Honda traveled down a descending embankment, the vehicle's front plane struck a tree, where it came to rest. The belted 73-year-old female driver sustained fatal injuries and was declared deceased on-scene. The investigation determined that the vehicle's road departure mitigation (RDM) system and lane keeping assist system (LKAS) had been turned off by the owner prior to the crash and did not activate.

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Special Crash Investigations
On-Site Crash Avoidance Technology Investigation
Case Number: DS20007
Vehicle: 2018 Honda CR-V
Location: Washington
Crash Date: January 2020

Background

This report documents the investigation of a crash involving a 2018 Honda CR-V (Figure 1) with standard crash avoidance technology, including adaptive cruise control (ACC), a road departure mitigation (RDM) system with lane departure warning (LDW), a lane keeping assist system (LKAS), a collision mitigation braking system (CMBS), vehicle stability assist (VSA), blind spot information (BSI), and a rear visibility system (RVS). According to the Honda owner's manual, the RDM alerts and helps to assist the driver when the system detects a possibility of the vehicle unintentionally crossing over detected lane markings, and the 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. The investigation was intended to determine what role, if any, the crash avoidance technology played in the crash. The investigation was initiated by the Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration in response to a notification from the Fatality Analysis Reporting System (FARS). SCI assigned the case to Dynamic Science, Inc., in June 2020, and the vehicle and scene field inspections were completed in July 2020.

Figure 1. The 2018 Honda CR-V

The crash occurred during the day in wet conditions in January 2020 in a rural area in the State of Washington. The Honda was traveling on a county-maintained roadway with one lane for each direction separated by a dashed yellow painted stripe for southbound traffic and a solid yellow painted stripe for northbound traffic. The roadway had no fog lines or any lane markings other than the centerline. The driver was negotiating a right curve when, for unknown reasons, the Honda departed the roadway on the right edge before returning to the roadway, crossing over

both lanes and departing the roadway on the left edge. After the Honda traveled 32.7 m (107.3 ft) down a descending embankment, the vehicle's front plane struck a tree measuring 35 cm (13.8 in) in diameter, where it came to rest. The belted 73-year-old female driver sustained police-reported "K" (fatal) type injuries and was declared deceased on-scene. The Honda was towed due to damage. The investigation determined that the vehicle's RDM and LDW systems had been disabled (turned off) by the owner prior to the crash and did not activate. The vehicle owner confirmed this during the interview, and the Event Data Recorder (EDR) pre-crash data indicated that the systems were "Off."

The Honda's EDR was supported by the Bosch Crash Data Retrieval (CDR) system and was imaged during the inspection. The EDR report included data relating to crash avoidance technology, including ACC, RDM with LDW, LKAS, and CMBS. According to the EDR data, the LKAS was "On" and "Not Engaged" prior to impact. The RDM was "Off" and "Not Engaged"; the LDW was "Off" and "Not Warning" prior to impact. An interview with the vehicle owner — the driver's spouse — revealed that they historically and routinely turned off the RDM and LDW systems due to what they considered to be an overly sensitive system that caused audible warnings too frequently, including when the vehicle came in close proximity to a lane stripe but not actually touching or crossing it. The interviewee stated that the local roadways they frequently traveled often tended to be narrow and winding. Due to the RDM and LDW systems being disabled by the driver, they could not be engaged prior to this crash. According to the EDR report, the only crash avoidance system that did activate was the VSA, which did so at approximately T-0.5 seconds to algorithm enable (AE).

Summary

Crash Site

The crash site was a two-lane undivided north/south state highway in Washington (Figure 2). The roadway was paved with asphalt, in good condition, with one lane for each direction. The centerline separating the lanes was a double yellow painted stripe in good condition that was dashed (passing zone) for southbound traffic and solid (no passing zone) for opposing northbound traffic. The roadway had no fog lines or any lane markings other than the centerline. Each lane measured 3.3 m (10.8 ft) wide from centerline to pavement edge. The centerline striping had dashed lines measuring 3.2 m (10.5 ft) long and spaces measuring 8.6 m (28.0 ft) long. The stripes measured 15 cm (6.0 in) wide. The asphalt pavement was in traveled condition, and the painted lane striping was in good condition.

Figure 2. Approach to crash site looking south

The southbound roadway had a straight section measuring 60.0 m (196.9 ft) long preceding a right curve beginning 105.0 m (344.5 ft) north of the point of impact (POI). The curve radius measured at the centerline was 475.0 m (1,558.4 ft).

The southbound roadway in approach to the POI had a negative slope profile. At 152.4 m (500.0 ft) north of the POI, the slope was negative 0.2 percent; at 121.9 m (400.0 ft), it was negative 2.3 percent; at 91.4 m (300.0 ft), it was negative 3.0 percent; at 61.0 m (200.0 ft), it was negative 5.6 percent; at 30.5 m (100.0 ft), it was negative 8.8 percent; and at 33.0 m (108.3 ft) (the point of departure) north of the POI, the slope measured negative 10.5 percent. The super-elevation at the point of departure was positive 1.0 percent. The off-road slope measured along the vehicle's trajectory path from the departure point to POI was negative 19.4 percent. The west roadside had a narrow gravel shoulder measuring 1.0 m (3.3 ft) wide, and a drainage ditch was located 2.0 m (6.6 ft) west of the pavement edge. A grass covered ascending embankment was west of the ditch.

The east roadside had a gravel shoulder measuring 1.5 m (5.0 ft) wide, a drainage ditch located 4.0 m (18.0 ft) east of the pavement edge, and a barbed wire fence located 5.2 m (17.1 ft) east of the pavement edge. A line of trees stood 4.5 m (14.8 ft) east of the pavement edge. The roadside between the pavement edge and the ditch descended at a slope measuring negative 25 percent.

Per state law, the speed limit for all unposted county roads was 80 km/h (50 mph). Conditions at the time of the crash were daylight, raining, and wet. A crash diagram is included at the end of this report.

Pre-Crash

The 2018 Honda was being driven southbound by the belted 73-year-old female at an EDR-reported vehicle speed of 73 km/h (45 mph) at T-5.0 seconds to AE.

According to the EDR data, the LKAS was "On" and "Not Engaged"; the RDM was "Off" and "Not Engaged"; and the LDW was "Off" and "Not Warning." The VSA was "On, Not Engaged," and the cruise control and ACC were "On, Not Engaged." On-scene police photos indicated that the Honda partially departed the right edge of the roadway at approximately T- 5.0 seconds and returned to the roadway at approximately T-4.0 seconds. After returning to the roadway, it traveled in a left trajectory crossing the centerline at approximately T-3.0 seconds and continuing southbound in the northbound lane at T-2.0 seconds.

At approximately T-1.5 seconds, the Honda departed the left edge of the roadway, depositing left and right side tire tracks in the dirt roadside (Figure 3). The roadway edge had no lane markings or fog line at the point of departure. Tire tracks indicated a departure angle of 10 degrees relative to the edge of pavement. At T-0.5 seconds, the vehicle was completely off the roadway, and the EDR data indicated that the VSA was "On, Engaged" and that the steering input was -75 degrees.[1] The service brake remained "Off," and the vehicle continued traveling on a straight trajectory to POI. According to the EDR data, none of the vehicle's crash avoidance systems initiated a warning or engagement prior to impact. The vehicle's pre-crash speed and distance calculations derived from the EDR data are included in the table below.

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
5	72	45	NA	NA	NA	NA
4.5	72	45	10.1	33	10.1	33
4	74	46	10.2	33.4	20.2	66.4
3.5	76	47	10.4	34.1	30.6	100.5
3	77	48	10.6	34.8	41.2	135.3
2.5	77	48	10.7	35.2	52	170.5
2	77	48	10.7	35.2	62.7	205.7
1.5	80	50	10.9	35.9	73.6	241.6
1	80	50	11.2	36.7	84.8	278.3
0.5	80	50	11.2	36.7	96	315
0	80	50	11.2	36.7	107.2	351.7

[1] According to the data limitations, a positive sign indicates a left turn, which is not SAE-J211 sign convention.

Figure 3. Police markings at the area of departure looking south

Figure 4. The 2018 Honda CR-V at final rest looking north (police photo)

Crash

The front plane of the Honda struck a tree measuring 35 cm (13.7 in) in diameter (Event 1). This event was captured by the vehicle's EDR as a deployment-level event in which the driver's frontal, seat-mounted side impact, and right inflatable curtain (IC) air bags deployed and the driver's seat belt pretensioner actuated. Following impact, the vehicle rotated counterclockwise approximately 40 degrees and came to rest on the roadside with its front plane in contact with the tree and facing east (Figure 4). The EDR captured a second, non-deployment event at 0.3 seconds after the first event. This was an event with low delta V that likely captured the vehicle in rotation and the engagement of the tires against the ground following the initial impact. The investigation determined that no secondary crash event had occurred.

For the Honda in Event 1, the barrier algorithm of the WinSMASH program calculated a total delta V of 59 km/h (36 mph), a longitudinal delta V of -58 km/h (-36 mph), a lateral delta V of 10 km/h (6 mph), and a barrier equivalent speed (BES) of 58 km/h (36 mph). The WinSMASH fits the collision model and appears low when compared with the EDR-reported values. The EDR reported a maximum longitudinal delta V of -86 km/h (-53 mph) and a maximum lateral delta V of 16 km/h (10 mph).

Post-Crash

According to the interviewee, a passing motorist and neighbor of the driver observed the Honda on the roadside and stopped to offer assistance. She observed the driver seated in the driver's seat in an unresponsive state and called for emergency services using a cell phone. Fire responders arrived 10 minutes after their dispatch call, and EMS arrived 19 minutes after their dispatch call. To gain access to the driver, the fire department broke out the glazing of the left front, right front, and right rear windows. Its report indicated that a fireman thought he detected a faint pulse at the driver's jugular vein, but that she did not respond to the breaking of the windows or to yelling or shaking stimuli. After a medic arrived, they cut the driver's seat belt and left IC air bag to remove the driver from the vehicle through the left front door. They laid her on the ground and applied automated external defibrillator (AED) pads to her torso, attempting to revive the driver via defibrillation. Efforts to revive the driver were unsuccessful, and she was pronounced deceased on-scene. She was transported to the medical examiner's office. The Honda was towed due to damage and was later salvaged.

