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

NHTSA

DOT HS 813 349

September 2022

Special Crash Investigations: On-Site Reported Driver Manual Restraint System Malfunction Crash Investigation; Vehicle: 2018 Honda Civic EX; Location: Florida; Crash Date: January 2020

DISCLAIMER

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Suggested APA Format Citation:

Crash Research & Analysis, Inc. (2022, September). *Special Crash Investigations: On-site reported driver manual restraint system crash investigation; Vehicle: 2018 Honda Civic EX; Location: Florida; Crash Date: January 2020* (Report No. DOT HS 813 349). National Highway Traffic Safety Administration.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 813 349		

4. Title and Subtitle	5. Report Date
Special Crash Investigations: On-Site Reported Driver Manual Restraint System Malfunction Crash Investigation; Vehicle: 2018 Honda Civic EX; Location: Florida; Crash Date: January 2020	September 2022
	6. Performing Organization Code

7. Author	8. Performing Organization Report No.
Crash Research & Analysis, Inc.	CR20008

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Crash Research & Analysis, Inc. P.O. Box 302 Elma, NY 14059	**11. Contract or Grant No.** 693JJ919C000004

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
National Highway Traffic Safety Administration 1200 New Jersey Avenue SE Washington, DC 20590	Technical Report Crash Date: January 2020
	14. Sponsoring Agency Code

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 the reported malfunction of the driver seat belt system in a 2018 Honda Civic EX driven by a belted 90-year-old male who initiated a left turn at an intersection into the travel path of a 2011 Lexus ES 350. The front of the Honda was struck by the left front corner of the Lexus at an angle, which induced a counterclockwise rotation to the Honda. The Honda driver seat belt retractor pretensioner actuated during the crash and several inflatable supplemental restraints deployed. The Honda driver was transported by ambulance to a local hospital for treatment of non-incapacitating (B-level) injuries. He stated that the lower anchor bolt of the Honda driver seat belt system came loose during the crash. During inspection of the Honda, the SCI investigator observed that the driver seat belt system's lower anchor bolt had released from its securement location during the crash. This SCI investigation determined that the release of the lower anchor bolt was a result of improper reinstallation by the third-party company, and not from manufacturer defect or vehicle performance malfunction. These findings are documented and discussed in the Manual Restraints Section of this report, and were corroborated by the Honda representative's observations during the joint inspection.

17. Key Words	18. Distribution Statement
manual restraint system, aftermarket equipment	This document is available to the public from the DOT, BTS, National Transportation Library, Repository & Open Science Access Portal, rosap.ntl.bts.gov.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	63	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

Table of Contents

Background **1**

Summary **3**
- Crash Site 3
- Pre-Crash 4
- Crash 5
- Post-Crash 5

2018 Honda Civic EX **6**
- Description 6
- Vehicle History 6
- Exterior Damage 7
- Event Data Recorder 8
- Interior Damage 9
- Manual Restraint Systems 10
- Supplemental Restraint Systems 13
- NHTSA Recalls and Investigations 15

2018 Honda Civic EX Occupant Data **16**
- Driver Demographics 16
- Driver Injuries 16
- Driver Kinematics 17

2011 Lexus ES 350 ..... **19**
- Description 19
- Exterior Damage 20
- Event Data Recorder 21
- Occupant Data 22

Crash Diagram **23**

Appendix A: Event Data Recorder Report for 2018 Honda Civic EX **A-1**

Appendix B: Event Data Recorder Report for 2011 Lexus ES 350 ..... **B-1**

Special Crash Investigations
On-Site Reported Driver Manual Restraint System
Malfunction Crash Investigation
Office of Defects Investigation
Case Number: CR20008
Vehicle: 2018 Honda Civic EX
Location: Florida
Crash Date: January 2020

Background

This report documents the on-site investigation of the reported malfunction of the driver seat belt system in a 2018 Honda Civic EX (Figure 1) driven by a belted 90-year-old male who initiated a left turn at an intersection into the travel path of a 2011 Lexus ES 350. The front of the Honda was struck by the left front corner of the Lexus at an angle, which induced a counterclockwise rotation to the Honda about its vertical axis. The Honda driver's seat belt retractor pretensioner actuated during the crash and several inflatable supplemental restraints deployed. The Honda driver was transported by ambulance to a local hospital for treatment of non-incapacitating (B-level) injuries. He stated that the lower anchor bolt of the Honda driver's seat belt system came loose during the crash.

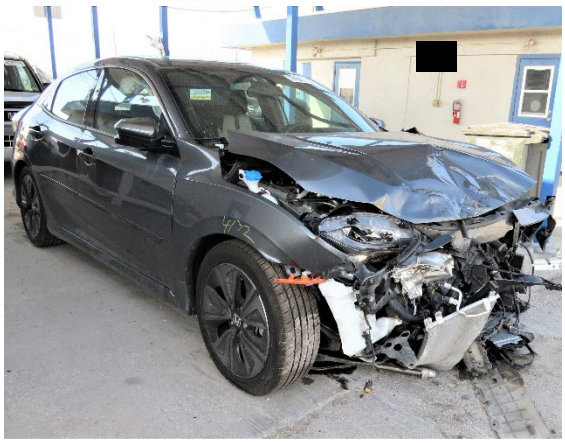


Figure 1. Right front oblique view of the Honda

This crash was reported to the National Highway Traffic Safety Administration by the Honda driver in February 2020. Notification was then forwarded to the Special Crash Investigations (SCI) group and assigned for on-site investigation by the SCI team at Crash Research & Analysis. The SCI team obtained a police crash report (PCR) documenting the crash and established cooperation to inspect the Honda at the vehicle salvage facility where it was located. The on-site portion of this investigation took place during February 2020 and was attended by a Honda representative. On-site activities included the exterior and interior inspection of the Honda to measure exterior deformation, interior damage, document evidence of interior occupant contact, and examine the manual and supplemental restraint systems. The Honda had an event data recorder (EDR), which was imaged during the inspection process using the Bosch Crash Data Retrieval (CDR) tool and software. The crash site was documented using photographs and a

total station mapping system. In addition, an exterior inspection of the Lexus was conducted and data were imaged from the Lexus' EDR.

During the Honda inspection, the SCI investigator observed that the driver seat belt system's lower anchor bolt had released from its securement location during the crash. Further inspection of the vehicle revealed that an aftermarket subwoofer was installed in the trunk space and an aftermarket amplifier was installed underneath the driver's seat. It was evident that the lower anchor of the driver seat belt system and surrounding left B-pillar fascia/trim had been temporarily removed and then reinstalled by the third-party installer to facilitate their stereo system modifications. The SCI investigator observed that the bottom two threads of the bolt were deformed, and documented evidence indicating that the bolt was loose/improperly torqued at the time of the crash. This SCI investigation determined that the release of the lower anchor bolt from its securement was a result of improper reinstallation by the third-party company, and not from manufacturer defect or vehicle performance malfunction. These findings are documented and discussed in the Manual Restraints Section of this report, and were corroborated by the Honda representative's observations during the joint inspection.

Summary

Crash Site

This crash occurred at the suburban intersection of a divided north-south roadway with a three-lane local roadway. The crash occurred at night under artificial lighting at the intersection, which was controlled by an electronic signal. Reported weather conditions in the locale at the time of the crash included clear skies, a temperature of 22 ºC (71 ºF), 75-percent relative humidity, and a northeast breeze of 19 km/h (12 mph). For the Honda's travel trajectory, the northbound portion of the roadway consisted of one left turn lane, two through lanes, and one right turn lane, all delineated by solid lane markings. A raised concrete median with vegetation and trees divided the northbound and southbound portions. For the Honda's northbound approach, the roadway was straight and level until the vicinity of the intersection. The roadway initiated a slight right curve as it widened to incorporate the 3.7 m (12.1 ft) wide left turn lane at the intersection (Figure 2). For the Lexus' travel trajectory, the roadway curved slightly left as it widened to four lanes at the intersection. The Lexus had approached the intersection in the 3.8 m (12.5 ft) wide right through lane (Figure 3).

Figure 2. Northbound view of the Honda's pre-crash approach to the crash site

Figure 3. Southbound view of the Lexus' pre-crash approach to the crash site

Speed on the north-south roadway was regulated by a posted limit of 72 km/h (45 mph). At the time of the crash, the electronic signal had cycled to stop traffic flow for the intersecting local roadway. A crash diagram is included at the end of this report.

Pre-Crash

The Honda traveled north on the multi-lane roadway, driven by a belted 90-year-old male . Specifics concerning his pre-crash activities and route of travel remain unknown. The driver stated during interview that he approached the intersection in the left turn lane and brought the Honda to a controlled stop in the intersection as he waited for traffic to clear so he could turn left. This was confirmed by the data imaged from the Honda's EDR, which indicated that at 5 seconds prior to the recorded crash event, the vehicle was stationary and the service brake pedal was depressed.

The Lexus traveled south on the multi-lane roadway, driven by a belted 18-year-old male. Specifics concerning his pre-crash activities and route of travel are also unknown. The Lexus traveled south in the right through lane as it approached the intersection. Lexus EDR data showed the driver depressed the accelerator pedal and was increasing the Lexus' speed as it approached the intersection. The Lexus' speed increased from 74 km/h (46 mph) to 92 km/h (57 mph) over the first five intervals of the pre-crash buffer data (equivalent to 4 seconds). It was apparent that the Lexus driver intended to proceed through the intersection and maintain his southbound travel trajectory.

The Honda driver stated during his interview that the light had turned yellow for north/south traffic. He further stated that since he already had positioned the Honda in advance of the stop bar and was in the intersection, he completed the left turn so that he would have cleared the intersection by the time the light turned red. The driver apparently did not see the approaching Lexus, which was accelerating to proceed through the intersection. Figure 4 shows the turning trajectory perspective of the intersection for the Honda's driver. Visibility of the oncoming southbound travel lanes was unobstructed. Law enforcement documentation of the crash reported the Honda driver told the investigating officer he initiated the left turn in front of the Lexus. As the front of the Honda encroached into the travel path of the Lexus, the Lexus' driver saw the Honda, evidenced by a final-second braking avoidance maneuver that reduced the Lexus' EDR-reported speed to 70 km/h (43 mph) at the time of algorithm enable (AE). The Honda's EDR-reported speed at AE was 23 km/h (14 mph).

Figure 4. View of the intersection and oncoming roadway for the Honda's pre-crash turning trajectory

Crash

The front left aspect of the Lexus struck the front of the Honda at an angle in the intersection. At impact, the heading angle of the Honda was approximately 290 degrees, while the heading angle of the Lexus was approximately 180 degrees. In conjunction with the vehicles' speeds, this produced directions of force within the Honda's 1-o'clock sector for the (40 degrees) and Lexus' 11-o'clock sector (330 degrees). Impact forces induced a rapid counterclockwise rotation to the Honda, with a minor clockwise rotation to the Lexus. The Honda rotated approximately 130 degrees and slid to final rest in the southwest intersection quadrant, facing south.

The Lexus was redirected toward the southwest by the impact. A dark tire mark on the roadway surface from the Lexus' left front tire showed its trajectory from initial impact. The front tires/wheels overrode the curb at the southwest corner of the intersection as the Lexus departed the roadway and entered the grassy roadside. It continued through the roadside and struck a large palm tree with the center aspect of its front plane. This tree impact was located approximately 31.0 m (101.7 ft) from the initial point of impact. The Lexus came to final rest with its front against the base of the palm tree. Figure 5 shows the trajectory of the Lexus into the roadside and the struck palm tree in the far center.

Figure 5. Southwest-facing view of the Lexus' trajectory into the roadside toward the palm tree impact

Post-Crash

The local emergency response system received several calls reporting the crash. Law enforcement, fire department, and EMS personnel responded to the crash scene. The Honda driver was assisted from the vehicle and evaluated on-scene by EMS personnel. He was then transported by ambulance to a local hospital and hospitalized for 4 days for treatment of reported non-incapacitating (B-level) injuries. The driver reported to NHTSA as part of his notification of the crash that he sustained a sternum fracture, rib fractures, and several soft tissue injuries.

The Lexus driver exited his vehicle without assistance, denied injury, and refused EMS evaluation/care. The Honda and Lexus were recovered from the scene by a local towing service and moved to a local yard, where they were deemed total losses by their respective insurers. They were then transferred to the regional insurance salvage facilities where they were located for this SCI investigation.

2018 Honda Civic EX

Description

The 2018 Honda Civic (Figure 6) was manufactured in April 2018 and identified by the VIN SHHFK7H56JUxxxxxx. The electric odometer was inoperable at the time of SCI inspection, however, the driver stated during interview that the Honda's odometer reading at the time of the crash was 24,544 km (15,251 miles). The Honda was a front-wheel drive platform with the EX trim package. It was powered by a 1.5-liter, inline 4-cylinder gasoline engine linked to an automatic transmission, with power-assisted 4-wheel disc brakes with antilock. The gross vehicle weight rating (GVWR) was 1,795 kg (3,957 lb), with gross axle weight ratings (GAWR) of 955 kg (2,105 lb) front and 850 kg (1,874 lb) rear. The manufacturer's recommended tire size was P215/50R17, with recommended cold tire pressures of 220 kPa (32 PSI) for all four axle positions. At the time of the SCI inspection, the Honda had Michelin Primacy MXM4 tires of the recommended size at all four axle positions. All four tires had at least 3 mm (4/32 in) of tread, remained inflated, and were not damaged or restricted in relation to the crash.

