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

16. Abstract

This report documents the on-site investigation of a crash involving a 2017 Ford E-450 Type III ambulance in a two-vehicle crash with a 2014 Dodge Grand Caravan and the subsequent rollover of the ambulance. The ambulance, crewed by a driver and two paramedics, was transporting a cardiac patient to a hospital with lights and siren activated. The crash occurred in the early afternoon in January 2019 in an urban, four-leg intersection in Michigan. The ambulance was driven by a belted 44-year-old male. The rear compartment was occupied by an unbelted 45-year-old male paramedic, an unbelted 25-year-old female paramedic, and a 79-year-old female patient restrained on a cot. The Dodge Caravan was driven by a 73-year-old female. As the vehicles entered the intersection, the ambulance was struck by the Dodge. The ambulance rotated clockwise, tripped, and then rolled one-quarter turn onto its left side. The driver sustained police-reported "A" injuries and was transported to a local hospital, where he was treated and released. The male EMT sustained "B" injuries. He was transported to a local hospital for treatment. The female EMT sustained "A" injuries. She was transported to a local trauma center, where she was hospitalized for two days. The restrained patient sustained unknown injuries and died later that day.

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Ambulance Crash Investigation
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Vehicle: 2017 Ford E-450 Type III Ambulance
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BACKGROUND

This report documents the on-site investigation of a crash involving a 2017 Ford E-450 Type III ambulance in a two-vehicle crash with a 2014 Dodge Grand Caravan and the subsequent rollover of the ambulance (**Figure 1**). The ambulance was crewed by a driver and two paramedics and was transporting a cardiac patient to a hospital with lights and siren activated. The National Highway Traffic Safety Administration's Office of Emergency Medical Services notified NHTSA's Special Crash Investigations (SCI) group about this crash. Dynamic Science, Inc. (DSI) was notified of this crash in March 2019. Permission to inspect the vehicle in this crash was obtained in April 2019 and the case was assigned on the same day. The vehicle inspections were conducted in April 2019. Attorneys and investigators were present during the inspections. The ambulance was supported by the Bosch Crash Data Retrieval (CDR) system and was imaged during the inspection. The Dodge was imaged at an earlier date by the police, and a copy of the Event Data Recorder (EDR) report was obtained in PDF format.

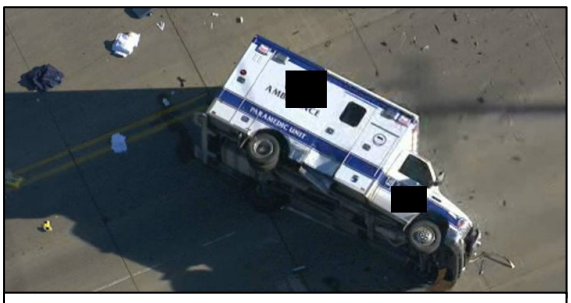


Figure 1. The ambulance at final rest (online image).

The crash occurred in the early afternoon in January 2019 in an urban, four-leg intersection in Michigan. The ambulance was traveling northbound, lights and siren activated, approaching the intersection. The ambulance was driven by a belted 44-year-old male. The rear compartment was occupied by an unbelted 45-year-old male paramedic, an unbelted 25-year-old female paramedic, and a 79-year-old female patient restrained on a cot. The Dodge Caravan was driven by a 73-year-old female. The Dodge was traveling westbound approaching the intersection. As the vehicles entered the intersection, the right plane of the ambulance was struck by the front plane of the Dodge. The ambulance rotated clockwise, tripped, and then rolled one-quarter turn onto its left side. The driver sustained police-reported "A" injuries and was transported to a local hospital where he was treated and released. The male EMT sustained "B" injuries. He was transported to a local hospital for treatment. The female EMT sustained "A" injuries. She was transported to a local trauma center, where she was hospitalized for two days. The restrained patient sustained unknown injuries and died later that day. Both vehicles were towed from the scene.

SUMMARY

Crash Site

The crash site was the intersection of an undivided north/southbound roadway and an undivided east/westbound roadway. The northbound roadway was composed of two northbound travel

lanes, a left turn lane, and two southbound travel lanes (**Figure 2**). The concrete roadway was straight and level. The westbound roadway was composed of two westbound travel lanes, a left turn lane, and a wide eastbound lane (**Figure 3**). The concrete roadway was straight and level. There were tall willow bushes in the southeast corner of the intersection obscuring the view looking south. The intersection was controlled by 3-phase overhead traffic signals. The speed limit was 80 km/h (50 mph) for both roadways.

Figure 2. Northbound approach, the ambulance.

The weather at the nearest reporting station was 12 °C (53 °F), 74 percent humidity, fair conditions, and the winds were out of the west-northwest at 11 km/h (7 mph). Crash diagrams are included at the end of this technical report.

Figure 3. Westbound approach, the 2014 Dodge Caravan.

Pre-Crash

At approximately 1240 hours, the ambulance responded to a call of a person with a cardiac arrest. It arrived on-scene at 1246 hours. Paramedics assessed the patient and determined that she was experiencing an active stroke and that she needed to be transported priority 1. She was placed into the ambulance and departed for a local hospital approximately 29 minutes prior to the crash. The ambulance, driven by a belted 44-year-old male, was traveling in the second lane from the right. The lights and siren were activated.

According to the EDR report, at 5 seconds prior to the crash the vehicle speed was 52 km/h (32.3 mph) and the service brakes were "off." The vehicle slowed as it approached the intersection and then began accelerating at 2.5 seconds prior to the crash. The traffic signal was red. The ambulances's pre-crash speeds and distances traveled are shown in the table below:

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
5	52	32.3	NA	NA	NA	NA
4.5	46	28.6	6.8	22.3	6.8	22.3
4	41	25.5	6	19.8	12.8	42.1
3.5	36	22.4	5.4	17.6	18.2	59.7
3	30	18.6	4.6	15	22.8	74.7
2.5	30	18.6	4.1	13.6	26.9	88.3

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
2	29	18	4.1	13.4	31	101.7
1.5	30	18.6	4.1	13.4	35.1	115.1
1	33	20.5	4.4	14.3	39.4	129.4
0.5	35	21.7	4.7	15.5	44.2	144.9
0	38	23.6	5.1	16.6	49.2	161.5

The Dodge, driven by a belted 73-year-old female, was initially traveling in the second lane from the right. This driver had a disability of an unknown nature. The vehicle was configured for a disabled person's use. According to the EDR, at 5 seconds prior to the crash the vehicle speed was 25 km/h (15 mph) and the service brakes were "off." The driver began changing lanes to the right. To the driver's left, there was a stopped SUV and a stopped truck tractor with a 53-foot trailer. The driver's view would have been completely blocked by the truck as she approached the intersection. Witnesses in the stopped SUV reported that they could hear the ambulance siren and observed the ambulance as it entered the intersection. The traffic signal was green for this direction of travel, according to witnesses. The Dodge's pre-crash speeds and distances traveled are shown in the table below:

Time	Vehicle Speed		Distance Traveled			
			Incremental		Cumulative	
-sec	km/h	mph	m	ft	m	ft
5	24	15	NA	NA	NA	NA
4.5	29	18	3.7	12.1	3.7	12.1
4	34	21	4.4	14.3	8	26.4
3.5	37	23	4.9	16.1	13	42.5
3	42	26	5.5	18	18.4	60.5
2.5	45	28	6	19.8	24.5	80.3
2	50	31	6.6	21.6	31.1	101.9
1.5	53	33	7.2	23.5	38.2	125.4
1	56	35	7.6	24.9	45.8	150.3
0.5	58	36	7.9	26	53.7	176.3
0	55	34	7.8	25.7	61.6	202

Crash

Both vehicles traveled into the intersection. Just prior to the crash, the driver of the Dodge braked. The front plane of the Dodge struck the right plane of the ambulance (Event 1). The ambulance was out of the scope of the WinSMASH program and the program was not run. The EDR reported a maximum longitudinal delta V of -8.91 km/h (-5.54 mph) at 300 ms and a maximum lateral delta V of -4.01 km/h (-2.49 mph) at 54 ms for the ambulance. The EDR reported a maximum longitudinal delta V of -47 km/h (-29.4 mph) at 232 ms and a maximum lateral delta V of 19 km/h (12.1 mph) at 128 ms for the Dodge. The ambulance began a clockwise rotation, rotated approximately 90 degrees, tripped, and began a left side leading rollover (Event 2). The ambulance continued rotating another 90 degrees as it struck its left plane

and came to rest on its left side facing south. The Dodge rotated clockwise approximately 85 degrees and came to rest facing north.