2018 Honda CR-V

Description

The 2018 Honda CR-V, identified by the Vehicle Identification Number 2HKRW2H85JHxxxxxx, was manufactured in April 2018. The Honda was a 4-door, 5-passenger, compact SUV with all-wheel drive; a 4-cylinder, 1.5-liter, turbocharged gasoline engine; hydraulic brakes; and a power moon roof. The steering wheel had 2.3 turns from lock-to-lock and a steering ratio of 12.30:1. The vehicle manufacturer's recommended tire size was P235/60R18 for the front and rear with a recommended cold pressure of 228 kPa (33 psi) for the front and 207 kPa (30 psi) for the rear. It had Mastercraft Stratus AS tires of the recommended size manufactured in 2019. The vehicle's interior had two rows for seating five occupants. The front row had bucket seats with adjustable head restraints. According to the driver's spouse, due to her small stature and prior surgeries, the driver historically adjusted her seat cushion to the forward-most track position and her seat back to the full upright position. The head restraint was adjusted to 4 cm (1.6 in) above the lowest setting. The vehicle was equipped with crash avoidance systems discussed later in this report.

Figure 5. Front plane damage, the 2018 Honda CR-V

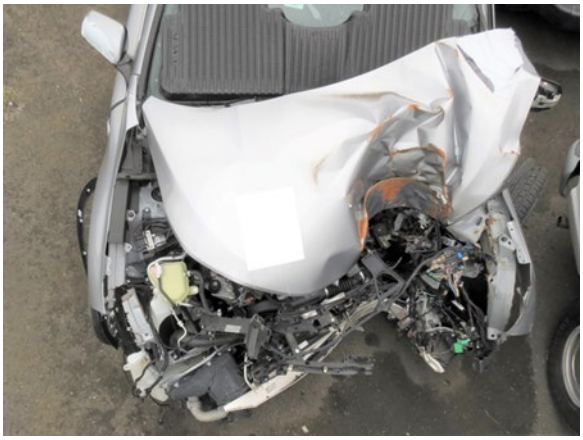


Figure 6. Front plane damage, the 2018 Honda CR-V

Exterior Damage

The Honda sustained severe front plane crush damage at impact with a tree measuring 35 cm (13.7 in) in diameter. The front bumper fascia, grille, radiator, upper radiator support, and headlamps were displaced; the left and right front tires were restricted; the left front wheel was detached from the suspension; the hood, left front fender, and left front door were crumpled; and the right side view mirror was displaced. The bumper backing bar was used to measure crush. The damage flow represented a classic between-rails frontal pole or tree crash type (Figures 5 and 6). Direct damage to the front plane at bumper level began in the left sector at 30 cm (11.8 in) right of the front left bumper corner and extended 50 cm (19.7 in) to the right ending the center sector. The field L extended from bumper corner to bumper corner and measured 110 cm (43.3 in). Fifteen measurements were taken at bumper level by the Nikon Total Station, and the Faro Blitz program computed crush measurement in six increments as follows: C_1 = 34 cm (13.4 in), C_2 = 67 cm (26.4 in), C_3 = 63 cm (24.8 in), C_4 = 38 cm (15.0 in), C_5 = 17 cm (6.7 in), and C_6 = 0 cm. Maximum crush measured 67 cm (26.4 in) and was located at 40 cm (15.7 in) right of

the front left bumper corner. The calculated principal direction of force was 350 degrees, and the collision deformation classification (CDC) for the Honda in Event 1 was 12FYEW3.

Figure 7. Crash avoidance technology controls, left instrument panel, the 2018 Honda CR-V

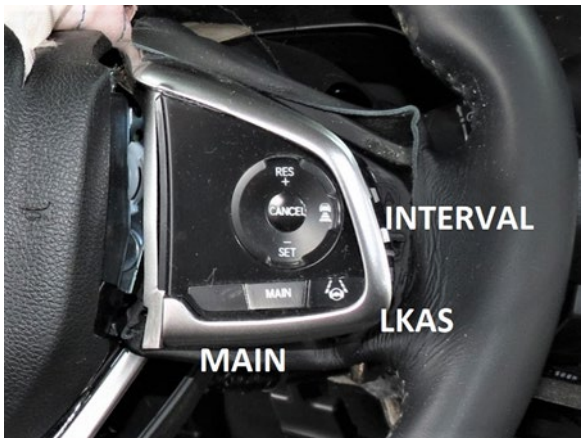


Figure 8. Crash avoidance technology controls, right steering wheel, the 2018 Honda CR-V

Crash Avoidance Technology

As previously stated, the Honda's crash avoidance technology included a road departure mitigation system with LDW, LKAS, CMBS, ACC with low-speed follow (LSF), VSA, BSI, and RVS. The crash avoidance systems employed a radar sensor located at the lower aspect of the front bumper and a front sensor camera mounted to the interior windshield and located behind the rearview mirror. The Honda had manual controls on the left IP (Figure 7) and steering wheel (Figure 8) allowing the user to change settings for LKAS, RDM, LDW, CMBS, ACC, and VSA. The ACC had four user settings to adjust the following intervals to short, middle, long, and extra-long. The Honda had two primary users, including the driver in this crash and her spouse. The spouse stated during the SCI interview that he historically set the adaptive cruise control to a shorter following interval and that the driver in this crash historically set the system to a longer following interval. The EDR report indicated that all crash avoidance systems were "On," with the exceptions of the RDM and LDW, which had been manually disabled by the driver. The crash avoidance systems for this vehicle were as follows.

Road Departure Mitigation System

According to the vehicle owner's manual, the RDM alerts and helps to assist the driver when it determines a possibility of the vehicle unintentionally crossing over detected lane markings and/or leaving the roadway altogether. The front camera behind the rearview mirror monitors left and right lane markings (in white or yellow). The system will apply visual and audible alerts in addition to applying torque to the steering to assist the driver in keeping the vehicle in the lane. Additionally, the system may apply braking but only when the lane markings are solid continuous lines. At the site of this crash, the yellow painted centerline was solid for the opposing northbound lane and dashed for the southbound lane in which the Honda was traveling. The roadway was not configured with fog lines. The accuracy of this system is affected by vehicle speed and lane line condition. The system does not activate during periods of braking, acceleration, or active steering to left or right. The EDR report indicated a steering input of 0

degrees until T-1.0 seconds when steering input was -5 degrees (as defined in EDR report, negative input is a turn to the right). The EDR indicated that no pre-impact braking occurred. Environmental conditions, including darkness, sudden changes between dark and light, low contrast between objects and background, strong light reflected onto the roadway, and driving in shadows, limit the system's functionality. According to the EDR report, this system was "Off" at the time of the crash and did not engage.

Lane Departure Warning

According to the vehicle owner's manual, when the vehicle enters the warning area, the LDW alerts the driver with slight steering wheel vibration as well as a warning display. According to the EDR report, this system was "Off" at the time of the crash and did not engage.

Lane Keeping Assist System

According to the owner's manual, the 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. The front sensor camera monitors lane lines and provides tactile and visual alerts when the vehicle is drifting out of a detected lane. If a lane departure occurs without a turn signal applied, the alerts activate, and torque is applied to the steering. The system does not work if hands are off the steering wheel or if the driver does not actively steer. The system will not perform when the brake pedal is depressed. The EDR indicated that no pre-impact braking occurred, this system was "On" prior to impact, and it did not engage.

Collision Mitigation Braking System

According to the owner's manual, the CMBS is designed to assist the driver when a potential frontal collision exists, as well as to reduce vehicle speed to help minimize collision severity when a collision is deemed unavoidable. The system is designed primarily to detect pedestrians and other vehicles in the path of this vehicle. When the system activates, it may automatically apply the brake, but it does not automatically stop the vehicle. The system has limitations, including environmental conditions such as darkness, sudden changes between dark and light, low contrast between objects and background, strong light reflected onto the roadway, and driving in shadows. The system also has detection limitations at times, such as approaching a vehicle or pedestrian ahead at a high speed, or when the speed difference between this vehicle and a vehicle or pedestrian in front is significantly large. The system uses three alert stages as follows:

- risk detected: audible and visual alerts
- increased risk detected: audible and visual alerts plus light braking
- unavoidable collision: audible and visual alerts plus forcefully applied braking

According to the EDR report, the CMBS was "On" at the time of the crash, but it did not engage. According to the vehicle owner's manual (CMBS Conditions and Limitations), environmental and road conditions may reduce the CMBS functions or cause the system to automatically shut off. Some of the conditions listed in the manual include driving in bad weather (rain, etc.) and driving on a wet roadway. At the time of this crash, conditions were overcast, raining, and wet. Additionally, the manual states that the CMBS "can assist you when there is a possibility of your

vehicle colliding with a vehicle or a pedestrian detected in front of yours." The manual does not discuss how the CMBS responds to stationary, off-road objects. In this crash, the Honda struck a tree after departing the roadway.

Adaptive Cruise Control with Low-Speed Follow

This system helps maintain a constant vehicle speed and a set following interval behind a vehicle detected ahead and, if the detected vehicle comes to a stop, can decelerate and stop this vehicle, without the driver having to keep a foot on the brake or the accelerator. At the time of the crash, this system was "On" but not engaged.

Vehicle Stability Assist

According to the vehicle owner's manual, the VSA helps to stabilize the vehicle when turning more or less than intended, and assists in maintaining traction by regulating engine output and selectively applying the brakes. According to the EDR report, the system was "On" and not engaged up to and including T-1.0 seconds, then engaged from T-0.5 seconds to T0.0 seconds (at impact). The system likely activated in response to right steering maneuvers of -75 degrees at T-0.5 seconds and -90 degrees at T0.0 seconds.

Event Data Recorder

The Honda was equipped with an air bag control module (ACM) that had EDR capabilities. The EDR was imaged during the SCI vehicle inspection using Bosch CDR software version 19.4.1 via the direct-to-module method. The data were reported using version 21.3. According to the data limitations, the EDR typically records only one event. The front plane impact in this crash was captured as a deployment level event. The record included pre-crash data at 0.5 second intervals and 250 ms of post-crash data. The report indicated that the driver was belted and that her frontal, seat-mounted side impact, and IC air bags were commanded to deploy and her seat belt pretensioner was commanded to actuate.

The EDR report included crash avoidance technology data. It indicated that the CMBS was "On" and "Not Engaged" prior to impact. The CMBS is not designed to mitigate off-road object impacts. The EDR report indicated that the operational status for the RDM and LDW were "Off" and therefore would not engage if needed. It indicated that the FCW, LKAS, and ACC were "On," either "Not Warning" or "Not Engaged" prior to impact.