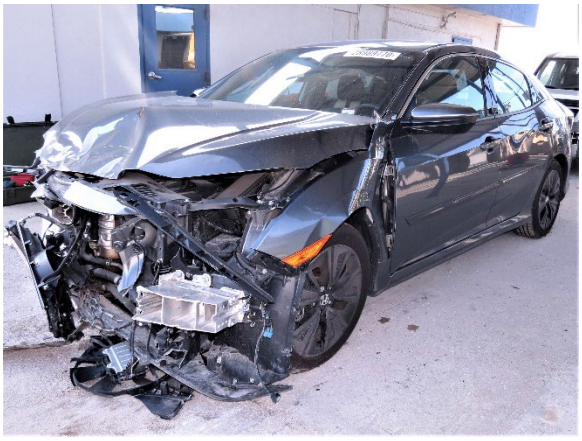


Figure 6. Left front oblique view of the 2018 Honda Civic during the SCI vehicle inspection

The Honda had seating for up to five occupants (2/3), with front-row bucket seats and a second-row bench seat with split forward-folding seatbacks. Both front seats had adjustable head restraints, while the head restraints in the second row were integral. Manual restraint systems consisted of 3-point lap and shoulder seat belts for all seat positions. Supplemental restraint systems included front seat belt retractor pretensioners, with six inflatable supplemental restraints. The driver's seat belt pretensioner actuated and the driver's frontal, right front seat-mounted, and right inflatable curtain (IC) air bags deployed.

Vehicle History

According to its owner, the Honda was purchased new in July 2018. It had been involved in one prior crash, which occurred in Florida in January 2019. In that crash, the Honda sustained minor left front corner body damage when it was struck by the right front corner of a 2014 Kia Optima in an intersection. No supplemental restraint device actuation or deployment occurred in that minor-severity crash. The Honda was repaired by a manufacturer service center and returned to the owner in March 2019.

The Honda owner further reported that following the prior crash, he bought an aftermarket stereo system that consisted of an amplifier, several speakers, and a subwoofer system. He paid a professional business in Florida to install the system in March 2019.

Exterior Damage

The Honda's front plane damage pattern resembled an angular distributed impact to the right and center aspects of the vehicle. The bumper fascia, grille, bumper beam, and other frontal components were completely separated from the vehicle by the angular crash forces. Figure 7 shows the damage pattern from a horizontal frontal perspective, while Figure 8 shows the direct contact and front damage profile from overhead . Direct contact on the hood began on the far right corner and extended to 29 cm (11.4 in) left of center. The hood itself was shifted 10 cm (3.9 in) to the left. Overall direct damage width measured 111 cm (43.7 in), beginning at the right front bumper corner. Rubber tire transfer from the left front tire/wheel of the Lexus was visible on the center aspect of the Honda's deformed/separated bumper beam.

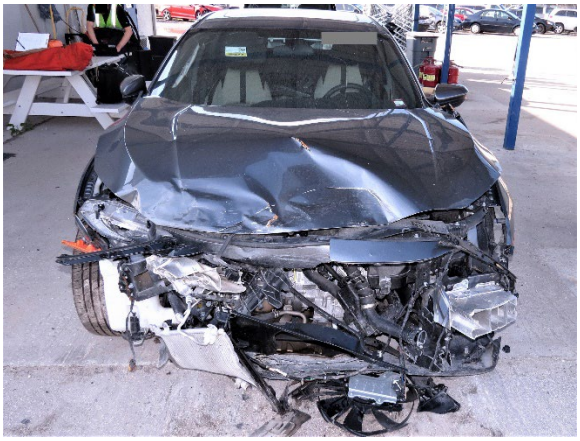


Figure 7. Front plane damage to the Honda at the time of the SCI vehicle inspection

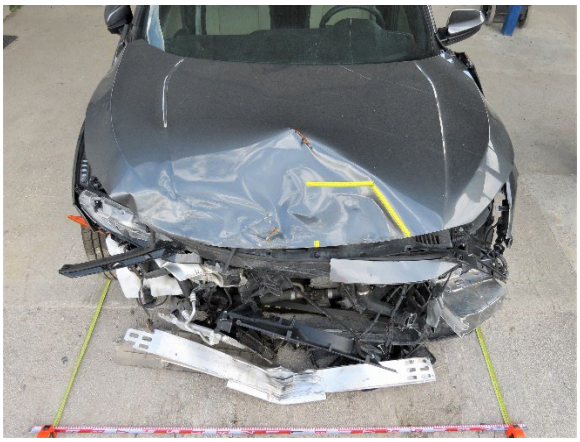


Figure 8. SCI documentation of the Honda's front plane damage pattern

A residual crush profile was documented to the remaining front plane components to serve as a most representative profile of the sustained crush. The corresponding direct and induced damage width (Field-L) was 149 cm (58.7 in). Resultant measurements included: C1 = 10 cm (3.9 in), C2 = 14 cm (5.5 in), C3 = 34 cm (13.4 in), C4 = 30 cm (11.8 in), C5 = 23 cm (9.1 in), and C6 = 22 cm (8.7 in). Maximum crush was observed immediately to the right of the Honda's centerline. A collision deformation classification (CDC) of 01FDEW2 was assigned to the Honda's front plane damage profile. The damage algorithm of the WinSMASH model was used to calculate the severity of the crash. The total calculated vehicle velocity change (delta V) of the crash for the Honda was 26 km/h (16 mph). Specific longitudinal and lateral components of the calculated delta V were -20 km/h (-12 mph) and -17 km/h (-11 mph), respectively. Based on SCI expertise and observed vehicle damage, and compared to the EDR-reported delta V values, these results fit the collision model but were underestimated.

Event Data Recorder

The 2018 Honda Civic had an air bag control module (ACM) mounted to the center tunnel beneath the center instrument stack. The control unit monitored three-dimensional acceleration and commanded the actuation/deployment of supplemental restraints.

The Honda's ACM also had EDR capabilities, and its data were imaged during the SCI inspection using the Bosch CDR tool and software version 19.3.1, via a direct to module connection. The imaged data was later reported using software version 21.5, and is included in Appendix A of this report.

The requirements for event recording included a change in longitudinal or lateral velocity of 8 km/h (5 mph) or greater over a 150 millisecond timeframe, or commandment of a non-reversible restraint device (air bag). The EDR typically would record only one event unless the time zero values for several events occurred within 5 seconds of one another. In this manner, a non-deployment event could be recorded and locked if it occurred within 5 seconds of a deployment event. By definition, a deployment event was any recognized event in which the control unit commanded deployment of an air bag system. A non-deployment event did not deploy air bags, but could include pretensioner actuation-only commanded events. Depending on the specific control unit type, it could record approximately 255 milliseconds of data associated with a deployment command. If power supply to the SRS control unit was lost during or following a crash event, all or part of the data may not have been recorded to the EDR's memory. System status data, inclusive of reported Diagnostic Trouble Codes (DTCs), seat belt usage of front row occupants, and vehicle ignition cycle at the time of the event were recorded. Associated to the recording of each respective event was an asynchronous 5-second pre-crash buffer that recorded several pre-crash data points in 0.5-second intervals. Data recorded included vehicle speed (mph), accelerator pedal (% full), service brake (on/off) status, ABS activity (on/off), stability control (on, off, engaged), steering input (+/- 5 degrees), and engine speed rpm data.

The imaged data contained one recorded event, a deployment event type, recorded as Event Record 1. The data was imaged on ignition cycle counter 1,677, and the ignition cycle at event counter was 1,674. Therefore, the recovered data was related to the crash under investigation. The following recorded pre-crash buffer data was reported with the recorded Event Record 1.

Time (sec)	Speed (km/h [mph])	Accel. Pedal (%)	Service Brake	ABS Activity	Steering Input	Engine rpm
-5.0	0 [0]	0	ON	OFF	10	700
-4.5	0 [0]	27	OFF	OFF	20	800
-4.0	0 [0]	16	OFF	OFF	85	1,800
-3.5	2 [1]	11	OFF	OFF	130	1,600
-3.0	8 [5]	12	OFF	OFF	175	1,600
-2.5	12 [7]	13	OFF	OFF	190	1,600
-2.0	14 [9]	16	OFF	OFF	185	1,500
-1.5	14 [9]	17	OFF	OFF	110	1,400
-1.0	17 [11]	23	OFF	OFF	95	1,500
-0.5	20 [12]	35	OFF	OFF	110	1,800
0.0	23 [14]	0	ON	OFF	130	1,600

The seat belt status of the driver (sole occupant) and right front occupant positions were reported "on" and "off," respectively. The driver seat track position was reported as not in a forward position. There were no DTCs active when the crash occurred, and no supplemental restraint system warning lights were illuminated. A complete file was recorded in association to the deployment event.

The maximum longitudinal delta V reported was -27 km/h (-17 mph) at 167.5 milliseconds after time zero. The maximum lateral delta V was -26 km/h (-16 mph), which occurred at 97.5 milliseconds after time zero. Associated with the frontal event were the following supplemental restraint system deployment/actuation commands relative to time zero: driver retractor pretensioner at 17 ms, driver frontal air bag first stage at 43 ms, driver frontal air bag second stage at 83 ms, front row right seat-mounted air bag at 55 ms, and right IC air bag at 55 ms.

Interior Damage

There was no loss of integrity to the occupant compartment of the Honda associative to the crash. All doors remained closed and were operational post-crash. Only the windshield was cracked by the exterior forces of the crash; all other glazing remained intact and undamaged or contacted by the driver. Discernable evidence in the Honda's interior from occupant contact included a large scuff to the underside of the steering column from the driver's left knee (Figure 9). There was also loading of the seat belt system by the driver, as is described in the Manual Restraint Systems section of this report.

Figure 9. Left knee scuff and skin transfer to the underside of the Honda's steering column

Manual Restraint Systems

The Honda had 3-point continuous loop lap and shoulder seat belt systems for all five seat positions. The front seat belts used cinching latch plates and were configured with adjustable D-rings. The driver's seat belt retracted onto an emergency locking retractor (ELR), while the other systems all used switchable ELR/automatic locking retractors (ALR). Both front seat belt systems were equipped with retractor pretensioners. Data imaged from the Honda EDR reported an actuation command for the driver retractor pretensioner.

At the time of the inspection, the SCI investigator found the driver seat belt system hanging loosely against the B-pillar, with the D-ring adjusted to its highest position and the webbing extended in a used position. The retractor pretensioner was actuated, and the webbing was locked in position. Examination of the webbing identified several areas of polymer transfer and apparent loading evidence, and the webbing was observed to be gathered and jammed into the latch plate.

Figure 10 shows the driver's seat belt during the SCI vehicle inspection, while Figure 11 shows the driver's latch plate. There were 188 cm (74.0 in) of exposed webbing from the D-ring to the latch plate, and an additional 85 cm (35.5 in) of exposed webbing from the latch plate to the lower anchor. The lower anchor was loose in the vehicle, no longer threaded into or otherwise attached to the lower B-pillar mounting location. Figure 12 shows the loose lower anchor/bolt, while Figure 13 shows the mounting location in the lower left B-pillar.

Figure 10. Driver's seat belt in the Honda during the SCI vehicle inspection

Figure 11. Seat belt webbing gathered in the latch plate of the Honda's driver seat belt

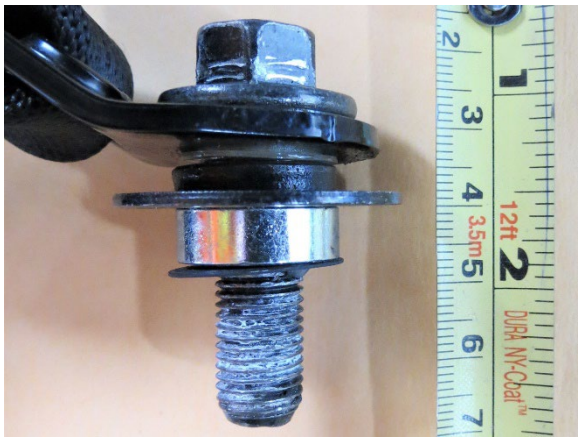


Figure 12. Lower anchor bolt of the Honda's driver seat belt system at the time of the SCI inspection

Figure 13. Lower B-pillar mounting location of the driver seat belt's lower anchor in the Honda

The lower anchor bolt had tool marks visible on the hexagonal head. There was residue from the OEM thread lock in the threads, which showed the bolt had been removed since the vehicle was manufactured. Of the exposed circumferential threads on the bolt, only the bottom two appeared damaged. These two bottom threads were bent slightly. The mounting location showed circumferential scratching on the metallic surface of the lower B-pillar that evidenced removal of the bolt. The outermost thread of the hole was peened, and there was a swiping mark on the polymer trim at the forward upper corner. Despite the damage to the bottom two threads of the bolt and the outermost thread of the hole, the SCI investigator was able to thread the bolt back into its mounting location with numerous revolutions.

Based on the minor damage to the bolt and its mounting location, it was evident that the bolt was only inserted/tightened a maximum of two complete revolutions when the crash occurred. Under the significant loading force from the driver that was translated through the webbing to the bolt during the crash, the un-torqued bolt pulled loose from its mounting . This was evidenced by the swipe/peen mark on the forward upper corner of the hole in the polymer fascia. It was obvious to the SCI investigator that the bolt had been removed after the Honda's original manufacture and not properly installed and re-torqued.

Further investigation revealed the aftermarket stereo equipment installed in the Honda. This included a Sony model XM-GS6DSP class-D 6/5 channel amplifier mounted to the floor beneath the driver's seat (Figure 14). Aftermarket electrical wiring to supply power to the amplifier was routed from the amplifier to the left sill, beneath the trim/fascia along the sill to the left A-pillar, up the A-pillar and through the firewall into the engine compartment, and connected directly to the Honda's 12-V battery. In addition, an aftermarket 12-gauge copper paired primary wire with quick connectors was found in the trunk space (Figure 15).