Post-Crash

Witnesses and passersby responded to the crash. They first checked on the driver of the Dodge and then went to the ambulance. The driver of the ambulance was ambulatory and attempting to self-extricate without success. The windshield was kicked in and the driver was helped out of the vehicle. After law enforcement arrived, the police and the driver of the ambulance began treating the rear-compartment occupants. The female EMT sustained a nasal fracture, head laceration, and multiple contusions. She was removed from the vehicle, treated for shock, and prepped for transport. Her care was then turned over to a separate ambulance crew. She was transported to a local trauma center where she was hospitalized for two days. The driver of the ambulance was instructed to stand down until he could be re-assessed. He was later transported to a local hospital, where he was treated and released. The patient was removed from the vehicle and it was determined that she did not have a pulse. A Lucas chest compression device[1] was placed on the patient. She was transported from the scene at 1310 hours and arrived at the hospital at 1337 hours. She passed away later that day. The male EMT sustained multiple contusions and pain. He was transported to a local hospital for treatment and released. Both vehicles were towed from the scene.

2017 FORD E-450 TYPE III AMBULANCE

Description

The ambulance was a 2017 Ford E-450 chassis manufactured in 2017 and identified by the Vehicle Identification Number 1FDXE4FS1HDxxxxxx. The chassis was completed during secondary manufacturing by American Emergency Vehicles (AEV) as a Type III ambulance in May 2017. The chassis was a rear-wheel drive platform powered by a 6.8-liter, 10-cylinder, gasoline engine linked to an automatic transmission. Secondary manufacturing of the vehicle consisted of installation of the patient compartment module and installation of emergency services operational equipment (warning lights, sirens, and radio communications). Completed as a Type III certified ambulance, the vehicle was configured with a forward cab and rear patient compartment equipped for the treatment of medical emergencies in a mobile environment. The ambulance was fully certified to the Commission on Accreditation of Ambulance Services (CAAS) Ground Vehicle Standard (GVS) version 1.0.

The ambulance's cab was configured for the seating of two occupants, with forward-facing pedestal seats that featured manual seat track and seat back recline adjustments integrated into the seat backs. Three-point lap and shoulder seat belts were available for manual restraint. The cab's seats were divided by a center console that integrated communications equipment and an array of switches related to the ambulance's emergency response and operational activities. In the patient compartment module was seating for up to four crew members as well as for the patient (**Figure 4**). This included a high back attendant seat at the forward plane facing rearward, a two-passenger squad bench seat on the right plane, a high back attendant seat on the left plane facing inward, and a centrally located single occupant cot attached to a Stryker cot mount. The

[1] Mechanical device manufactured by Stryker that provides continuous chest compressions for cardiac arrest patients.

rear-facing attendant seat was equipped with adjustable arm rests and a lap and shoulder belt. The attendant seats were configured with a lap and shoulder belt. The squad bench was configured with lap and shoulder belts. The patient compartment was configured with double-wide rear doors for the loading and unloading of the cot, as well as entry for the crew, and a single door at the forward aspect of the right side. The compartment length, width, and headroom were 375 cm (148.0 in), 241 cm (95.0 in), and 172 cm (68.0 in), respectively. The interior was configured with polycarbonate and laminated cabinets.

Figure 4. Patient compartment, the ambulance.

Vehicle Weight, Payload, and Tire Data

The ambulance chassis was placarded with a Gross Vehicle Weight Rating (GVWR) of 6,577 kg (14,500 lbs). This was distributed as Gross Axle Weight Ratings (GAWR) of 2,268 kg (5,000 lbs) front and 4,355 kg (9,600 lbs) rear. The vehicle curb weight was 454 kg (10,030 lbs) and the total usable payload was 1,676 kg (3,695 lbs). The loaded weight was 5,805 kg (12,800 lbs). The vehicle manufacturer's recommended tire size was LT225/75R16 with recommended cold tire pressures of 517 kPa (75 psi) for the front tires and 551 kPa (80 psi) for the rear dual tires. The vehicle was equipped with Firestone Transforce tires of the recommended size.

Figure 5. Right plane damage, the ambulance.

Exterior Damage

The ambulance sustained moderate right plane damage to the patient compartment from the impact with the Dodge (Event 1) and minor left plane damage from the rollover (Event 2).

The direct damage for the right plane impact began 30 cm (11.8 in) aft of the right rear axle and extended 198 cm (77.9 in) forward (**Figure 5**). Twenty-three measurements were taken at the sill level by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: C_1 = 1 cm (0.4 in), C_2 = 1 cm (0.4 in), C_3 = 10 cm (3.9 in), C_4 = 13 cm (5.1 in), C_5 = 35 cm (13.7 in), and C_6 = 25 cm (9.8 in). The calculated Principal Direction of Force (PDOF) was approximately 20 degrees. The maximum crush was located 150 cm (59.0 in) forward of the right rear axle. The Truck Deformation Classification (TDC) was 01RBEWA.

The direct damage to the left plane from the rollover began at the rear aspect of the patient compartment and extended 410 cm (161.4 in) forward (**Figure 6**). The damage height was 229 cm (90.1 in), which include components from the sill to the roof. There was no damage to the vehicle chassis. The TDC was 00LBAOA.

Event Data Recorder

The ambulance was equipped with a Restraint Control Module (RCM) that had EDR capability to store deployment and non-deployment events. The data from events which do not qualify as deployable events can be overwritten by subsequent events. The RCM can store up to two deployment events. Both types of events can contain pre-crash and crash data. For the pre-crash data, there is a 5-second buffer that records Vehicle Speed, Accelerator pedal percentage, Engine RPM, Service Brake, ABS activity, traction control via brakes, and traction control via engine.

The data from the ambulance's EDR was imaged using the Bosch Crash Data Retrieval Tool version 18.0.2 by going through the DLC with vehicle power, and the data was reported using version 19.5. One unlocked event was recovered.

The event resulted from the impact with the Dodge. The maximum longitudinal delta V was -8.91 km/h (-5.54 mph). The maximum lateral delta V was -4.01 km/h (-2.49 mph). The Bosch CDR report is included at the end of this as **Appendix A** and the EDR-reported data was summarized as follows:

At -5.0 to -3.0 seconds, the driver was braking and the vehicle slowed from 52 km/h (32.3 mph) to 30 km/h (18.6 mph). From -2.5 to 0 seconds, the accelerator pedal percentage rose from 0 to 99 percent and the vehicle accelerated from 29 km/h (18 mph) to 38 km/h (23.6 mph) at impact.

