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

NHTSA

DOT HS 813 402

January 2023

Special Crash Investigations: On-Site Semi-Trailer Underride Crash Investigation; Vehicle: 2019 International Tractor/ 2018 Wabash Semi-Trailer; Location: New York; Crash Date: February 2020

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Suggested APA Format Citation:

Crash Research & Analysis, Inc. (2023, January). *Special Crash Investigations: On-site semi-trailer underride crash investigation; Vehicle: 2019 International Tractor/2018 Wabash Semi-Trailer; Location: New York; Crash Date: February 2020* (Report No. DOT HS 813 402). National Highway Traffic Safety Administration.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 813 402		

4. Title and Subtitle	5. Report Date
Special Crash Investigations: On-Site Semi-Trailer Underride Crash Investigation; Vehicle: 2019 International Tractor/2018 Wabash Semi-Trailer; Location: New York; Crash Date: February 2020	January 2023
	6. Performing Organization Code

7. Author	8. Performing Organization Report No.
Crash Research & Analysis, Inc.	CR20009

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Crash Research & Analysis, Inc. PO 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: February 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 vehicles or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.

16. Abstract

This report documents the on-site investigation of a fatal underride crash of a 2018 Wabash van-bodied semi-trailer with a 2017 Dodge Journey in a rural area of New York. The Wabash trailer was attached to a 2019 International Harvester tractor driven by a 50-year-old belted male. The Dodge struck and rode under the left plane of the Wabash trailer as the International was making a left turn at a three-leg intersection in dense foggy conditions with substantially reduced visibility. The intersection was not a simple 90-degree configuration, and the semi-trailer had not cleared the intersection when the crash occurred. The Dodge was driven by a belted 38-year-old female with a belted 10-year-old female front right passenger and a belted 11-year-old female second-row right passenger. The driver of the International was not injured. The Dodge driver sustained fatal injuries and was pronounced deceased at the crash site. Both passengers sustained police-reported non-incapacitating (B-level) injuries and were transported by ambulance to a hospital and a regional trauma center.

17. Key Words	18. Distribution Statement
severe underride, semi-trailer, conspicuity	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

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Special Crash Investigations
On-Site Semi-Trailer Underride Crash Investigation
Case Number: CR20009
Vehicle: 2019 International Tractor/2018 Wabash Semi-Trailer
Location: New York
Crash Date: February 2020

Background

This report documents the on-site investigation of a fatal underride crash of a 2018 Wabash van-bodied semi-trailer with a 2017 Dodge Journey in a rural area of New York in February 2020. The Wabash trailer was attached to a 2019 International Harvester tractor driven by a 50-year-old belted male. The Dodge struck and rode under the left plane of the Wabash (Figure 1) as the International was turning left at an angular three-leg intersection in dense foggy conditions with substantially reduced visibility. The intersection was not a simple 90-degree configuration, and the semi-trailer had not cleared the intersection when the crash occurred. The Dodge was driven by a belted 38-year-old female with a belted 10-year-old female front right passenger and a belted 11-year-old female second-row right passenger. The Dodge driver sustained fatal injuries and was pronounced deceased at the crash site. Both passengers sustained police-reported non-incapacitating (B-level) injuries and were transported by ambulance to a hospital and a regional trauma center. The driver of the International was not injured.

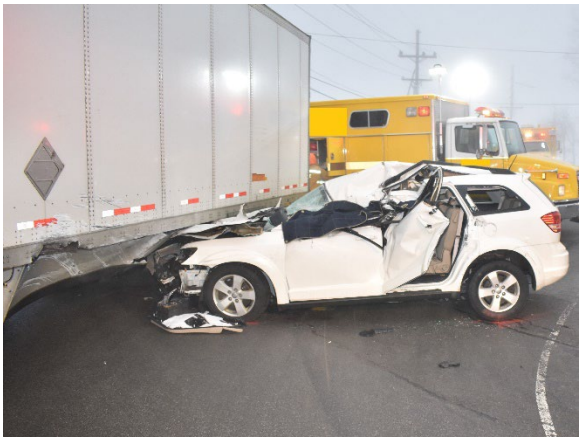


Figure 1. View of the Dodge and Wabash trailer at final rest (on-scene law enforcement image)

This crash was identified by a news report that was forwarded by the Special Crash Investigations (SCI) team at Crash Research & Analysis, Inc., to the Crash Investigation Division of the National Highway Traffic Safety Administration in February 2020. The crash was assigned for on-site investigation on the same day. The SCI team established cooperation with the investigating law enforcement agency to inspect the Dodge at its local impound lot. The tractor and semi-trailer had been released following the on-scene law enforcement investigation and returned to their State of origin; they were not available for inspection. The on-site portion of

this investigation took place in March 2020 and included an inspection of the Dodge and documentation of the crash site. During the SCI vehicle inspection, the event data recorder (EDR) data was imaged from the Dodge's air bag control module (ACM) using the current version of the Bosch Crash Data Retrieval (CDR) software/tool.

On-scene images were obtained from the investigating law enforcement agency. A surveillance video from a residential structure that captured the crash was also provided to SCI by the law enforcement agency.

Summary

Crash Site

This crash occurred in a rural area at the angular three-leg intersection of an east/west two lane roadway with a north/south two lane roadway. The east/west roadway culminated at the intersection. At the time of the afternoon crash, weather conditions in the locale included heavy/dense fog with a temperature of 3 ºC (38 ºF), 92-percent relative humidity, cloudy skies, and calm winds. The dense fog conditions at the time of the crash created substantially reduced visibility in the area. The crash site was documented during the SCI inspection using digital photographs and a Nikon total station mapping system. There was no physical evidence of the crash discernable on the roadway surface at the time of the SCI crash site inspection.

For the eastbound trajectory of the International, the roadway transitioned from an extended straightaway to a sharp right curve at the mouth of the intersection (Figure 2). The eastbound lane measured 3.1 m (10.2 ft) wide, delineated by a single solid white fog line and a double-yellow centerline. Speed was regulated by a posted limit of 89 km/h (55 mph). Traffic on approach to the intersection was controlled by a stop sign and stop bar painted on the asphalt surface.

Figure 2. Northeast-facing view of the eastbound approach for the International to the intersection

Figure 3. South-facing view of the southbound approach for the Dodge to the intersection

For the southbound trajectory of the Dodge, the roadway was straight and level for an extended distance. The southbound lane measured 3.5 m (11.5 ft) wide and was delineated by a single solid white fog line and a double-solid yellow centerline (Figure 3). Speed on the north/south roadway was regulated by a posted limit of 89 km/h (55 mph). Several intersections were located along the roadway in the vicinity, none of which were controlled for the north/south roadway. A crash diagram is included at the end of this report.

Pre-Crash

The International tractor/Wabash semi-trailer had just begun a long-distance trip from a commercial facility 7.6 km (4.7 mi) from the crash scene, a distance that the truck/semi-trailer would have travelled in approximately 9 minutes under clear environmental conditions. The semi-trailer was laden with 18,144 kg (40,000 lb) of cargo from the commercial facility.

The 50-year-old male tractor driver held a valid Class A driver license that was dated to expire in August 2021, as well as a valid medical card that was dated to expire in April 2020. According to the law enforcement documentation, the driver had no record of crashes or citations in New York. He told the investigating law enforcement agency he was traveling east and slowed the vehicle on approach to the intersection. He referenced the heavy fog conditions and said he was proceeding slowly due to the significantly reduced visibility. He further stated he brought the combination unit to a controlled stop at the mouth of the intersection, waited for traffic to clear, and then began a left turn to proceed northbound on the north/south roadway. These statements were confirmed by home video surveillance footage from a camera system located on a residential structure overlooking the intersection, which captured the entire sequence of events leading up to, during, and after the crash.

The Dodge was traveling south on the north/south roadway, on approach to the intersection. It was driven by the 38-year-old belted female, with a 10-year-old belted female front right passenger and an 11-year-old belted female second-row right passenger. Data imaged from the Dodge during the SCI vehicle inspection reported that the Dodge's speed was 96 km/h (60 mph) with the accelerator pedal depressed 8-percent at 5 seconds prior to algorithm enable (AE). The EDR data further indicated that the Dodge driver initiated right steering and braking avoidance action at 1.5 seconds prior to AE, when the vehicle's speed was 94 km/h (58 mph). The braking input reduced the Dodge's speed to 67 km/h (42 mph) at 0.3 seconds prior to AE, and the vehicle's antilock braking and stability control systems were engaged.

Figure 4. East-facing surveillance camera view of the International/Wabash stopped at the intersection

Figure 5. East-facing surveillance camera view of the International/Wabash as it turned left

It should be noted that the dense foggy conditions substantially reduced the visibility for both drivers. Further, the white color of the Dodge, the International tractor, and the Wabash trailer would have made it even more difficult to distinguish them in the fog. The video surveillance footage showed the International combination unit as it entered view from the right, squared off to the north/south roadway with its left turn indicator engaged, and came to a complete stop at the mouth of the intersection (Figure 4). The truck/semi-trailer remained stopped for approximately 4 seconds before it began to accelerate forward and turn left. Figure 5 shows the International/Wabash combined unit as it began the left turn. Approximately 5 seconds into the left turn, the Dodge entered the view from the left.

Crash

The crash occurred as the front of the Dodge struck and underrode the Wabash semi-trailer. It was visible in the video that the Dodge's headlights were not illuminated at the time of the crash (Figure 6). Initial contact involved the Dodge's front plane, left aspect with the aerodynamic skirt, which deflected the skirt under the semi-trailer (Figure 7).

Figure 6. East-facing surveillance camera view of the turning truck/semi-trailer and approaching Dodge

Figure 7. East-facing surveillance camera view of the International/Wabash and Dodge at initial impact

Figure 8. East-facing surveillance camera view of the Dodge at maximum engagement with the semi-trailer

Figure 9. East-facing surveillance camera view of the International/Wabash and Dodge at final rest

As the hood and "greenhouse" of the Dodge underrode the Wabash, its front plane engaged the left tires/wheels (Figure 8). Maximum engagement of the Dodge underneath the Wabash semi-trailer involved a significant portion of the Dodge's greenhouse/occupant compartment. The left upper A- and B-pillars of the Dodge, as well as the windshield header, roof, and left roof side rail were crushed downward and longitudinally by the underride. This lifted the left side of the semi-trailer and shifted it slightly right, discernable in the surveillance video.

The International's driver felt movement of the combined unit induced by the impact/underride to the attached Wabash semi-trailer. He saw in his left mirror that a vehicle had crashed into the trailer, and immediately brought the unit to a controlled stop with the entire unit blocking the

roadway. The Dodge had rebounded and been displaced slightly northward and rotated counterclockwise from impact to the trailer. Figure 9 shows the International, Wabash, and Dodge at final rest.

Post-Crash

The International's driver exited his tractor following the crash, saw the Dodge wedged beneath the semi-trailer, and called the emergency response system on his cellphone. He and other bystanders who happened upon the crash assisted the second-row right passenger from the Dodge and awaited emergency responders.

Upon arrival, firefighting and emergency medical services personnel removed the front right passenger and transported her to a local hospital. The second-row right occupant was transported by ambulance to a regional trauma center. The Dodge driver was pronounced deceased at the crash site. Her body was removed from the vehicle and transferred to a local morgue for post-mortem examination. The International's driver was not injured. He was given a field sobriety test conducted by a drug recognition expert of the law enforcement agency. Use of alcohol and/or illicit substances by the International driver prior to the crash was not suspected.

A local service recovered the Dodge and towed it to a local yard, where it was held in impound pending completion of the law enforcement investigation. Following the on-scene law enforcement investigation, the Wabash trailer was offloaded, placed out of service, and transferred to a regional yard, where it was repaired and returned to service.

2019 International LT625

Description

The tractor involved in this crash was a 2019 International LT625 conventional, identified by the Vehicle Identification Number (VIN) 3HSDZAPR8KNxxxxxx. The tractor was not available for SCI inspection; however, images of the tractor at the crash scene were provided by the investigating law enforcement agency (Figure 10). At the time of the crash its electric odometer reading was 362,434 km (225,206 mi). It was powered by a 14.9-liter, inline 6-cylinder, Cummins X15 diesel engine with a 6x4 driveline configuration. It had a gross vehicle weight rating (GVWR) of 23,746 kg (52,350 lb). The International had an integrated sleeper berth and an aerodynamic air deflector. Additional specific equipment remains unknown. The International was not contacted or damaged in the crash.

Figure 10. Left front oblique view of the International tractor (on-scene law enforcement image)

2018 Wabash Semi-Trailer

Description

The International was towing a 2018 Wabash van semi-trailer (Figure 11) identified by the VIN 1JJV532D5JLxxxxxx. It was 16.1 m (53 ft) long 2.6 m (8.5 ft) wide, and was built on a ladder-type frame. The Wabash was a fully enclosed van trailer OEM equipped with composite body panels, galvanized steel inner and outer panels, vertically oriented hinged rear doors, a solid-oak wood floor, and an aluminum roof.

Figure 11. Right plane view of the Wabash semi-trailer (on-scene law enforcement image)

The trailer had a GVWR of 30,845 kg (68,000 lb), with gross axle weight ratings (GAWR) of 9,072 kg (20,000 lb). The trailer's axles were capable of being adjusted forward or rearward for loading/unloading and dependent on the load or its weight. The manufacturer's recommended tire size was 295/75R22.5 with 8.25x22.5 steel wheels, with recommended maximum cold tire pressure of 689 kPa (100 PSI). Specific tire data were not available. The forward rear axle was damaged during the crash; its mount was fractured on the left side. This caused the left rear tires to touch.

The Wabash had aerodynamic side skirting between the landing gear and rear axles. The aerodynamic skirting were fiberglass reinforced composite panels with a reinforced hem at the bottom edges. Manufacturer-designed mounting brackets were composite materials designed to absorb impact by bending 180 degrees over the length. There were seven brackets bolted to the semi-trailer's frame, with the skirt bolted to the brackets. The skirts were mounted on the Wabash's undercarriage.

Damage

There was no damage to or involvement of the International tractor in the impact by the Dodge. Damage to the Wabash semi-trailer was observed in law enforcement images to the left plane and undercarriage, consisting of direct contact abrasions to the sidewall of the cargo body, minor deformation to the outer sill, direct contact to the aerodynamic side skirt, and deformation of the forward left axle assembly. On-scene images showed the side skirt was folded partially up and under the semi-trailer as a result of the impact and engagement of the Dodge beneath it. Contact damage to the skirt consisted of paint transfers, scuff marks, and abrasions; the panel itself did not appear fractured. Damage to the semi-trailer began immediately forward of the center of the

trailer's left side, at the location of the amber marker light, and extended approximately 3.1 m (10.2 ft) rearward to the tandem axles. There was minor contact (abrasions and scuffs) to the undercarriage of the trailer, and the mounting bracket for the forward axle on the left frame rail was fractured. The truck deformation classification (TDC) assigned to the Wabash was 10LTFWB. Figures 12 and 13 show the damage pattern to the Wabash.