The EDR report included pre-crash data for the seat track position switch. According to the data limitations, the seat track position switch is used to indicate the relative position of a seat on the seat track where it may be used to indicate the seat/occupant is in a forward position near an air bag which may be deployed (NHTSA 49 CFR Part 563 definition). The seat track position switch, foremost, status refers to the status of the switch that detects whether the seat is moved to a forward position. The EDR reported the seat track position switch for the driver in this crash as "Foremost, Status, Driver: No." The data appear to be in conflict with the position of the driver's seat track setting at the time of the vehicle inspection as well as the interviewee's statement that the driver historically adjusted her seat to the forward-most position. The complete EDR report is included in Appendix A.

NHTSA Recalls and Investigations

A recall search queried in November 2021 using the vehicle's VIN revealed no unrepaired recalls associated with this vehicle.

Interior Damage

The inspection of the interior revealed damage from impact forces, deployed air bags, occupant contacts, and post-crash activities. The IP was fractured, and the center console was displaced. Three air bags deployed, and the driver's seat belt pretensioner actuated, locking the belt in the unspooled position. The steering column, which had a collapsible design, was compressed forward due to occupant loading. The steering wheel rim was bent forward 5 cm (2.0 in) at the upper quadrant and 7 cm (2.8 in) at the right quadrant. The driver's seat belt was stretched, and the deployed frontal air bag revealed blood deposits. The front row was reduced by longitudinal intrusions, including the left toe pan (6 cm [2.4 in]), left IP (10 cm [3.9 in]), center IP (10 cm [3.9 in]), and right IP (6 cm [2.4 in]). To gain access to the driver, emergency responders broke out the glazing of the left front, right front, and right rear windows. Additionally, they cut the driver's seat belt and the left IC air bag.

Manual Restraint Systems

The driver's seat position was equipped with a lap and shoulder seat belt configured with a continuous loop webbing, sliding latch plate, emergency locking retractor (ELR), and adjustable shoulder anchor. The D-ring was adjusted to the middle position. The driver was belted at the time of the crash, and the seat belt retractor pretensioner actuated, locking the belt in the unspooled position. The belt webbing revealed scuff marks caused by driver loading.

Supplemental Restraint Systems

The Honda had six air bags for supplemental restraint, including driver's and passenger's frontal, seat-mounted side impact, and IC air bags. The driver's frontal, seat-mounted side impact, and IC air bags deployed at impact with the tree. The air bags appeared to have deployed normally. The driver's frontal air bag revealed blood deposits, and the IC air bag revealed damage caused during the post-crash activities.

2018 Honda CR-V Occupant

Driver Demographics

Age/sex:	73 years/female
Height:	142 cm (56 in)
Weight:	67 kg (148 lb)
Eyewear:	None
Seat type:	Bucket
Seat track position:	Forward most
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Vehicle inspection, EDR report
Air bags:	Frontal, seat-mounted side impact, and IC air bags deployed
Alcohol/drug data:	None reported
Egress from vehicle:	Removed by emergency responders through side door
Transport from scene:	Taken to medical examiner's office
Type of medical treatment:	Defibrillation attempted, declared deceased on-scene

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Died of injury NFS	099999.9	Unknown	Unknown
2	Laceration, minor, nose	210602.1	Frontal air bag	Probable
3	Abrasion, right forearm	710202.1	Steering wheel	Possible

Sources: police report, death certificate, EMS medical records, and interview.

Limited injury data were available for this report. The local prosecuting attorney's office refused to release the autopsy to SCI. The driver's spouse made no inquiries into her injuries and had very limited knowledge of her medical condition. SCI obtained a death notice stating that the cause of death was multiple blunt force injuries. SCI obtained the driver's EMS medical records which included minimal injury data. A paramedic noted in his report that the driver exhibited what appeared to be a skull fracture above the left eye. The driver's spouse indicated during the interview that she sustained a minor laceration above the nose and possibly an ankle fracture. Neither fracture could be medically confirmed in the documents obtained by SCI. The driver had a history of unspecified back or spinal surgeries, but she had no other serious pre-existing conditions or ailments, according to the spouse.

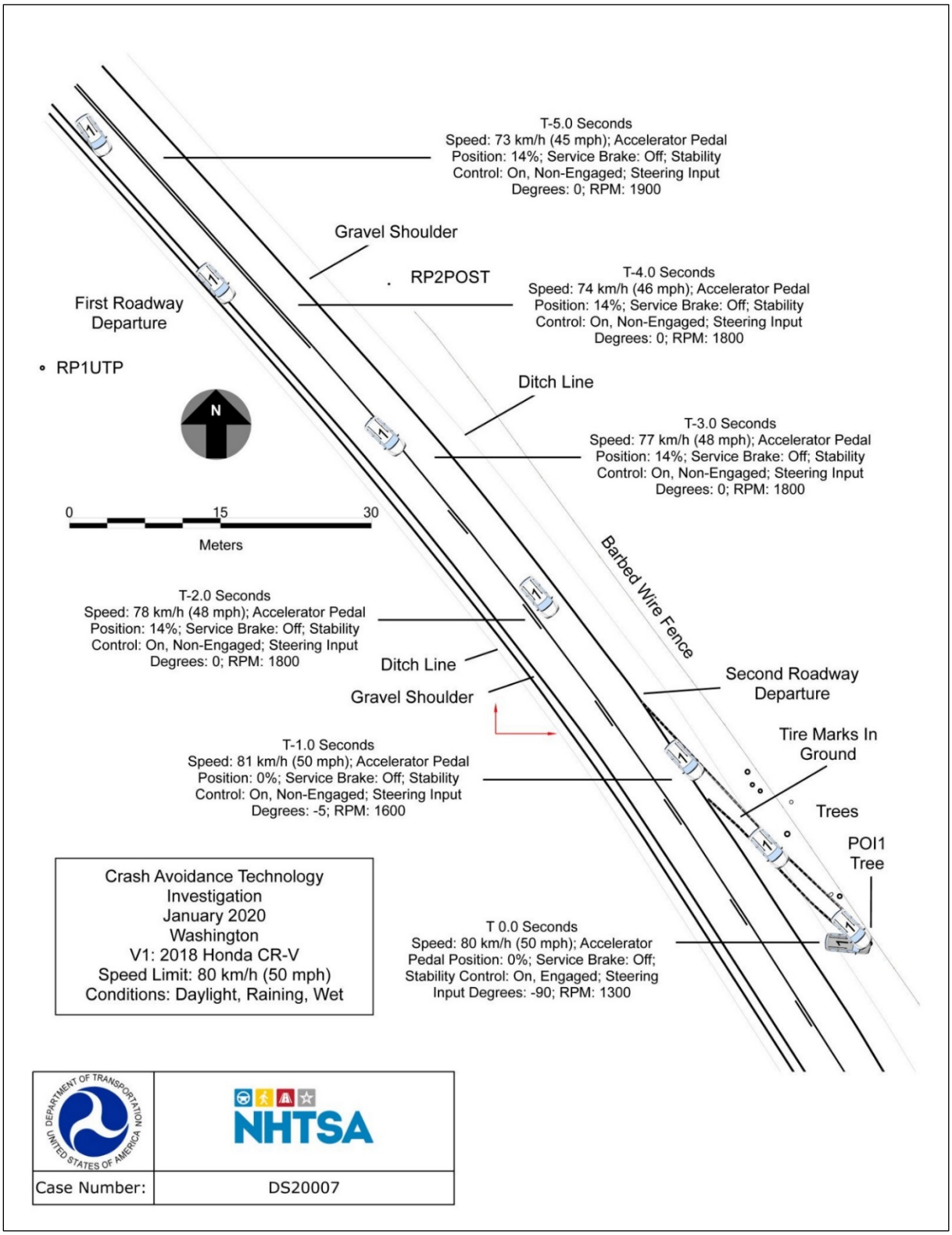
Driver Kinematics

The belted 73-year-old female driver was seated in an unknown posture. Her spouse indicated that she historically set her seat cushion in the forward-most position and her seat back fully upright, placing her as close as possible to the foot controls and very close to the steering wheel. The steering wheel tilt and telescoping settings were in the middle positions. The driver had been negotiating a straight section of the roadway for several seconds, and her steering input was zero

degrees. Scene evidence suggested that prior to the crash, the Honda's right side tires departed the pavement on the right edge for a short distance, then returned to the roadway. It appears that the driver overcorrected to the left in response and that the vehicle crossed over both lanes and departed the roadway on the left edge. The change from paved to unpaved surface had minor effect on the vehicle's trajectory or the driver's kinematics. The vehicle traveled off-road down a wet, descending embankment during which time the driver remained in her seated position before its front plane struck a mature tree. The driver did not brake during the pre-crash sequence but did steer right at T-0.5 seconds.

At impact, the driver's frontal, seat-mounted side, and IC air bags deployed and her seat belt pretensioner actuated. The driver was displaced sharply forward in response to the 12 o'clock direction of force, loading the seat belt with her chest, the deployed driver's frontal air bag and steering wheel with her chest, neck, face, and head. Contact evidence was present on the belt in the form of scuff marks, and on the steering wheel which was bent forward at the top and right aspects. Blood was found on the driver's frontal air bag. The driver sustained a minor laceration to the nose bridge and an unspecified lesion to the left eye to the temple areas of the face. Her right forearm possibly contacted the steering wheel, resulting in an abrasion. The driver's lower extremities were displaced forward, likely contacting the foot controls and possibly contacting the longitudinally intruding floor pan. The vehicle initiated a counterclockwise rotation of 40 degrees and came to rest with its front plane in contact with the tree. During the crash sequence, the driver remained held in her seated position by the pretensioned belt. She was found in a posture described as slumped somewhat to the right by a passerby at an unknown time. When emergency responders arrived, they removed the driver through the side door and placed her on the ground, then attempted defibrillation before declaring her deceased on-scene 24 minutes after the crash. She was transported to the medical examiner's office, and the vehicle was towed due to damage.