Figure 6. Left plane damage, the ambulance.

Figure 7. Right patient compartment intrusion, the ambulance.

Interior Damage

The ambulance sustained moderate interior damage from intrusion, occupant contacts, and post-crash extrication efforts.

The front windshield was damaged during the driver's extrication. The side windows were undamaged. Both front doors remained closed and operational. There was no intrusion to the front cab.

The patient compartment sustained right plane intrusion from the impact with the Dodge. The lateral intrusion measured 18 cm (7.0 in) and was located at the base of the right compartment

door (**Figure 7**). The right bench seat cushions were displaced laterally. The right door was jammed. The rear compartment doors remained closed and operational. There were blood deposits and hair located along the left wall and cabinetry.

Manual Restraint Systems

The front row was equipped with driver and front right passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and an adjustable upper anchor that was adjusted to the full down position. There was evidence of historical usage but no loading evidence. The EDR reported the seat belt status for the driver as "Driver Buckled." The bench seat and the inner-facing/rear- facing captain's chairs were equipped with four-point seat belts that were not used in this crash.

Supplemental Restraint Systems

The ambulance's Supplemental Restraint Systems included an RCM, driver's and passenger's frontal air bags, and front row seat belt retractor pretensioners. There were no air bag deployments or seat belt pretensioner actuations.

Rollover Mitigation

There are no specific rollover ratings for this vehicle. The ambulance was equipped with 4-wheel disc brakes with ABS, traction control, and power steering. The loss of control that led to the rollover was the result of crash forces during the impact with the Dodge, causing the vehicle to rotate rapidly clockwise approximately 90 degrees, trip, and then roll over left-side-leading. The ambulance continued rotating approximately 90 degrees as it struck its left plane and came to rest on its left side facing south (**Figure 8**).

Patient Cot

The patient cot was a Power-Pro XT ambulance cot manufactured by Stryker (**Figure 9**). The X-frame supporting the mattress platform featured power height adjustment capabilities and the mattress platform featured 0-73 degrees of

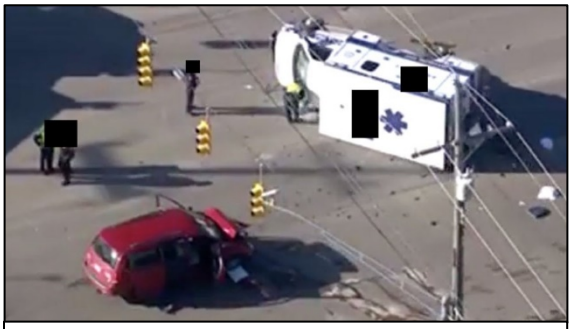


Figure 8. Ambulance at final rest (on-line image).

Figure 9. Rugged Power-Pro XT ambulance cot.

Figure 10. Stryker 6392 Performance-Load floor-mount cot fastener.

backrest articulation. Its length was 203 cm (79.9 in) and the width was 58 cm (22.8 in). The cot (minus mattress and restraints) weighed 40 kg (89 lbs) and had a maximum weight capacity of 318 kg (700 lbs). The serial number for the cot was 121xxxxxx. The cot was secured in place in the passenger compartment via a Stryker 6392 Performance-Load floor-mount cot fastener system (**Figure 10**). The cot was equipped with three lap and one torso cot restraints.

Figure 11. Ambulance cot damage.

The cot remained anchored to the patient compartment floor throughout the crash sequence. Since the time of the crash, the cot was loaded and unloaded several times and was fully functional. The cot sustained minor damage to the left arm during the rollover (**Figure 11**). It appears that the EMT contacted and fractured the arm as she pitched to the left side of the vehicle.

AMBULANCE OCCUPANTS

Driver Demographics

Age/sex:	44 year/male
Height:	188 cm (74 in)
Weight:	127 kg (280 lbs)
Eyewear:	Unknown
Seat type:	Pedestal seat
Seat track position:	Unknown track position
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection and EDR report
Air bags:	Driver's air bag available, did not deploy
Alcohol/drug data:	None
Egress from vehicle:	Assisted from vehicle by passersby and police
Transport from scene:	Ambulance to a local hospital
Type of medical treatment:	Treated and released

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Headache	110009.1	Left side window	Probable

Source: emergency room records.

Driver Kinematics

The 44-year-old driver was seated in an unknown posture. He was using the lap and shoulder seat belt. At impact with the Dodge, the driver was displaced slightly toward the front and right. During the left leading rollover, he was displaced to the left and probably contacted the left side window.

The driver complained of pain (pain scale 6 out of 10) to his back and head. After being extricated, he assisted in the treatment of other passengers. He was assessed on site and transported to a local hospital for evaluation and possible treatment. He did not sustain any visible injuries but did report a minor headache. He was discharged approximately three hours after being assessed.

Rear Compartment EMT Demographics

Age/sex:	45 years/male
Height:	178 cm (70 in)
Weight:	95 kg (209 lbs)
Eyewear:	Unknown
Seat type:	Rear-facing captain's chair
Manual restraint usage:	4-point seat belt available, not used
Usage source:	Police report, vehicle inspection
Air bags:	None available
Alcohol/drug data:	None
Egress from vehicle:	Exited with some assistance
Transport from scene:	Ambulance
Type of medical treatment:	Transported and released

Rear Compartment EMT Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Concussion with no loss of consciousness	161001.2	Seat back	Probable
2	Contusion, chest	410402.1	Left side cabinetry	Possible

Source: ER records, radiology, discharge summary.

Rear Compartment EMT Kinematics

This occupant was seated in the rear-facing captain's chair in the patient compartment and was not using the 4-point seat belt. At impact with the Dodge, he was displaced forward and slightly to his left into the seat back in response to the 1 o'clock direction of force. During the rotation and subsequent rollover, he was displaced to the left and probably contacted the left side surface.

Rear Compartment EMT Demographics

Age/sex:	25 years/female
Height:	168 cm (66 in)
Weight:	74 kg (163 lbs)
Eyewear:	Unknown
Seat type:	Bench
Manual restraint usage:	4-point seat belt available, not used
Usage source:	Vehicle inspection, police report
Air bags:	None available
Alcohol/drug data:	None

Egress from vehicle: Extricated by EMS
Transport from scene: Ambulance
Type of medical treatment: Hospitalized for two days

Rear Compartment EMT Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Bilateral comminuted open nasal fracture	251002.2	Left side cabinetry	Certain
2	Head laceration, right side forehead to mid scalp, 8 in.	210604.2	Left side cabinetry	Certain
3	Left shoulder contusion	710402.1	Left side cabinetry	Probable
4	Forehead contusions	210402.1	Left side cabinetry	Probable
	Bilateral periorbital edema			

Source: ER records, radiology, discharge summary.

Rear Compartment EMT Kinematics

The 25-year-old female rear compartment EMT was seated on the right inner-facing bench seat and was not using the available seat belt. She was actively treating the patient on the center cot. At impact with the Dodge, she was displaced to the right into seat back. During the clockwise rotation and subsequent rollover, she was displaced to the left. She contacted and fractured the left arm of the ambulance cot with her legs/torso. She continued to the left and contacted the left side surface/cabinetry with her head. She was initially treated the other EMT. She was extricated and then transported to a local hospital for treatment and admission.