Figure 12. Damage pattern to the Wabash from the left plane underride impact by the Dodge (on-scene law enforcement image)

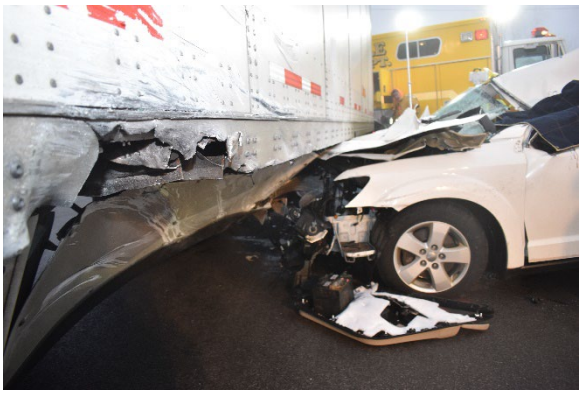


Figure 13. Close-up of the direct contact to the Wabash's left sill from the left pillar(s) of the Dodge (on-scene law enforcement image)

Through the course of this investigation, it was noted that the side skirting was not designed or intended to provide rigid structural protection or prevent underride crash events similar to this crash. Although the Wabash's side skirting provided significant aerodynamic benefit to the tractor/trailer combination unit, the skirting provided no benefit from a crash protection perspective. However, if the side skirting had been manufactured with some type of rigid structural beams and designed to provide crash protection, it likely would have provided some level of mitigation in this crash scenario and likely significantly reduced the degree of underride by the Dodge.

Semi-Trailer Conspicuity

The Wabash had a conspicuity treatment certified by its manufacturer to conform to Federal Motor Vehicle Safety Standard (FMVSS) No. 108. Red and white retroreflective tape was placed on the lower side surfaces of the semi-trailer at the level of the frame. The tape segments were 31 cm (12.2 in) long and consisted of equal length red and white reflective material, spaced an average of 28 cm (11.0 in) apart, covering the full length of the semi-trailer. This red and white reflective tape was also positioned full-width at the bottom surface of the rear doors. Amber marker lights were located at the front and side top corners of the semi-trailer and a single amber marker light was located on the aerodynamic skirt at the mid-point of the semi-trailer. Red marker lights were at the aft aspect of the side surfaces, mounted on a bracket below the level of the frame. Three red marker lights were centered at the top aspect of the back plane. All of the trailer's conspicuity/marker lighting was illuminated at the time of the crash, confirmed by the surveillance video.

The Wabash also had a rear underride guard constructed of box tubing. The guard was positioned below the frame of the semi-trailer, supported by two brackets with angled braces positioned between the vertical supports. All components of the underride guard were bolted together. Reflective tape of alternating red and white rectangles extended the width of the beam for conspicuity. The underride guard was not involved in this crash. There also was no prior damage to the guard.

2019 International LT625 Occupant

Driver Demographics

Age/sex:	50 years/male
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Forward-facing suspension seat with reclining seatback
Seat track position:	Unknown
Manual restraint usage:	3-point lap and shoulder seat belt
Usage source:	Official records
Air bags:	None
Alcohol/drug involvement:	None
Egress from vehicle:	Exited vehicle without assistance
Transport from scene:	None; drove vehicle from scene
Type of medical treatment:	None

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
N/A	None	N/A	N/A	N/A

Source: official records

Driver Kinematics

The 50-year-old male driver of the International was seated in the highback air-suspension seat and belted by the manual seat belt system. He drove the International with the Wabash semi-trailer in tow as he approached the intersection from the west. The driver steered the combined unit in a sweeping curve at the sharp right mouth of the intersection to "square up" to the intersection, as visible in the surveillance video. After bringing the vehicle to a stop and waiting while checking for oncoming traffic, the driver then accelerated the combined unit and initiated the left turn at the intersection. Because the Dodge was a white vehicle being driven in dense fog conditions and without its headlights illuminated, the International driver likely could not detect and likely never saw the Dodge as it approached from the north. No avoidance action was taken by the International driver prior to the crash.

The driver told law enforcement investigators he sensed the load shift, looked into the side mirror, and saw the Dodge struck against the rear left aspect of the trailer. He did not undergo a kinematic response to the crash and was not injured. Following completion of the law enforcement's on-scene investigation, he drove the International from the scene and returned to the commercial facility.

2017 Dodge Journey

Description

The other vehicle in this crash was a 2017 Dodge Journey manufactured in September 2016 and identified by the VIN 3C4PDCAB9HTxxxxxx. Data imaged from the Dodge's ACM indicated that the odometer reading at the time of the recorded crash event was 103,184.8 km (64,116.1 mi). The Dodge was a 4-door SUV equipped with the SE trim level and powered by a 2.4-liter, inline 4-cylinder, gasoline engine linked to a 4-speed automatic transmission with front-wheel drive.

Figure 14. Left front oblique view of the Dodge at the time of the SCI vehicle inspection

Figure 14 shows the Dodge at the time of the SCI vehicle inspection. Standard features included electric power steering, power-assisted 4-wheel disc brakes with ABS, traction control, electronic stability control, a tire pressure monitoring system, and a post-collision safety system. The GVWR was 2,405 kg (5,300 lb), with GAWRs of 1,248 kg (2,750 lb) front and 1,339 kg (2,950 lb) rear. The vehicle manufacturer's recommended tire size was P225/65R17, with recommended cold tire pressures of 250 kPa (36 PSI) for all four axle positions.

At the time of the crash the Dodge had Cooper Evolution tires of the recommended size, mounted on OEM multi-spoke alloy wheels. The tires had matching tire identification numbers of U92Y 1LN. None of the Dodge's tires were damaged or restricted relative to the crash.

The Dodge's interior had seating for up to seven occupants (2/3/2), with front bucket seats and second- and third-row bench seats with split forward-folding seatbacks. All seat surfaces were cloth. The front row, outboard second row, and both third-row seat positions had adjustable head restraints. The third-row seatbacks were folded down (forward) at the time of the crash. Manual restraint systems included 3-point lap and shoulder seat belts for all seven seat positions, with a retractor pretensioner available for the driver's position and a buckle and retractor pretensioner combination available for the front right passenger's position. Supplemental restraint systems included frontal air bags, driver knee air bag, front-seat-mounted side impact air bags, and dual-sensing (side impact and rollover) roof side rail-mounted inflatable curtain (IC) air bags. The Dodge's front retractor pretensioners actuated and the frontal and driver knee air bags deployed in the crash.

Exterior Damage

The front plane, left aspect of the Dodge initially contacted the aerodynamic side skirting of the semi-trailer, then the top surface of the hood and left front fender engaged and underrode the semi-trailer. The sequence of contact resulted in severe crush and intrusion to the greenhouse/occupant compartment of the Dodge, including both A-pillars, the windshield header, the left B-pillar, and the roof structure. Direct contact spanned the entire width of the front plane, largely resultant from engagement with the dual tires of the trailer's forward left axle position. There was moderate deformation to the front bumper beam, with direct contact to frontal and engine compartment components. The direct contact damage extended onto the left side plane, consisting of scratches, abrasions, and deformation that primarily were all above the level of the Dodge's tires/wheels and the mid-door aspect. The hood was completely separated from the vehicle and lying loosely in position at the time of the SCI vehicle inspection. The left upper A-pillar and left upper B-pillar were deformed flat in the longitudinal direction. Along the perspective of a diagonal line extending from the left upper C-pillar to the right upper A-pillar, the entire greenhouse was deformed and objects above the beltline were flattened rearward (Figure 15).

Figure 15. Left plane view of the Dodge and the severe deformation to the greenhouse/occupant compartment

Figure 16. Front plane view of the Dodge and its damage profile

Both left doors were jammed closed by exterior deformation and were cut from the vehicle by the firefighters to remove the driver. The rear lift gate and the right side doors remained closed during the crash and were operational at the time of the SCI vehicle inspection. Direct contact from the sill and undercarriage of the trailer was present on the top surface of the interior instrument panel and steering wheel rim. Figure 16 shows the front plane damage profile to the Dodge.

Direct contact to the front plane spanned the entire 150 cm (59.1 in) undeformed end width. A residual crush profile was documented to the front bumper beam, using a field-L width that spanned the entire 110 cm (43.3 in) width. Resultant measurements included: C1 = 2 cm (0.8 in), C2 = 18 cm (7.1 in), C3 = 26 cm (10.2 in), C4 = 33 cm (13.0 in), C5 = 38 cm (15.0 in) and C6 = 30 cm (11.8 in). Maximum crush was located 20 cm (7.9 in) left of the right front bumper corner. The right wheelbase was reduced by 8 cm (3.1 in). Direct contact extended a total of 331 cm (130.3 in) rearward from the front plane, ending on the roof/left roof side rail above the second-row left seat position at 57 cm (22.4 in) forward of the left rear axle. The collision deformation classification (CDC) assigned to the Dodge for the underride impact with the Wabash semi-trailer was 11FDAW9. A borderline barrier equivalent speed of 35 km/h (21.7 mph) was calculated using the WinSMASH model. Based on SCI expertise, these results were underestimated.

Event Data Recorder

The 2017 Dodge Journey had an ACM mounted beneath the center stack. The ACM monitored three-dimensional acceleration, and commanded the actuation/deployment of pretensioners and inflatable supplemental restraint systems. The ACM also had EDR capabilities. The Bosch CDR tool with software version 19.3.1 was used during the SCI vehicle inspection to image the EDR data via a direct connection to the module. The data were later read using software version 21.5.1, and are included as an appendix. The EDR could store up to three crash event records, termed “deployment” or “non-deployment” event types. By definition, a deployment event was any recognized event in which the ACM commanded deployment of an air bag system. A non-deployment event did not deploy air bags, but could include pretensioner actuation-only commanded events. Non-deployment events were subject to overwrite by subsequent events of greater severity, whereas deployment event types became locked to memory and could not be overwritten.

If power supply to the ACM was lost following a crash event, all or part of the data may not have been recorded to the EDR’s memory. The EDR had the capacity to record 300 milliseconds of data once the minimum threshold was achieved for longitudinal and lateral event types. For rollover events, 5,000 milliseconds of data was recorded (2,500 milliseconds both prior to and after deployment).

Associated to the recording of each respective event was an asynchronous 5-second pre-crash buffer that recorded pre-crash data points in 0.1-second intervals. Data recorded could include vehicle speed (mph), accelerator pedal (% full), engine throttle (% full), service brake (on/off) status, engine speed (rpm), ABS activity, stability control status, steering input (degrees), yaw rate (deg/sec), individual wheel speed, and other data. System status data, inclusive of reported diagnostic trouble codes (DTCs), belt usage of front-row occupants, and vehicle ignition cycle at the time of the event were also recorded.

The imaged data contained one recorded event, which occurred on ignition cycle 6,384, a deployment event associated with a frontal (longitudinal) algorithm. The "safety belt status" of both the driver and front right passenger was reported as "buckled," which corroborated the SCI Investigator's observations. The maximum recorded longitudinal delta V was -83 km/h (-51.7 mph) at 256 milliseconds after AE. The maximum recorded lateral delta V was -9 km/h (-5.4 mph) at 296 milliseconds after AE. Accompanying the event was the actuation of the driver's retractor pretensioner and the passenger's retractor and buckle pretensioners, as well as the deployment of the driver's frontal air bag (first and second stages) and the passenger's frontal air bag (first and second stages). The frontal air bags were initially commanded at 28 milliseconds after AE. A portion of the pre-crash buffer data were as follows.

Time (sec)	Vehicle Speed (km/h [mph])	Accelerator Pedal (% full)	Service Brake (on/off)	Steering Wheel Angle (degrees)
-5.0	96 (60)	8	Off	3
-4.5	96 (60)	2	Off	-5
-4.0	96 (60)	0	Off	-1
-3.5	95 (59)	0	Off	-4
-3.0	95 (59)	0	Off	-5
-2.5	94 (59)	8	Off	-5
-2.0	94 (59)	9	Off	-6
-1.5	94 (58)	0	On	-39
-1.0	77 (48)	0	On	-74
-0.5	71 (44)	0	On	-265

Interior Damage

The Dodge's interior sustained severe damage associated with the exterior deformation and intrusion of the roof structure. The left A-pillar, headliner, roof, and left roof side rail all directly contacted and engaged the left plane and undercarriage of the semi-trailer. Emergency personnel subsequently cut the left A- and B-pillars and the left doors from the vehicle. Residual intrusion at the time of the inspection included 53 cm (20.9 in) rearward displacement of the left windshield header and 64 cm (25.2 in) of downward displacement into the driver's position. The header intruded rearward 18 cm (7.1 in) and 5 cm (2.0 in) respectively into the center and right positions of the front row.

Figure 17. Forward-facing view from the rear of the Dodge of the severe intrusion at the driver's position

Vertical intrusion into these occupant positions were 41 cm (16.1 in) and 15 cm (5.9 in), respectively. The left roof side rail intruded right laterally 24 cm (9.4 in) into the driver's position and 22 cm (8.7 in) into the second-row left position. Figure 17 shows a forward-facing view of the interior and the severe deformation/intrusion.

Two distinct areas of occupant contact were identified in the Dodge. The first was an 8x5 cm (3.2x2.0 in) scuff mark on the left lower instrument panel, determined to have resulted from contact and loading by the driver's left knee. The second was a circular impression and visual face mark from the second-row right passenger's head, located on the vertically deformed headliner/roof. A 15x17 (5.9x6.7 in) circular depression was present in the deformed headliner (Figure 18).

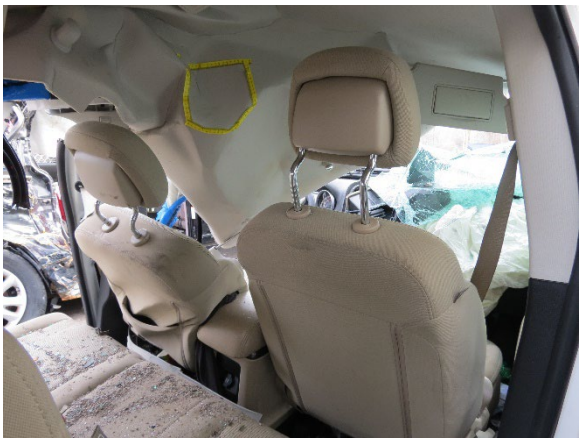


Figure 18. Area of contact from the second-row right occupant's head to the deformed/intruded roof

All four door windows were closed at the time of the crash. The AS1 laminated windshield was fully fractured, with separation from the left A-pillar, the windshield header, and the upper 25 cm (9.8 in) of the right A-pillar. Both left door and the left rear quarter glazing were disintegrated by the crash forces and exterior deformation. The backlight and all right side glazing remained intact.

Manual Restraint Systems

The Dodge had manual 3-point continuous loop lap and shoulder belts with sliding latch plates for the seven seat positions. The driver's system retracted onto an emergency locking retractor (ELR), while all others used switchable ELR/automatic locking (ALR) retractors. Both front-row belt systems had adjustable D-rings. At the time of the SCI inspection, the driver's was adjusted to the full-down position and the front right was adjusted fully upward. The driver's belt system had a retractor pretensioner, while the front right passenger's system had both buckle and retractor pretensioners. All of the equipped front pretensioners actuated during the crash.

Inspection of the driver's, front right passenger's, and second-row right belt systems yielded evidence of historical usage and crash-related loading on the latch plates of all three systems. The SCI determination was that all three occupants were using their belt systems at the time of the crash. On-scene law enforcement images showed the driver's body belted in the vehicle.