Figure 14. Aftermarket Sony amplifier installed beneath the Honda's driver seat

Figure 15. Exposed wiring in the Honda's trunk space, determined to be for an aftermarket subwoofer

Figure 16. View of the subwoofer wire routed behind the trim, fascia, and carpet along the Honda's left sill

This aftermarket wire was routed down below the carpeting to the left C-pillar, along the left sill beneath and behind the trim/fascia past the left-pillar (Figure 16). It continued back to the amplifier, where it was connected to the positive and neutral terminals of the woofer/subwoofer outlet on the back of the amplifier. In order to visualize/observe the subwoofer wiring and trace its path, the SCI investigator had to remove the B-pillar fascia and surrounding trim panels.

In order to route this subwoofer wire from the amplifier to the trunk space, the installer had removed the lower anchor bolt of the driver's seat belt system. It would not have been possible to route the wire in this manner without removing the bolt, as removal of the lower anchor bolt was required in order to remove the lower B-pillar fascia and surrounding trim. Based on all available evidence, the installer of the aftermarket stereo system had removed the lower anchor bolt of the driver's seat belt system from the Honda to facilitate installation of the aftermarket stereo equipment, and then neglected to properly re-torque the lower anchor bolt upon completion of the stereo system installation. Over the months between the installation of the aftermarket stereo system and the crash under investigation, the improperly re-installed bolt likely loosened further, to the point that it was inserted less than two circumferential threads into the anchor location. Under the loading force experienced during the crash under investigation, the improperly installed and loose bolt pulled from its mounting location. The release of the Honda's lower anchor did not appear to be a result of manufacturer negligence or vehicle performance malfunction, but rather was an isolated occurrence with specific and unique circumstances as described.

Supplemental Restraint Systems

The Honda had several devices to provide for the supplemental restraint of its occupants. This included a certified advanced 208-compliant (CAC) frontal air bag system, front seat-mounted side impact air bags, and dual-sensing (side impact and rollover) IC air bags. The CAC system consisted of dual-stage driver's and passenger's frontal air bags, front-seat track position sensors, front-seat belt buckle switch sensors, front retractor pretensioners, and a front right occupant classification sensor. The driver frontal air bag was mounted in the hub of the four-spoke steering wheel, while the passenger frontal air bag was a top-mount design in the right instrument panel. The front seat-mounted side impact air bags were mounted in the outboard aspect of each front seat adjacent to the respective B-pillars, and provided supplemental protection for lateral (side) crash forces. The IC air bags were mounted to the roof side rails and concealed by the Honda's headliner, designed to provide outboard protection for both of the Honda's seating rows. Labeling molded into the polymer surfaces of the pillar trim panels identified the presence of the IC air bags. The supplemental restraints (air bags and pretensioners) were controlled and monitored by the SRS control unit. In this crash, the driver retractor pretensioner actuated and the driver's frontal, right seat-mounted, and right IC air bags deployed.

The driver's frontal air bag deployed from the steering wheel hub-mounted module and through the tri-configuration cover flaps without damage. In its deflated state, the driver's frontal air bag measured approximately 70 cm (28 in) in overall diameter. It had a 19 cm (7.5 in) wide circular center stitch pattern, to which internal tethers were affixed. The air bag was vented on its rear aspect by a pair of 5 cm (2.0 in) diameter vent ports, located at the 11 o'clock and 1 o'clock

positions. There was no discernable occupant contact evidence or other crash-related damage to the Honda's deployed driver's frontal air bag.

The Honda's right front seat-mounted side impact air bag deployed forward through the outboard edge stitching of the seatback. In its deflated state, the air bag measured approximately 58 cm (23 in) tall and was a maximum of approximately 28 cm (11 in) wide. There were two 3 cm (1.2 in) diameter vents located on the upper forward aspect. There was no damage or contact to the Honda's deployed right front seat-mounted air bag.

The right IC air bag deployed downward from the roof side rail mounting location through the edge of the headliner. It extended the full 203 cm (79.9 in) length from the right A-pillar to the right C-pillar, and provided outboard protection for the full glazing height from the roof side rail to below the beltline. A fabric tether attached the lower aspect to the A-pillar. There was no contact to the deployed right IC air bag; however, the fabric had been cut post-crash by an unknown person (presumably to gain unobstructed access to the Honda's interior).

Figure 17 shows the deployed driver frontal air bag at the time of the SCI inspection, while Figure 18 shows the deployed right front seat-mounted side impact and right IC air bags.

Figure 17. View of the deployed driver's frontal air bag in the Honda at the time of the SCI inspection

Figure 18. View of the deployed right front seat-mounted side impact and right IC air bags in the Honda

NHTSA Recalls and Investigations

A VIN-based query of the NHTSA recall database (www.nhtsa.gov/recalls) both prior to the on-site inspection and as of the July 2022 date of this report for the 2018 Honda Civic showed that there were no open recalls and no open investigations pertaining to this specific vehicle.

2018 Honda Civic EX Occupant Data

Driver Demographics

Age/sex:	90 years/male
Height:	168 cm (66 in)
Weight:	70 kg (155 lb)
Eyewear:	None
Seat type:	Forward-facing bucket seat with adjustable head restraint
Seat track position:	Between middle and full-rear
Manual restraint usage:	3-point lap and shoulder seat belt with retractor pretensioner (actuated)
Usage source:	Vehicle inspection, EDR data
Air bags:	Frontal, seat-mounted side impact, and IC air bags available; Frontal air bag deployed
Alcohol/drug involvement:	None (No test given)
Egress from vehicle:	Exited vehicle without assistance
Transport from scene:	Ambulance to a local hospital
Type of medical treatment:	Hospitalized for 4 days

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Sternum fracture, NFS	450804.2	Tandem IPC; Initial: Interior – Shoulder portion of belt restraint; Secondary: Left Air Bag – Steering wheel hub	Certain Possible
2	Rib fractures, right, NFS	450210.2	Tandem IPC; Initial: Interior – Shoulder portion of belt restraint; Secondary: Left Air Bag – Steering wheel hub	Certain Possible
3	Right thumb laceration, 2.5 cm, requiring sutures	710602.1	Isolated IPC; Front – Center instrument panel	Probable
4	Right hand contusion	710402.1	Isolated IPC; Front – Center instrument panel	Probable
5	Left chest contusion	410402.1	Isolated IPC; Interior – Shoulder portion of belt restraint	Certain
6	Left chest abrasion	410202.1	Isolated IPC; Interior – Shoulder portion of belt restraint	Certain
7	Left knee contusion	810402.1	Isolated IPC; Front - Steering column, transmission selector lever, other attachment	Certain

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
8	Left knee abrasion	810202.1	Isolated IPC; Front - Steering column, transmission selector lever, other attachment	Certain
9	Right toe contusion, NFS	810402.1	Isolated IPC; Floor – Foot controls including parking brake	Probable

Source: driver interview

Driver Kinematics

The 90-year-old male was seated in the Honda driver seat. He had adjusted the seat to a track position between middle and rearmost track position, with the seat back slightly reclined and the adjustable head restraint fully downward. The driver used the available 3-point lap and shoulder seat belt system for manual restraint. His use of the seat belt system was determined by the post-crash SCI inspection of the Honda's manual restraints, and corroborated by the data imaged from the Honda SRS control unit.

He drove the Honda northbound on the multi-lane roadway, merged into the left turn lane, and stopped at the intersection to wait to turn left. He stated during interview that when the traffic signal turned yellow, he decided to turn left as he was already advanced out into the intersection. He did not see the approaching Lexus as it accelerated through the intersection.

At impact with the Lexus, the Honda driver initiated a forward and right trajectory in response to the 1 o'clock direction of force. His torso and lap loaded the seat belt system, which restricted his forward displacement. However, as the magnitude of the driver's loading force was translated through the webbing of the seat belt system, the tensile loading force exceeded the frictional normal force of the untightened threads on the improperly torqued lower anchor bolt. This deformed the two inserted bottom threads of the bolt, and the bolt pulled out of its lower B-pillar mounting location. This released the tension on the lap portion of the driver seat belt system, which exacerbated his loading of the shoulder portion and pulled webbing from the lap portion through the latch plate. These circumstances gathered the webbing in the belt path of the latch plate, and allowed the driver to become slightly displaced forward and to the right from his seated position. Loading of the shoulder portion of the seat belt system, combined with contact to the deployed driver's frontal air bag, resulted in rib fractures, a sternum fracture, and soft tissue injuries to his chest.

The driver's right hand separated from the steering wheel during his displacement, and likely contacted components of the center instrument panel. This resulted in soft tissue injuries to his right hand and right thumb. However, the SCI investigator was unable to discern any contact evidence in the Honda attributable to these injuries. Additionally, the driver's left knee contacted and engaged the underside of the steering column. This was evidenced by a scuff/skin transfer, and resulted in soft tissue injuries to the driver. Last, engagement of the driver's right foot with the brake pedal resulted in a minor soft tissue injury.

The driver remained in the Honda as it rotated from impact and slid to final rest. He rebounded into the driver's seat, and the shoulder portion of the seat belt system remained buckled in front

of him. The driver was assisted from the vehicle by emergency response personnel and transported to a local hospital. He was treated and released after 4 days.

2011 Lexus ES 350

Description

The 2011 Lexus ES 350 (Figure 19) was manufactured in February 2011 and identified by the VIN JTHBK1EG3Bxxxxxx. It was a 4-door sedan that had a 278 cm (109.4 in) wheelbase and was powered by a 3.5-liter, V-6 gasoline engine linked to an automatic transmission. The electric odometer was inoperable at the time of the SCI inspection; no odometer reading could be obtained. The Lexus GVWR was 2,123 kg (4,680 lb), with GAWRs of 1,210 kg (2,668 lb) front and 1,070 kg (2,359 lb) rear. The manufacturer's recommended tire size was P215/55R17, with recommended cold tire pressures of 210 kPa (30 PSI) for all four axle positions. At the time of the SCI inspection, the Lexus had Kumho Solus TA31 tires of the recommended size at all four axle positions. All four tires had at least 5 mm (6/32 in) of tread. The left front tire was cut and restricted from the crash, while the remaining three tires were undamaged. The leather-surfaced interior of the Lexus had seating for up to five occupants, with manual and supplemental restraint systems available for all.

Figure 19. Front left oblique view of the Lexus at the time of the SCI inspection

Figure 20. Left front corner impact damage to the Lexus from the impact with the Honda

Exterior Damage

The Lexus sustained front plane, left aspect damage from the impact with the Honda and front plane, center aspect damage from the secondary impact with the palm tree. Damage from first event with the Honda began on the left front bumper corner and extended 35 cm (13.8 in) to the right. A residual crush profile documented to the bumper beam of the front plane revealed crush only to the left end of the bumper beam (C1), with a magnitude of only 3 cm (1.2 in). The damage associated with the Honda struck extended down the left plane to the left A-pillar (Figure 20), and the left wheelbase was reduced by 19 cm (7.5 in). The corresponding CDC assigned to the Lexus was 11FLEE5.

The damage algorithm of the WinSMASH model was used to calculate the severity of the crash. The total calculated vehicle velocity change (delta V) of the crash for the Lexus was 23 km/h (14 mph). Specific longitudinal and lateral components of the calculated delta V were -20 km/h (-12 mph) and 12 km/h (7mph), respectively. Based on SCI expertise and observed vehicle damage, these results fit the collision model but appeared underestimated.

The secondary impact with the palm tree was centered in the Lexus' front plane (Figure 21). Direct contact measured 48 cm (18.9 in) wide. A residual crush profile was documented across the entire width of the front bumper beam, which measured 112 cm (44.1 in) wide. Resultant measurements included: C1 = 0 cm (0 in), C2 = 12 cm (4.7 in), C3 = 21 cm (8.3 in), C4 = 29 cm (11.4 in), C5 = 17 cm (6.7 in), and C6 = 0 cm (0 in). Maximum crush was observed at the Lexus's centerline. The CDC assigned to the Lexus for the large diameter tree impact was 12FCEW2. The damage algorithm of the WinSMASH model was used to calculate the severity of the crash. The total calculated vehicle velocity change (delta V) of the tree impact for the Lexus was 33 km/h (21 mph). Specific longitudinal and lateral components of the calculated delta V were -33 km/h (-21 mph) and 0 km/h (0 mph), respectively. Based on SCI expertise and observed vehicle damage, these results fit the collision model but appeared overestimated.

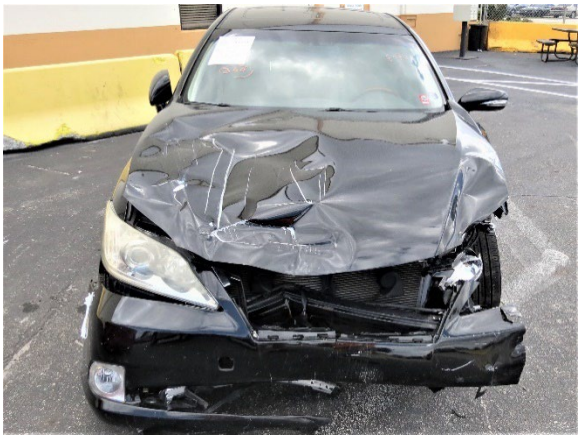


Figure 21. Front plane damage to the Lexus, with the initial damage from the Honda on the left edge and the tree impact damage in the center aspect

Event Data Recorder

The 2011 Lexus ES 350 was equipped with an air bag electronic control unit (ECU) that was mounted to the floor on the center tunnel, beneath the center console. The ECU monitored the diagnostic functions of the Lexus's restraint systems (air bags and seat belt pretensioners) and controlled the deployment/actuation of those devices dependent upon crash event trigger severity. The ECU also had EDR capabilities to record crash event data for longitudinal (front/rear), lateral (side), and non-horizontal (rollover) crash events. Data were imaged from the Lexus EDU during the SCI vehicle inspection using a connection through the diagnostic link connector (DLC) and external power supplied through the interior fuse panel. The EDR data were retrieved using the Bosch CDR software and tool, version 19.3.1. It was later reported using software version 21.5, and is included at the end of this technical report as Appendix B.