Patient Demographics

Age/sex: 79 years/female
Height: Unknown
Weight: Unknown
Eyewear: Unknown
Seat type: Immobilized longitudinally on cot
Seat track position: N/A
Manual restraint usage: Lap/torso restraints used on cot
Usage source: Police report
Air bags: None available
Alcohol/drug data: Unknown
Egress from vehicle: Removed by emergency personnel
Transport from scene: Ambulance
Type of medical treatment: Hospitalized and then passed away later that day

Patient Injuries
The 79-year-old female patient was suffering from a cardiac event prior to the crash. It is not known if she sustained any crash-related injuries. An autopsy was not conducted and efforts to obtain her hospital records were unsuccessful.

Patient Kinematics
The female patient was lying supine on the ambulance cot and was restrained by the cot restraints. She remained restrained throughout the crash events. The cot remained attached to the vehicle.

2014 DODGE GRAND CARAVAN

Description
The 2014 Dodge Grand Caravan was identified by the VIN 2C4RDGCG9ERxxxxxx. The Dodge was equipped with a 3.6-liter, 6-cylinder, flex fuel engine; an automatic transmission; and front wheel drive. The vehicle had been configured for use by disabled people. The vehicle had been altered by the Braun Corporation in February 2014 for side entry wheelchair entry and travel.

Figure 12. Frontal damage, the 2014 Dodge Grand Caravan.

Exterior Damage
The Dodge sustained moderate front plane damage from the impact to the right side of the ambulance (**Figure 12**). The direct contact extended from bumper corner to bumper corner. Twelve measurements were taken at the bumper backing bar level by the Nikon Total Station and the Faro Blitz program computed crush measurement in six increments as follows: C_1 = 8 cm (3.1 in), C_2 = 23 cm (9.0 in), C_3 = 27 cm (10.6 in), C_4 = 18 cm (7.0 in), C_5 = 10 cm (3.9 in), and C_6 = 0 cm. The calculated PDOF was 340 degrees. The Collision Deformation Classification (CDC) was 11FDEW2.

Event Data Recorder
The Dodge was equipped with an air bag control module that had EDR capability to store deployment and non-deployment events. The RCM can store up to three events. All the events can contain pre-crash and crash data. For the pre-crash data, there is a 5-second buffer that records vehicle speed, Accelerator pedal percentage, engine rpm, engine throttle percentage, manifold pressure, service brake, brake lamp status, stability control, steering input, and yaw rate. The data from the Dodge's EDR was imaged using the Bosch Crash Data Retrieval Tool version 17.8 by the police and reported using version 17.10. One deployment event was recovered.

The event resulted from the impact with the ambulance. The maximum longitudinal delta V was -47 km/h (-29.4 mph). The maximum lateral delta V was 19 km/h (12.1 mph). The Bosch CDR report is included at the end of this as **Appendix B** and the EDR-reported data not discussed elsewhere in this report was summarized on the next page.

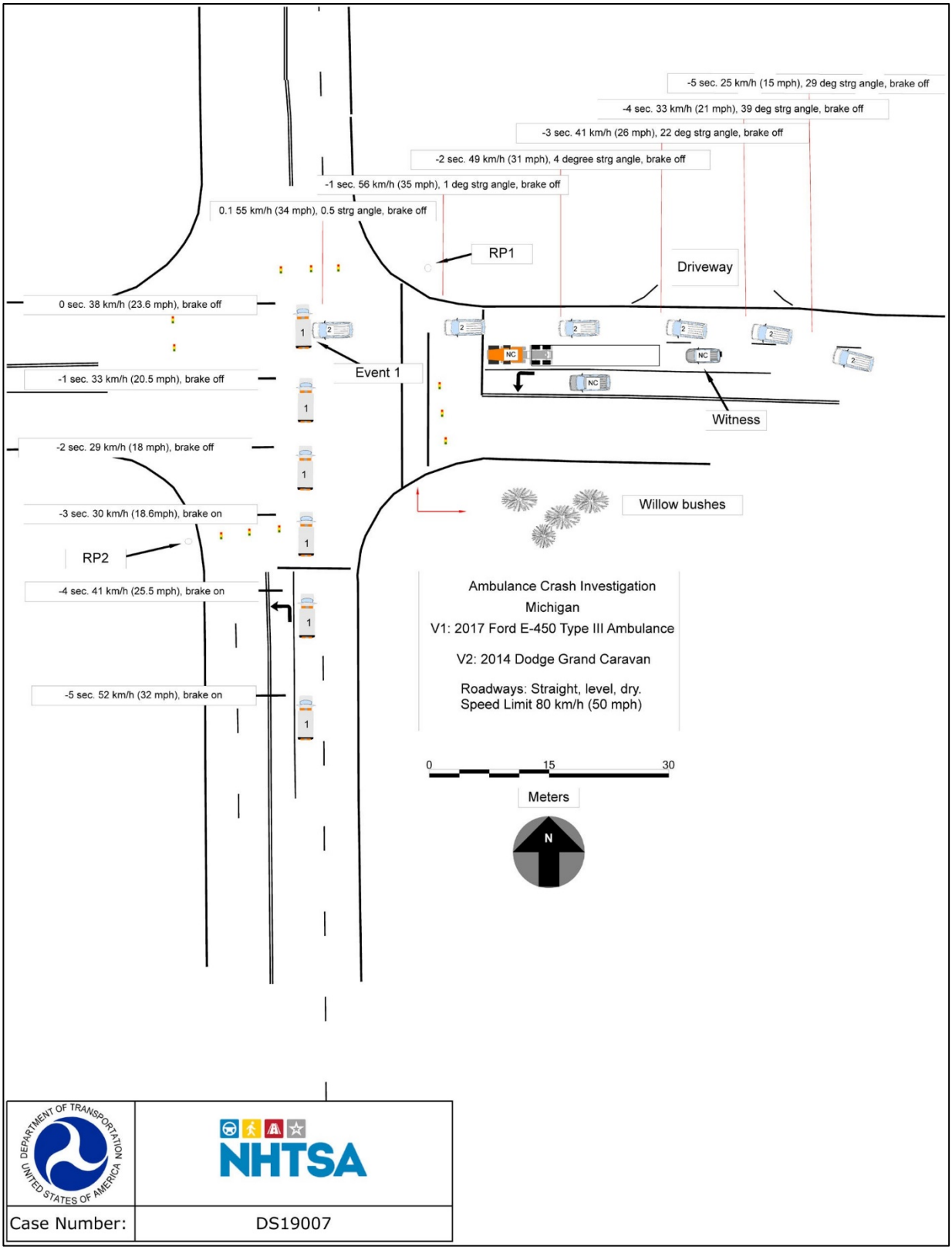
The pre-crash data at EDR Time "0.1" was as follows:

Vehicle speed:	55 km/h (34 mph)
Accelerator pedal:	0
Engine rpm:	2,941
Engine throttle:	8 percent
Service brake:	On
Brake lamp on:	Brake on
Stability control:	9 degrees
Yaw rate (deg/sec)	0.49