The lap belt webbing was cut 13 cm (5.1 in) above the seat frame anchor point and the shoulder belt webbing was cut 18 cm (7.1 in) below the D-ring by the coroner to facilitate the removal of the driver's body. The corresponding cut segment of webbing was missing from the vehicle at the time of the SCI inspection. The latch plate remained engaged in the buckle (Figure 19), with frictional abrasions observed in the polymer surface of the latch plate along the belt path. The front right passenger's belt system was found intact and unbuckled, with the webbing extended from the locked retractor and lying on the seat (Figure 20). The total length of exposed webbing measured from the D-ring to the seat frame anchor point was 133 cm (52.4 in). Frictional abrasions were observed in the polymer surface of the latch plate from webbing loading. There was no specific evidence of loading on the webbing. The buckle stalk measured 23 cm (9.1 in), measured from the anchor bolt vertically to the top of the buckle. The sleeve that concealed the cable did not appear to be compressed.

Figure 19. View of the Dodge's driver latch plate engaged in the buckle

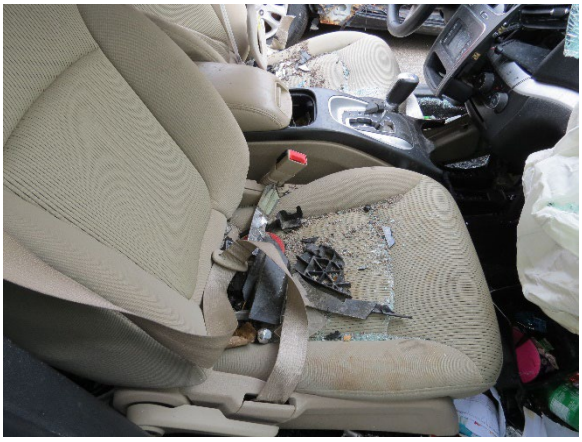


Figure 20. Front right passenger's seat belt system at the time of the SCI vehicle inspection

The second-row right passenger was restrained by the manual seat belt system. Based on the evidence on the belt system, the apparent slack in the system, and the contact evidence documented to the deformed roof of the vehcile, it is possible that she was wearing the system with the shoulder belt positioned off her right shoulder, or she otherwise was slightly out-of-position to her left, at the time of the crash. She loaded the belt system, evidenced by subtle frictional abrasions on the polymer surface of the latch plate. Additionally, the lower portion of the lap belt loaded against the outer trim of the seat frame. This caused the webbing to crease 20-33 cm (7.9-13.0 in) above the floor anchor point (Figure 21).

Figure 21. View of the Dodge's second-row right seat belt system at the time of the SCI vehicle inspection

Supplemental Restraint Systems

The 2017 Dodge Journey had supplemental restraints including a certified advanced 208-complaint (CAC) frontal air bag system, a driver knee air bag, front-seat-mounted side impact air bags, and dual-sensing (side impact and rollover) IC air bags. The CAC air bag system consisted of dual-stage frontal air bags, front retractor pretensioners, a front right buckle pretensioner, seat track positioning sensors, and a front right seat occupant classification sensor. Both frontal and the driver knee air bags deployed in the crash.

The driver's frontal air bag deployed from the steering wheel hub through a tri-flap module cover. The side flaps were 14 cm (5.5 in) high and 3 cm (1.2 in) wide. The top hinged center flap was 6 cm (2.4 in) wide at the hinge point and 8 cm (3.1 in) high. The cover flaps opened at the designated tear seams. The deployed driver's frontal air bag measured 61 cm (24.0 in) in diameter in its deflated state, from peripheral seam to seam. It was vented by a pair of 4 cm (1.6 in) diameter ports on the back side of the air bag, centered 6 cm (2.4 in) below the peripheral seam. The air bag was not tethered and had a maximum rearward excursion of 47 cm (18.5 in) in its deflated state. There was no driver-related contact evidence to the air bag. The top surface of the air bag was scuffed from direct contact with the undercarriage of the semi-trailer (Figure 22). The undercarriage contact was also present at the top surface of the brow of the upper instrument panel over the instrument cluster and to the top surface of the steering wheel rim.

The driver knee air bag deployed from the bottom of the lower left instrument panel. The air bag was 38 cm (15.0 in) wide at the inflator location and fanned to a maximum width of 56 cm (22.0

in). It extended 43 cm (16.9 in) rearward in its deflated state. There were two 25 cm (9.8 in) long tether seams sewn into the top surface of the air bag. Nomenclature identifying the air bag was stamped onto the fabric: 312311630d and 46690. There was no damage or contact evidence to the deployed driver knee air bag (Figure 23). However, it was oil soaked.

Figure 22. View of the deployed driver's frontal air bag in the Dodge

Figure 23. View of the Dodge's deployed driver knee air bag

The passenger's frontal air bag deployed from a top-mounted module in the right upper instrument panel (Figure 24). The module consisted of a single forward-hinged cover flap that had overall measurements of 48 cm (18.9 in) wide and 13 cm (5.1 in) in depth. It deployed from the module and was contacted by the displaced and intruding windshield during the crash. A corresponding 9 cm (3.5 in) cut was present on the top center aspect of the air bag. Dimensionally, the face of the passenger's frontal air bag was 29 cm (11.4 in) wide and 58 cm (22.8 in) high. It was vented by a series of ports, with two 1 cm (0.4 in) diameter ports incorporated into a gather portion of air bag fabric on the lateral aspects, located 11 cm (4.3 in) aft of the cover flap. Two more 5 cm (2.0 in) diameter vent ports were located on the sides of the air bag, located 30 cm (11.8 in) from the cover flap. Internal tethers limited the rearward

excursion of the front right air bag to 36 cm (14.1 in), measured in its deflated state. There was no occupant contact evidence present to the deployed passenger's frontal air bag.

Figure 24. Passenger's frontal air bag deployed in the Dodge at the time of the SCI vehicle inspection

2017 Dodge Journey Occupants

Driver Demographics

Age/sex:	38 years/female
Height:	168 cm (66 in)
Weight:	64 kg (140 lb)
Eyewear:	None
Seat type:	Forward-facing bucket seat with reclining seatback
Seat track position:	Mid-track
Manual restraint usage:	3-point lap and shoulder belt
Usage source:	Vehicle inspection, EDR data
Air bags:	Frontal, knee, seat-mounted side impact and IC air bags available; Frontal and knee air bags deployed
Alcohol/drug involvement:	None
Egress from vehicle:	Occupant fatal before removed from vehicle
Transport from scene:	Transferred to medical examiner for autopsy
Type of medical treatment:	None

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
N/A	Unknown	N/A	N/A	N/A

Source: several medical examination records requests denied

Driver Kinematics

The Dodge driver was seated in a normal driving posture with the manual seat track adjusted to a middle position. The seat track was 15 cm (5.9 in) aft of the full forward and 8 cm (3.1 in) forward of full-rear. The position of the seatback was altered by intrusion of the roof and displacement of the B-pillar. The adjustable head restraint was 7 cm (2.8 in) above the seatback. The driver was restrained by the 3-point lap and shoulder seat belt system. Her restraint usage was determined from the cut status of the belt webbing and the engaged position of the latch plate in the buckle at the time of the SCI inspection, in conjunction with a review of the Dodge's EDR data which recorded the driver's belt status as buckled. Immediately prior to the crash, the driver applied the brakes and steered right in an attempt to avoid the impending crash.

At impact with the Wabash, several systems in the Dodge actuated/deployed, including the driver's retractor pretensioner, frontal air bag, and knee air bag. The driver initiated a forward trajectory in response to the frontal crash forces and loaded the seat belt system and the deployed air bag. Her left knee contacted and scuffed the left aspect of the lower left instrument panel. As the Dodge engaged and underrode the Wabash semi-trailer, the left A-pillar and roof were crushed and displaced rearward and downward. Although there was no evidence of contact on the headliner, the driver's head and upper torso were likely contacted and displaced by the intruding roof as it reduced the volume of the occupant compartment rearward and downward. The driver slumped to her right as her pelvic region remained secured in the seat by the lap belt. Emergency responders observed the driver absent of vital life signs upon their arrival at the crash

scene, and she was pronounced deceased prior to her removal from the Dodge. Hydraulic rescue equipment was used to cut the left A- and B-pillars and the left doors from the Dodge in order to extricate the driver. Her body was transferred to the medical examiner for autopsy.

Front-Row Right Occupant Demographics

Age/sex:	11 years/female
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Forward-facing bucket seat with reclining seatback
Seat track position:	Mid-track
Manual restraint usage:	3-point lap and shoulder belt
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
Egress from vehicle:	Exited vehicle with some assistance
Transport from scene:	Ambulance
Type of medical treatment:	Transported to a local hospital, then transferred by ambulance to a regional trauma center

Front-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
N/A	Unknown	N/A	N/A	N/A

Source: several medical record requests denied

Front-Row Right Occupant Kinematics

The front right child passenger was seated in a mid-track position with the seatback slightly reclined and the head restraint adjusted 9 cm (3.5 in) above the seatback. She was restrained by the manual seat belt system. Her manual restraint usage was determined from frictional abrasions on the latch plate, the lack of interior occupant contact points, and imaged EDR data. At impact with the Wabash semi-trailer, the pretensioner systems actuated and the passenger's frontal air bag deployed. The child initiated a forward trajectory and loaded the seat belt system and the deployed passenger's frontal air bag. These safety systems prevented her from contact with interior frontal components.

Following the crash, a passing motorist stopped at the crash site to offer assistance. This person assisted the child from the vehicle. She was subsequently transported by ambulance to a regional trauma center, where she received treatment for her reported non-incapacitating (B-level) injuries. Specifics concerning her injuries and course of treatment remain unknown due to a lack of cooperation by the treating medical facility.

Second-Row Right Occupant Demographics

Age/sex:	10 years/female
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Forward-facing split bench seat w/separate backs
Seat track position:	Non-adjustable
Manual restraint usage:	3-point lap and shoulder belt
Usage source:	Vehicle inspection
Air bags:	IC air bags available; None deployed
Alcohol/drug involvement:	None
Egress from vehicle:	Removed by emergency response personnel
Transport from scene:	Ambulance
Type of medical treatment:	Transported to a regional trauma center and hospitalized

Second-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Severe head injury, NFS	100099.9	Intruding roof/headliner	Certain

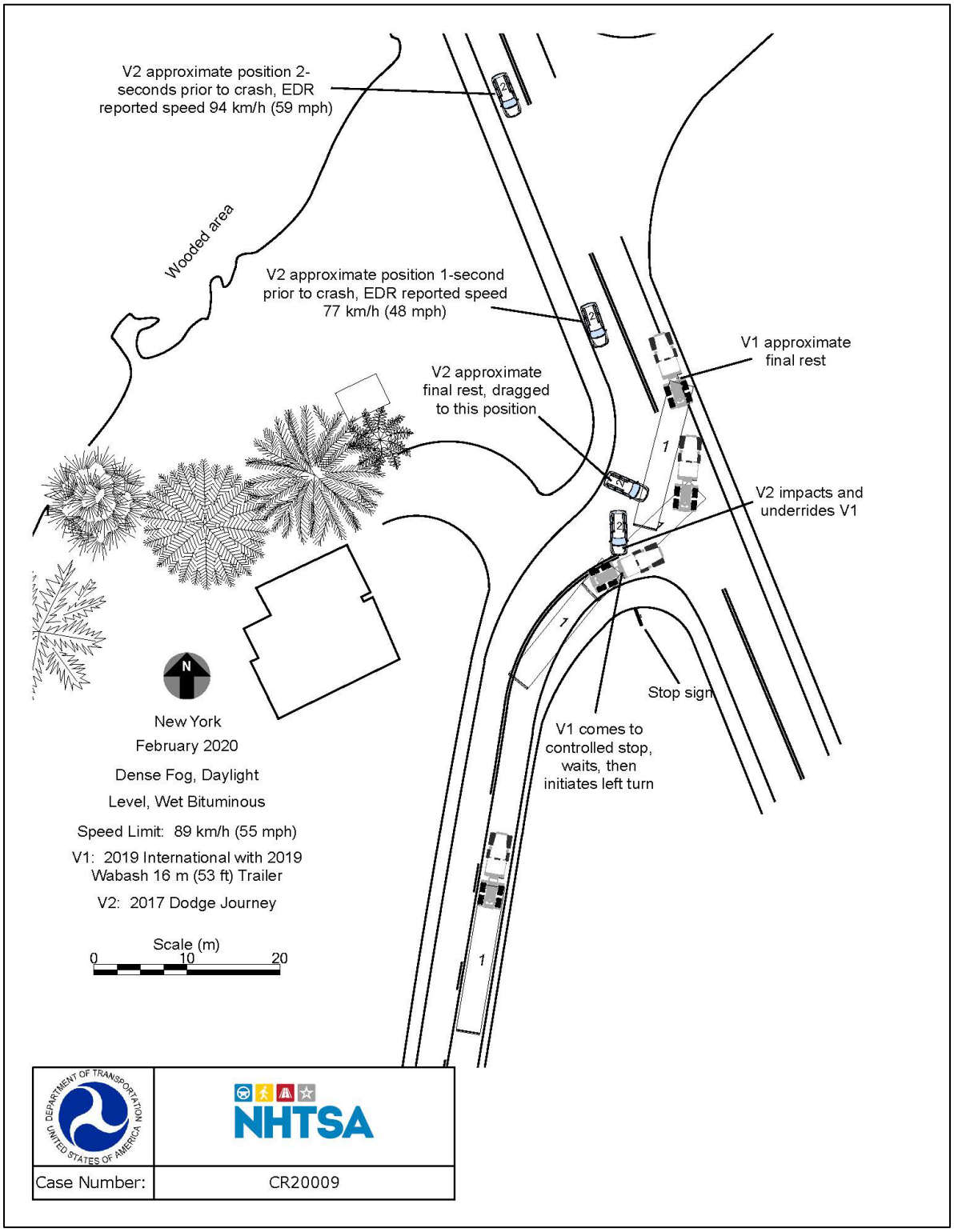
Source: law enforcement documentation; several medical record requests denied

Second-Row Right Occupant Kinematics

The second-row right child passenger was seated with the adjustable seat track in an unknown position (it had been moved post-crash). The head restraint was adjusted 4 cm (1.6 in) above the seatback. She was restrained by the manual seat belt system, evidenced by subtle frictional abrasions on the polymer surface of the latch plate and creasing of the webbing from loading against the seat trim. Based on contact evidence, the second-row right passenger was probably leaning to her left pre-crash and/or had the shoulder belt with extra slack room and positioned loosely off of her right shoulder.

At impact she initiated a forward trajectory and loaded the seat belt webbing. Due to the slack/positioning of the occupant and the shoulder portion of the belt system, she translated forward and extended toward the center of the vehicle between the front-row seatbacks. Her head contacted and engaged the intruding headliner/roof, resulting in a pronounced circular area of contact visible in the headliner. This 15x17 (5.9x6.7 in) depression in the headliner was 3 cm (1.2 in) in depth. She sustained a closed head injury and was found slumped over the second-row seat to her left by emergency response personnel. She was removed from the vehicle by emergency responders and transported to a level I trauma center, where she was admitted for treatment. Specifics concerning her injuries and course of treatment remain unknown due to a lack of cooperation by the treating medical facility.

Crash Diagram



Appendix A: 2017 Dodge Journey Event Data Recorder Report[1]

[1] The EDR report contained in this technical report was imaged using the current version of the Bosch CDR software at the time of the vehicle inspection. The CDR report contained in the associated Crash 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	3C4PDCAB9HT******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CR20009_V1_ACM.CDRX
Saved on	
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 21.5.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Most Recent Event

Comments

No comments entered.