The Lexus' EDR could store up to two recording pages for each of the three crash event types, in chronological order based on event recognition (termed *trigger* or TRG). The reported data were referenced based on the TRG counter, and the recording of each event was based on a judgement threshold (specific value unknown) dependent upon the type.

In crash impacts where forces were recognized in several directions, data correlating to that event may be recorded in additional pages (i.e., an angular horizontal impact may be recorded in both front/rear and side event type pages). For a recorded event, if the "Freeze Signal" was indicated ON, subsequent events would not be recorded in the recording page. The freeze signal typically was associated with air bag deployment commands. If power supply to the ECU was lost during or following a crash event, all or part of the data may not have been recorded to the EDR's memory.

The imaged data contained two events, which included a side (most recent, TRG 2) and frontal (first prior, TRG 1). There were no diagnostic trouble codes (DTCs) present at the time of data imagery. Event recording was complete for both recorded events. The TRG 1 and TRG 2 events were separated by only 6 milliseconds, indicative that they were related to the same overall crash event. That is, both sets of recorded data were related to the initial impact event with the Honda, and, due to the limitations of the EDR, the secondary palm tree event was not recorded.

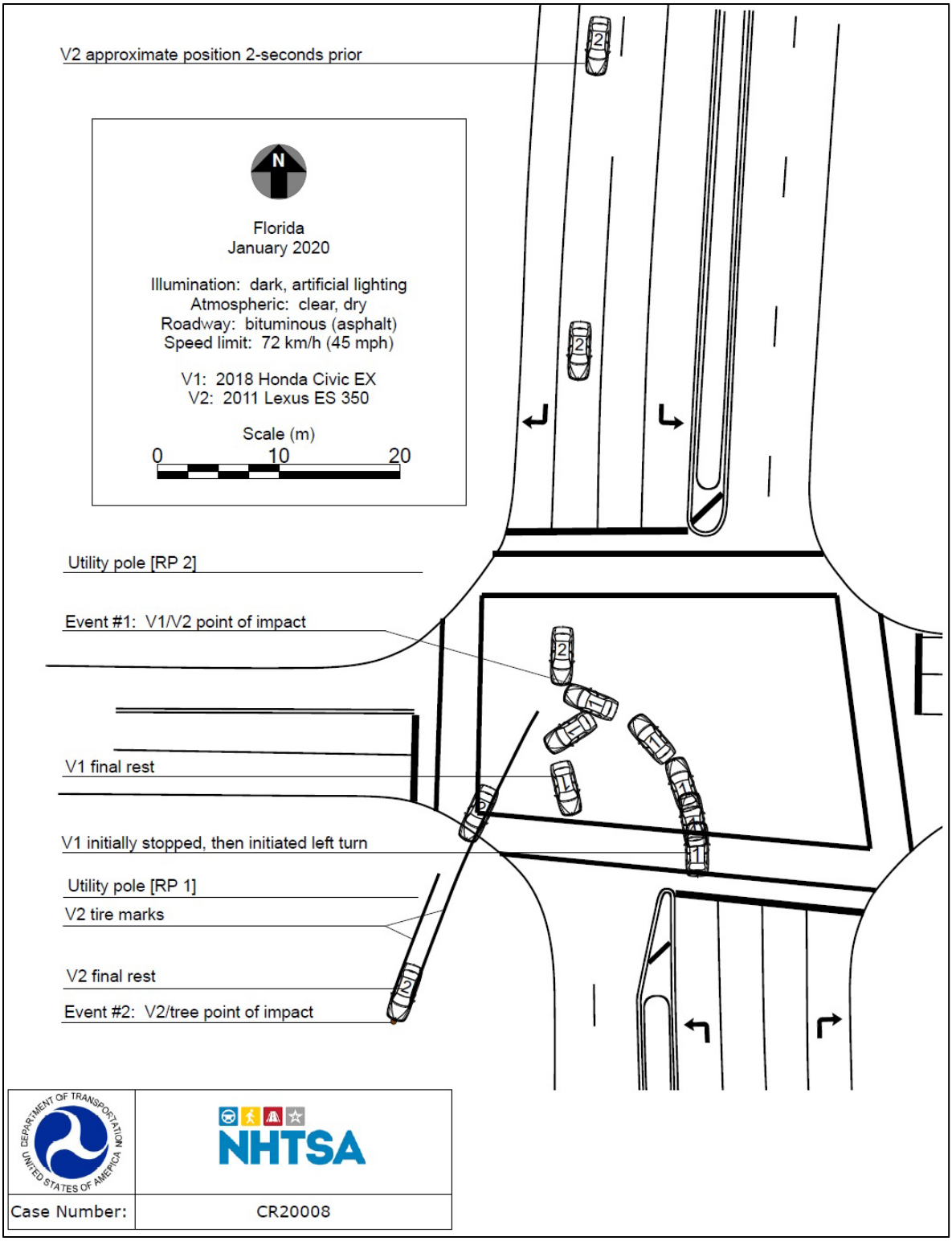
Recorded pre-crash buffer data showed the driver seat belt was buckled and there was no front-row right occupant. The air bag warning lamp was off. Supplemental restraint device actuations/deployments related to TRG 1 (frontal event) included driver pretensioner actuation and driver frontal air bag deployment at 29 milliseconds. The recorded maximum longitudinal delta V (TRG 1) was -24 km/h (-14.9 mph). The recorded maximum lateral delta V (TRG 2, B-pillar) was 12 km/h (7.5 mph). The following recorded pre-crash buffer data were reported with TRG 1.

Time (sec)	Speed (km/h [mph])	Service Brake	Engine rpm
-4.8	46 [74]	OFF	2,400
-3.8	47.2 [76]	OFF	3,200
-2.8	52.2 [84]	OFF	4,800
-1.8	57.2 [92]	OFF	5,200
-0.8	57.2 [92]	ON	3,600
TRG (0)	43.5 [70]	ON	2,000

Occupant Data

The Lexus was driven by the belted 18-year-old male. He denied injury from the crash and refused medical evaluation/transport at the crash scene.

Crash Diagram



Appendix A: Event Data Recorder Report for 2018 Honda Civic EX[1]

[1] The EDR report contained in this technical report was imaged using the version of the Bosch CDR software current at the time of the vehicle inspection. The CDR report contained in the associated Crash Viewer application may differ relative to this report.

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN	SHHFK7H56JU******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR20008_V1_ACM.CDRX
Saved on	Wednesday, February 26 2020 at 09:58:20
Imaged with CDR version	Crash Data Retrieval Tool 19.3.1
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 21.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	1

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	1677
Maximum Delta-V, Longitudinal (MPH [km/h])	-17 [-27]
Time, Maximum Delta-V, Longitudinal (msec)	167.5
Maximum Delta-V, Lateral (MPH [km/h])	-16 [-26]
Time, Maximum Delta-V, Lateral (msec)	97.5
Time, Maximum Delta-V, Resultant (msec)	167.5
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 1)

Pretensioner Deployment, Time to Fire, Driver (msec)	17
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to Deploy First Stage, Driver (msec)	43
Frontal Air Bag Deployment, Time to Deploy First Stage, Right Front Passenger (msec)	0
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (msec)	83
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)	55
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)	55
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)

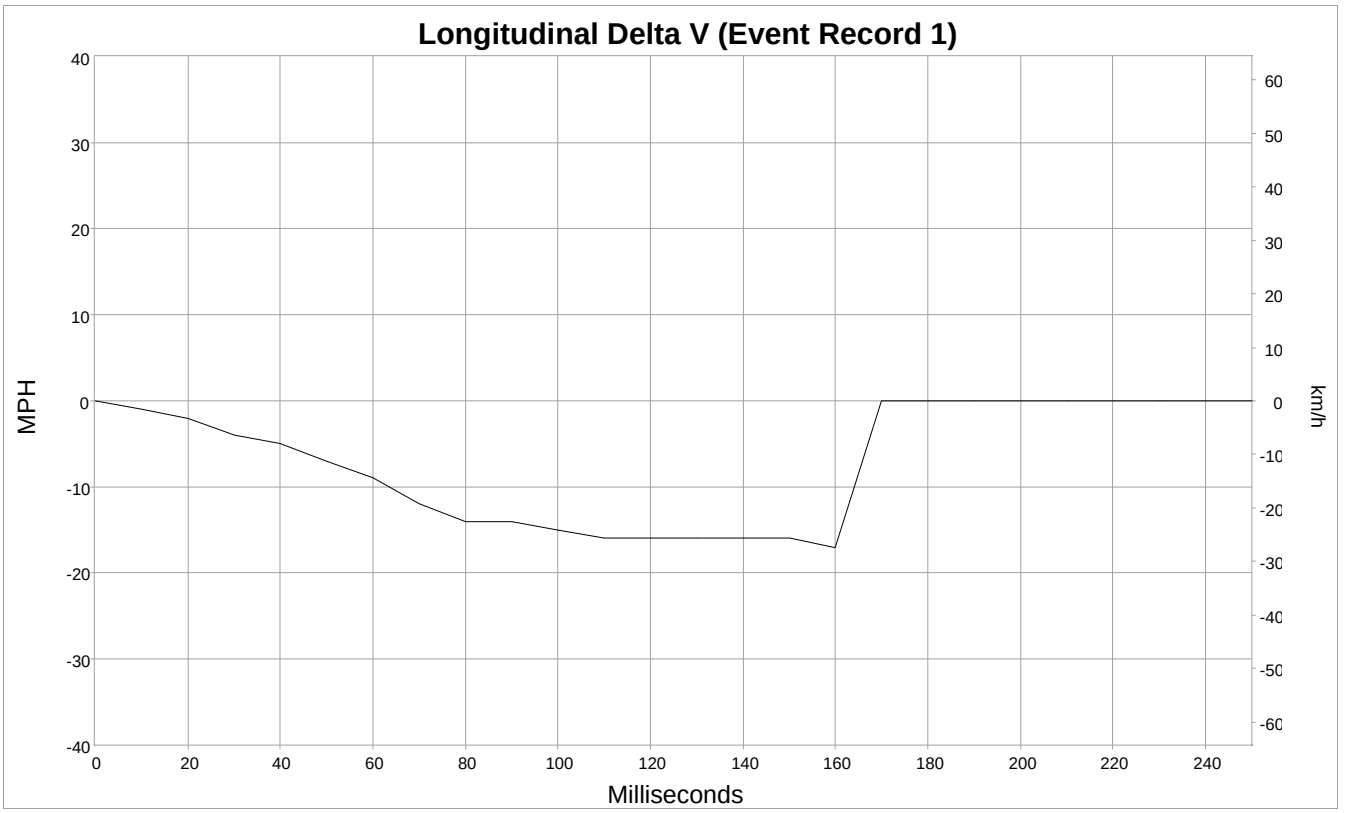
Safety Belt Status, Driver	On
Safety Belt Status, Right Front Passenger	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Occupant Size Classification, Right Front Passenger Airbag Suppressed (Yes/No)	Yes
Frontal Air Bag Warning Lamp (On, Off)	Off
Ignition Cycle, Crash	1674

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

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	PCM Derived Accelerator Pedal Position, % full
-5.0	0 [0]	0	On	Off	On Non-Engaged	10	700	0
-4.5	0 [0]	27	Off	Off	On Non-Engaged	20	800	27
-4.0	0 [0]	16	Off	Off	On Non-Engaged	85	1,800	16
-3.5	1 [2]	11	Off	Off	On Non-Engaged	130	1,600	11
-3.0	5 [8]	12	Off	Off	On Non-Engaged	175	1,600	12
-2.5	7 [12]	13	Off	Off	On Non-Engaged	190	1,600	13
-2.0	9 [14]	16	Off	Off	On Non-Engaged	185	1,500	16
-1.5	9 [14]	17	Off	Off	On Non-Engaged	110	1,400	17
-1.0	11 [17]	23	Off	Off	On Non-Engaged	95	1,500	23
-0.5	12 [20]	35	Off	Off	On Non-Engaged	110	1,800	35
0.0	14 [23]	0	On	Off	On Non-Engaged	130	1,600	0