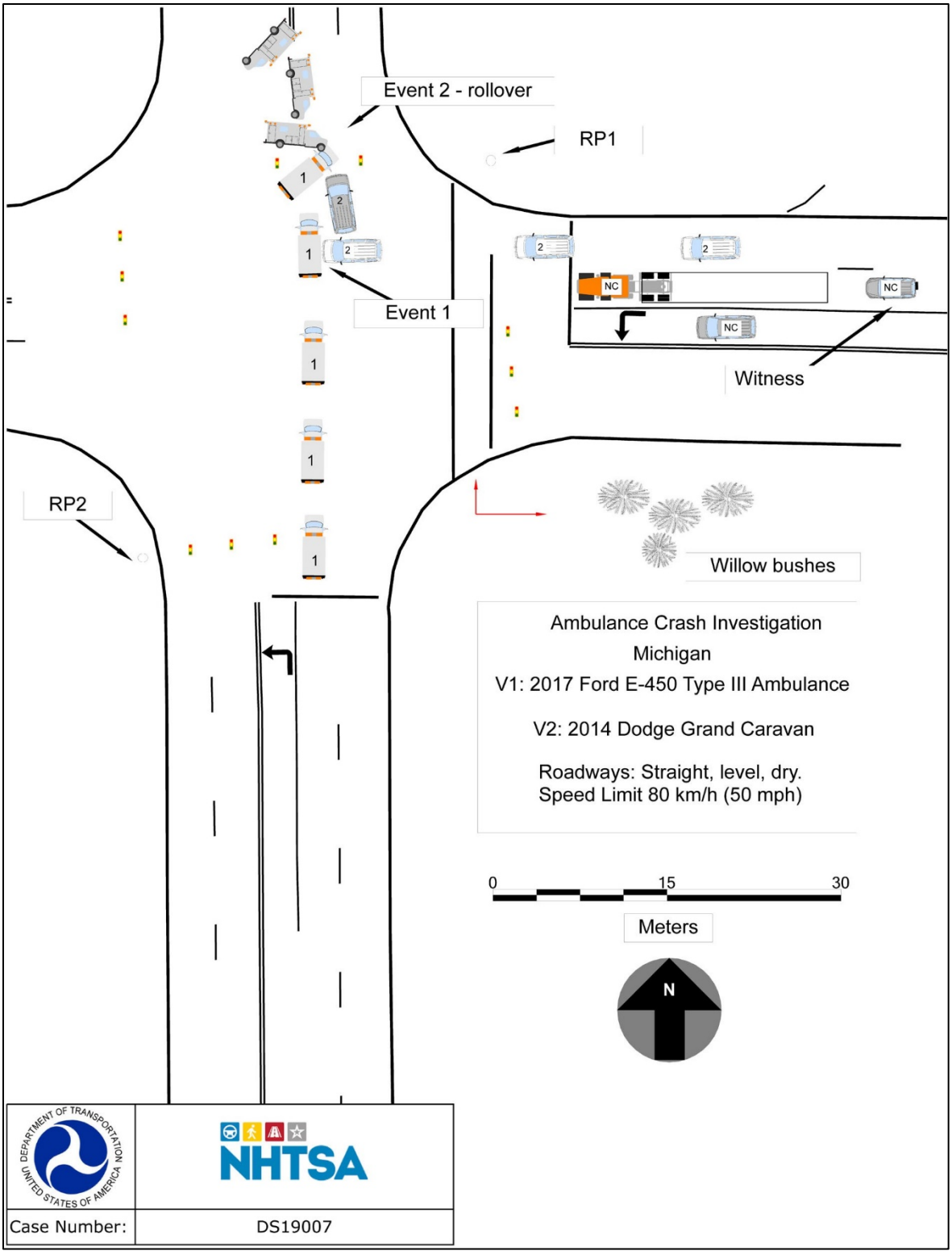
Occupant Data

The Dodge was driven by a belted 73-year-old female. She was reported to have a physical disability of an unknown nature. She sustained a fractured right ankle during the crash and was transported by ambulance to local hospital for treatment. It is unknown if she was hospitalized.

Crash Diagram



Crash Diagram: A Detailed View



APPENDIX A: Event Data Recorder Report for 2017 Ford E-450 Type III Ambulance [2]

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

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

CDR File Information

User Entered VIN	1FDXE4FS1HD******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	DS19007_V1_ACM.CDRX
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 18.0.2
Imaged with Software Licensed to (Company Name)	Company Name information was removed when this file was saved without VIN sequence number
Reported with CDR version	Crash Data Retrieval Tool 19.5
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
ACM Adapter Detected During Download	No
Event(s) recovered	unlocked event

Comments

No comments entered.

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a court order or search warrant, as indicated by the CDR tool user on .

Data Limitations

Restraints Control Module Recorded Crash Events:
Deployment Events cannot be overwritten or cleared from the Restraints Control Module (RCM). Once the RCM has deployed any airbag device, the RCM must be replaced. The data from events which did not qualify as deployable events can be overwritten by subsequent events. The RCM can store up to two deployment events.

Airbag Module Data Limitations:

- Restraints Control Module Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced from the point of algorithm wake up. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately five seconds prior to algorithm wake up. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change.
- Event Recording Complete will indicate if data from the recorded event has been fully written to the RCM memory or if it has been interrupted and not fully written.
- If power to the Airbag Module is lost during a crash event, all or part of the crash record may not be recorded.
- For 2011 Ford Mustangs, the Steering Wheel Angle parameter indicates the change in steering wheel angle from the previously recorded sample value and does not represent the actual steering wheel position.

Airbag Module Data Sources:

- Event recorded data are collected either INTERNALLY or EXTERNALLY to the RCM.

  - INTERNAL DATA is measured, calculated, and stored internally, sensors external to the RCM include the following:
    > The Driver and Passenger Belt Switch Circuits are wired directly to the RCM.
    > The Driver's Seat Track Position Switch Circuit is wired directly to the RCM.
    > The Side Impact Sensors (if equipped) are located on the side of vehicle and are wired directly to the RCM.
    > The Occupant Classification Sensor is located in the front passenger seat and transmits data directly to the RCM on high-speed CAN bus.
    > Front Impact Sensors (right and left) are located at the front of vehicle and are wire directly to the RCM.

  - EXTERNAL DATA recorded by the RCM are data collected from the vehicle communication network from various sources such as Powertrain Control Module, Brake Module, etc.

02007_RCM-RC6_r002

System Status at Time of Retrieval

VIN as programmed into RCM at factory	1FDXE4FS1HD******
Current VIN from PCM	1FDXE4FS1HD******
Ignition cycle, download (first record)	1,973
Ignition cycle, download (second record)	N/A
Restraints Control Module Part Number	BC24-14B321-BD
Restraints Control Module Serial Number	9182420400000000
Restraints Control Module Software Part Number (Version)	BL84-14C028-AB
Left/Center Frontal Restraints Sensor Serial Number	1D5CF19D
Left Side Restraint Sensor 1 Serial Number	00000000
Left Side Restraint Sensor 2 Serial Number	00000000
Right Frontal Restraints Sensor Serial Number	00000000
Right Side Restraint Sensor 1 Serial Number	00000000
Right Side Restraints Sensor 2 Serial Number	00000000

System Status at Event (First Record)

Recording Status	Unlocked Record
Complete file recorded (yes,no)	Yes
Multi-event, number of events (1,2)	1
Time from event 1 to 2 (msec)	N/A
Lifetime Operating Timer at event time zero (seconds)	17,668,950
Key-on Timer at event time zero (seconds)	16,985
Vehicle voltage at time zero (Volts)	13.851
Energy Reserve Mode entered during event (Y/N)	No

Faults Present at Start of Event (First Record)

No Faults Recorded

Deployment Data (First Record)

Maximum delta-V, longitudinal (MPH [km/h])	-5.54 [-8.91]
Time, maximum delta-V longitudinal (msec)	300
Maximum delta-V, lateral (MPH [km/h])	-2.49 [-4.01]
Time, maximum delta-V lateral (msec)	54
Longitudinal Delta-V Time Zero Offset	3.0 ms
Lateral Delta-V Time Zero Offset	3.0 ms

Pre-Crash Data -1 sec (First Record)