Data Limitations

AIRBAG CONTROL MODULE (ACM) DATA LIMITATIONS:

GENERAL INFORMATION:

CAUTION: During direct-to-module imaging where the Airbag Control Module (ACM) is disconnected and removed from a vehicle, make sure the ACM is not moved, tilted or turned over while connected to and powered by the CDR Interface Module (with appropriate adaptors in place, where required). Also, after a CDR imaging process, wait 2 minutes after power is removed from the ACM before attempting to move the module. Not following these general ACM guidelines for direct-to-module imaging may cause new events to be recorded in the ACM.

- For additional definitions, please refer to the CDR Help File Glossary.
- As the VIN may be used to determine the configuration of the restraint system, it is imperative that the correct VIN be entered into the CDR Tool during the imaging process.
- If a DLC adapter has to be used with the CDR Tool, the "Read VIN from Vehicle" feature in the CDR Tool will not work. The VIN will have to be manually entered.
- If a 2021 or later MY Dodge Durango was imaged with a CDR Tool version 19.4 or older, the ACM will need to be reimaged as not all the peripheral sensor data will have been retrieved.
- The 2019 MY RAM 1500 may take up to 30 minutes to retrieve the EDR data. The ignition will time out within 20 minutes so the vehicle flashers must be turned on within 20 minutes to keep the ignition and communication bus active.
- Lateral Delta V will not be displayed for the 2013 MY Jeep Compass and Patriot.
- Ignition Cycle, download/crash
    - For RAMs and Dodge Vipers, there are 2 internal ignition counters in the ACM. It is possible for the ignition cycles at download to be different than the ignition cycles at event due to the 2 different counters.
    - Note that the ignition cycle count in an ACM may differ from the ignition cycle count in a Pedestrian Protection Module (PPM) in the same vehicle due to the fact that the ACM has an energy reserve while the PPM does not.

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 Notation Indicates**
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Delta-V, Lateral	Left to Right
Maximum Delta-V, Lateral	Left to Right
Angular Rate	Clockwise rotation around the longitudinal axis

Peripheral Sensors, X and Y	Outside to Inside
Pressure Sensors	Compression of air
Internal Y Acceleration	Left to Right
Low-g Z Acceleration	Downward
Steering Input	Steering wheel turned counter clockwise
Yaw Rate	Counter clockwise rotation

CDR FILE INFORMATION:

- An event will be stored when the delta V is approximately 5 mph (8 km/h) or greater within a 150 ms interval.
- For non-NAFTA ACMs that control pedestrian protection devices, a non-deployment event will be stored when the pedestrian protection devices are activated.
- A non-deployment event may be stored with activation of the Active Head Restraints. See AHR explanation under System Configuration at Retrieval/Event section.
- A deployment event may be stored in a 2019 MY+ Ram 3500 as the result of a rear impact, even though the Ram 3500 does not deploy any restraint system devices in a rear impact.

Event(s) Recovered definitions:
- None - There are no stored events in the ACM
- Not Retrievable - Event Data may be stored in the ACM but is not retrievable by the CDR Tool.
- Most Recent Event - Data of the most recent event is displayed in the report
- 1st Prior Event - Two events are stored in the ACM, Data displayed is of the first prior event.
- 2nd Prior Event - Three events are stored in the ACM, Data displayed is of the second prior event.
- For 2013 and 2014 MY Dodge Journey and Fiat Freemont:
    - Event Record 1 - Data from an event is stored in the ACM (not necessarily in chronological order)
    - Event Record 2 - Data from another event is stored in the ACM (not necessarily in chronological order)
- For TRW modules:
- If there is a side impact, two EDR events may be stored for the one side impact event. The second event may be recorded due to the Lateral Delta V exceeding 5 mph (8 km/h) within a 150 ms interval after the side deployment occurred.
- For some Fiat vehicles:
    - Two EDR events may be stored for one impact event. The second event may be recorded due to the deployment of the frontal airbag, 3rd stage passenger.
- During an event, if power to the ACM is lost, all or part of the event data record may not be recorded. An indication may be observed in the recorded data under this condition: The restraint data is recorded first and then the vehicle data.
    - "None" may be displayed in the "Event(s) Recovered" section of the report indicating no pre-crash vehicle data.
    - An event may be displayed in the "Event(s) Recovered" section of the report and "Interrupted" will be displayed for Pre-Crash Recorder Status.
- For the 2021MY Jeep Grand Cherokee L, an event may be displayed in the "Event(s) Recovered" section of the report as "End of Line Test event - See Data Limitations". This event is an End of Line test event from the module manufacturing process which will be included in the count for the total number of events, but no data will be displayed in the CDR Report.

SYSTEM STATUS AT RETRIEVAL:

- Original VIN - The VIN is captured by the ACM and then recorded as the Original VIN after 10 consecutive ignition cycles of capturing the same number. Once it has been recorded, this number cannot be changed.

SYSTEM CONFIGURATION AT RETRIEVAL/EVENT:

- The System Configuration data tables indicate the components that the ACM for a particular vehicle monitors and/or controls.
- Active Head Restraint (AHR) - This refers to some active head restraint systems that are electronically controlled by the ACM. AHRs may activate but not store an EDR Record if the delta V does not exceed the minimum delta V threshold. It is possible that the AHRs may activate after the EDR record has been stored and written, based on achieving the minimum delta V. This condition will result in an EDR but no record of the AHR activation in the CDR report. Activation of only the AHRs, if stored, will be a non-deployment event.

SYSTEM STATUS AT EVENT:
- Frontal Airbag Warning Lamp - In Veoneer modules, the airbag warning lamp may indicate ON at the time of a most recent event without any DTCs present if a deployment event has already occurred in the same ignition cycle. The ABWL will come on due to the deployment but, as there are still algorithms processing data, the actual faults will not be qualified yet and will not show up as DTCs.

- Number, Total Events - Cumulative number of events that the ACM has recorded, including those non-deployment events that have been

overwritten by a subsequent event.

  - For the 2021MY Jeep Grand Cherokee L, the module will contain one, two, or three End of Line test events from the module manufacturing process which will be included in the count for the total number of events. However, the data from these End of Line test events will not be displayed in the CDR Report.

- Occupant Size Classification, Outboard Front Passenger - "Child" status may be used to indicate anything weighing less than a 5th percentile female adult crash dummy, including an empty seat; "Not Child" indicates anything weighing the same as or more than a 5th percentile female adult crash dummy. "SNA" indicates undetermined;
  - For some non-North American applications, "Empty" indicates an empty seat;
- Odometer at Event - Vehicle odometer at the time of the event
  - For 2014-2016 MY Fiat 500L, the odometer value in miles may be shown in the brackets, labeled as kilometers. If this is the case, the non-bracketed value is not valid.
- Operation via Energy Reserve Only -"Yes" indicates that the ACM had lost power at or before T0 and was only operating on energy reserve at T0.
- Safety Belt Status, Outboard Front Passenger - For vehicles sold outside of North America which do not contain a buckle switch for the outboard front passenger, the safety belt status, outboard front passenger will default to "not buckled/unbuckled".
- System Voltage at Event, ACM - Voltage at the ACM as measured by the ACM. This voltage may be approximately 0.7V (one diode drop) below the bused voltage.
- System Voltage at Event, Bused - Voltage of the vehicle system, communicated on the communication bus to other electronic modules in the vehicle.
- Temperature, Outside - Ambient Air Temperature.
- Time, Airbag Warning Lamp On - This is a cumulative time. It indicates the total amount of time that the ACM has requested the Airbag Warning Lamp be turned on.
  - This time does not include the warning lamp bulb check time, which occurs at every ignition cycle
    - For 2013 MY Minivans and new 2017+ MY Jeep Compass, this time is only cumulative for the past 10 ignition cycles.
- Time from event 1 to 2 -
  - If only one event is stored, either a value of 0 or >5 may be displayed for this data element.
  - For the 2018+ MY Promaster and 2019+ MY RAM 1500, a value of 0 may be displayed for the first event or for events >5 seconds apart.
  - If multiple events exist in the EDR, the time from event 1 to event 2 is defined as:
    - For Bosch and TRW modules, the time from the prior recorded event (even if it has been overwritten) to the current recorded event.
    - For Continental modules, the time from the prior existing recorded event (as long as it is still displayed in the CDR report) to the current recorded event. If the prior event in a multi-event condition is overwritten by a subsequent event, the multi-event status will no longer be displayed.
    - For the 2019+ MY RAM 1500, the time from event 1 to 2 may utilize a non-stored event as event 1. In this case, the total number of events and multi-event data elements will not include the non-stored event in the number of events. However, the time from event 1 to 2 will be shown as time from that non-stored event.
- Time, Operation System Time - This is a cumulative lifetime timer for the ACM. It indicates the total amount of time the ACM has been powered up.
  - For 2019 and later MY RAMs, this time is only cumulative for the current ignition cycle.
- Tire Pressure Indicator Lamp at Event- "On" indicates a tire with low pressure or a fault in the tire pressure monitoring system at the time of the event. The TPM module DTC's should be read and recorded for final system interpretation. "Flashing" indicates a recent fault in the tire pressure monitoring system.
- Tire Pressure at Event, LF, LF, RF, RR - See "Tire Information" under Pre-Crash Data section for details.
- VIN at Event, Last 8 Digits- Last 8 digits of the VIN of the vehicle at the time the ACM records the event.

DEPLOYMENT COMMAND DATA:

- A "Yes" for a particular item indicates that the ACM commanded the deployment /activation of the associated device.
- The phrase "Exceeded Storage Range" for a particular time to deploy indicates that the deployment time is equal to or greater than the 255 milliseconds that can be stored.
- If a device is not deployed, the "time to deploy" for that device will N/A.
- A time to deploy value of 0 is valid and indicates that the deployment of the device triggered the EDR t0.
- In vehicles with Bosch and Veoneer ACMs, once a device has been deployed in an ignition cycle, it is possible that the ACM will not attempt to re-deploy any already deployed device during subsequent events in that same ignition cycle.

DTCs PRESENT AT START OF EVENT:

- If any DTCs (diagnostic trouble codes) are present in the ACM at the start of the event, these will be listed in this section. A dealership service manual can be used to decode the DTCs.
  - DTCs Present at Start of Event are not present in the Alfa Romeo Giulia, Fiat 500X, and the Jeep Renegade.
- For the 2021 MY+ Jeep Grand Cherokee L, the DTCs will not be updated for the subsequent events within the same ignition cycle.

SENSOR DATA:

- The design range for the angular rate data is:
    - +/- 240 deg/sec for Bosch ACMs unless specifically called out below
    - +/- 300 deg/sec for TRW ACMs, the 2019 MY RAM 1500, and the 2018+ MY Dodge Journey
    - +/- 290 deg/sec for 2008+ MY minivans and 2009-2017 MY Dodge Journey
    - +/- 340 deg/sec for 2017+ MY Chrysler Pacifica and new 2017+ MY Jeep Compass
    - - 416.67 deg/sec to +413.41 deg/sec for 2014+ MY Jeep Cherokee
    - +/- 300 deg/sec for vehicles with Veoneer ACMs
- For vehicles that store peripheral sensor data, t0 for the peripheral sensors is the same as the t0 for the delta V.
- Internal y acceleration is stored prior to t0 so the internal y acceleration data will usually be zero unless the rollover sensing algorithm has triggered storage of the EDR event.
- The words "Sensor Design Range Exceeded" and a vertical line will be displayed on the Longitudinal and Lateral Delta-V graphs the first time the applicable sensor range is exceeded.
- For the 2010-2012 MY Chrysler Town and Country, Dodge Caravan, Dodge Grand Caravan, and Dodge Journey and the 2010-2011 MY Grand Voyager, the angular rate will only be displayed if it is non-zero.

PRE-CRASH DATA:

- The recorded Event may contain Pre-Crash data. Pre-Crash data from the various electronic control modules in the vehicle is transmitted to the Airbag Control Module via the vehicle's communication bus.
- In the Pre-Crash Data graph, data transmitted at a rate other than 0.1 seconds will be shown as dots for each available data point. Only data transmitted at a rate of 0.1 seconds will have the dots connected by a line.
- (if equip.) - If a parameter name is followed by the words (if equip.), then the parameter is only valid for vehicles equipped with the associated parameter/vehicle system.
- The MIL (Malfunction Indicator Lamp) Status for the various recorded systems indicates the requested state of the applicable malfunction indicator lamp at the time that the data was captured. Note: Some fault codes could be stored due to component/system damage from the accident. The appropriate diagnostic tool should be used to read any stored Diagnostic Trouble Codes (DTC's) in the various electronic modules (ACM, PCM, ABS, TCM, etc., where applicable) for use in interpretation of some vehicle specific recorded data.
- ABS Activity - "Yes" indicates an active ABS event in which the ABS is actively controlling the brakes.
- ABS MIL- This indicates the ABS fault indicator lamp status. It will only be "On" when there is a fault in the ABS system. The Electronic brake module DTC's should be read and recorded for final system interpretation.
- Accelerator Pedal, % Full - This indicates the actual position of the accelerator pedal. It will be "SNA" if the vehicle is in the power free mode which limits acceleration.
- Accelerator Pedal (Derived), % Full - This indicates the calculated value of the accelerator pedal for battery electric vehicles only.
- Accelerator Pedal/Engine Throttle, % Full - This indicates the actual position of the accelerator pedal unless the cruise control is engaged. If the cruise control is engaged, this indicates the actual position of the engine throttle blade.
- Brake Pedal Position - This indicates the percentage of brake pedal depression by the driver.
- Brake Torque - This indicates the calculated amount of brake torque the system is producing at the wheels.
- Brake Torque Driver - This indicates the calculated amount of brake torque that the driver is requesting.
- Braking System, Maximum Braking -- "Yes" indicates that ABS is active on all 4 wheels at the same time.
- Cruise Control:
    - Note that the following two Cruise Control data elements are only valid for vehicles not equipped with Adaptive Cruise Control (ACC). For vehicles equipped with ACC, the ACC data elements are used for both regular Cruise Control and ACC.
    - Cruise Control System/Lamp Status -"On" indicates that the Cruise Control system is turned on.
    - Cruise Control Status - "Off" indicates that all cruise control functionality is disabled; "NCC_On" indicates that the Normal Cruise Control system is turned on; "NCC_Engaged" indicates the Normal Cruise Control is actively controlling vehicle speed; "ACC_On" indicates that ACC is turned on; "ACC_Engaged" indicates that the ACC is actively controlling vehicle speed.
    - Cruise Control Engaged Status/Active - "Engaged"/"Yes" indicates the Cruise Control system is actively controlling vehicle speed. "Not Engaged"/"No" indicates the system is NOT controlling vehicle speed.
    - Cruise Control Override - "Active" indicates that the driver has overridden the set speed. "Not Active" indicates that the cruise control is either not turned on or is not being overridden.
    - Adaptive Cruise Control (ACC) Status (if equip.)- "Off" indicates that all cruise control functionality is disabled; "NCC_On" indicates that the Normal Cruise Control system is turned on; "NCC_Set" indicates the Normal Cruise Control is actively controlling vehicle speed; "ACC_On" indicates that ACC is turned on; "ACC_Set" indicates that the ACC is actively controlling vehicle speed. If the value is SNA for all time stamps, then the vehicle is not equipped with ACC.
    - Set Speed (if equip.)- This indicates the desired speed in mph that was input by the driver for the cruise control system.
    - ACC Faulted - "Yes" indicates that the ACC system will not function and the ACC warning lamp is lit; "No" indicates that the ACC system is functional and the ACC warning lamp is off;
    - For new 2017+MY Jeep Compass, cruise control data elements are only available for vehicles NOT equipped with ACC.
- Drive Mode - This indicates the driver selected mode of operation (e.g. normal, sport, track, …)
- Electronic Brake/Stability Control information:
    - Stability Control - This is the status of the ESC symbol - "car with squiggly lines" indicator lamp. "On" indicates that the ESC system is functional. "Off" indicates that the ESC system was turned off either by the driver or due to a fault or thermal mode shutdown. "Engaged" indicates an active ESC/TCS event. "Partial Off" indicates that engine management has been turned off but brake traction control is still functional.
        - For the Jeep Renegade, if the Stability Control is "Off", the ESC Button Status is "Disabled", and the vehicle speed exceeds 40 mph, the stability control system will operate in a reduced functionality mode with traction control turned off ("partial off" mode) even though the user disabled it. For all other conditions, when the Stability Control is "Off", the stability control system will be off.