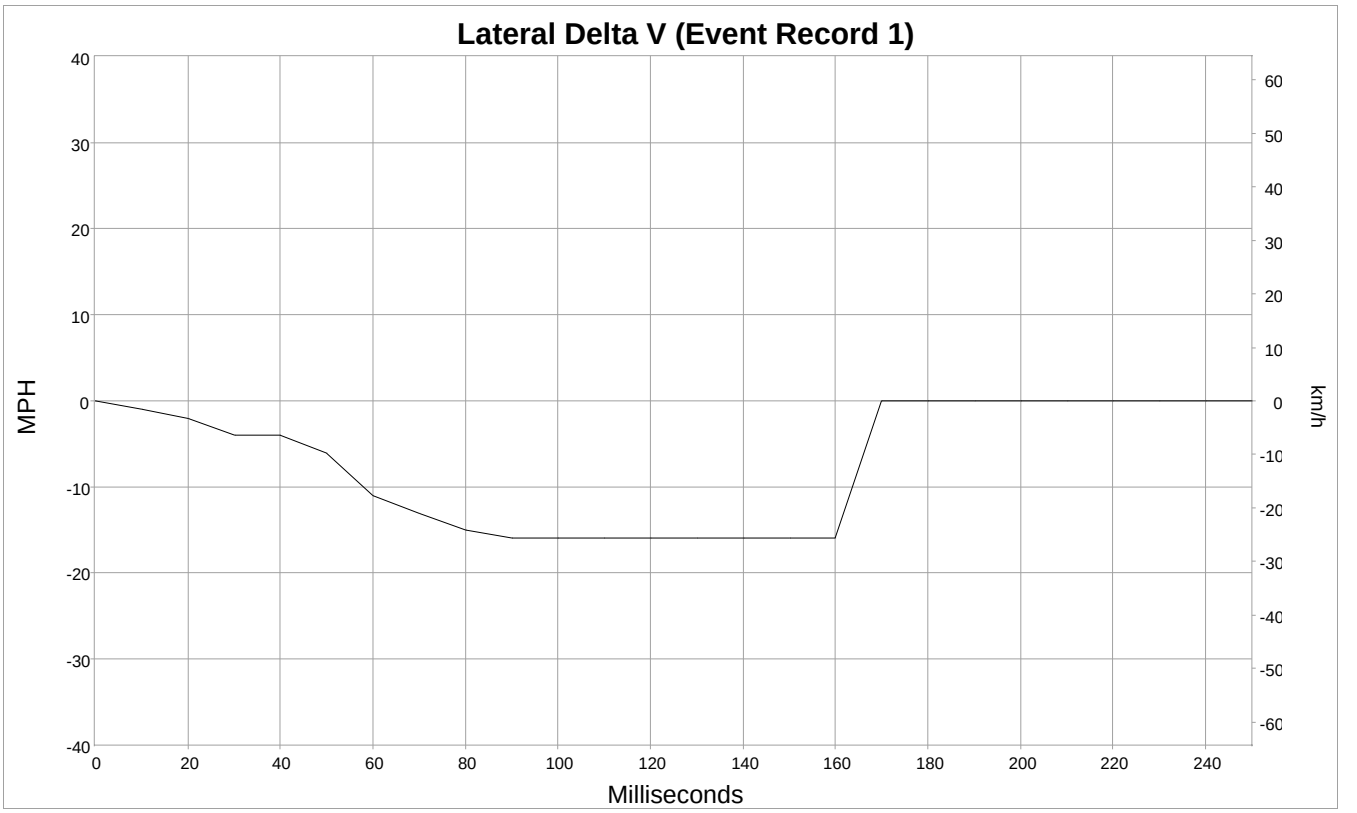
Pre-Crash Data -5 to 0 sec [2 samples/sec] (Event Record 1) - Table 2 of 2

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



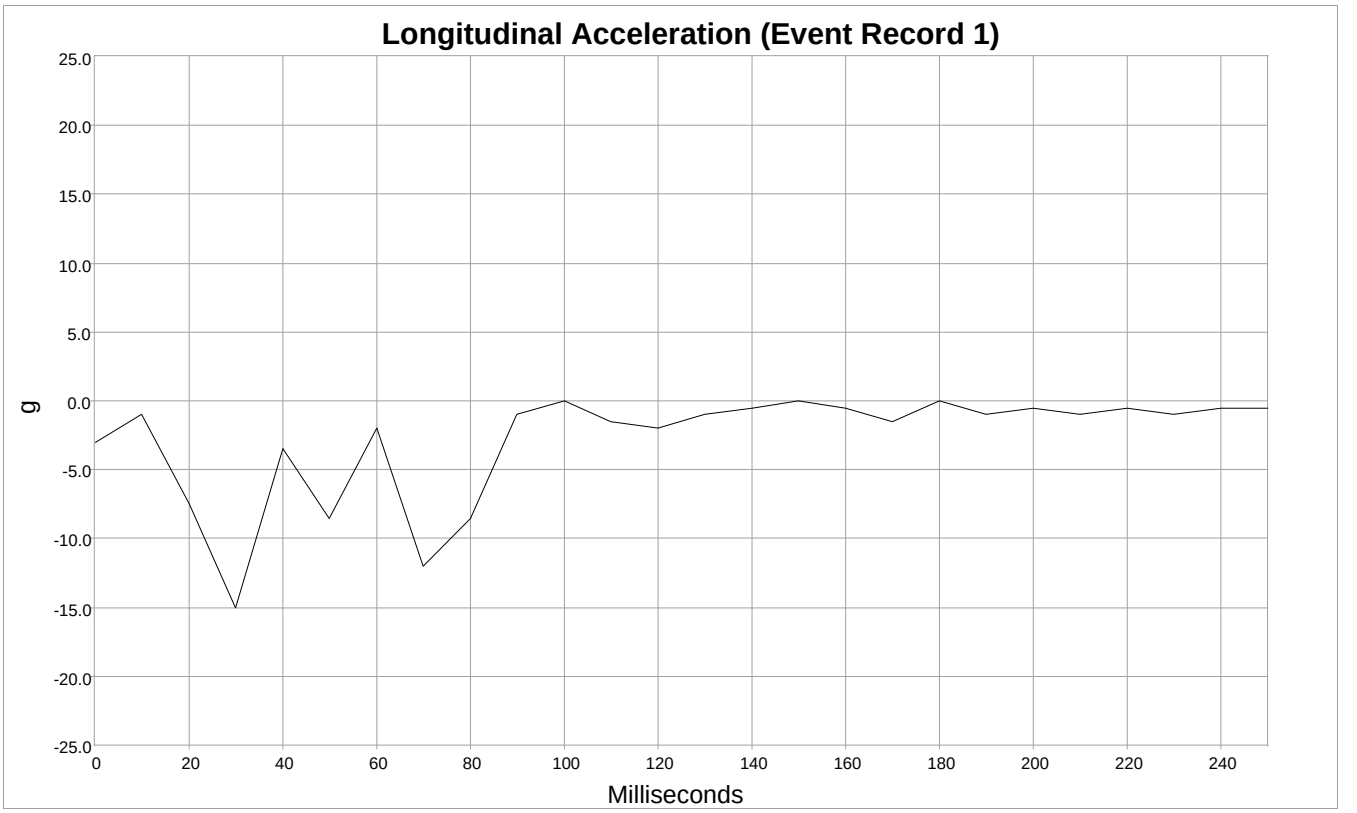
Longitudinal Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	-1 [-1]
20	-2 [-4]
30	-4 [-6]
40	-5 [-8]
50	-7 [-12]
60	-9 [-15]
70	-12 [-19]
80	-14 [-22]
90	-14 [-23]
100	-15 [-24]
110	-16 [-25]
120	-16 [-25]
130	-16 [-26]
140	-16 [-26]
150	-16 [-26]
160	-17 [-27]
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]



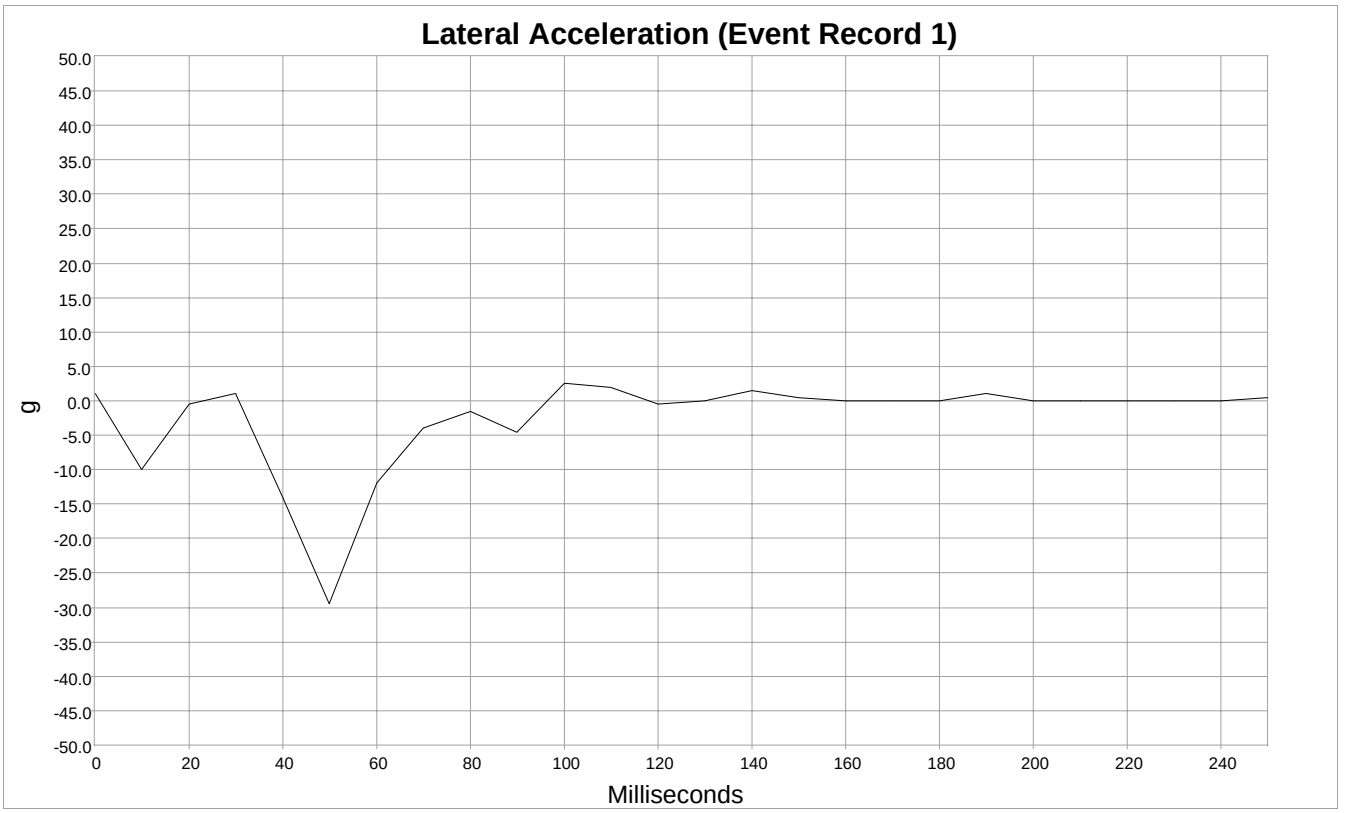
Lateral Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	-1 [-1]
20	-2 [-4]
30	-4 [-6]
40	-4 [-7]
50	-6 [-10]
60	-11 [-18]
70	-13 [-21]
80	-15 [-24]
90	-16 [-26]
100	-16 [-26]
110	-16 [-26]
120	-16 [-26]
130	-16 [-26]
140	-16 [-26]
150	-16 [-25]
160	-16 [-25]
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]



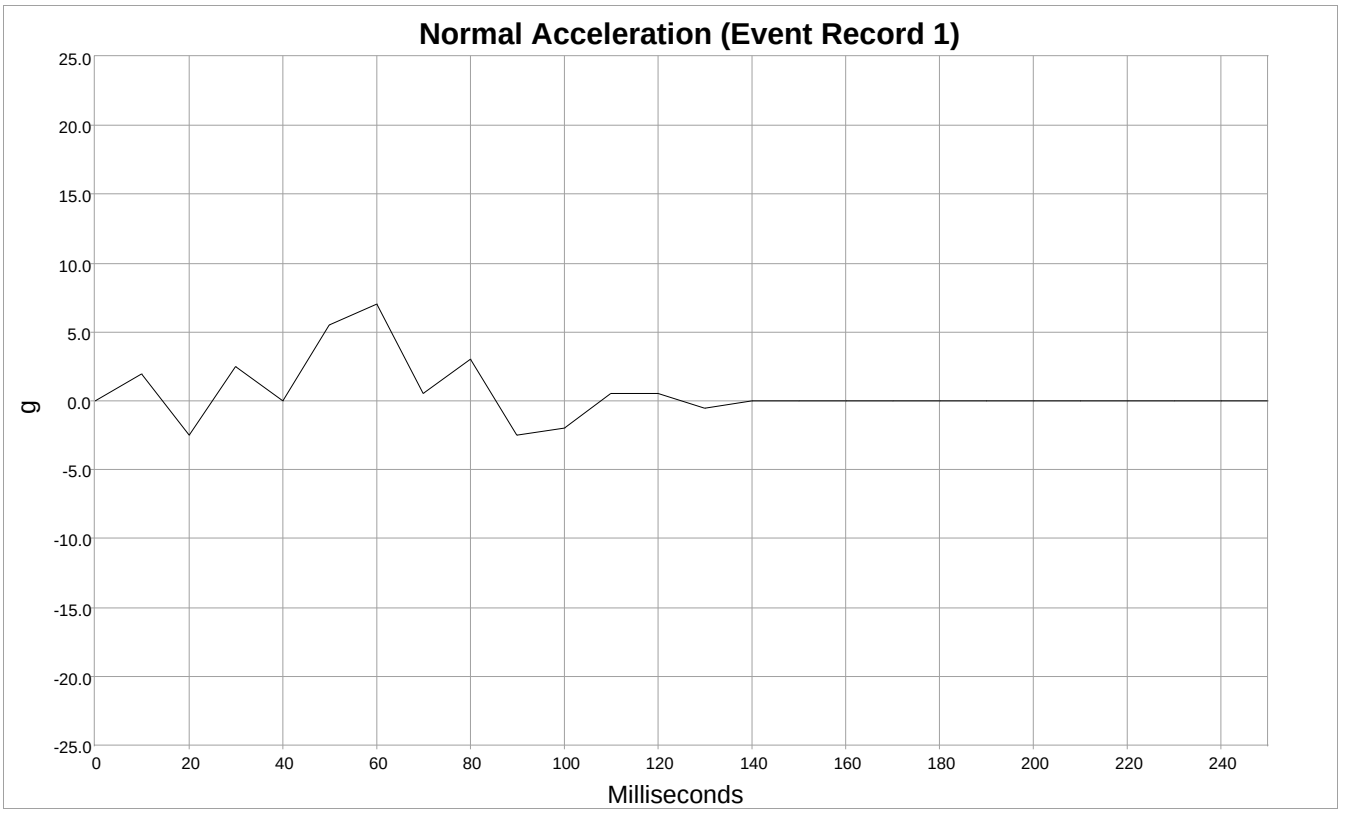
Longitudinal Acceleration (Event Record 1)