Ignition cycle, crash	1,965
Frontal air bag warning lamp, on/off	Off
Frontal air bag suppression switch status, front passenger	Not Active
Safety belt status, driver	Driver Buckled
Brake Telltale	Off
ABS Telltale	Off
Stability Control Telltale	Off
Speed Control Telltale	Off
Powertrain Wrench Telltale	Off
Powertrain Malfunction Indicator Lamp (MIL)Telltale	Off

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

Times (sec)	Speed vehicle indicated MPH [km/h]	Accelerator pedal, % full	Service brake, on/off	Engine RPM	ABS activity (engaged, non-engaged)	Stability control (engaged, non-engaged)	Traction Control via Brakes (engaged, non-engaged)	Traction Control via Engine (engaged, non-engaged)
- 5.0	32.3 [52.0]	0	On	1,100	non-engaged	non-engaged	non-engaged	non-engaged
- 4.5	28.6 [46.0]	0	On	1,000	non-engaged	non-engaged	non-engaged	non-engaged
- 4.0	25.5 [41.0]	0	On	1,000	non-engaged	non-engaged	non-engaged	non-engaged
- 3.5	22.4 [36.0]	0	On	900	non-engaged	non-engaged	non-engaged	non-engaged
- 3.0	18.6 [30.0]	0	On	700	non-engaged	non-engaged	non-engaged	non-engaged
- 2.5	18.6 [30.0]	53	Off	700	non-engaged	non-engaged	non-engaged	non-engaged
- 2.0	18.0 [29.0]	76	Off	1,500	non-engaged	non-engaged	non-engaged	non-engaged
- 1.5	18.6 [30.0]	90	Off	2,000	non-engaged	non-engaged	non-engaged	non-engaged
- 1.0	20.5 [33.0]	94	Off	2,300	non-engaged	non-engaged	non-engaged	non-engaged
- 0.5	21.7 [35.0]	95	Off	2,400	non-engaged	non-engaged	non-engaged	non-engaged
0.0	23.6 [38.0]	99	Off	2,400	non-engaged	non-engaged	non-engaged	non-engaged

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

Times (sec)	Steering Wheel Angle (degrees)
- 5.0	Invalid
- 4.9	Invalid
- 4.8	Invalid
- 4.7	Invalid
- 4.6	Invalid
- 4.5	Invalid
- 4.4	Invalid
- 4.3	Invalid
- 4.2	Invalid
- 4.1	Invalid
- 4.0	Invalid
- 3.9	Invalid
- 3.8	Invalid
- 3.7	Invalid
- 3.6	Invalid
- 3.5	Invalid
- 3.4	Invalid
- 3.3	Invalid
- 3.2	Invalid
- 3.1	Invalid
- 3.0	Invalid
- 2.9	Invalid
- 2.8	Invalid
- 2.7	Invalid
- 2.6	Invalid
- 2.5	Invalid
- 2.4	Invalid
- 2.3	Invalid
- 2.2	Invalid
- 2.1	Invalid
- 2.0	Invalid
- 1.9	Invalid
- 1.8	Invalid
- 1.7	Invalid
- 1.6	Invalid
- 1.5	Invalid
- 1.4	Invalid
- 1.3	Invalid
- 1.2	Invalid
- 1.1	Invalid
- 1.0	Invalid
- 0.9	Invalid
- 0.8	Invalid
- 0.7	Invalid
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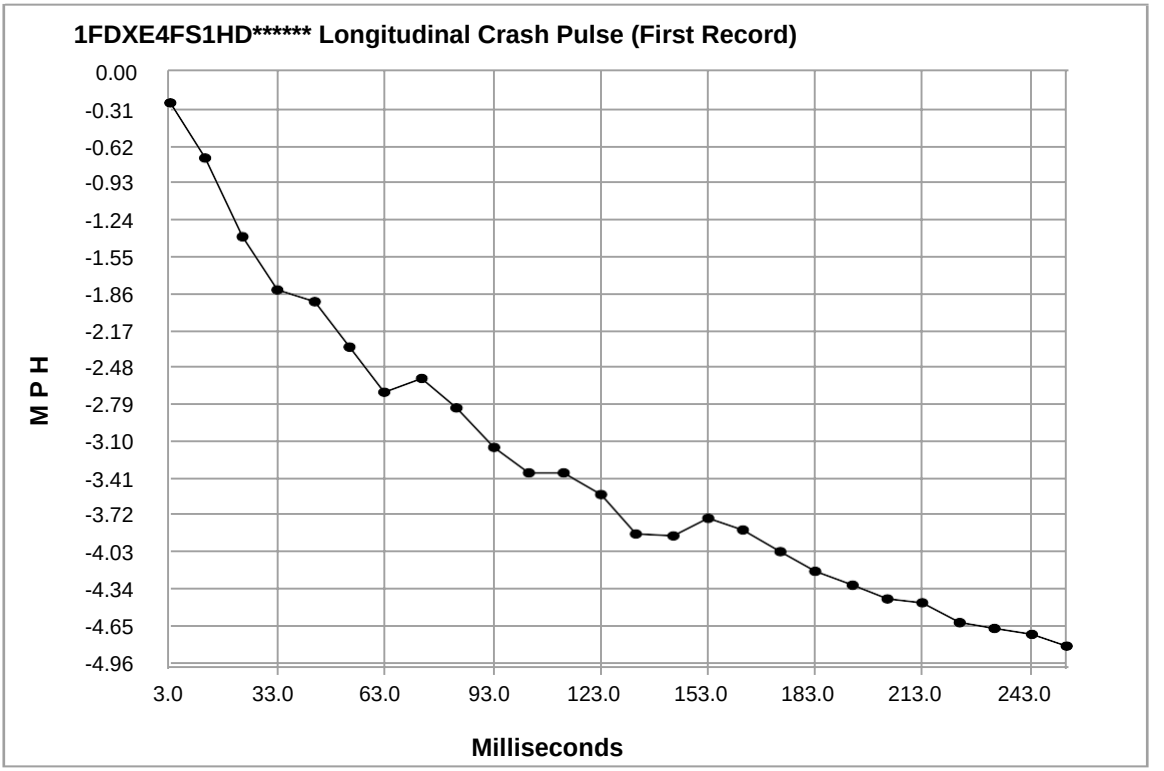
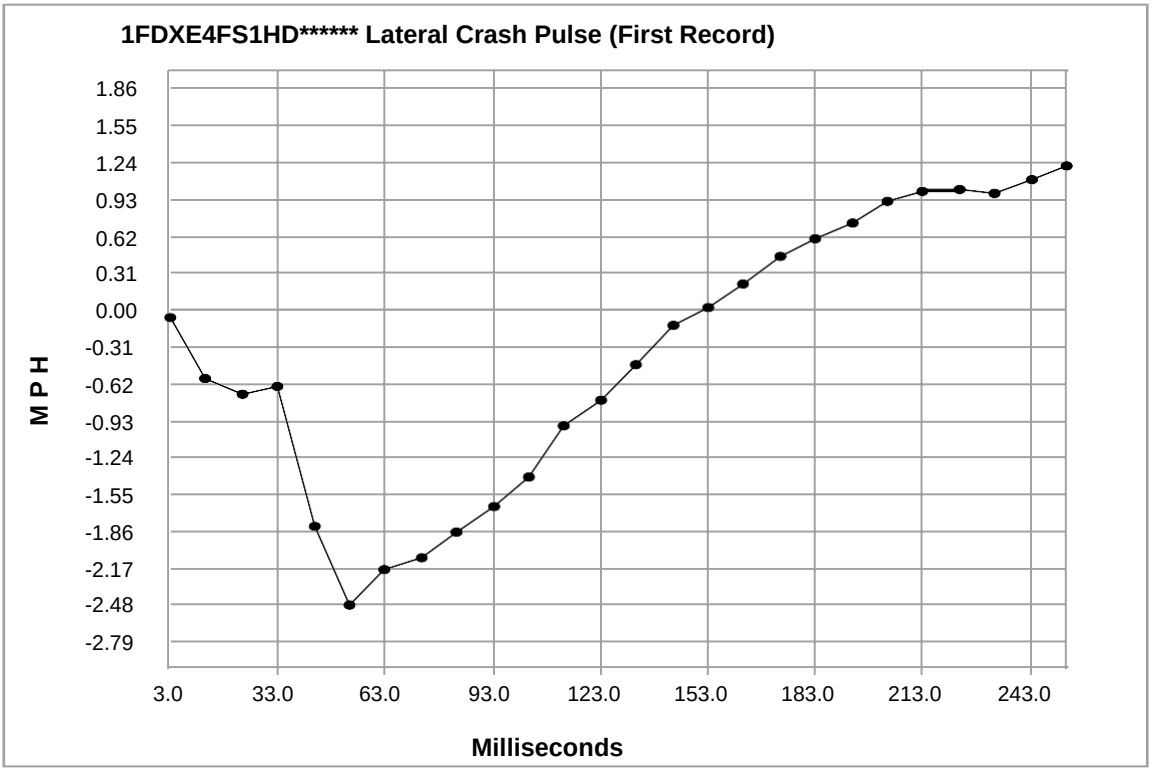
- 0.5	Invalid
- 0.4	Invalid
- 0.3	Invalid
- 0.2	Invalid
- 0.1	Invalid
0.0	Invalid