- ESC Button Status - This indicates the driver selected mode for the ESC system. "Disabled" indicates that the driver pressed the ESC Button to disable engine management. "Enabled" is the default state for the ESC system.
  - SRT and some Fiat products have the ability to fully disable the ESC system if the ESC button has been pressed and held for a specific amount of time. Additional system analysis is required.
- ESP Feature is Completely Disabled - This indicates that the stability control system has turned off engine management, traction control, and stability control.
- ESC/ESP MIL - This indicates the ESC/ESP fault indication lamp status. It will only be "On" when there is a fault or thermal mode shutdown in the ESC/ESP system. The ESC/ESP module DTC's should be read and recorded for final system interpretation.
- Brake Intervention by ESP - "Yes" indicates that the stability control system has engaged the brakes.
- Engine Torque Applied - "No" indicates no engine torque output was applied (as in Park/Neutral for Automatic transmissions or clutch depressed on manual or during an ESP/Traction Control event). If "Yes", then engine torque output was applied.
- Traction Control Active - "Yes" indicates that the traction control system is actively controlling the vehicle's wheels.

- Electronic Park Brake (EPB):
  - Park Brake Engaged - "Yes" indicates that the park brake is applied.
  - EPB MIL - "On" indicates that there is a fault in the Electronic Park Brake System.
- Engine RPM - For the RAM ProMaster City, the minimum resolution for Engine RPM is 32 rpm.
- Engine Throttle, % Full - This indicates the actual position of the Engine Throttle blade. This data element is not supported by vehicles with diesel engines. Thus a value of "SNA" will be displayed if the vehicle has a diesel engine.
- ETC Lamp - Lamp "ON "indicates there is an active Electronic Throttle DTC.
- ETC Lamp Flashing - "Yes" indicates that the ETC is in the limp-in mode.
- Forward Collision Warning (FCW) (if equip.):
  - Object of Interest Distance - If the FCW system is acting on the object, this indicates the actual forward distance to the main object being tracked by the FCW system. "No Object" indicates that the FCW system is not currently acting on an object. If the value is SNA for all time stamps, then the vehicle is not equipped with FCW.
  - FCW System Operating State - "Off" indicates that the FCW system is off and the FCW Warning Lamp will be "On"; "On" indicates that the FCW system is on with the audible and visual warnings enabled.
  - FCW System Status - "Off" indicates that the FCW system is off and the FCW Warning Lamp will be "On". "On-warning" indicates that the FCW system is on but active braking is disabled. In an FCW event, the driver will only receive FCW audible and visual warnings. "On-full" indicates that the FCW system is fully on with active braking enabled as well as the audible and visual warnings enabled. SNA indicates that the vehicle is not equipped with FCW.
  - FCW Braking Enabled - "Yes" indicates that the FCW system has active braking enabled; "No" indicates that the FCW system does not have active braking enabled.
- Gear Position/Current Gear - For all vehicles except the RAM ProMaster City, this indicates the current transmission gear. For the RAM ProMaster City, this indicates the status of the gear shift lever.
- Estimate Regenerative Braking Axle Torque - (HEV only) This indicates the calculated braking torque applied by the HEV system to the drive axles in Nm.
- Driver Intended Axle Torque - (HEV only) This indicates the calculated value of torque in Nm being applied to the drive axles based on accelerator pedal position.
- Trans torque request - (HEV only) "Yes" indicates that the transmission controller has requested a torque reduction when shifting from one gear to another.
- Static Axle Torque - (HEV only) This indicates the torque in Nm at the axle when the speed of the axle is constant.
- HEV Battery Pack Contactor State - (HEV only) "Closed' indicates that the HEV battery pack is connected to the vehicle's electrical system. "Open" indicates that the HEV battery pack is disconnected from the vehicle's electrical system. "Pre-Charging" indicates that the inverter internal capacitor is charging. "Pre-Charge Failed" indicates that the attempt to charge an internal capacitor failed. "Pre-Charge Inhibited" indicates that an attempt to charge an internal capacitor was not made.
- HEV Lamp Request - (HEV only) This indicates the HEV indicator lamp status. It will only be "On" when there is a fault in the HEV system. The vehicle DTC's should be read and recorded for final system interpretation.
- Master Cylinder Pressure - This indicates the brake pressure applied to the brakes through the brake pedal.
- PCM MIL - This indicates the PCM fault indicator lamp status. It will only be "On" when there is a fault in the PCM. "Flashing" indicates misfire detection. The Powertrain Control Module DTC's should be read and recorded for final system interpretation.
- Pre-Crash Recorder Complete - Due to the interruption of data recording in one section, this data element may display "Interrupted" for all sections when some data sections are actually complete.
  - For the 2014 MY Jeep Grand Cherokee and Dodge Durango, if recording of angular rate data is interrupted, the entire EDR record will display "Interrupted" even though the rest of the data may be complete.
- PRND/PRNDL/PRNDS Status - This indicates the status of the Shifter Position.
- Raw Manifold Pressure - This indicates engine load in kPa.
- Reverse Gear - For manual transmission vehicles only, "Yes" indicates the transmission is in the reverse gear.
- Service Brake - "On" indicates that the brake pedal is physically depressed. Braking from the ABS or FCW systems will not be reported in this data element.
- Shift Selector Position - This indicates the status of the gear shift selector.
- Speed, Vehicle Indicated - This indicates the average of the wheel speeds of the drive wheels.
  - The reporting resolution for Speed, Vehicle Indicated is 1 km/h.
  - To display this data element in mph, the CDR Tool converts the km/h to mph and reports a rounded value in mph.
  - The accuracy of the recorded Speed, Vehicle Indicated may be affected by a significant change of the tire size for the drive wheels or the final drive axle ratio of the transmission from the factory build specifications, wheel lockup, wheel slip, or wheel spin.
  - On some vehicles capable of speeds in excess of 255km/h (about 158mph), the actual vehicle speed may have exceeded the reporting range. It is always prudent to check the reported wheel speeds and other parameters to confirm the Speed, Vehicle

Indicated value(s).

- Tire Information:
  - XX where LF = Left Front Tire, RF = Right Front Tire, LR = Left Rear Tire, and RR = Right Rear Tire.
  - Tire X Location - This indicates the location of the tire pressure sensor data being displayed for that time stamp. Default is used to indicate that the location of the tire pressure sensor is unknown or there is no tire pressure sensor in that wheel. Vehicles with Base Tire Pressure Monitoring systems will display SNA for both Tire Locations as these vehicles do not send actual pressure values across the communication bus.
  - Tire X Pressure/Tire Pressure Status, XX -This indicates the actual pressure status of the Tire Location defined in the previous column (Tire X Location) or by the values for XX. Possible values are Significantly Under Inflated (TPM lamp will be on), LOW/Under/Under Inflated, NORMAL, HIGH/Over/Over Inflated, or SNA for this parameter. Vehicles with Base Tire Pressure Monitoring systems may display NORMAL even though these vehicles do not send actual pressure values across the communication bus.
  - Tire X Pressure/Tire Pressure Value, XX (psi) - This indicates the actual tire pressure value of the Tire Location defined in the previous column (Tire X Location) or by the values for XX. Vehicles with Base Tire Pressure Monitoring systems will display N/A for this parameter as these vehicles do not send actual pressure values across the communication bus.
  - For the following vehicles, the tire location, if displayed, may not be accurate if the tires have been rotated:
    - -2013 MY Ram
    - -2013-2017 MY Jeep Patriot
    - -2013-2014 MY Chrysler 200
    - -2013-2017 MY Jeep Compass
    - -2013-2016 MY Dodge Dart
  - For the 2013 MY Ram, if the values for tire pressure status and the tire pressure are SNA, the EDR does not store tire pressure monitoring data.
  - Tire pressure is not stored in the EDR for the following vehicles:
    - -2014-2018 MY RAM 1500
    - -2014+ MY RAM (all but 1500)
    - -2013+ MY Jeep Wrangler
    - -2013 MY Jeep Grand Cherokee
    - -2013 MY Dodge Durango
    - -2013-2014 MY Dodge Challenger
    - -2013-2016 MY Chrysler Town and Country
    - -2013+ MY Dodge Grand Caravan
    - -2015+ MY Fiat 500

  - Wheel Speed, XX - This indicates the speed value of a particular tire as denoted by XX.
- Tire Pressure Monitor Indicator Lamp/Faults - "On" indicates a tire with low pressure or a fault in the tire pressure monitoring system. The TPM module DTC's should be read and recorded for final system interpretation. "Flashing" indicates a recent fault in the tire pressure monitoring system.
- "T0" ("Time zero" where '0' is seen as subscript) is defined as "beginning of the crash event". T0 is the time at which the ACM algorithm is activated, a specific Delta-V is exceeded, or a non-reversible restraint device is deployed. T0 may be defined differently for front, side, rear and roll-over events.
  - If multiple algorithm decisions (i.e.: frontal, side, rear and/or rollover) are made before the first recorded event ends, all of those events are part of the same event record and "T0" is defined as the "T0" from the first recorded event.
  - In the Pre-Crash data tables, the relative time marker "-0.1s" or "-0.25s" respectively represents the last set of data captured in the buffer prior to "T0."
- Torque Information:
  - Axle Torque - This indicates the E-Motor Torque multiplied by the gear ratio for battery electric vehicles only.
  - E-Motor Torque - This indicates the calculated torque from the output shaft of the electric motor in battery electric vehicles only.
- Traction Control Intervention Active - "Active" indicates wheel slippage was occurring during vehicle acceleration.

APPLICATION INFORMATION:

- Alfa Romeo Giulia, Alfa Romeo Stelvio, Fiat 500L, Fiat 500X, and Jeep Renegade are only CDR supported in the United States, Canada, and Saudi Arabia markets.
- Fiat 500/500e is only CDR supported in the United States, Canada, Mexico, and Brazil markets.

03002_Chrysler_ r046

System Status at Retrieval

Original VIN	3C4PDCAB9HT******
Ignition Cycle, Download	6386
Airbag Control Module Serial Number	T06JF2516283XR
Airbag Control Module Part Number	68163807AB
Airbag Control Module Supplier	Continental Corporation
ACM Supply Voltage at Time of Retrieval	14.6

System Configuration at Retrieval

Configured for Driver Frontal Airbag	Yes
Configured for Driver Knee Airbag	Yes
Configured for Driver Buckle Pretensioner	No
Configured for Driver Retractor Pretensioner	Yes
Configured for Driver Active Head Restraints	Yes
Configured for Passenger Frontal Airbag	Yes
Configured for Passenger Buckle Pretensioner	Yes
Configured for Passenger Retractor Pretensioner	Yes
Configured for Passenger Active Head Restraints	Yes
Configured for Right Side Seat Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Left Side Seat Airbag	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Driver Seat Track Position Sensor	Yes
Configured for Passenger Seat Seatbelt Switch	Yes
Configured for Passenger Seat Track Position Sensor	Yes
Configured for Pedestrian Protection Hood Actuators	No
Configured for Up Front Sensors	Yes
Configured for Side Sensing	Yes

System Status at Event (Most Recent Event)

Complete File Recorded	Yes
Ignition Cycle, Crash	6384
Safety Belt Status, Driver	Buckled
Safety Belt Status, Passenger	Buckled
Airbag Warning Lamp, On/Off	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Seat Track Position Switch, Foremost, Status, Passenger	No
Maximum Delta-V Longitudinal (MPH [km/h])	-51.7 [-83]
Time, Maximum Delta-V, Longitudinal (msec)	256
Maximum Delta-V Lateral (MPH [km/h])	-5.4 [-9]
Time, Maximum Delta-V, Lateral (msec)	296
Time, Operation System Time (sec)	7072651.15
Time, Airbag Warning Lamp On (min)	0
Event Number	1
Total Number of Events	1
Time from Event 1 to 2 (sec)	0.0
Multi-Event, Number of Events (1,2)	1
Operation Via Energy Reserve Only (Yes, No)	Yes
Supply Voltage at Event, ACM (V)	14.3
Event Signal Transmission, Complete (if equip.)	Yes
Odometer at Event (km)	103184.8
VIN, Original	3C4PDCAB9HT******
VIN at event, Last 8 Digits	HT******

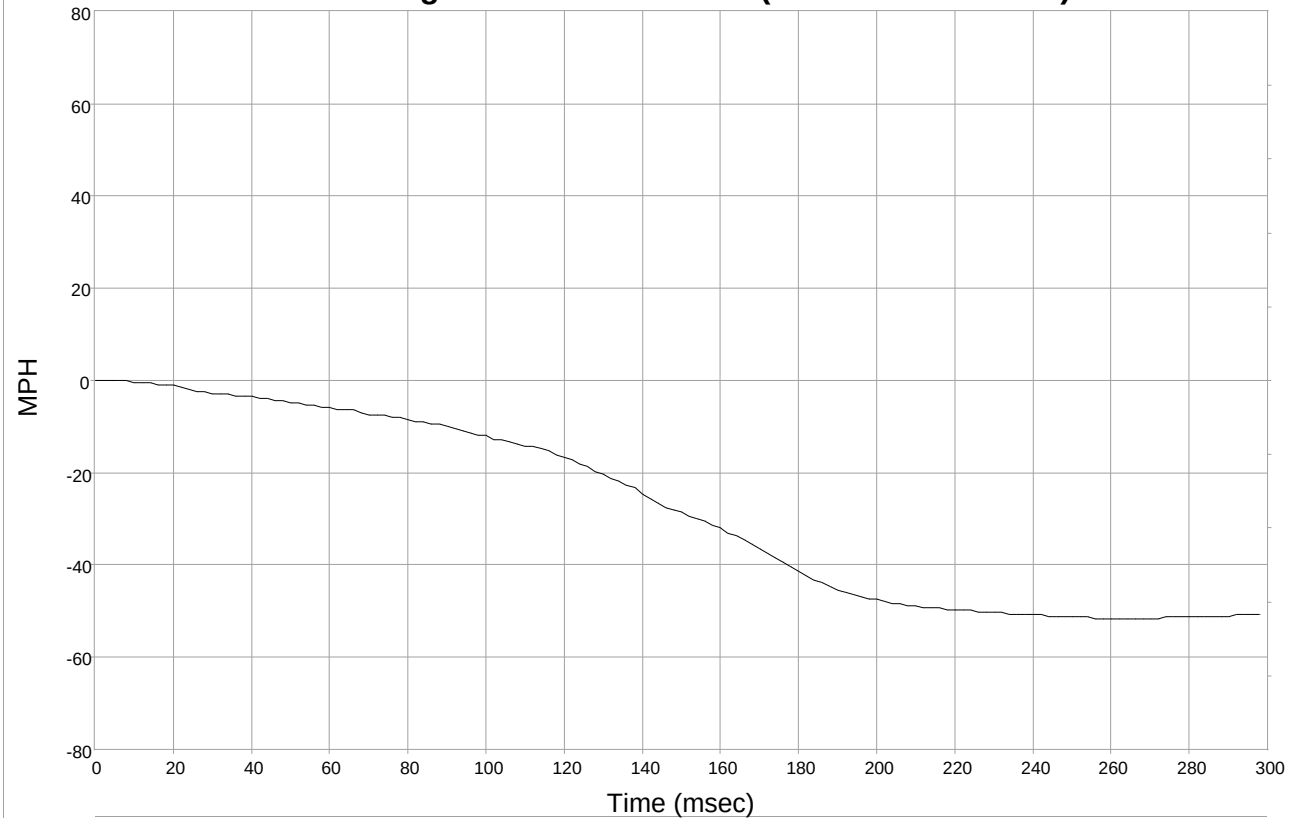
Deployment Command Data (Most Recent Event)