Crash Diagram



Appendix A: Event Data Recorder Report for 2018 Honda CR-V[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 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	2HKRW2H85JH******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS20007_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 19.4.1
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 21.3
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	1.3.4.0

System Status at Event (Event Record 1)

Multi-Event, Number of Events (1, 2)	1
Complete File Recorded (Yes/No)	Yes
Ignition Cycle, Download	1591
Maximum Delta-V, Longitudinal (MPH [km/h])	-53 [-86]
Time, Maximum Delta-V, Longitudinal (msec)	287.5
Maximum Delta-V, Lateral (MPH [km/h])	10 [16]
Time, Maximum Delta-V, Lateral (msec)	187.5
Time, Maximum Delta-V, Resultant (msec)	287.5
Time, Accelerometer Range Exceeded, Longitudinal (msec)	0
Time, Accelerometer Range Exceeded, Lateral (msec)	0
Time, Accelerometer Range Exceeded, Normal (msec)	147.0

Deployment Command Data (Event Record 1)

Pretensioner Deployment, Time to Fire, Driver (msec)	125
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	0
Lap Pretensioner Deployment, Time to Fire, Driver (msec)	129
Lap Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to Deploy First Stage, Driver (msec)	137
Frontal Air Bag Deployment, Time to Deploy First Stage, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (msec)	0
Safety Belt Adaptive Load Limiter, Time to Initiation, Right Front Passenger (msec)	0
Side Air Bag Deployment, Time to Deploy, Driver (msec)	168
Side Air Bag Deployment, Time to Deploy, Right Front Passenger (msec)	0
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Driver Side (msec)	168
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Right Side (msec)	0
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	1590

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

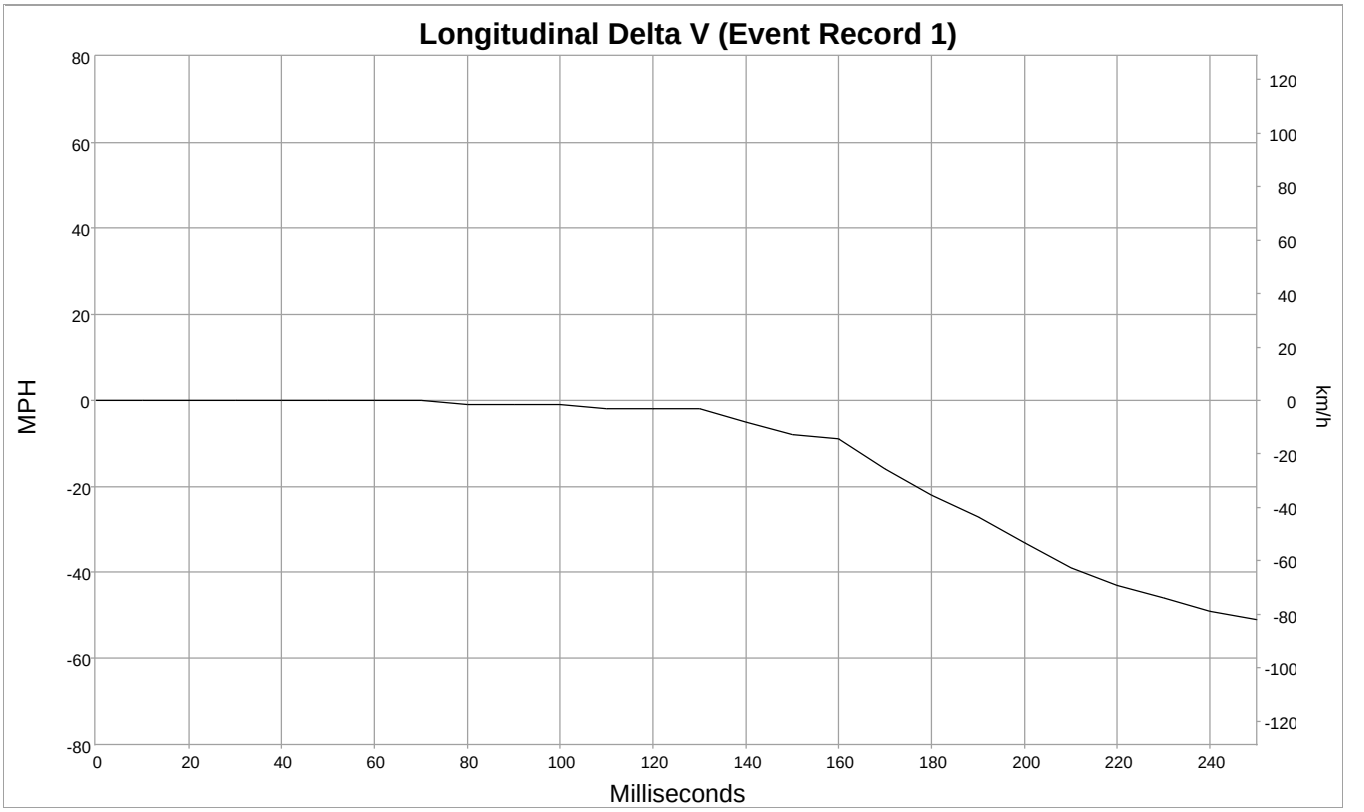
Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal Position, % full	Service Brake (On, Off)	ABS Activity (On, Off)	Stability Control (On, Off, Engaged)	Steering Input (deg)	Engine RPM
-5.0	45 [73]	14	Off	Off	On Non-Engaged	0	1,900
-4.5	45 [73]	14	Off	Off	On Non-Engaged	0	1,800
-4.0	46 [74]	14	Off	Off	On Non-Engaged	0	1,800
-3.5	47 [75]	14	Off	Off	On Non-Engaged	0	1,800
-3.0	48 [77]	14	Off	Off	On Non-Engaged	0	1,800
-2.5	48 [77]	14	Off	Off	On Non-Engaged	0	1,800
-2.0	48 [78]	14	Off	Off	On Non-Engaged	0	1,800
-1.5	50 [80]	14	Off	Off	On Non-Engaged	0	1,800
-1.0	50 [81]	0	Off	Off	On Non-Engaged	-5	1,600
-0.5	50 [80]	0	Off	Off	On Engaged	-75	1,300
0.0	50 [80]	0	Off	Off	On Engaged	-90	1,300

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	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-4.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-4.0	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-3.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-3.0	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-2.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-2.0	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-1.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-1.0	0	Not warning	Not engaged	On	Not warning	Not engaged	Off
-0.5	0	Not warning	Not engaged	On	Not warning	Not engaged	Off
0.0	0	Not warning	Not engaged	On	Not warning	Not engaged	Off

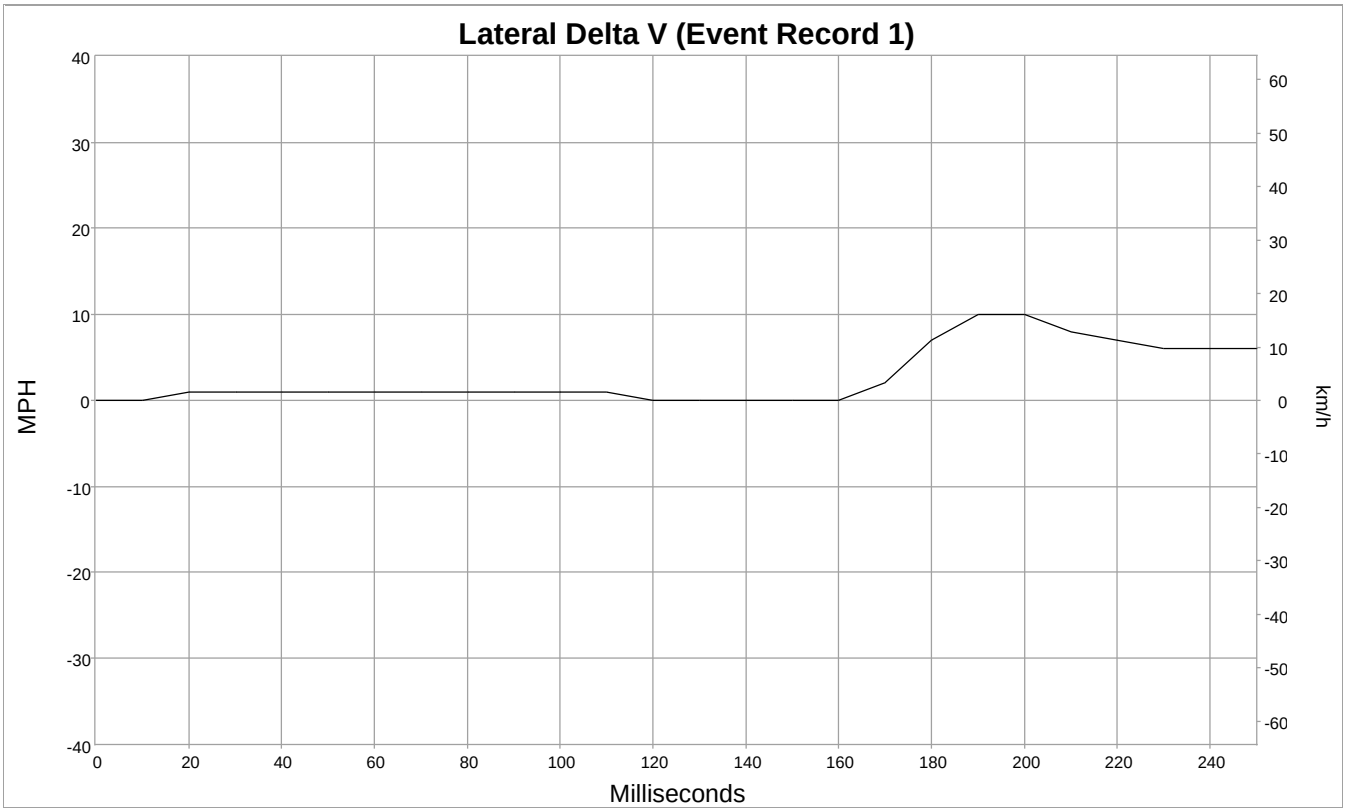
Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 1) - Table 3 of 3

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	On	Not engaged	On	Not Engaged	On
-4.5	Not engaged	On	Not engaged	On	Not Engaged	On
-4.0	Not engaged	On	Not engaged	On	Not Engaged	On
-3.5	Not engaged	On	Not engaged	On	Not Engaged	On
-3.0	Not engaged	On	Not engaged	On	Not Engaged	On
-2.5	Not engaged	On	Not engaged	On	Not Engaged	On
-2.0	Not engaged	On	Not engaged	On	Not Engaged	On
-1.5	Not engaged	On	Not engaged	On	Not Engaged	On
-1.0	Not engaged	On	Not engaged	On	Not Engaged	On
-0.5	Not engaged	On	Not engaged	On	Not Engaged	On
0.0	Not engaged	On	Not engaged	On	Not Engaged	On