Longitudinal Crash Pulse (First Record)

Time (msec)	Delta-V, longitudinal (MPH)	Delta-V, longitudinal (km/h)
3.0	-0.27	-0.44
13.0	-0.73	-1.17
23.0	-1.39	-2.24
33.0	-1.82	-2.94
43.0	-1.93	-3.11
53.0	-2.31	-3.72
63.0	-2.68	-4.32
73.0	-2.58	-4.16
83.0	-2.82	-4.55
93.0	-3.16	-5.08
103.0	-3.37	-5.43
113.0	-3.37	-5.42
123.0	-3.55	-5.71
133.0	-3.89	-6.25
143.0	-3.89	-6.26
153.0	-3.74	-6.02
163.0	-3.84	-6.18
173.0	-4.02	-6.47
183.0	-4.19	-6.74
193.0	-4.31	-6.93
203.0	-4.42	-7.12
213.0	-4.45	-7.17
223.0	-4.62	-7.44
233.0	-4.67	-7.51
243.0	-4.72	-7.60
253.0	-4.82	-7.76



Lateral Crash Pulse (First Record)

Time (msec)	Delta-V, lateral (MPH)	Delta-V, lateral (km/h)
3.0	-0.06	-0.10
13.0	-0.57	-0.92
23.0	-0.71	-1.14
33.0	-0.65	-1.04
43.0	-1.80	-2.90
53.0	-2.47	-3.97
63.0	-2.18	-3.51
73.0	-2.07	-3.33
83.0	-1.85	-2.98
93.0	-1.64	-2.64
103.0	-1.40	-2.25
113.0	-0.98	-1.57
123.0	-0.76	-1.22
133.0	-0.46	-0.74
143.0	-0.13	-0.21
153.0	0.01	0.02
163.0	0.22	0.36
173.0	0.44	0.71
183.0	0.60	0.97
193.0	0.73	1.18
203.0	0.90	1.45
213.0	0.99	1.60
223.0	1.02	1.63
233.0	0.98	1.58
243.0	1.09	1.75
253.0	1.21	1.95

Hexadecimal Data

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

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42 4C 38 34 2D 31 34 43 30 32 38 2D 41 42 00 00 00 00 00 00 00 00 00 00

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31 46 44 58 45 34 46 53 31 48 44 2A 2A 2A 2A 2A 2A

31 46 44 58 45 34 46 53 31 48 44 2A 2A 2A 2A 2A 2A 00 00 00 00 00 00 00
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BOSCH CDR CRASH DATA RETRIEVAL

Event Record 1


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D0 A4 02 01 1B A6 02 01 C2 A5 02 01 9A A6 02 01 C2 A7 02 01 83 A8 02 01 7F A8 02 01
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C1 AB 02 01 2A AC 02 01 45 AC 02 01 DA AC 02 01 03 AD 02 01 33 AD 02 01 8E AD 02 01
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FB EA FC FE BD EB FC FE 78 EC FC FE 51 ED FC FE CA EE FC FE 8C EF FC FE 97 F0 FC FE
BC F1 FC FE 3B F2 FC FE F5 F2 FC FE BA F3 FC FE 48 F4 FC FE BD F4 FC FE 53 F5 FC FE
A2 F5 FC FE B7 F5 FC FE 9B F5 FC FE F9 F5 FC FE 68 F6 FC FE 00 00 00 00 00 00 00 00
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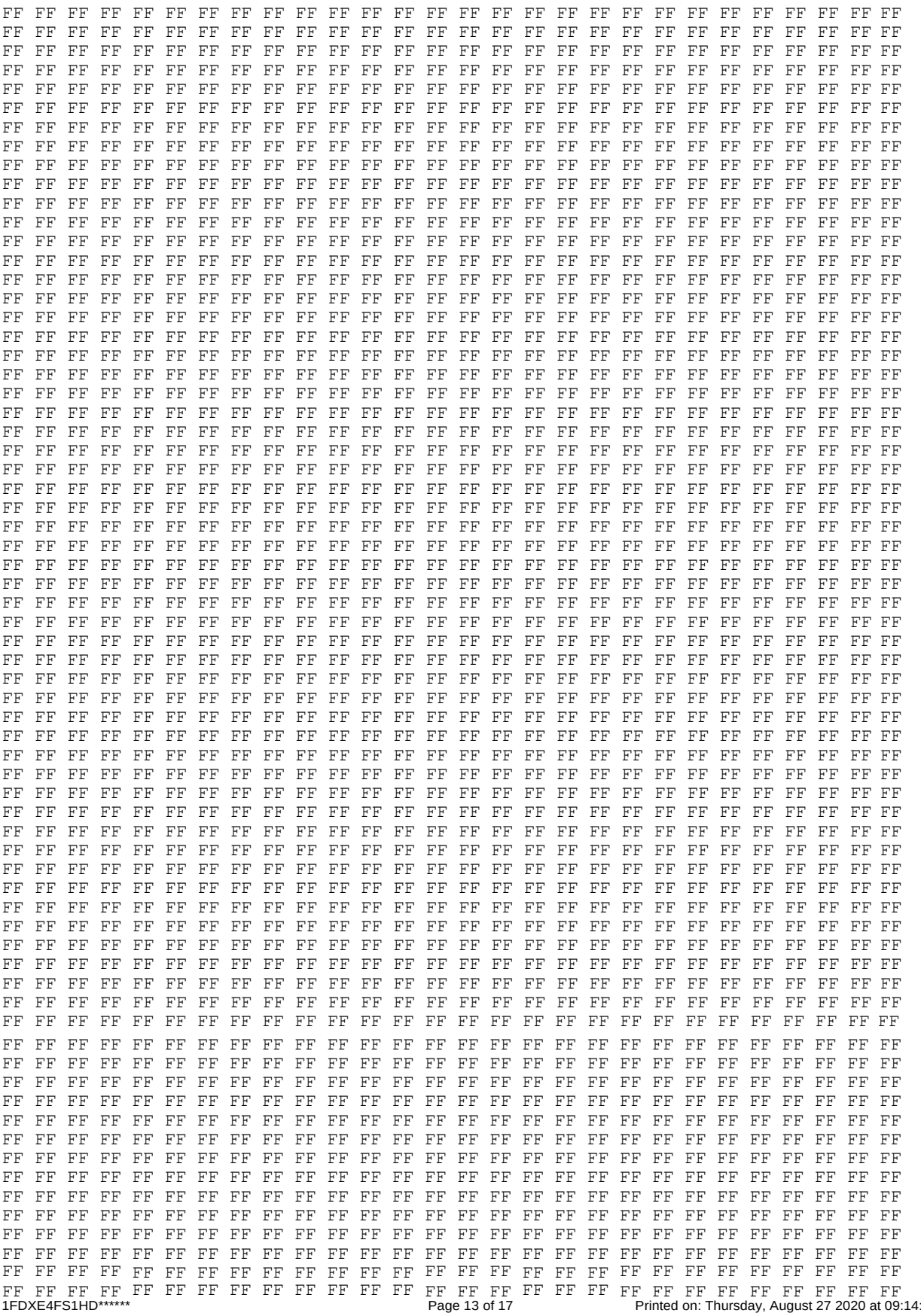