Frontal Airbag Deployment, 1st Stage, Driver	Yes
Frontal Airbag Deployment, 2nd Stage, Driver	Yes
Frontal Airbag Deployment, Time to First Stage Deployment, Driver (msec)	28
Frontal Airbag Deployment, Time to 2nd Stage Deployment from T0, Driver (msec)	101
Frontal Airbag Deployment, 1st Stage, Passenger	Yes
Frontal Airbag Deployment, 2nd Stage, Passenger	Yes
Frontal Airbag Deployment, Time to First Stage Deployment, Passenger (msec)	28
Frontal Airbag Deployment, Time to 2nd Stage Deployment from T0, Passenger (msec)	151
Knee Airbag Deployment, Driver	Yes
Buckle Pretensioner, Driver	No
Retractor Pretensioner, Driver	Yes
Frontal Airbag Deployment, Passenger 3rd Squib	Yes
Buckle Pretensioner, Passenger	Yes
Retractor Pretensioner, Passenger	Yes
Side Seat Airbag Deployment, Left	No
Side Seat Airbag Deployment, Right	No
Side Curtain Airbag Deployment, Left	No
Side Curtain Airbag Deployment, Right	No
Active Head Restraint, Driver	No
Active Head Restraint, Passenger	No

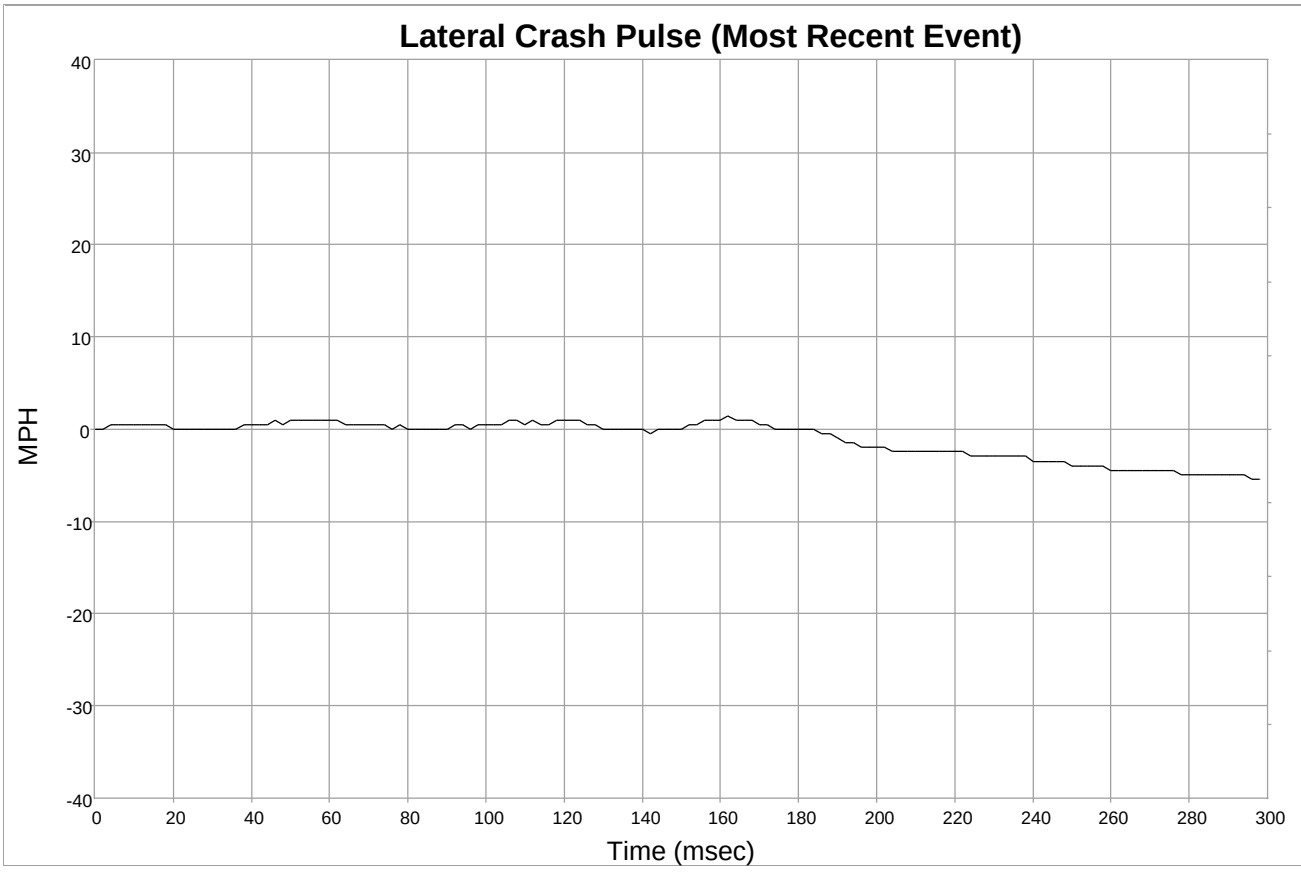
DTCs Present at Start of Event (Most Recent Event)

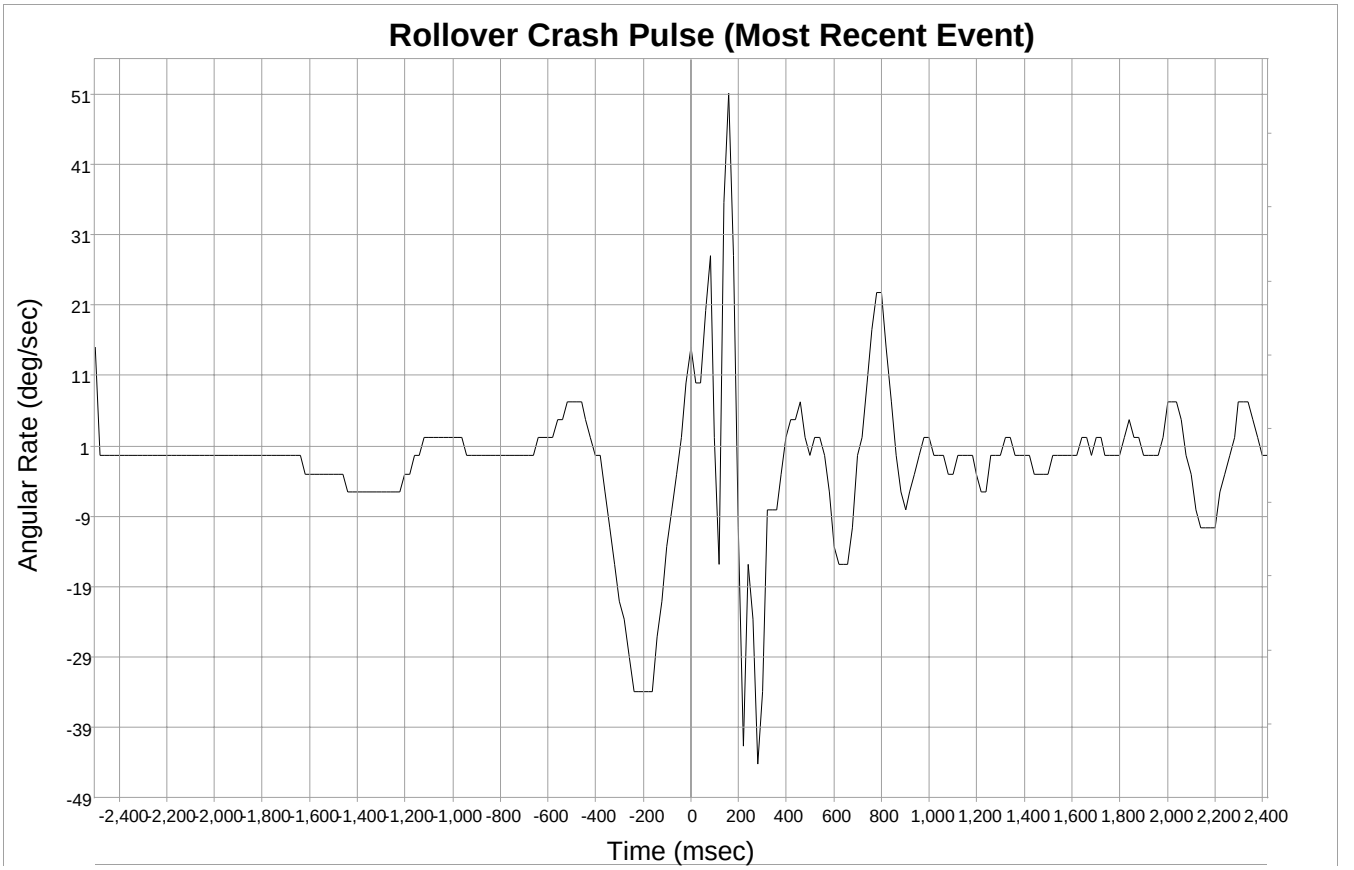
No DTCs Present

Longitudinal Crash Pulse (Most Recent Event)



Lateral Crash Pulse (Most Recent Event)




Rollover Crash Pulse (Most Recent Event)
Angular Rate (deg/sec)
51
41
31
21
11
1
-9
-19
-29
-39
-49
-2,400 -2,200 -2,000 -1,800 -1,600 -1,400 -1,200 -1,000 -800 -600 -400 -200 0 200 400 600 800 1,000 1,200 1,400 1,600 1,800 2,000 2,200 2,400
Time (msec)

Longitudinal Crash Pulse (Most Recent Event)

Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Time (msec)	Delta-V, Longitudinal (MPH [km/h])	Time (msec)	Delta-V, Longitudinal (MPH [km/h])
0	0.0 [0]	100	-11.8 [-19]	200	-47.3 [-76]
2	0.0 [0]	102	-12.8 [-21]	202	-47.8 [-77]
4	0.0 [0]	104	-12.8 [-21]	204	-48.3 [-78]
6	0.0 [0]	106	-13.3 [-21]	206	-48.3 [-78]
8	0.0 [0]	108	-13.8 [-22]	208	-48.8 [-78]
10	-0.5 [-1]	110	-14.3 [-23]	210	-48.8 [-78]
12	-0.5 [-1]	112	-14.3 [-23]	212	-49.3 [-79]
14	-0.5 [-1]	114	-14.8 [-24]	214	-49.3 [-79]
16	-1.0 [-2]	116	-15.3 [-25]	216	-49.3 [-79]
18	-1.0 [-2]	118	-16.3 [-26]	218	-49.8 [-80]
20	-1.0 [-2]	120	-16.7 [-27]	220	-49.8 [-80]
22	-1.5 [-2]	122	-17.2 [-28]	222	-49.8 [-80]
24	-2.0 [-3]	124	-18.2 [-29]	224	-49.8 [-80]
26	-2.5 [-4]	126	-18.7 [-30]	226	-50.2 [-81]
28	-2.5 [-4]	128	-19.7 [-32]	228	-50.2 [-81]
30	-3.0 [-5]	130	-20.2 [-33]	230	-50.2 [-81]
32	-3.0 [-5]	132	-21.2 [-34]	232	-50.2 [-81]
34	-3.0 [-5]	134	-21.7 [-35]	234	-50.7 [-82]
36	-3.4 [-6]	136	-22.7 [-36]	236	-50.7 [-82]
38	-3.4 [-6]	138	-23.2 [-37]	238	-50.7 [-82]
40	-3.4 [-6]	140	-24.6 [-40]	240	-50.7 [-82]
42	-3.9 [-6]	142	-25.6 [-41]	242	-50.7 [-82]
44	-3.9 [-6]	144	-26.6 [-43]	244	-51.2 [-82]
46	-4.4 [-7]	146	-27.6 [-44]	246	-51.2 [-82]
48	-4.4 [-7]	148	-28.1 [-45]	248	-51.2 [-82]
50	-4.9 [-8]	150	-28.6 [-46]	250	-51.2 [-82]
52	-4.9 [-8]	152	-29.6 [-48]	252	-51.2 [-82]
54	-5.4 [-9]	154	-30.1 [-48]	254	-51.2 [-82]
56	-5.4 [-9]	156	-30.5 [-49]	256	-51.7 [-83]
58	-5.9 [-10]	158	-31.5 [-51]	258	-51.7 [-83]
60	-5.9 [-10]	160	-32.0 [-52]	260	-51.7 [-83]
62	-6.4 [-10]	162	-33.0 [-53]	262	-51.7 [-83]
64	-6.4 [-10]	164	-33.5 [-54]	264	-51.7 [-83]
66	-6.4 [-10]	166	-34.5 [-55]	266	-51.7 [-83]
68	-6.9 [-11]	168	-35.5 [-57]	268	-51.7 [-83]
70	-7.4 [-12]	170	-36.5 [-59]	270	-51.7 [-83]
72	-7.4 [-12]	172	-37.4 [-60]	272	-51.7 [-83]
74	-7.4 [-12]	174	-38.4 [-62]	274	-51.2 [-82]
76	-7.9 [-13]	176	-39.4 [-63]	276	-51.2 [-82]
78	-7.9 [-13]	178	-40.4 [-65]	278	-51.2 [-82]
80	-8.4 [-13]	180	-41.4 [-67]	280	-51.2 [-82]
82	-8.9 [-14]	182	-42.4 [-68]	282	-51.2 [-82]
84	-8.9 [-14]	184	-43.4 [-70]	284	-51.2 [-82]
86	-9.4 [-15]	186	-43.8 [-71]	286	-51.2 [-82]
88	-9.4 [-15]	188	-44.8 [-72]	288	-51.2 [-82]
90	-9.9 [-16]	190	-45.3 [-73]	290	-51.2 [-82]
92	-10.3 [-17]	192	-45.8 [-74]	292	-50.7 [-82]
94	-10.8 [-17]	194	-46.3 [-75]	294	-50.7 [-82]
96	-11.3 [-18]	196	-46.8 [-75]	296	-50.7 [-82]
98	-11.8 [-19]	198	-47.3 [-76]	298	-50.7 [-82]

Lateral Crash Pulse (Most Recent Event)