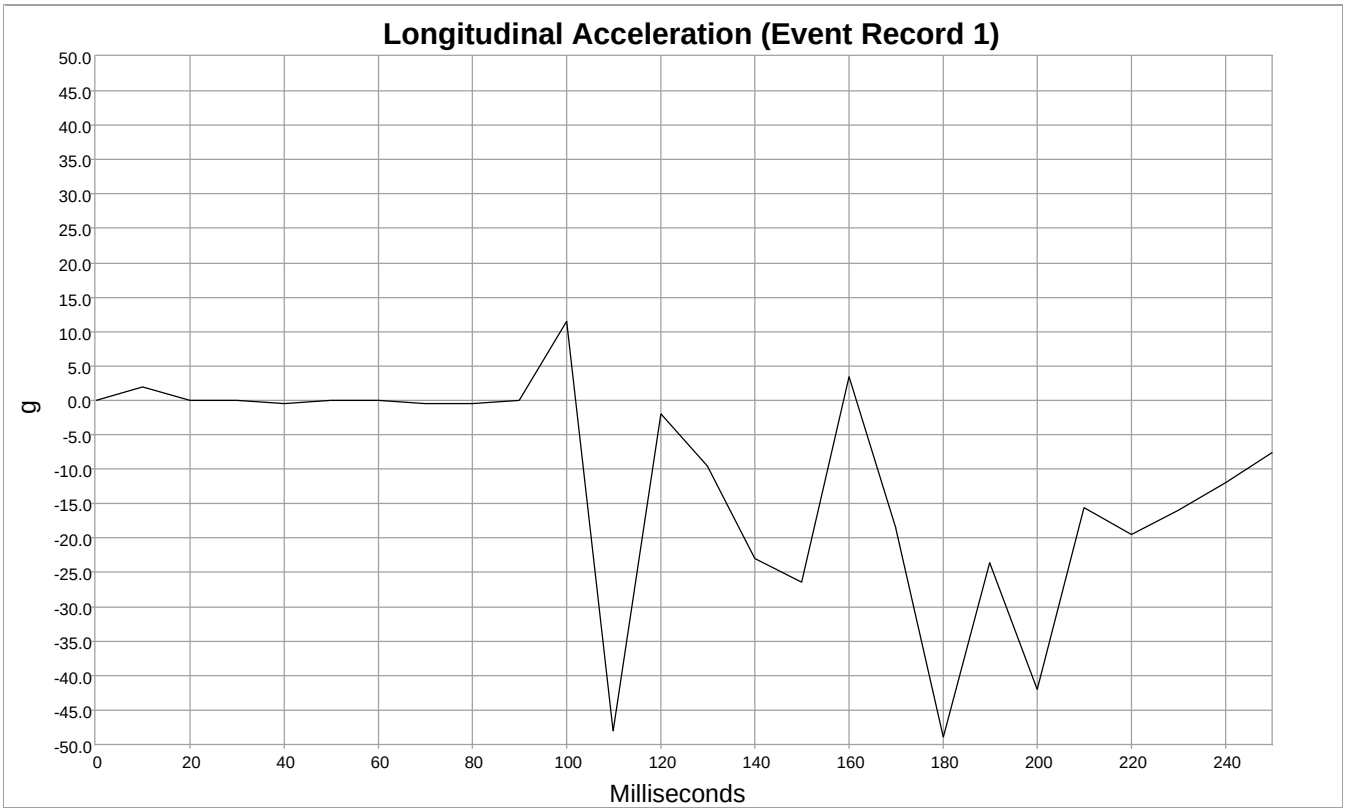
Longitudinal Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	0 [0]
20	0 [0]
30	0 [0]
40	0 [0]
50	0 [0]
60	0 [0]
70	0 [0]
80	-1 [-1]
90	-1 [-1]
100	-1 [-2]
110	-2 [-4]
120	-2 [-3]
130	-2 [-4]
140	-5 [-8]
150	-8 [-13]
160	-9 [-15]
170	-16 [-25]
180	-22 [-36]
190	-27 [-44]
200	-33 [-53]
210	-39 [-62]
220	-43 [-70]
230	-46 [-74]
240	-49 [-79]
250	-51 [-82]



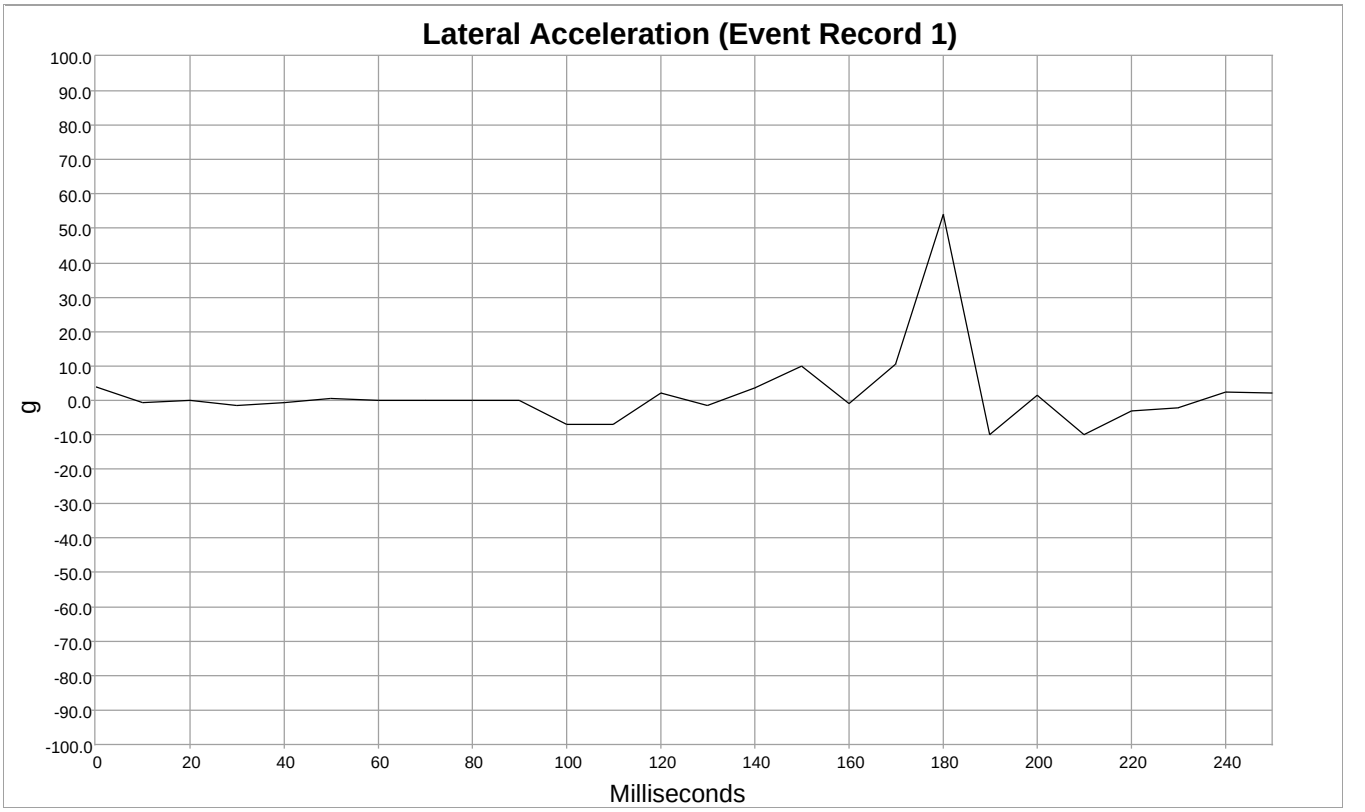
Lateral Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	0 [0]
20	1 [1]
30	1 [1]
40	1 [1]
50	1 [1]
60	1 [1]
70	1 [1]
80	1 [1]
90	1 [1]
100	1 [1]
110	1 [1]
120	0 [0]
130	0 [0]
140	0 [0]
150	0 [0]
160	0 [0]
170	2 [4]
180	7 [11]
190	10 [16]
200	10 [16]
210	8 [13]
220	7 [11]
230	6 [10]
240	6 [10]
250	6 [10]



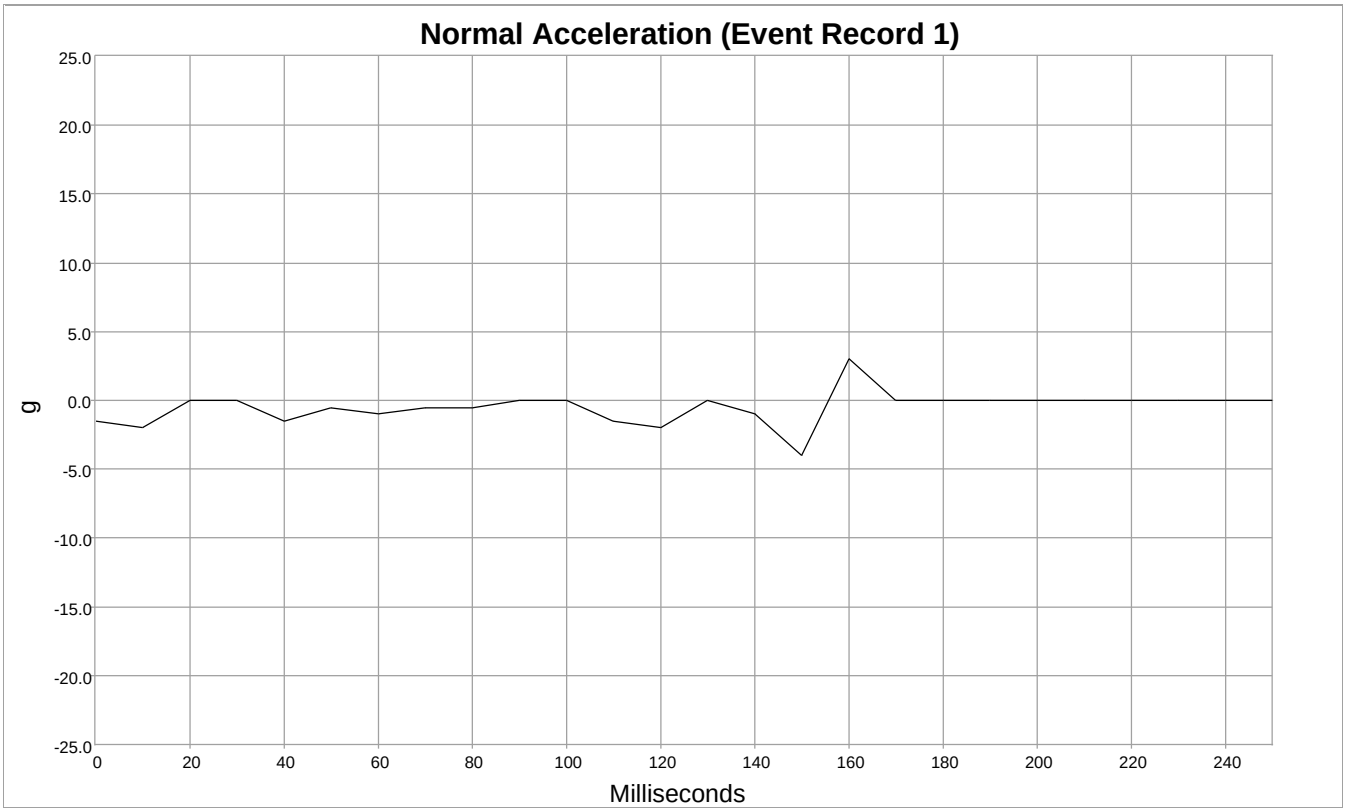
Longitudinal Acceleration (Event Record 1)