Time (msec)	g
0	-3.0
10	-1.0
20	-7.5
30	-15.0
40	-3.5
50	-8.5
60	-2.0
70	-12.0
80	-8.5
90	-1.0
100	0.0
110	-1.5
120	-2.0
130	-1.0
140	-0.5
150	0.0
160	-0.5
170	-1.5
180	0.0
190	-1.0
200	-0.5
210	-1.0
220	-0.5
230	-1.0
240	-0.5
250	-0.5



Lateral Acceleration (Event Record 1)

Time (msec)	g
0	1.0
10	-10.0
20	-0.5
30	1.0
40	-14.0
50	-29.5
60	-12.0
70	-4.0
80	-1.5
90	-4.5
100	2.5
110	2.0
120	-0.5
130	0.0
140	1.5
150	0.5
160	0.0
170	0.0
180	0.0
190	1.0
200	0.0
210	0.0
220	0.0
230	0.0
240	0.0
250	0.5



Normal Acceleration (Event Record 1)

Time (msec)	g
0	0.0
10	2.0
20	-2.5
30	2.5
40	0.0
50	5.5
60	7.0
70	0.5
80	3.0
90	-2.5
100	-2.0
110	0.5
120	0.5
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	0.0
240	0.0
250	0.0

Hexadecimal Data

DID #	Data
$8000	21 4D 13 14 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 29
$8020	01 03 00 00 00 00 00 00 00 00 00 00 00 00 00 FC
$8021	AA 00 01 00 00 00 00 00 00 00 00 55 06 8D AA 00
$8022	AA 00 C0 78 66 00 00 00 11 00 00 00 00 00 00 00
	00 2B 00 53 00 00 00 00 00 00 37 00 00 00 37 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 AA
$8023	AA 00 C0 78 66 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
	11 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A7
$8024	AA 00 FF 00 00 40 43 02 12 12 11 00 06 8A 00 00
	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0D
$8025	AA 00 FF 00 00 40 43 00 12 00 11 00 00 00 00 00
	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 B1
$8026	AA 01 FC 10 35 00 00 00 00 00 30 00 00 00 00 00
	00 00 02 07 00 01 00 00 00 11 00 10 00 00 00 00
	00 1B 04 08 1B 00 00 00 00 11 00 10 00 00 00 00
	00 10 11 12 10 00 00 00 00 11 00 10 00 00 00 00
	02 0B 1A 10 0B 00 00 00 00 11 00 10 00 00 00 00
	08 0C 23 10 0C 00 00 00 00 11 00 10 00 00 00 00
	0C 0D 26 10 0D 00 00 00 00 11 00 10 00 00 00 00
	0E 10 25 0F 10 00 00 00 00 11 00 10 00 00 00 00
	0E 11 16 0E 11 00 00 00 00 11 00 10 00 00 00 00
	11 17 13 0F 17 00 00 00 00 11 00 10 00 00 00 00
	14 23 16 12 23 00 00 00 00 11 00 10 00 00 00 00
	17 00 1A 10 00 01 00 00 00 11 00 10 00 00 00 1E
$8027	AA 01 FC 10 35 00 00 00 00 00 30 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 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 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 00 00 00 E4
$8028	AA 00 00 FF FC FA F8 F4 F1 ED EA E9 E8 E7 E7 E6
	E6 E6 E5 00 00 00 00 00 00 00 00 00 00 00 00 00
	00 00 00 00 00 00 00 00 E5 43 00 00 00 00 00 4F
$8029	AA 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 56

```
$802A   AA 00 00 FF FC FA F9 F6 EE EB E8 E6 E6 E6 E6 E6
        E6 E7 E7 00 00 00 00 00 00 00 00 00 00 00 00 00
        00 00 00 00 00 00 00 00 E6 27 00 43 00 00 00 2F

$802B   AA 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 56

$802C   AA 01 FA FE F1 E2 F9 EF FC E8 EF FE 00 FD FC FE
        FF 00 FF FD 00 FE FF FE FF FE FF FF 00 00 00 00
        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 E9

$802D   AA 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 55

$802E   AA 01 02 EC FF 02 E4 C5 E8 F8 FD F7 05 04 FF 00
        03 01 00 00 00 02 00 00 00 00 00 01 00 00 00 00
        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 DA

$802F   AA 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 55

$8030   AA 01 00 04 FB 05 00 0B 0E 01 06 FB FC 01 01 FF
        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 39

$8031   AA 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 55

$8007   AA 00 00 00 00 00 00 00 0E 00 00 00 00 00 00 00
        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 F2

$803F   AA 01 00 30 80 80 00 00 00 00 00 00 00 00 00 00
        80 07 07 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

$8011   AA 01 C4 2F E0 00 00 00 00 01 27 16 00 00 00 16
        00 00 00 00 04 00 10 00 1A FF 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

$8012   AA 00 51 0A DC 04 97 05 BB 01 E1 00 20 50 20 00
        00 20 10 36 00 00 20 10 36 00 00 00 00 00 00 00
        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 86
        02 00 0F 00 00 53 13 00 00 00 00 00 00 00 00 00
        00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 89

$8013   AA 01 C4 2F E0 00 00 00 00 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 00 00 00 00 00 00 00
        00 00 00 00 00 00 00 00 00 81

$8014   AA 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 56
        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

$8015   AA 01 C4 2F E0 00 00 00 00 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 00 00 00 00 00 00 00
```

```
              00 00 00 00 00 00 00 00 00 81

$8016         AA 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 56

$8017         AA 01 C4 2F E0 00 00 00 00 01 27 16 00 00 00 16
              00 00 00 00 07 00 10 00 1A FF 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 FE

$8018         AA 00 01 42 05 C9 0E 0E 00 00 00 10 04 AC 00 00
              00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 69

$8019         AA 01 C4 2F E3 10 BF 80 00 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 00 00 00 00 00 00 00
              00 00 00 00 00 00 00 00 00 2F

$801A         AA 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 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

$801B         AA 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 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

$8001         AA 00 C4 18 00 00 00 00 36 36 00 00 00 36 00 00
              00 00 00 07 07 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

$8002         AA 01 E0 FE F8 FF 00 00 02 80 3F 00 00 00 00 00
              00 3C E5 00 E6 00 28 00 00 00 00 06 30 00 00 00
              7F E0 08 01 FD 00 0C 7F 00 00 00 00 00 00 00 00
              00 00 00 00 00 00 00 00

$8004         Not Used

$8005         AA 00 FE F0 F0 F0 DE 01 DE 01 E0 00 00 00 00 00
              00 00 00 DA 00 00 00 00 00 00 00 00 00 00 00 00
              E2 5F E2 5F 00 00 00 00 00 00 00 00 00 00 00 00
              FF A4 00 FD 7D 02 27 00 00 00 00 00 00 00 00 BA
              04 1D 00 02 DC 01 41 00 00 00 00 00 00 00 00 BF
              01 01 FF 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         Not Used

$8009         AA 01 B7 F8 AA AA AA AA 00 00 01 FF FF FF FA 07
              00 00 00 00

$800A         AA 00 00 31 00 00 46 F6 92 86 A7 46 E0 9B 15 14
              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

$8010         AA 00 F8 F8 F8 F8 E0 E0 E0 E3 00 00 00 00 00 00
```

	AF 80 01 20 08 00 00 00 AF 00 10 50 3F 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 AF 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 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
$801C	AA 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 56
$801F	Not Used
$8040	AA 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 00 00 00 00 00 00 00
$8041	AA 00 FC CC 00 00 00 00 57 57 57 57 57 57 00 00 55 55 00 00 55 55 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
$8043	AA 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
$8044	AA 00 FF 00 80 7F 81 80 7F 7F 80 80 00 00 00 00 00 00 00 00
$8045	AA 00 B4 00 7F 00 78 5E 00 00 00 00 00 00 00 00 00 00 00 00
$8046	AA 00 C0 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
$8050	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 18 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
$8051	98 71 01 00 98 72 01 00 B3 11 01 00 12 31 03 00 12 81 02 00 11 81 02 00 33 31 01 00 33 11 01 00
$8052	03 33 01 01 01 15 01 01 01 00 00 00 00 00 00 00
$8053	98 98 28 00 00 00 00 00 00 00 00 00 00 00 00 00
$8054	AA 00 E2 5F 28 E9 E2 5F 28 E9 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
$8060	AA 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
$8061	AA 00 CF 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 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 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 00 00 00 00 00 00 00 00 00 00 00 00

$8062          AA 01 FF F0 3F 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
               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 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 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 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 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 00 00 00 00 00 00 00 00 00

$8063          AA 00 FF FF 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 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 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 00 00 00 00 00 00 00 00 00 00 00

$8064          AA 00 F0 32 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 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 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 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
               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 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 00 00 00 00 00 00 00 00 00 00

$8065          AA 00 FF F0 F0 CC 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 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 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 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 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 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 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 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 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 00 00 00 00 00 00 00

$8070   AA 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

$8071   AA 00 F3 FF F0 0F 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 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 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 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 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 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 00 00 00 00 00 00 00 00

$8072   AA 00 FF F9 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 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 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 00 00 00 00 00 00 00 00 00 00 00

$E600         31 72

$E604         01 00 00 00

$F100         00 00 00 00

$F110         0E 37 37 39 36 30 54 47 47 41 30 32 30 4D 32 00
              00

$F112         0B 43 31 39 30 30 35 4E 50 34 32 20 00 00 00 00
              00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