Time (msec)	Delta-V, Lateral (MPH [km/h])	Time (msec)	Delta-V, Lateral (MPH [km/h])	Time (msec)	Delta-V, Lateral (MPH [km/h])
0	0.0 [0]	100	0.5 [1]	200	-2.0 [-3]
2	0.0 [0]	102	0.5 [1]	202	-2.0 [-3]
4	0.5 [1]	104	0.5 [1]	204	-2.5 [-4]
6	0.5 [1]	106	1.0 [2]	206	-2.5 [-4]
8	0.5 [1]	108	1.0 [2]	208	-2.5 [-4]
10	0.5 [1]	110	0.5 [1]	210	-2.5 [-4]
12	0.5 [1]	112	1.0 [2]	212	-2.5 [-4]
14	0.5 [1]	114	0.5 [1]	214	-2.5 [-4]
16	0.5 [1]	116	0.5 [1]	216	-2.5 [-4]
18	0.5 [1]	118	1.0 [2]	218	-2.5 [-4]
20	0.0 [0]	120	1.0 [2]	220	-2.5 [-4]
22	0.0 [0]	122	1.0 [2]	222	-2.5 [-4]
24	0.0 [0]	124	1.0 [2]	224	-3.0 [-5]
26	0.0 [0]	126	0.5 [1]	226	-3.0 [-5]
28	0.0 [0]	128	0.5 [1]	228	-3.0 [-5]
30	0.0 [0]	130	0.0 [0]	230	-3.0 [-5]
32	0.0 [0]	132	0.0 [0]	232	-3.0 [-5]
34	0.0 [0]	134	0.0 [0]	234	-3.0 [-5]
36	0.0 [0]	136	0.0 [0]	236	-3.0 [-5]
38	0.5 [1]	138	0.0 [0]	238	-3.0 [-5]
40	0.5 [1]	140	0.0 [0]	240	-3.4 [-6]
42	0.5 [1]	142	-0.5 [-1]	242	-3.4 [-6]
44	0.5 [1]	144	0.0 [0]	244	-3.4 [-6]
46	1.0 [2]	146	0.0 [0]	246	-3.4 [-6]
48	0.5 [1]	148	0.0 [0]	248	-3.4 [-6]
50	1.0 [2]	150	0.0 [0]	250	-3.9 [-6]
52	1.0 [2]	152	0.5 [1]	252	-3.9 [-6]
54	1.0 [2]	154	0.5 [1]	254	-3.9 [-6]
56	1.0 [2]	156	1.0 [2]	256	-3.9 [-6]
58	1.0 [2]	158	1.0 [2]	258	-3.9 [-6]
60	1.0 [2]	160	1.0 [2]	260	-4.4 [-7]
62	1.0 [2]	162	1.5 [2]	262	-4.4 [-7]
64	0.5 [1]	164	1.0 [2]	264	-4.4 [-7]
66	0.5 [1]	166	1.0 [2]	266	-4.4 [-7]
68	0.5 [1]	168	1.0 [2]	268	-4.4 [-7]
70	0.5 [1]	170	0.5 [1]	270	-4.4 [-7]
72	0.5 [1]	172	0.5 [1]	272	-4.4 [-7]
74	0.5 [1]	174	0.0 [0]	274	-4.4 [-7]
76	0.0 [0]	176	0.0 [0]	276	-4.4 [-7]
78	0.5 [1]	178	0.0 [0]	278	-4.9 [-8]
80	0.0 [0]	180	0.0 [0]	280	-4.9 [-8]
82	0.0 [0]	182	0.0 [0]	282	-4.9 [-8]
84	0.0 [0]	184	0.0 [0]	284	-4.9 [-8]
86	0.0 [0]	186	-0.5 [-1]	286	-4.9 [-8]
88	0.0 [0]	188	-0.5 [-1]	288	-4.9 [-8]
90	0.0 [0]	190	-1.0 [-2]	290	-4.9 [-8]
92	0.5 [1]	192	-1.5 [-2]	292	-4.9 [-8]
94	0.5 [1]	194	-1.5 [-2]	294	-4.9 [-8]
96	0.0 [0]	196	-2.0 [-3]	296	-5.4 [-9]
98	0.5 [1]	198	-2.0 [-3]	298	-5.4 [-9]

Rollover Crash Pulse (Most Recent Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)
-2500	15.47
-2480	0.00
-2460	0.00
-2440	0.00
-2420	0.00
-2400	0.00
-2380	0.00
-2360	0.00
-2340	0.00
-2320	0.00
-2300	0.00
-2280	0.00
-2260	0.00
-2240	0.00
-2220	0.00
-2200	0.00
-2180	0.00
-2160	0.00
-2140	0.00
-2120	0.00
-2100	0.00
-2080	0.00
-2060	0.00
-2040	0.00
-2020	0.00
-2000	0.00
-1980	0.00
-1960	0.00
-1940	0.00
-1920	0.00
-1900	0.00
-1880	0.00
-1860	0.00
-1840	0.00
-1820	0.00
-1800	0.00
-1780	0.00
-1760	0.00
-1740	0.00
-1720	0.00
-1700	0.00
-1680	0.00
-1660	0.00
-1640	0.00
-1620	-2.58
-1600	-2.58
-1580	-2.58
-1560	-2.58
-1540	-2.58
-1520	-2.58

Time (msec)	Angular Rate (deg/sec)
-1500	-2.58
-1480	-2.58
-1460	-2.58
-1440	-5.16
-1420	-5.16
-1400	-5.16
-1380	-5.16
-1360	-5.16
-1340	-5.16
-1320	-5.16
-1300	-5.16
-1280	-5.16
-1260	-5.16
-1240	-5.16
-1220	-5.16
-1200	-2.58
-1180	-2.58
-1160	0.00
-1140	0.00
-1120	2.58
-1100	2.58
-1080	2.58
-1060	2.58
-1040	2.58
-1020	2.58
-1000	2.58
-980	2.58
-960	2.58
-940	0.00
-920	0.00
-900	0.00
-880	0.00
-860	0.00
-840	0.00
-820	0.00
-800	0.00
-780	0.00
-760	0.00
-740	0.00
-720	0.00
-700	0.00
-680	0.00
-660	0.00
-640	2.58
-620	2.58
-600	2.58
-580	2.58
-560	5.16
-540	5.16
-520	7.73

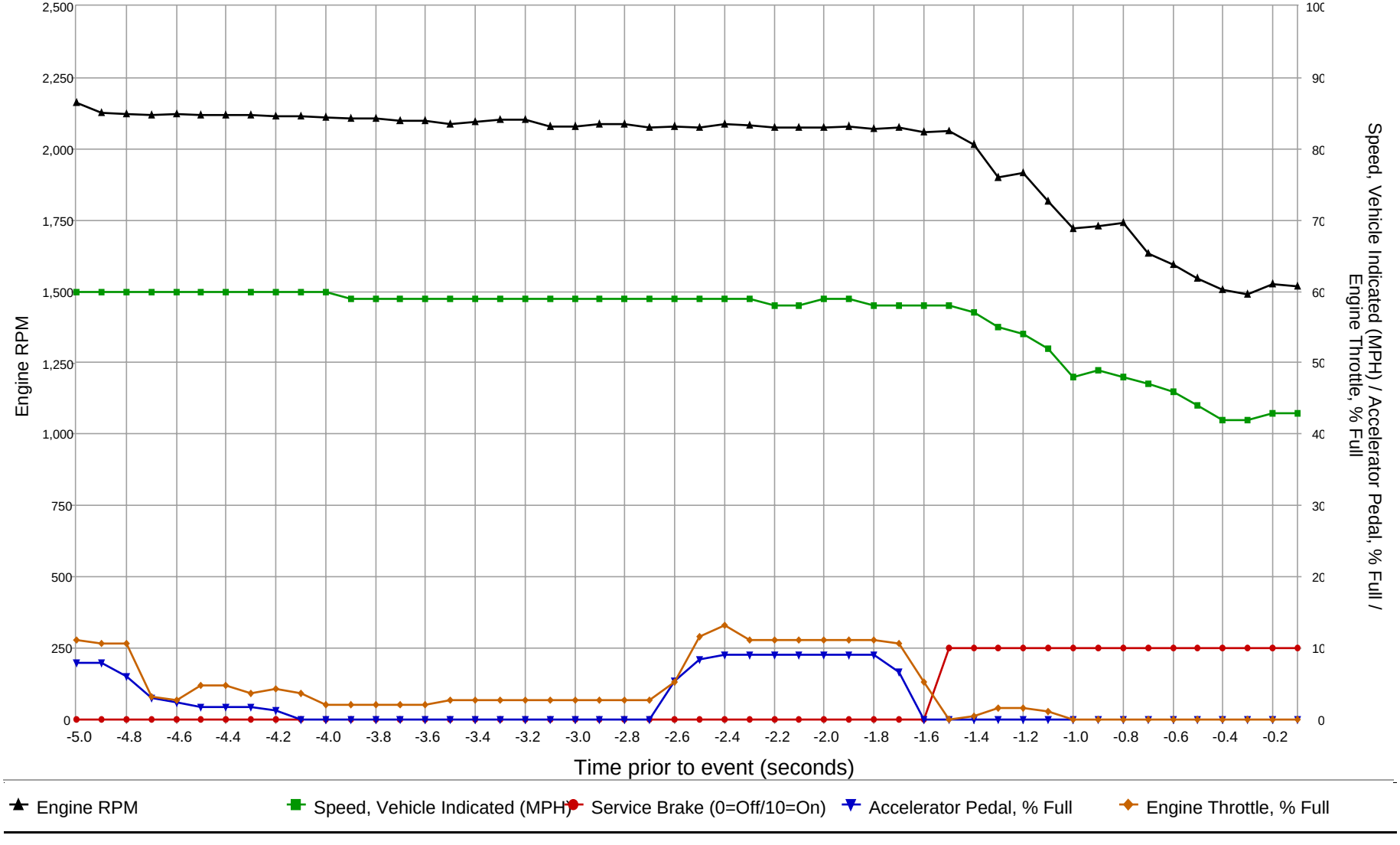
Time (msec)	Angular Rate (deg/sec)
-500	7.73
-480	7.73
-460	7.73
-440	5.16
-420	2.58
-400	0.00
-380	0.00
-360	-5.16
-340	-10.31
-320	-15.47
-300	-20.62
-280	-23.20
-260	-28.36
-240	-33.52
-220	-33.52
-200	-33.52
-180	-33.52
-160	-33.52
-140	-25.78
-120	-20.62
-100	-12.89
-80	-7.73
-60	-2.58
-40	2.58
-20	10.31
0	15.47
20	10.31
40	10.31
60	20.62
80	28.36
100	2.58
120	-15.47
140	36.09
160	51.56
180	28.36
200	-10.31
220	-41.25
240	-15.47
260	-23.20
280	-43.83
300	-33.52
320	-7.73
340	-7.73
360	-7.73
380	-2.58
400	2.58
420	5.16
440	5.16
460	7.73
480	2.58

Rollover Crash Pulse (Most Recent Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)
500	0.00
520	2.58
540	2.58
560	0.00
580	-5.16
600	-12.89
620	-15.47
640	-15.47
660	-15.47
680	-10.31
700	0.00
720	2.58
740	10.31
760	18.05
780	23.20
800	23.20
820	15.47
840	7.73
860	0.00
880	-5.16
900	-7.73
920	-5.16
940	-2.58
960	0.00
980	2.58
1000	2.58
1020	0.00
1040	0.00
1060	0.00
1080	-2.58
1100	-2.58
1120	0.00
1140	0.00
1160	0.00
1180	0.00
1200	-2.58
1220	-5.16
1240	-5.16
1260	0.00
1280	0.00
1300	0.00
1320	2.58
1340	2.58
1360	0.00
1380	0.00
1400	0.00
1420	0.00
1440	-2.58
1460	-2.58
1480	-2.58

Time (msec)	Angular Rate (deg/sec)
1500	-2.58
1520	0.00
1540	0.00
1560	0.00
1580	0.00
1600	0.00
1620	0.00
1640	2.58
1660	2.58
1680	0.00
1700	2.58
1720	2.58
1740	0.00
1760	0.00
1780	0.00
1800	0.00
1820	2.58
1840	5.16
1860	2.58
1880	2.58
1900	0.00
1920	0.00
1940	0.00
1960	0.00
1980	2.58
2000	7.73
2020	7.73
2040	7.73
2060	5.16
2080	0.00
2100	-2.58
2120	-7.73
2140	-10.31
2160	-10.31
2180	-10.31
2200	-10.31
2220	-5.16
2240	-2.58
2260	0.00
2280	2.58
2300	7.73
2320	7.73
2340	7.73
2360	5.16
2380	2.58
2400	0.00
2420	0.00

Pre-Crash Data (Most Recent Event)



SNA values will not be plotted on the graph

Pre-Crash Data (Most Recent Event - table 1 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Pre-Crash Recorder Status	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % Full	Engine Throttle, % Full	Service Brake (On, Off)	Engine RPM	ABS Activity	Stability Control
-5.0	Complete	60 [96]	8	11	Off	2,163	No	On
-4.9	Complete	60 [96]	8	11	Off	2,126	No	On
-4.8	Complete	60 [96]	6	11	Off	2,124	No	On
-4.7	Complete	60 [96]	3	3	Off	2,118	No	On
-4.6	Complete	60 [96]	2	3	Off	2,122	No	On
-4.5	Complete	60 [96]	2	5	Off	2,120	No	On
-4.4	Complete	60 [96]	2	5	Off	2,118	No	On
-4.3	Complete	60 [96]	2	4	Off	2,117	No	On
-4.2	Complete	60 [96]	1	4	Off	2,113	No	On
-4.1	Complete	60 [96]	0	4	Off	2,114	No	On
-4.0	Complete	60 [96]	0	2	Off	2,109	No	On
-3.9	Complete	59 [96]	0	2	Off	2,108	No	On
-3.8	Complete	59 [96]	0	2	Off	2,106	No	On
-3.7	Complete	59 [95]	0	2	Off	2,100	No	On
-3.6	Complete	59 [95]	0	2	Off	2,097	No	On
-3.5	Complete	59 [95]	0	3	Off	2,085	No	On
-3.4	Complete	59 [95]	0	3	Off	2,095	No	On
-3.3	Complete	59 [95]	0	3	Off	2,101	No	On
-3.2	Complete	59 [95]	0	3	Off	2,103	No	On
-3.1	Complete	59 [95]	0	3	Off	2,080	No	On
-3.0	Complete	59 [95]	0	3	Off	2,078	No	On
-2.9	Complete	59 [95]	0	3	Off	2,086	No	On
-2.8	Complete	59 [94]	0	3	Off	2,088	No	On
-2.7	Complete	59 [94]	0	3	Off	2,073	No	On
-2.6	Complete	59 [94]	5	5	Off	2,080	No	On
-2.5	Complete	59 [94]	8	12	Off	2,076	No	On
-2.4	Complete	59 [94]	9	13	Off	2,088	No	On
-2.3	Complete	59 [94]	9	11	Off	2,082	No	On
-2.2	Complete	58 [94]	9	11	Off	2,074	No	On
-2.1	Complete	58 [94]	9	11	Off	2,074	No	On
-2.0	Complete	59 [94]	9	11	Off	2,076	No	On
-1.9	Complete	59 [94]	9	11	Off	2,078	No	On
-1.8	Complete	58 [94]	9	11	Off	2,071	No	On
-1.7	Complete	58 [94]	7	11	Off	2,075	No	On
-1.6	Complete	58 [94]	0	5	Off	2,057	No	On
-1.5	Complete	58 [94]	0	0	On	2,061	No	On
-1.4	Complete	57 [92]	0	1	On	2,014	No	Engaged
-1.3	Complete	55 [88]	0	2	On	1,901	Yes	Engaged
-1.2	Complete	54 [86]	0	2	On	1,914	Yes	Engaged
-1.1	Complete	52 [83]	0	1	On	1,815	Yes	Engaged
-1.0	Complete	48 [77]	0	0	On	1,720	Yes	Engaged
-0.9	Complete	49 [79]	0	0	On	1,727	Yes	Engaged
-0.8	Complete	48 [78]	0	0	On	1,741	Yes	Engaged
-0.7	Complete	47 [75]	0	0	On	1,633	No	Off
-0.6	Complete	46 [73]	0	0	On	1,592	No	Engaged
-0.5	Complete	44 [71]	0	0	On	1,548	No	Engaged
-0.4	Complete	42 [68]	0	0	On	1,508	No	Off
-0.3	Complete	42 [67]	0	0	On	1,490	Yes	Engaged
-0.2	Complete	43 [69]	0	0	On	1,527	Yes	Engaged
-0.1	Complete	43 [69]	0	0	On	1,520	Yes	Engaged