Time (msec)	g
0	0.0
10	2.0
20	0.0
30	0.0
40	-0.5
50	0.0
60	0.0
70	-0.5
80	-0.5
90	0.0
100	11.5
110	-48.0
120	-2.0
130	-9.5
140	-23.0
150	-26.5
160	3.5
170	-18.5
180	-49.0
190	-23.5
200	-42.0
210	-15.5
220	-19.5
230	-16.0
240	-12.0
250	-7.5



Lateral Acceleration (Event Record 1)

Time (msec)	g
0	4.0
10	-0.5
20	0.0
30	-1.5
40	-0.5
50	0.5
60	0.0
70	0.0
80	0.0
90	0.0
100	-7.0
110	-7.0
120	2.0
130	-1.5
140	3.5
150	10.0
160	-1.0
170	10.5
180	54.0
190	-10.0
200	1.5
210	-10.0
220	-3.0
230	-2.0
240	2.5
250	2.0



Normal Acceleration (Event Record 1)

Time (msec)	g
0	-1.5
10	-2.0
20	0.0
30	0.0
40	-1.5
50	-0.5
60	-1.0
70	-0.5
80	-0.5
90	0.0
100	0.0
110	-1.5
120	-2.0
130	0.0
140	-1.0
150	-4.0
160	3.0
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

System Status at Event (Event Record 2)

Multi-Event, Number of Events (1, 2)	2
Complete File Recorded (Yes/No)	Yes
Ignition Cycle, Download	1591
Time from Event 1 to 2 (sec)	0.3
Maximum Delta-V, Longitudinal (MPH [km/h])	2 [4]
Time, Maximum Delta-V, Longitudinal (msec)	300.0
Maximum Delta-V, Lateral (MPH [km/h])	-6 [-9]
Time, Maximum Delta-V, Lateral (msec)	280.0
Time, Maximum Delta-V, Resultant (msec)	300.0
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)	0
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	0
Lap Pretensioner Deployment, Time to Fire, Driver (msec)	0
Lap 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, Right Front Passenger (msec)	0
Safety Belt Adaptive Load Limiter, Time to Initiation, 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, 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)	Off
Ignition Cycle, Crash	1590

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

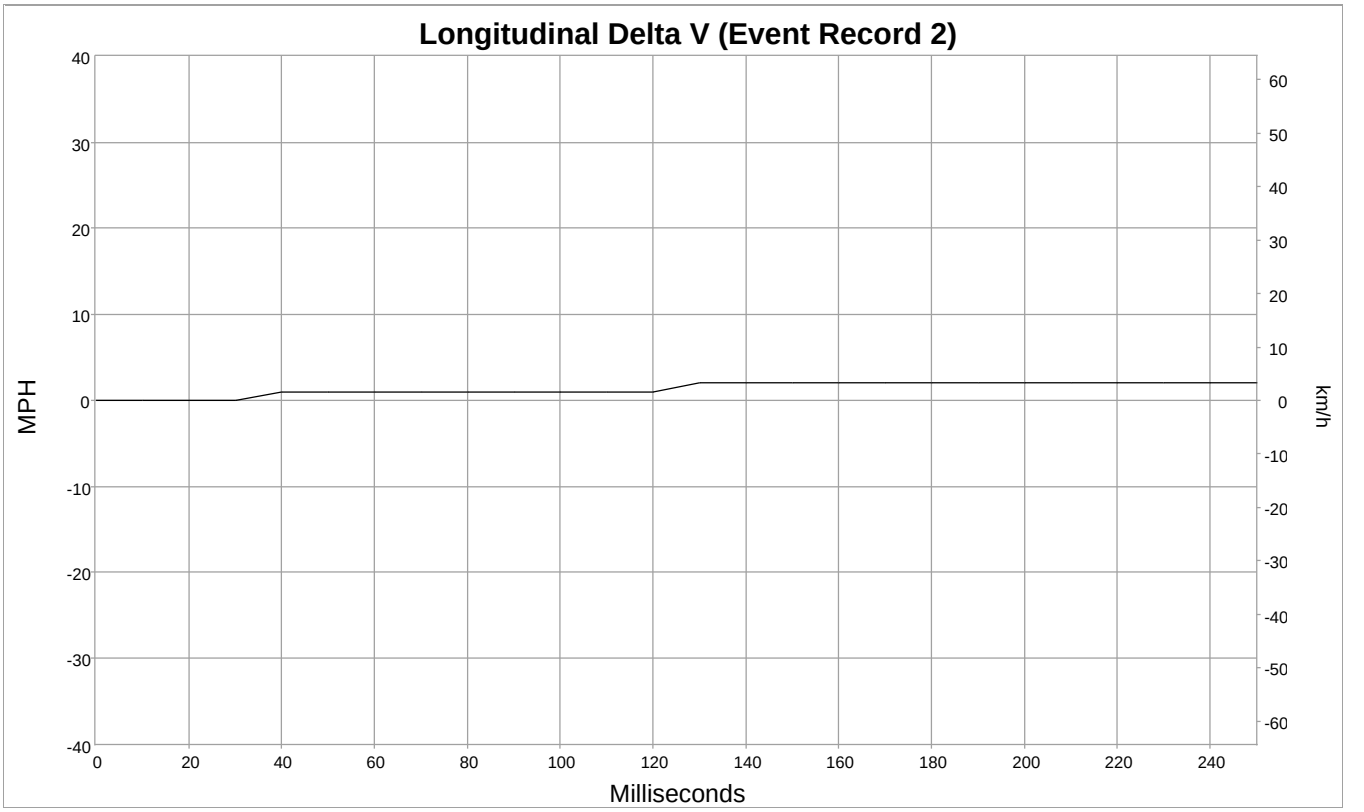
Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal Position, % full	Service Brake (On, Off)	ABS Activity (On, Off)	Stability Control (On, Off, Engaged)	Steering Input (deg)	Engine RPM
-5.0	45 [73]	14	Off	Off	On Non-Engaged	0	1,900
-4.5	45 [73]	14	Off	Off	On Non-Engaged	0	1,800
-4.0	46 [74]	14	Off	Off	On Non-Engaged	0	1,800
-3.5	47 [75]	14	Off	Off	On Non-Engaged	0	1,800
-3.0	48 [77]	14	Off	Off	On Non-Engaged	0	1,800
-2.5	48 [77]	14	Off	Off	On Non-Engaged	0	1,800
-2.0	48 [78]	14	Off	Off	On Non-Engaged	0	1,800
-1.5	50 [80]	14	Off	Off	On Non-Engaged	0	1,800
-1.0	50 [81]	0	Off	Off	On Non-Engaged	-5	1,600
-0.5	50 [80]	0	Off	Off	On Engaged	-75	1,300
0.0	50 [80]	73	On	Off	On Non-Engaged	-80	1,400

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	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-4.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-4.0	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-3.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-3.0	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-2.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-2.0	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-1.5	14	Not warning	Not engaged	On	Not warning	Not engaged	Off
-1.0	0	Not warning	Not engaged	On	Not warning	Not engaged	Off
-0.5	0	Not warning	Not engaged	On	Not warning	Not engaged	Off
0.0	73	Not warning	Not engaged	On	Not warning	Not engaged	Off

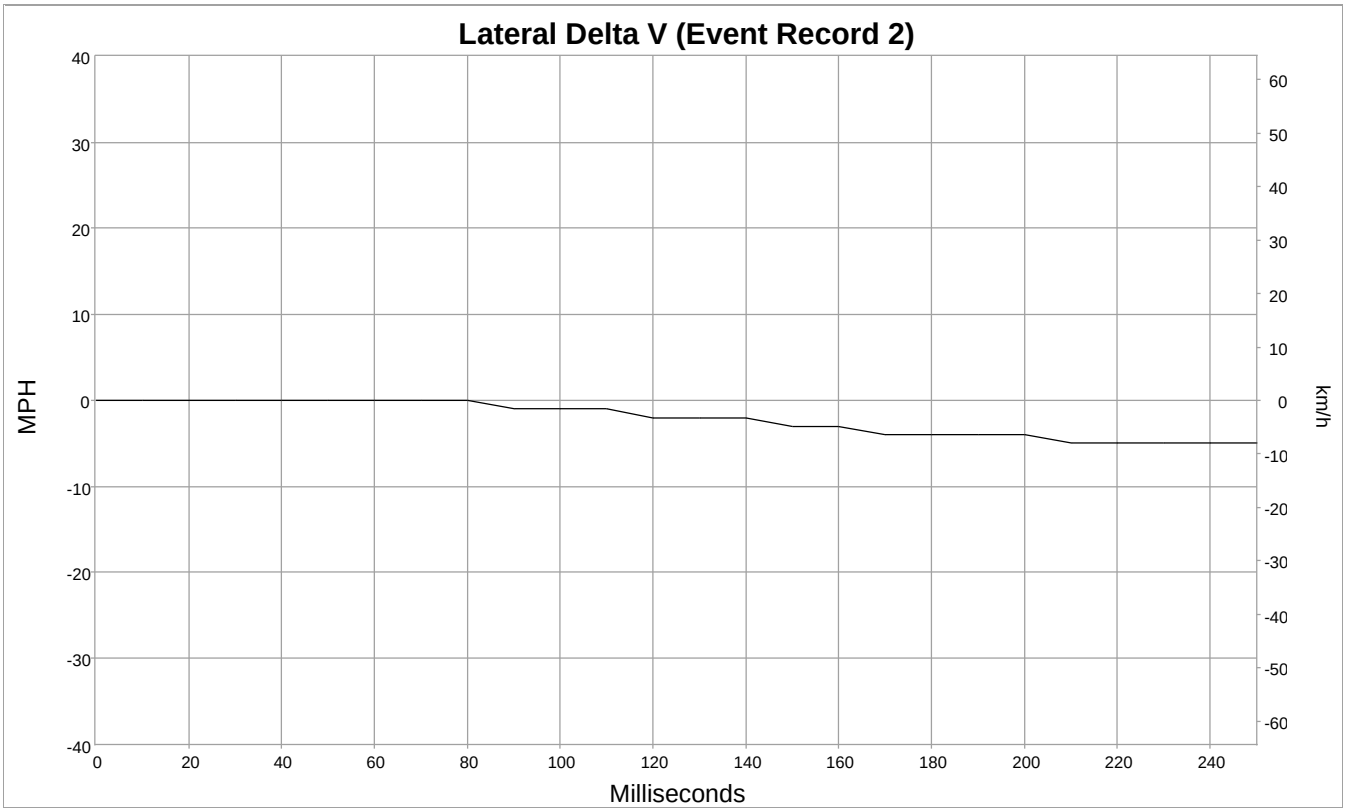
Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 2) - Table 3 of 3