$F181         37 37 39 35 39 2D 54 47 47 2D 41 30 32 30 00 00
```

Disclaimer of Liability

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

Appendix B: Event Data Recorder Report for 2011 Lexus ES 350[2]

[2] The EDR report contained in this technical report was imaged using the version of the Bosch CDR software current at the time of the vehicle inspection. The CDR report contained in the associated Crash Viewer application may differ relative to this report.

IMPORTANT NOTICE: Robert Bosch LLC and the manufacturers whose vehicles are accessible using the CDR System urge end users to use the latest production release of the Crash Data Retrieval system software when viewing, printing or exporting any retrieved data from within the CDR program. Using the latest version of the CDR software is the best way to ensure that retrieved data has been translated using the most current information provided by the manufacturers of the vehicles supported by this product.

CDR File Information

User Entered VIN/Frame Number	JTHBK1EG3B2******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR20008_V2_ACM.CDRX
Saved on	Tuesday, February 25 2020 at 15:03:33
Imaged with CDR version	Crash Data Retrieval Tool 19.3.1
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 21.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Front/Rear (1), Side (1)

Comments

No comments entered.

Data Limitations

CDR Record Information:

- Due to limitations of the data recorded by the airbag ECU, such as the resolution, data range, sampling interval, time period of the recording, and the items recorded, the information provided by this data may not be sufficient to capture the entire crash.
- Pre-Crash data is recorded in discrete intervals. Due to different refresh rates within the vehicle's electronics, the data recorded may not be synchronous to each other.
- Airbag ECU data should be used in conjunction with other physical evidence obtained from the vehicle and the surrounding circumstances.
- If the airbags did not deploy or the pretensioners did not operate during an event that meets a specified recording threshold, it is called a Non-Deployment Event. Data from a Non-Deployment Event can be overwritten by a succeeding event that meets the specified recording threshold. If the airbag(s) deploy or the pretensioners are operated, it is called a Deployment Event. Deployment Event data cannot be overwritten or deleted by the airbag ECU following that event.
- If power supply to the airbag ECU is lost during an event, all or part of the data may not be recorded.
- "Diagnostic Trouble Codes" are information about faults when a recording trigger is established. Various diagnostic trouble codes could be set and recorded due to component or system damage during an accident.
- The airbag ECU records only diagnostic information related to the airbag system. It does not record diagnostic information related to other vehicle systems.
- The TaSCAN, Global Tech Stream, or Intelligent Tester II devices (or any other Toyota genuine diagnostic tool) can be used to obtain detailed information on the diagnostic trouble codes from the airbag system, as well as diagnostic information from other systems. However, in some cases, the diagnostic trouble codes of the airbag system recorded by the airbag ECU when the event occurred may not match the diagnostic trouble codes read out when the diagnostic tool is used.

General Information:

- The data recording specifications of Toyota's airbag ECUs are divided into the following categories. The specifications for 12EDR or later are designed to be compatible with NHTSA's 49CFR Part 563 rule.
  - 00EDR / 02EDR / 04EDR / 06EDR / 10EDR / 12EDR / 13EDR / 15EDR / 17EDR / 19EDR
- The airbag ECU records data for all or some of the following accident types: frontal crash, rear crash , side crash, and rollover events. Depending on the installed airbag ECU, data for side crash and/or rollover events may not be recorded.
- This airbag ECU records post-crash data, and depending on the airbag ECU, may record pre-crash data.
  - If a single event occurs independently, the data for that event is recorded on a one-to-one basis.
  - If multiple events occur successively (within a period of approximately 500ms), the establishment of the recording trigger for the first event is defined as the "pre-crash recording trigger". Pre-crash data for the first event and post-crash data for each successive event is then recorded.
- The airbag ECU has two recording pages (memory maps) to store pre-crash data. Additionally, to store post-crash data, the airbag ECU has two recording pages for each accident type: two pages for frontal and rear crash, two pages for a side crash, and two pages for rollover event.

- The data recorded by the airbag ECU includes correlating information between each previously occurring event (i.e., information that clarifies the collision event sequence. This correlation information consists of the following items.
  - Time from Previous Pre-Crash TRG
  - Linked Pre-Crash Page
  - Time from Pre-Crash TRG
  - TRG Count
  - Previous Crash Type
- The point in time at which the recording trigger is established is regarded as time zero for the recorded data.
- The recording trigger judgment threshold value differs depending on the collision type (i.e., frontal crash, rear crash, side crash, or rollover event).
- Time series data for side crash may have 24 or 25 sampling points.
- Some of the data recorded by the airbag ECU is transmitted to the airbag ECU from various vehicle control modules by the vehicle's Controller Area Network (CAN).
- In some cases, the airbag ECU part number printed on the ECU label may not match the airbag ECU part number that the CDR tool reports. The part number retrieved by the CDR tool should be considered as the official ECU part number.

Data Element Sign Convention:
The following table provides an explanation of the sign notation for data elements that may be included in this CDR report.

Data Element Name	Positive Sign Notation Indicates
Max. Longitudinal Delta-V	Forward
Longitudinal Delta-V	Forward
Max. Lateral Delta-V , B-Pillar Sensor	Outside to Inside
Max. Lateral Delta-V , C-Pillar Sensor	Outside to Inside
Max. Lateral Delta-V , Front Door Sensor	Outside to Inside
Max. Lateral Delta-V , Slide Door Sensor	Outside to Inside
Lateral Delta-V , B-Pillar Sensor	Outside to Inside
Lateral Delta-V , C-Pillar Sensor	Outside to Inside
Lateral Delta-V , Airbag ECU Sensor	Left to Right
Roll Angle Peak	Clockwise Rotation
Roll Angle	Clockwise Rotation
Lateral Acceleration , Airbag ECU Sensor *	Right to Left

* For sensing a rollover

Data Definitions:

- The "ON" setting for the "Freeze Signal" indicates a state in which the non-volatile memory can not be overwritten or deleted by the airbag ECU. After "Freeze Signal" has been turned ON, subsequent events will not be recorded.
- "Recording Status" indicates a state in which all recorded event data has been written into the non-volatile memory, or a state in which this process was interrupted and not fully written into the non-volatile memory. If "Recording Status" is "Incomplete", recorded event data may not be valid.
- "Time to Deployment Command" indicates the time between recording trigger establishment and the determination of airbag deployment. This value may differ from the actual time it takes for the airbag to fully deploy.
- Even if an airbag/pretensioner did not deploy due to the "front passenger airbag disable switch and/or "RSCA Disable Switch" in the ON position or other disabling criteria are met, the "Time to deployment command" data element for that airbag/pretensioner may still be recorded.
- "Engine RPM" indicates the number of engine revolutions, not the number of motor revolutions. The recorded value has an upper limit of 5,200 rpm. Resolution is 400 rpm and the value is rounded down and recorded. For example, if the actual engine speed is 799 rpm, the recorded value will be 400 rpm.
- The upper limit for the recorded "Vehicle Speed" value is 122 km/h (75.8mph). Resolution is 2km/h (1.2mph) and the value is rounded down and recorded. The accuracy of the "Vehicle Speed" value can be affected by various factors. These include, but not limited, to the following.
  - Significant changes in the tire's rolling radius
  - Wheel lock and wheel slip
- "Accelerator Rate" has two recording specifications. Both the recorded value increases as the driver depresses the accelerator.
  - Percentage of accelerator pedal depressed (recorded as 0-100(%)).
  - Output voltage of accelerator pedal module (recorded as 0-5(V)).
- The "Drive" setting for the "Shift Position" value indicates the shift position state is other than "R,"(Reverse), "N" (Neutral), or "P" (Park). If sequential shift had been used, "Invalid" may be displayed.
- Depending on the type of occupant sensor installed in the vehicle, one of the following four recording formats for "Occupancy Status, Passenger" will be utilized.
  - Occupied / Not Occupied
  - Adult / Child / Not Occupied
  - AM50 / AF05 / Child / Not Occupied
  - AM50 / AF05 / Child or Not Occupied
- Resolution of the "Air Bag Warning Lamp ON Time Since DTC was Set" is 15 minutes, and the value is rounded down and recorded.