Pre-Crash Data (Most Recent Event - table 2 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Steering Input (deg)	Raw Manifold Pressure (kPa)	PCM MIL	ESC Lamp (if equip.)	Yaw Rate (deg/sec) (if equip.)	Wheel Speed LF (RPM) (if equip.)	Wheel Speed RF (RPM) (if equip.)	Wheel Speed LR (RPM) (if equip.)	Wheel Speed RR (RPM) (if equip.)
-5.0	3	57	Off	Off	1	721	724	719	720
-4.9	3	58	Off	Off	2	721	721	718	719
-4.8	3	58	Off	Off	1	721	721	718	720
-4.7	-1	46	Off	Off	1	720	723	719	721
-4.6	-4	39	Off	Off	0	719	721	719	717
-4.5	-5	39	Off	Off	0	719	720	719	717
-4.4	-5	38	Off	Off	0	718	718	717	716
-4.3	-4	37	Off	Off	0	719	718	717	715
-4.2	-2	36	Off	Off	0	716	718	716	716
-4.1	0	34	Off	Off	0	715	718	716	714
-4.0	-1	30	Off	Off	1	716	717	715	714
-3.9	-2	28	Off	Off	0	714	715	714	714
-3.8	-3	27	Off	Off	0	714	714	714	713
-3.7	-3	27	Off	Off	0	712	714	712	713
-3.6	-4	26	Off	Off	0	712	714	713	711
-3.5	-4	26	Off	Off	0	713	712	712	709
-3.4	-4	27	Off	Off	0	711	710	710	708
-3.3	-5	27	Off	Off	0	709	711	708	709
-3.2	-5	26	Off	Off	0	708	709	709	708
-3.1	-5	26	Off	Off	0	709	709	708	706
-3.0	-5	27	Off	Off	0	707	708	707	706
-2.9	-5	27	Off	Off	0	706	706	705	705
-2.8	-5	27	Off	Off	0	706	706	705	703
-2.7	-5	27	Off	Off	0	703	705	704	704
-2.6	-5	30	Off	Off	0	703	704	704	702
-2.5	-5	50	Off	Off	0	705	704	704	701
-2.4	-5	61	Off	Off	0	705	704	703	702
-2.3	-5	62	Off	Off	0	705	704	703	702
-2.2	-5	62	Off	Off	0	703	705	702	702
-2.1	-5	63	Off	Off	0	703	704	702	703
-2.0	-6	63	Off	Off	0	704	704	703	701
-1.9	-7	63	Off	Off	0	704	704	702	700
-1.8	-7	63	Off	Off	0	703	702	702	701
-1.7	-9	63	Off	Off	0	705	703	702	700
-1.6	-28	50	Off	Off	-1	702	702	700	701
-1.5	-39	38	Off	Off	-7	703	699	704	699
-1.4	-54	34	Off	Off	-10	690	663	695	681
-1.3	-69	33	Off	Off	-13	668	644	687	637
-1.2	-62	32	Off	Off	-13	650	639	668	629
-1.1	-67	31	Off	Off	-12	645	608	653	592
-1.0	-74	29	Off	Off	-9	621	582	638	619
-0.9	-81	26	Off	Off	-8	595	595	621	598
-0.8	-105	24	Off	Off	-9	559	575	612	574
-0.7	-144	23	Off	Off	-13	577	554	601	568
-0.6	-191	22	Off	Off	-17	554	541	592	557
-0.5	-265	22	Off	Off	-19	535	524	584	552
-0.4	-303	22	Off	Off	-20	485	521	572	540
-0.3	-292	22	Off	Off	-24	517	486	570	460
-0.2	-279	23	Off	Off	-30	533	496	562	444
-0.1	-274	23	Off	Off	-40	540	508	559	414

Pre-Crash Data (Most Recent Event - table 3 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	ETC Lamp (if equip.)	ETC Lamp Flashing (if equip.)	Engine Torque Applied	PRNDL Status (if equip.)	Reverse Gear (Manual Only)
-5.0	Off	No	Yes	Drive	No
-4.9	Off	No	Yes	Drive	No
-4.8	Off	No	Yes	Drive	No
-4.7	Off	No	Yes	Drive	No
-4.6	Off	No	Yes	Drive	No
-4.5	Off	No	Yes	Drive	No
-4.4	Off	No	Yes	Drive	No
-4.3	Off	No	Yes	Drive	No
-4.2	Off	No	Yes	Drive	No
-4.1	Off	No	Yes	Drive	No
-4.0	Off	No	Yes	Drive	No
-3.9	Off	No	Yes	Drive	No
-3.8	Off	No	Yes	Drive	No
-3.7	Off	No	Yes	Drive	No
-3.6	Off	No	Yes	Drive	No
-3.5	Off	No	Yes	Drive	No
-3.4	Off	No	Yes	Drive	No
-3.3	Off	No	Yes	Drive	No
-3.2	Off	No	Yes	Drive	No
-3.1	Off	No	Yes	Drive	No
-3.0	Off	No	Yes	Drive	No
-2.9	Off	No	Yes	Drive	No
-2.8	Off	No	Yes	Drive	No
-2.7	Off	No	Yes	Drive	No
-2.6	Off	No	Yes	Drive	No
-2.5	Off	No	Yes	Drive	No
-2.4	Off	No	Yes	Drive	No
-2.3	Off	No	Yes	Drive	No
-2.2	Off	No	Yes	Drive	No
-2.1	Off	No	Yes	Drive	No
-2.0	Off	No	Yes	Drive	No
-1.9	Off	No	Yes	Drive	No
-1.8	Off	No	Yes	Drive	No
-1.7	Off	No	Yes	Drive	No
-1.6	Off	No	Yes	Drive	No
-1.5	Off	No	Yes	Drive	No
-1.4	Off	No	Yes	Drive	No
-1.3	Off	No	Yes	Drive	No
-1.2	Off	No	Yes	Drive	No
-1.1	Off	No	Yes	Drive	No
-1.0	Off	No	Yes	Drive	No
-0.9	Off	No	Yes	Drive	No
-0.8	Off	No	Yes	Drive	No
-0.7	Off	No	Yes	Drive	No
-0.6	Off	No	Yes	Drive	No
-0.5	Off	No	Yes	Drive	No
-0.4	Off	No	Yes	Drive	No
-0.3	Off	No	Yes	Drive	No
-0.2	Off	No	Yes	Drive	No
-0.1	Off	No	Yes	Drive	No

Pre-Crash Data (Most Recent Event - table 4 of 4)

(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Tire Pressure Monitor Ind. Lamp (if equip.)	Tire Pressure, LF	Tire Pressure, RF	Tire Pressure, LR	Tire Pressure, RR	Cruise Control Engaged (if equip.)	Cruise Control Status (if equip.)
-5.0	Off	37	35	36	35	Not_Engaged	Off
-4.9	Off	37	35	36	35	Not_Engaged	Off
-4.8	Off	37	35	36	35	Not_Engaged	Off
-4.7	Off	37	35	36	35	Not_Engaged	Off
-4.6	Off	37	35	36	35	Not_Engaged	Off
-4.5	Off	37	35	36	35	Not_Engaged	Off
-4.4	Off	37	35	36	35	Not_Engaged	Off
-4.3	Off	37	35	36	35	Not_Engaged	Off
-4.2	Off	37	35	36	35	Not_Engaged	Off
-4.1	Off	37	35	36	35	Not_Engaged	Off
-4.0	Off	37	35	36	35	Not_Engaged	Off
-3.9	Off	37	35	36	35	Not_Engaged	Off
-3.8	Off	37	35	36	35	Not_Engaged	Off
-3.7	Off	37	35	36	35	Not_Engaged	Off
-3.6	Off	37	35	36	35	Not_Engaged	Off
-3.5	Off	37	35	36	35	Not_Engaged	Off
-3.4	Off	37	35	36	35	Not_Engaged	Off
-3.3	Off	37	35	36	35	Not_Engaged	Off
-3.2	Off	37	35	36	35	Not_Engaged	Off
-3.1	Off	37	35	36	35	Not_Engaged	Off
-3.0	Off	37	35	36	35	Not_Engaged	Off
-2.9	Off	37	35	36	35	Not_Engaged	Off
-2.8	Off	37	35	36	35	Not_Engaged	Off
-2.7	Off	37	35	36	35	Not_Engaged	Off
-2.6	Off	37	35	36	35	Not_Engaged	Off
-2.5	Off	37	35	36	35	Not_Engaged	Off
-2.4	Off	37	35	36	35	Not_Engaged	Off
-2.3	Off	37	35	36	35	Not_Engaged	Off
-2.2	Off	37	35	36	35	Not_Engaged	Off
-2.1	Off	37	35	36	35	Not_Engaged	Off
-2.0	Off	37	35	36	35	Not_Engaged	Off
-1.9	Off	37	35	36	35	Not_Engaged	Off
-1.8	Off	37	35	36	35	Not_Engaged	Off
-1.7	Off	37	35	36	35	Not_Engaged	Off
-1.6	Off	37	35	36	35	Not_Engaged	Off
-1.5	Off	37	35	36	35	Not_Engaged	Off
-1.4	Off	37	35	36	35	Not_Engaged	Off
-1.3	Off	37	35	36	35	Not_Engaged	Off
-1.2	Off	37	35	36	35	Not_Engaged	Off
-1.1	Off	37	35	36	35	Not_Engaged	Off
-1.0	Off	37	35	36	35	Not_Engaged	Off
-0.9	Off	37	35	36	35	Not_Engaged	Off
-0.8	Off	37	35	36	35	Not_Engaged	Off
-0.7	Off	37	35	36	35	Not_Engaged	Off
-0.6	Off	37	35	36	35	Not_Engaged	Off
-0.5	Off	37	35	36	35	Not_Engaged	Off
-0.4	Off	37	35	36	35	Not_Engaged	Off
-0.3	Off	37	35	36	35	Not_Engaged	Off
-0.2	Off	37	35	36	35	Not_Engaged	Off
-0.1	Off	37	35	36	35	Not_Engaged	Off

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.

```
5A 87 03 79 41 02 FF 10 12 12 32 00 36 38 31 36 33 38 30 37 41 42

5A 88 33 43 34 50 44 43 41 42 39 48 54 2A 2A 2A 2A 2A 2A

5A 90 33 43 34 50 44 43 41 42 39 48 54 2A 2A 2A 2A 2A 2A

5A 9C 01 03 79 41 02 FF 12 32 00 30 30 31 32 33 32 30 30 41 41

61 E1 54 30 36 4A 46 32 35 31 36 32 38 33 58 52

61 EA 05 9A 02 FF C0 9F C9 07 38 00 00 00 00 00 00 00 00 00 00

61 02 F1 65 00 00 EE 5A 18 C8 F0 04 B0 C1 00 00 00 00 00 00 00

61 10 3F FF 03 18 F2

61 13 00 00 01 F1

61 30 7F 00

61 31 01 CC 01 01 33 00 00 09 01 08 6E 66 DF 00 00 00 00 18 F0 0F BE A8 5D 97 82 F5 95 1C 1C
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 48 54 2A 2A 2A 2A 2A 2A

61 32 00 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
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71 02 01 00 CC 04 05 F0 00 00 03 3C 04 5E 04 37 03 F8 70 30 00 01 00 00 00 00 00 23 DC 2E 17
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00 00 00 00 22 94 00 00 20 00 24 00 FF 37 7E FF FF 05 7D 70 00 77 00 01 CF 10 00 00 00 00 00
00 00 00 00 00 00 00 00

71 02 01 01 CC 04 05 F7 00 00 03 77 04 64 04 29 03 E0 74 1F 00 01 00 00 00 00 00 23 DC 2E 17
1D 0A 00 C4 00 00 00 00 00 25 00 00 00 23 00 00 00 23 00 0D D2 00 00 00 00 00 0F 00 00 00 00
00 00 00 00 22 86 00 00 20 00 24 00 FF 37 7E FF FF 17 7D 6F 00 75 00 01 D2 10 C8 00 00 00 00
00 00 00 00 00 00 00 00

71 02 01 02 CC 04 05 D2 00 00 03 97 04 73 04 0A 03 CC 76 73 00 01 00 00 00 00 00 23 DB 2E 17
1C 0B 00 C4 00 00 00 00 00 25 00 00 00 23 00 00 00 23 00 0D B9 00 00 00 00 00 0F 00 00 00 00
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00 00 00 00 00 00 00 00

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00 00 00 00 00 00 00 00

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71 02 02 14 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
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F6 F5 F5 F4 F4 F3 F3 F3 F2 F1 F1 F1 F0 F0 EF EE EE ED ED EC EB EA E9 E8 E8 E6 E6 E5 E4 E3 E3
E2 E1 DF DE DD DB DA D8 D7 D5 D4 D2 D1 CE CC CA C8 C7 C6 C4 C3 C2 C0 BF BD BC BA B8 B6 B4 B2
B0 AE AC AA A8 A7 A5 A4 A3 A2 A1 A0 A0 9F 9E 9E 9D 9D 9C 9C 9C 9B 9B 9B 9B 9A 9A 9A 9A 99 99
99 99 99 98 98 98 98 98 98 97 97 97 97 97 97 97 97 97 98 98 98 98 98 98 98 98 98 99 99 99 99
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E0 C1 70 E0 D1 B0 E0 D1 AD E0 9C 4E E0 9B 22 E0 9B 1A E0 9C 29 E0 9C 2D E0 9B 02 E0 9B 06 E0
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57 01 D4 14 E0 00 FF FF FF FF 02 00 00 61 FF FF FF 6F 3D 5C

57 01 C1 74 E0 00 FF FF FF FF 01 00 00 00 FF FF FF FF FF FF

57 01 C1 77 E0 00 FF FF FF FF 01 00 00 00 FF FF FF FF FF FF

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57 01 D1 B0 E0 00 FF FF FF FF 01 00 00 00 FF FF FF FF FF FF

57 01 D1 AD E0 00 FF FF FF FF 01 00 00 00 FF FF FF FF FF FF

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57 01 9B 22 E0 00 FF FF FF FF 01 00 00 00 FF FF FF FF FF FF

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57 01 9C DC 60 00 FF FF FF FF 01 00 00 00 FF FF FF FF FF FF

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DOT HS 813 402
January 2023

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

15790-010423-v4