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	On	Not engaged	On	Not Engaged	On
-4.5	Not engaged	On	Not engaged	On	Not Engaged	On
-4.0	Not engaged	On	Not engaged	On	Not Engaged	On
-3.5	Not engaged	On	Not engaged	On	Not Engaged	On
-3.0	Not engaged	On	Not engaged	On	Not Engaged	On
-2.5	Not engaged	On	Not engaged	On	Not Engaged	On
-2.0	Not engaged	On	Not engaged	On	Not Engaged	On
-1.5	Not engaged	On	Not engaged	On	Not Engaged	On
-1.0	Not engaged	On	Not engaged	On	Not Engaged	On
-0.5	Not engaged	On	Not engaged	On	Not Engaged	On
0.0	Not engaged	On	Not engaged	On	Not Engaged	On



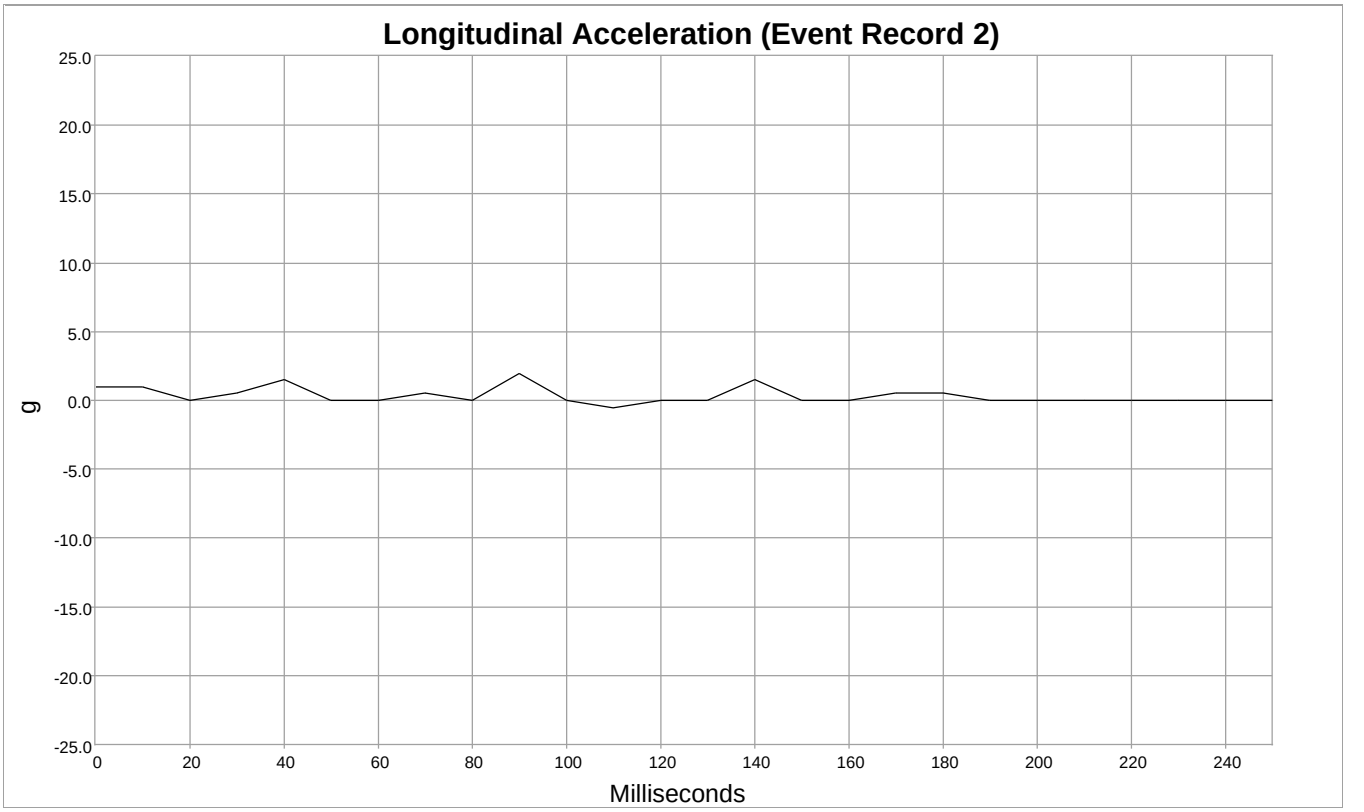
Longitudinal Delta V (Event Record 2)

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



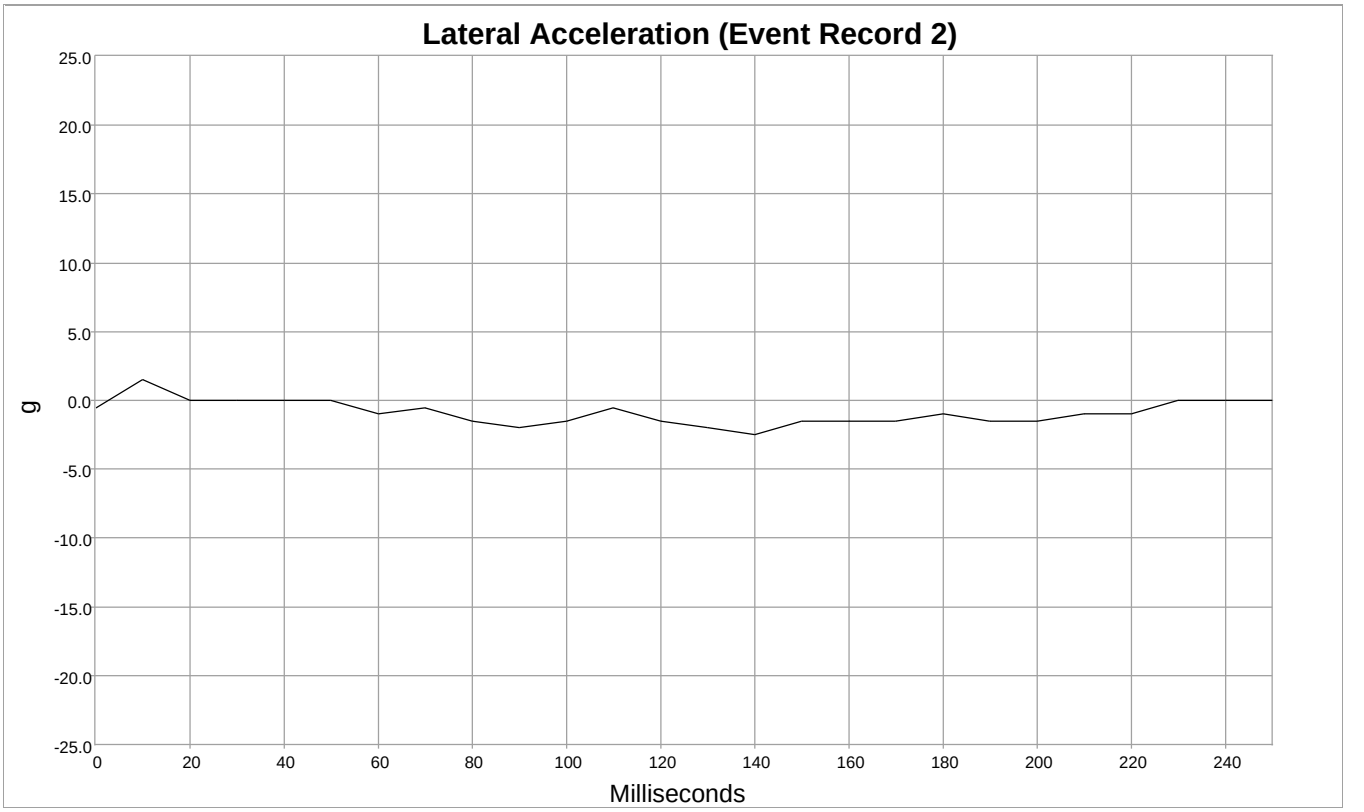
Lateral Delta V (Event Record 2)