- "Longitudinal Delta-V" indicates the change in forward speed after establishment of the recording trigger. This does not refer to vehicle speed, and it does not include the change in speed during the period from the start of the actual collision to establishment of the recording trigger.

- "Roll Angle peak" may not always match the peak value within the "Roll Angle" sampling points due to differences in data calculation method.
- For "Lateral Delta-V", the sensor location (B-pillar, front door, C-pillar, and slide door) shows the outline of a typical sensor position. Sensory location can be confirmed using the repair manual.
- "Time from Previous Pre-Crash TRG" indicates the time between the establishment of an event's pre-crash recording trigger to the establishment of a more recent event's pre-crash recording trigger. The upper limit for the recorded value is 16,381 milliseconds. In the event of establishment of the first pre-crash recording trigger after the ignition is switched ON, the upper limit value(max value) is recorded.
- "TRG Count" indicates a calculated value of the number of times recording triggers have been established for all crash types. The sequence in which each event occurred can be verified from the "TRG Count". The smaller the "TRG Count" value, the older the data. The upper limit for the recorded value is 65,533 times. When more than one event reaches the upper limit, the actual "TRG Count" may be greater than what is displayed for that event.
- "Linked Pre-Crash Page" is used to link 'paged" pre-crash data with 'paged" post-crash data. When old pre-crash data is overwritten by new pre-crash data, the "Linked Pre-Crash Page" value may record a page number that is not actually linked.
- Resolution of the "Time from Pre-Crash to TRG" is 100 [ms], and the value is rounded down and recorded.

05006_ToyotaDENSO_r028

System Status at Time of Retrieval

ECU Part Number	89170-33570
ECU Generation	06EDR
Recording Status, All Pages	Complete
Freeze Signal	ON
Freeze Signal Factor	Front Airbag Deployment Front Pretensioner Deployment
Diagnostic Trouble Codes Exist	No
Time from Previous Pre Crash TRG (msec)	16381 or greater
Latest Pre-Crash Page	0
Contains Unlinked Pre-Crash Data	No

Event Record Summary at Retrieval

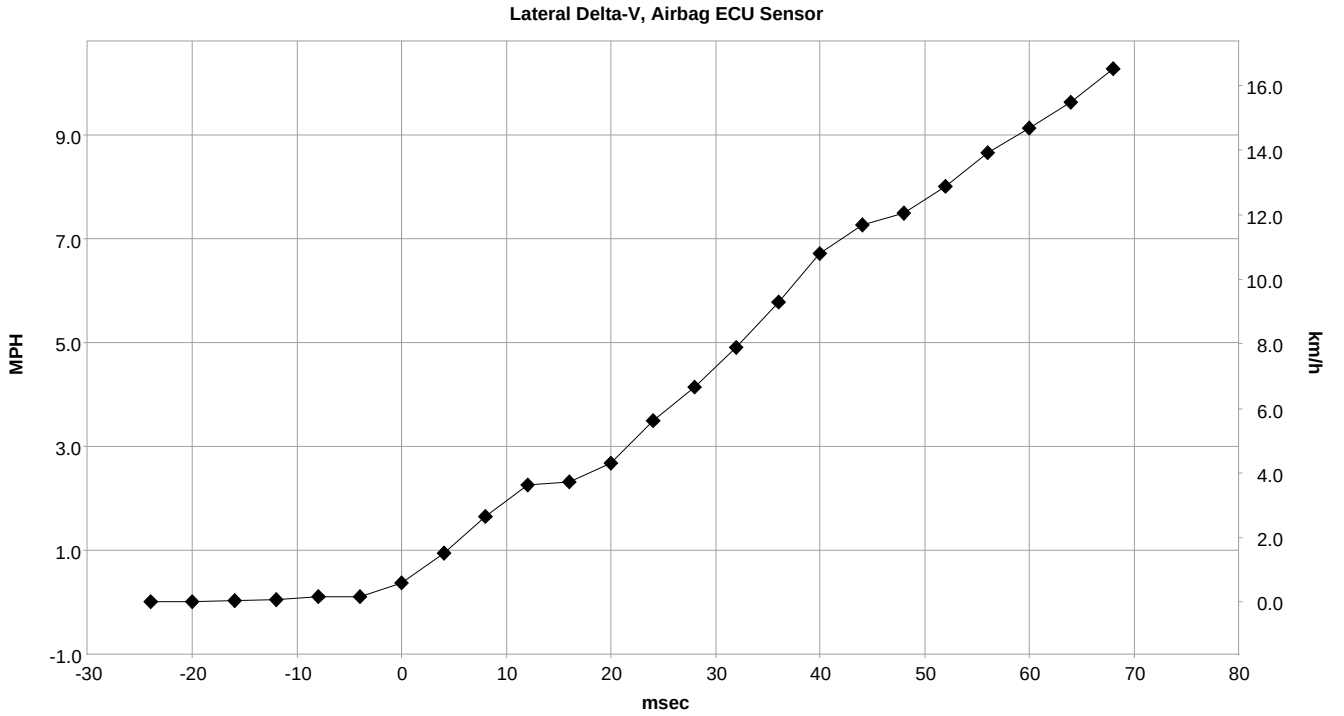
Events Recorded	TRG Count	Crash Type	Time (msec)	Pre-Crash and/or DTC Data Recording Status	Event & Crash Pulse Data Recording Status
Most Recent Event	2	Side Crash	0	Complete (Page 0)	Complete (Side Page 0)
1st Prior Event	1	Front/Rear Crash	-6	Complete (Page 0)	Complete (Front/Rear Page 0)

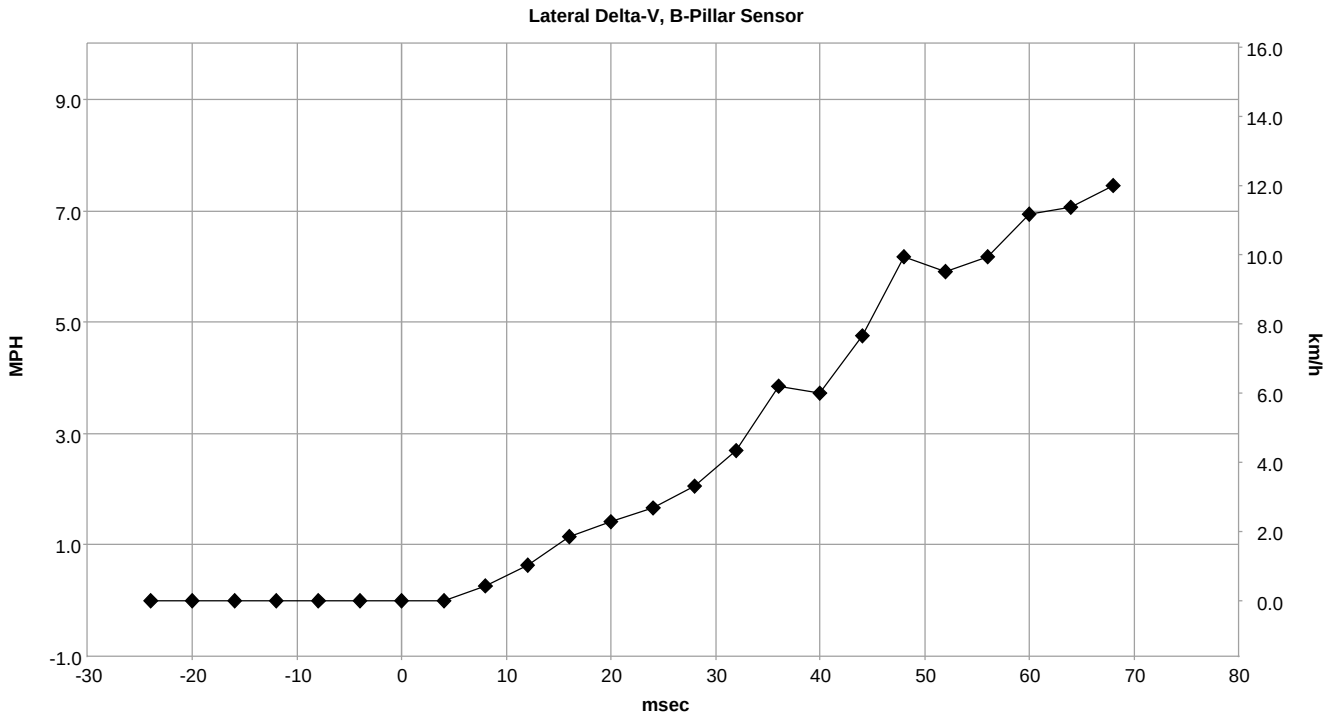
System Status at Event (Most Recent Event, TRG 2)

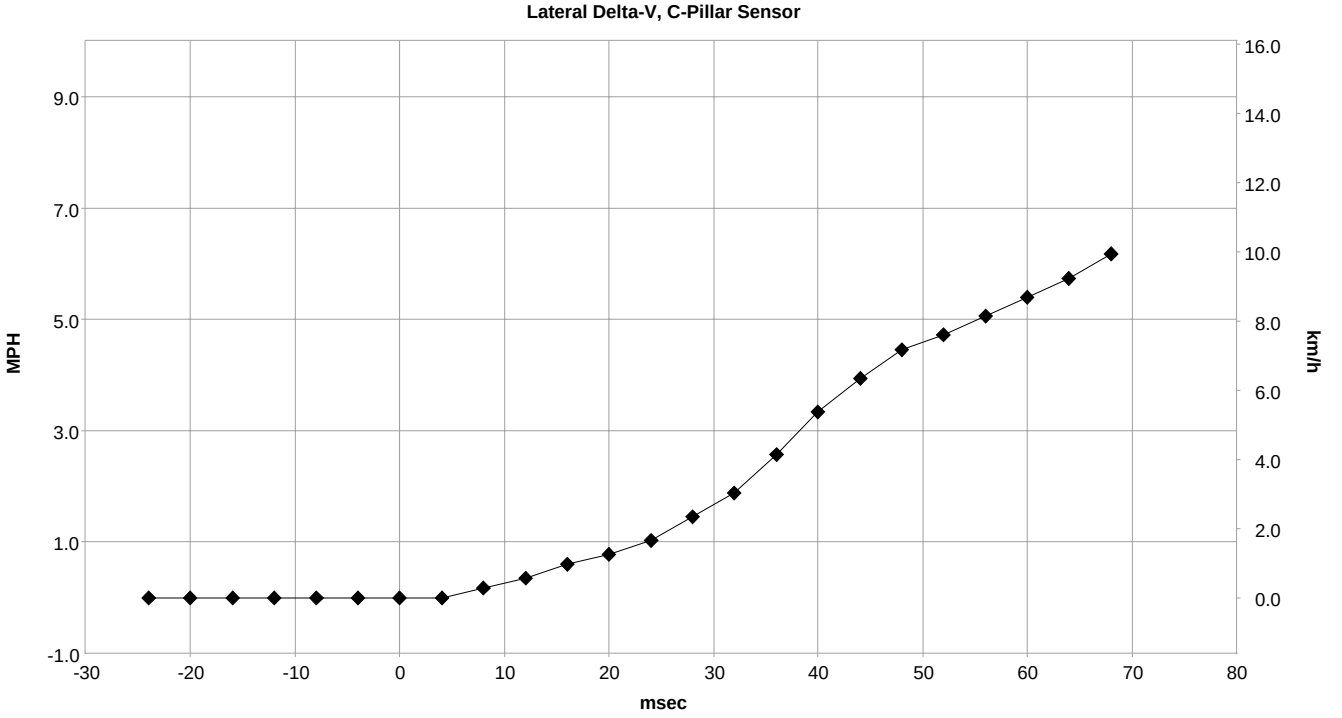
Recording Status, Side Crash Info.	Complete
Crash Type	Side Crash
TRG Count (times)	2
Recorded Side	Driver's Side
Previous Crash Type	Frontal/Rear
Time from Pre-Crash TRG (msec)	6
Linked Pre-Crash Page	0
Time to Deployment Command, B-Pillar Sensor (msec)	Not Commanded
Time to Deployment Command, C-Pillar Sensor (msec)	Not Commanded

Lateral Crash Pulse (Most Recent Event, TRG 2 - table 1 of 2)

Recording Status, Time Series Data	Complete
Time from TRG to Next Sample (msec)	0
Max Lateral Delta-V, B-Pillar Sensor (MPH [km/h])	7.5 [12.0]
Max Lateral Delta-V, C-Pillar Sensor (MPH [km/h])	6.2 [9.9]






Lateral Delta-V, C-Pillar Sensor
MPH
km/h
msec
9.0
7.0
5.0
3.0
1.0
-1.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-30
-20
-10
0
10
20
30
40
50
60
70
80

Lateral Crash Pulse (Most Recent Event, TRG 2 - table 2 of 2)

Time (msec)	Lateral Delta-V, Airbag ECU Sensor (MPH [km/h])	Lateral Delta-V, B-Pillar Sensor (MPH [km/h])	Lateral Delta-V, C-Pillar Sensor (MPH [km/h])
-24	0.0 [0.0]	0.0 [0.0]	0.0 [0.0]
-20	0.0 [0.0]	0.0 [0.0]	0.0 [0.0]
-16	0.0 [0.1]	0.0 [0.0]	0.0 [0.0]
-12	0.1 [0.1]	0.0 [0.0]	0.0 [0.0]
-8	0.1 [0.2]	0.0 [0.0]	0.0 [0.0]
-4	0.1 [0.2]	0.0 [0.0]	0.0 [0.0]
0	0.4 [0.6]	0.0 [0.0]	0.0 [0.0]
4	0.9 [1.5]	0.0 [0.0]	0.0 [0.0]
8	1.6 [2.6]	0.3 [0.4]	0.2 [0.3]
12	2.3 [3.6]	0.6 [1.0]	0.3 [0.6]
16	2.3 [3.7]	1.2 [1.9]	0.6 [1.0]
20	2.7 [4.3]	1.4 [2.3]	0.8 [1.2]
24	3.5 [5.6]	1.7 [2.7]	1.0 [1.7]
28	4.1 [6.7]	2.1 [3.3]	1.5 [2.3]
32	4.9 [7.9]	2.7 [4.3]	1.9 [3.0]
36	5.8 [9.3]	3.9 [6.2]	2.6 [4.1]
40	6.7 [10.8]	3.7 [6.0]	3.3 [5.4]
44	7.3 [11.7]	4.8 [7.7]	3.9 [6.3]
48	7.5 [12.1]	6.2 [9.9]	4.5 [7.2]
52	8.0 [12.9]	5.9 [9.5]	4.7 [7.6]
56	8.7 [13.9]	6.2 [9.9]	5.1 [8.1]
60	9.1 [14.7]	6.9 [11.2]	5.4 [8.7]
64	9.6 [15.5]	7.1 [11.4]	5.7 [9.2]
68	10.3 [16.5]	7.5 [12.0]	6.2 [9.9]

DTCs Present at Time of Event (Most Recent Event, TRG 2)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (Most Recent Event, TRG 2)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	800
Buckle Switch, Left Seat	Buckled
Buckle Switch, Right Seat	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward
Shift Position	Drive

Pre-Crash Data, -5 to 0 seconds (Most Recent Event, TRG 2)

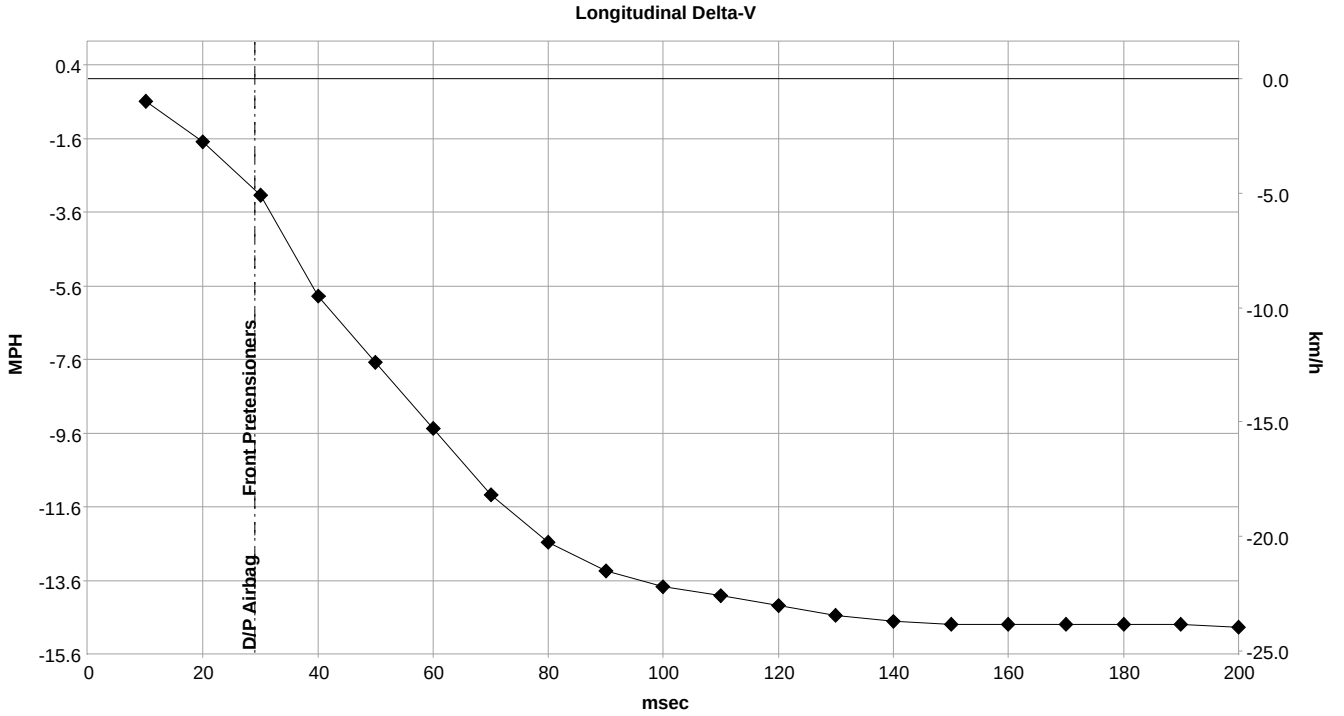
Time (sec)	-4.8	-3.8	-2.8	-1.8	-0.8	0 (TRG)
Vehicle Speed (MPH [km/h])	46 [74]	47.2 [76]	52.2 [84]	57.2 [92]	57.2 [92]	43.5 [70]
Brake Switch	OFF	OFF	OFF	OFF	ON	ON
Accelerator Rate (V)	2.85	2.85	2.85	0.78	0.78	0.78
Engine RPM (RPM)	2,400	3,200	4,800	5,200	3,600	2,000

System Status at Event (1st Prior Event, TRG 1)

Recording Status, Front/Rear Crash Info.	Complete
Crash Type	Front/Rear Crash
TRG Count (times)	1
Previous Crash Type	No Event
Time from Pre-Crash TRG (msec)	0
Linked Pre-Crash Page	0
Time to Deployment Command, Front Airbag, Driver (msec)	29
Time to Deployment Command, Front Airbag, Passenger (msec)	29
Event Severity Status, Driver	Level 3
Event Severity Status, Passenger	N/A
Time to Deployment Command, Pretensioner (msec)	29

Longitudinal Crash Pulse (1st Prior Event, TRG 1 - table 1 of 2)

Recording Status, Time Series Data	Complete
Max Longitudinal Delta-V (MPH [km/h])	-14.9 [-24.0]



Longitudinal Crash Pulse (1st Prior Event, TRG 1 - table 2 of 2)

Time (msec)	Longitudinal Delta-V (MPH [km/h])
10	-0.6 [-1.0]
20	-1.7 [-2.8]
30	-3.2 [-5.1]
40	-5.9 [-9.5]
50	-7.7 [-12.4]
60	-9.5 [-15.3]
70	-11.3 [-18.2]
80	-12.6 [-20.3]
90	-13.4 [-21.5]
100	-13.8 [-22.2]
110	-14.1 [-22.6]
120	-14.3 [-23.0]
130	-14.6 [-23.4]
140	-14.7 [-23.7]
150	-14.8 [-23.9]
160	-14.8 [-23.9]
170	-14.8 [-23.9]
180	-14.8 [-23.9]
190	-14.8 [-23.9]
200	-14.9 [-24.0]

DTCs Present at Time of Event (1st Prior Event, TRG 1)

Recording Status, Diagnostic	Complete
Ignition Cycle Since DTC was Set (times)	0
Airbag Warning Lamp ON Time Since DTC was Set (min)	0
Diagnostic Trouble Codes	None

Pre-Crash Data, 1 Sample (1st Prior Event, TRG 1)

Recording Status, Pre-Crash/Occupant	Complete
Time from Pre-Crash to TRG (msec)	800
Buckle Switch, Left Seat	Buckled
Buckle Switch, Right Seat	Unbuckled
Occupancy Status, Passenger	Not Occupied
Seat Position, Driver	Rearward
Shift Position	Drive

Pre-Crash Data, -5 to 0 seconds (1st Prior Event, TRG 1)

Time (sec)	-4.8	-3.8	-2.8	-1.8	-0.8	0 (TRG)
Vehicle Speed (MPH [km/h])	46 [74]	47.2 [76]	52.2 [84]	57.2 [92]	57.2 [92]	43.5 [70]
Brake Switch	OFF	OFF	OFF	OFF	ON	ON
Accelerator Rate (V)	2.85	2.85	2.85	0.78	0.78	0.78
Engine RPM (RPM)	2,400	3,200	4,800	5,200	3,600	2,000

Hexadecimal Data

Data that the vehicle manufacturer has specified for data retrieval is shown in the hexadecimal data section of the CDR report. The hexadecimal data section of the CDR report may contain data that is not translated by the CDR program. The control module contains additional data that is not retrievable by the CDR system.

PIDs

PID	Data
00	BC 60 00 01
01	00
03	33 33 35 37 30 30 30 30 45 43 30 30 30 45 43 30 30 30 45 35 30 30 30 45 35 30 30 30 45 41 30 30 30 45 41
04	02 02 01 01
05	01
06	07
0A	01
0B	00
20	80 00 00 01
21	00 31
40	00 00 00 01
60	00 00 00 01
80	00 00 00 01
A0	00 00 00 01
C0	00 00 00 01
E0	C0 10 00 00
E1	07 07
E2	00 5B 19 11 00
EC	FF

EEPROM

Address	Data (-- = data not imaged from ECU) (** = no response from ECU)
0	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
10	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20	-- -- -- -- -- -- -- -- -- -- -- -- -- -- 00 00
30	00 00 00 00 3F FD 00 00 A5 03 00 07 00 00 -- --
40	-- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50	-- -- 10 01 01 8D 14 59 B9 14 DC B8 14 86 A8 49
60	98 49 94 49 08 00 00 55 00 00 00 00 00 00 00 00
70	00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00
80	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
90	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
A0	00 00 -- -- 07 0D 11 20 15 15 15 0F 09 05 03 03
B0	03 02 01 00 00 00 00 01 02 8F 00 55 00 01 E0 00
C0	1D 1D 30 55 00 00 00 00 00 00 00 00 00 00 00 00
D0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
E0	00 00 00 00 -- -- 00 00 00 00 00 00 00 00 02 03
F0	04 02 02 03 05 09 FF 08 0B FE 02 06 01 03 00 00
100	00 00 00 00 00 00 02 02 03 02 03 05 05 08 09 07
110	06 03 04 04 04 05 FF 00 FF FF FD 00 F0 DF D7 DC
120	FD EB D0 DA D4 CD CA E0 F2 E2 DA E5 E3 DA 00 00
130	00 00 00 55 00 02 00 06 FE FE 00 55 00 00 00 00
140	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
150	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
160	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
170	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
180	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
190	00 00

Disclaimer of Liability

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

DOT HS 813 349
September 2022

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

15702-082222-v3