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



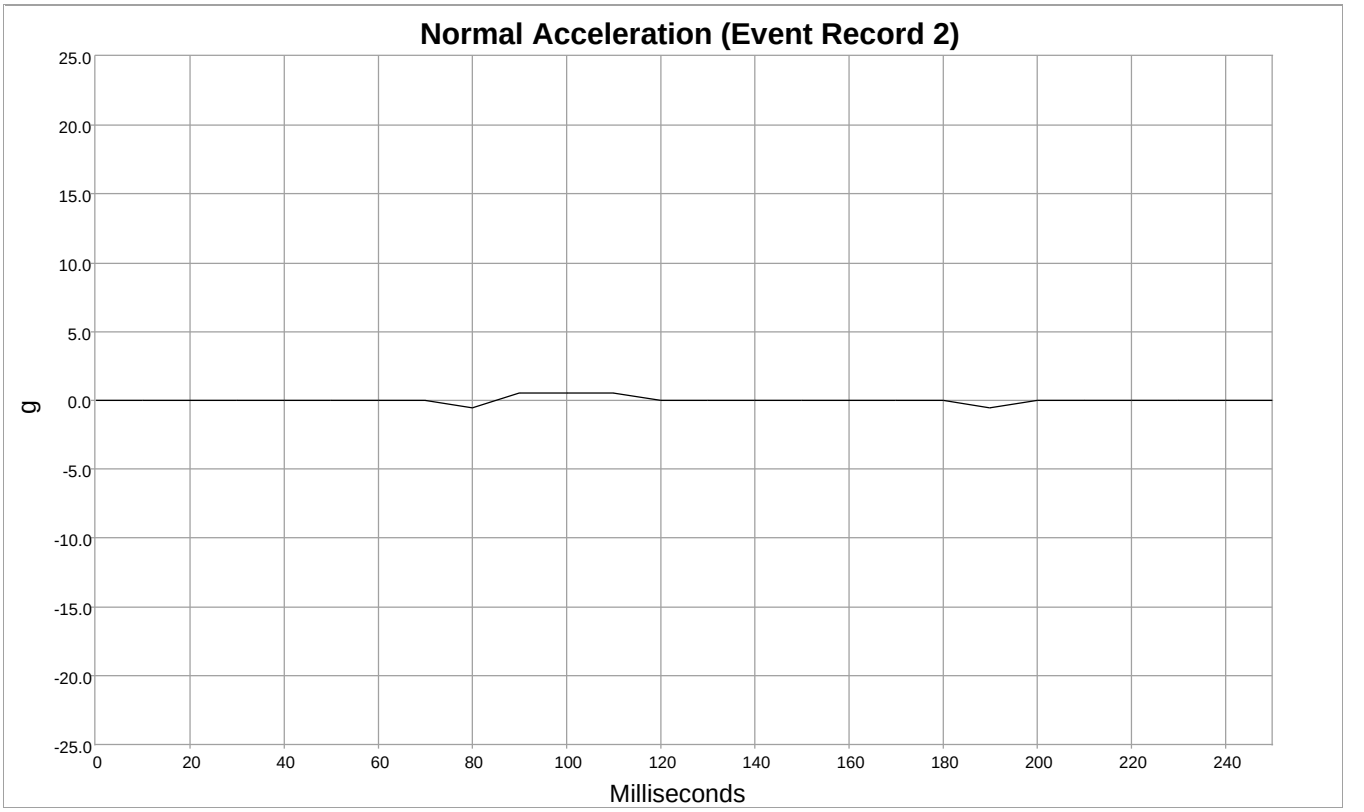
Longitudinal Acceleration (Event Record 2)

Time (msec)	g
0	1.0
10	1.0
20	0.0
30	0.5
40	1.5
50	0.0
60	0.0
70	0.5
80	0.0
90	2.0
100	0.0
110	-0.5
120	0.0
130	0.0
140	1.5
150	0.0
160	0.0
170	0.5
180	0.5
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	1.5
20	0.0
30	0.0
40	0.0
50	0.0
60	-1.0
70	-0.5
80	-1.5
90	-2.0
100	-1.5
110	-0.5
120	-1.5
130	-2.0
140	-2.5
150	-1.5
160	-1.5
170	-1.5
180	-1.0
190	-1.5
200	-1.5
210	-1.0
220	-1.0
230	0.0
240	0.0
250	0.0



Normal Acceleration (Event Record 2)

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

Hexadecimal Data

DID #	Data
$8000	41 58 15 15 01 13 00 5D 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 CF
$8020	01 03 00 00 00 00 00 00 00 00 00 00 00 00 00 FC
$8021	AA 00 01 02 00 03 00 00 00 00 00 50 06 37 AA AA
$8022	AA 00 CC 68 E6 00 00 00 7D 00 00 00 81 00 00 00 00 89 00 00 00 00 00 00 00 A8 00 00 00 A8 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 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 64
$8023	AA 00 CC 68 E6 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 00 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 3B
$8024	AA 00 FF 00 00 40 43 02 12 12 11 00 06 36 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 61
$8025	AA 00 FF 00 00 40 43 02 12 12 11 10 06 36 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 51
$8026	AA 01 FC D0 35 00 00 77 33 00 30 00 00 00 00 00 49 0E 00 13 0E 00 00 00 01 00 00 00 00 00 00 00 49 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4A 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4B 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4D 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4D 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4E 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 50 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 51 00 FF 10 00 00 00 00 01 00 00 00 00 00 00 00 50 00 F1 0D 00 20 00 00 01 00 00 00 00 00 00 00 50 00 EE 0D 00 20 00 00 01 00 00 00 00 00 00 66
$8027	AA 01 FC D0 35 00 00 77 33 00 30 00 00 00 00 00 49 0E 00 13 0E 00 00 00 01 00 00 00 00 00 00 00 49 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4A 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4B 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4D 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4D 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 4E 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 50 0E 00 12 0E 00 00 00 01 00 00 00 00 00 00 00 51 00 FF 10 00 00 00 00 01 00 00 00 00 00 00 00 50 00 F1 0D 00 20 00 00 01 00 00 00 00 00 00 00 50 49 F0 0E 49 01 00 00 01 00 00 00 00 00 00 F0
$8028	AA 00 00 00 00 00 00 00 00 00 FF FF FE FC FD FC F8 F3 F1 E7 DC D4 CB C2 BA B6 B1 AE 00 00 00 00 00 00 00 00 00 00 00 00 AA 73 00 00 00 00 00 79
$8029	AA 00 00 00 00 00 01 01 01 01 02 02 02 02 02 03 03 03 03 03 03 03 03 03 03 03 03 03 00 00 00 00 00 00 00 00 00 00 00 00 04 78 00 00 00 00 00 A5
$802A	AA 00 00 00 01 01 01 01 01 01 01 01 01 01 00 00 00 00 00 04 0B 10 10 0D 0B 0A 0A 0A 00 00 00 00

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                00 00 00 00 00 00 00 00 10 4B 00 73 00 00 00 19

$802B           AA 00 00 00 00 00 00 00 00 00 00 FF FE FE FD FD
                FC FB FB FA FA F9 F9 F8 F8 F8 F8 F8 00 00 00 00
                00 00 00 00 00 00 00 00 F7 70 00 78 00 00 00 D2

$802C           AA 01 00 04 00 00 FF 00 00 FF FF 00 17 A0 FC ED
                D2 CB 07 DB 9E D1 AC E1 D9 E0 E8 F1 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A7

$802D           AA 01 02 02 00 01 03 00 00 01 00 04 00 FF 00 00
                03 00 00 01 01 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 44

$802E           AA 01 08 FF 00 FD FF 01 00 00 00 00 F2 F2 04 FD
                07 14 FE 15 6C EC 03 EC FA FC 05 04 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 F8

$802F           AA 01 FF 03 00 00 00 00 FE FF FD FC FD FF FD FC
                FB FD FD FD FE FD FD FE FE 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 82

$8030           AA 01 FD FC 00 00 FD FF FE FF FF 00 00 FD FC 00
                FE F8 06 00 00 00 00 00 00 00 00 00 05 BE 00 00
                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 AC

$8031           AA 01 00 00 00 00 00 00 00 00 FF 01 01 01 00 00
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$8007           AA 00 00 00 00 00 00 00 0E 00 00 00 00 00 00 00
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$803F           AA 01 00 20 00 00 00 00 00 00 00 00 00 00 00 00
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                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

$8011           AA 01 C4 2F 80 00 00 00 00 01 27 16 00 00 00 16
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                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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$8012           AA 00 01 07 6D 06 6B 00 00 00 00 00 00 00 00 00
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                E1 03 0D 00 00 00 00 00 11 00 00 00 00 00 00 00
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$8013           AA 01 C4 2F 80 00 00 00 00 01 00 00 00 00 00 00
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                00 00 00 00 00 00 00 00 00 E1

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                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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$8015           AA 01 C4 2F 80 00 00 00 00 01 27 16 00 00 00 16
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$8016           AA 00 30 01 11 D0 0B 60 00 00 00 00 00 00 10 00
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$8017          AA 01 C4 2F 80 00 00 00 00 01 00 00 00 00 00 00
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$801A          AA 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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               00 00 00 00 00 00 00 00

$8004          00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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               00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               00 00 00 00 00 00 00 00

$8005          AA 00 F8 FF FF FF DE F1 DE F1 80 00 00 00 00 00
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               00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               FF FC 00 01 CF FE 2D 00 00 00 00 00 00 00 00 0A
               03 45 00 02 3D 01 08 00 00 00 00 00 00 00 00 70
               01 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

$8008          00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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$8009          AA 01 B7 F8 AA AA AA AA 00 00 09 FF F8 00 10 07
               00 00 00 00

$800A          AA 00 00 31 00 00 48 A6 92 02 15 48 DC 9B 07 6A
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               00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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$8010          AA 01 F8 F8 F8 F8 F0 F0 E0 E3 00 00 00 00 00 00
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               00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
               AF 01 00 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
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$8040           AA 01 00 00 00 00 00 00 FF FF 00 00 00 00 00 00
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$8041           AA 00 BF CC 04 00 00 00 8F 00 8F 8F 8F 8F 8F 8F
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                00 00 00 00 00 00 00 00

$8043           AA 01 01 FF 01 FF 01 FF 01 FF 01 FF 01 FF 00 00
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$8045           AA 00 BC 00 77 00 A0 32 20 01 00 00 00 00 00 00
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$8046           AA 00 C0 00 00 00 00 00 00 00 00 00 00 00 00 00
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                00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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$8051           A2 10 FF 00 A6 10 FF 00 A1 10 FF 00 26 10 F2 00
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$8052           C0 13 30 01 00 00 00 00 00 00 00 00 00 00 00 00

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$8060           AA 00 98 71 98 70 00 00 00 00 00 00 06 37 6F 00
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$8061           AA 00 CF C0 00 00 00 00 00 00 00 00 00 00 00 00
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$8063   AA 00 FF FF 00 00 00 00 00 00 00 00 00 00 00 00
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        FF 00 FF 00 FF 00 00 00 00 00 00 00 00 00 00 00
        00 00 00 00 00 FF 00 FF 00 FF 00 00 00 FF 01 00
        FF 00 FF 00 FF 00 00 00 00 00 00 00 00 00 00 00
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        00 00 00 00 00 FF 00 FF 00 FF 00 00 00 FF 01 00
        FF 00 FF 00 FF 00 00 00 00 00 00 00 00 00 00 00
        00 00 00 00 00 FF 00 FF 00 FF 00 00 00 FF 01 00
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$8065   AA 00 CF FF F0 CC 00 30 00 00 00 00 00 00 00 00
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        FF FF 00 00 FF FF FF FF FF FF FF FF FF FF FF FF
        FF FF FF FF 00 00 00 00 FF FF 00 00 FF FF 00 00
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          FF FF FF FF 00 00 00 00 FF FF 00 00 FF FF 00 00
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          02 00 69 69 00 00 00 00 00 00 00 00 00 00 00 0C
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          90 0D 32 32 20 20 02 1F 01 08 03 1A 01 64 03 B0
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$F181          37 37 39 35 39 2D 54 4C 41 2D 41 32 35 30 00 00
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**National Highway
Traffic Safety
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