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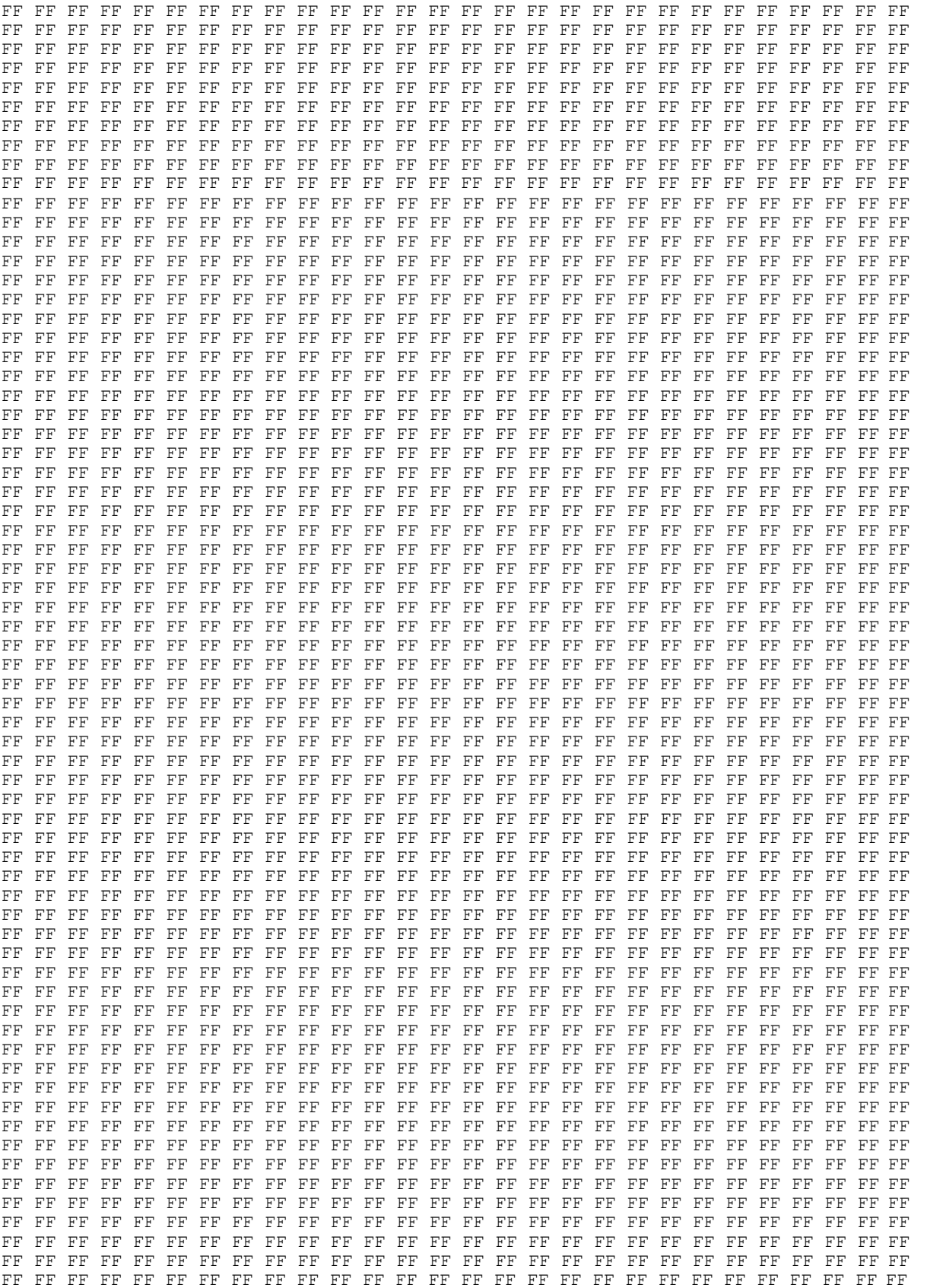
Event Record 2



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Disclaimer of Liability

APPENDIX B: Event Data Recorder Report for 2014 Dodge Grand Caravan[3]

[3] The EDR report contained in this technical report was imaged the investigating police department. Only a PDF copy of the report was provided by the police and the hexadecimal data contained in the report has been deleted due to potential personal identifiable information contained in the 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	2C4RDGCG9ERxxxxxx
User	x
Case Number	x
EDR Data Imaging Date	x
Crash Date	x
Filename	x
Saved on	
Imaged with CDR version	Crash Data Retrieval Tool 17.8
Imaged with Software Licensed to (Company Name)	
Reported with CDR version	Crash Data Retrieval Tool 17.10
Reported with Software Licensed to (Company Name)	x
EDR Device Type	Airbag Control Module
Event(s) recovered	Most Recent Event, Deployment Event

Comments

P225/65R17
Both actual and recommended

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.
- For Fiat vehicles, the “Read VIN from Vehicle” feature in the CDR Tool will not work. The VIN will have to be manually entered.
- 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.
- 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.

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.

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:

- 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.
- Occupant Size Classification, Outboard Front Passenger - "Child" status may be used to indicate anything weighing less than a 5 th percentile female adult crash dummy, including an empty seat; "Not Child" indicates anything weighing the same as or more than a 5 th percentile female adult crash dummy.
- Odometer at Event - Vehicle odometer at the time of the event
- 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.
- System Voltage at Event, ACM - Voltage at the ACM as measured by the ACM.
- System Voltage at Event, Bussed - 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.
- 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 display 0, SNA, N/A or 255.

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.

SENSOR DATA:

- The design range for the angular rate data is:
  - +/- 240 deg/sec for Bosch ACMs
  - +/- 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
- 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.

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.
- (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.
- Braking System, Maximum Braking - “Yes” indicates that ABS is active on all 4 wheels.
- 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 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.
  - 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.
  - ACC Speed Set (if equip.)- This indicates the desired speed in mph that was input by the driver for the ACC system. If the value is SNA for all time stamps, then the vehicle is not equipped with ACC.
  - 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;

- 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.
    - 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 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 - This indicates the actual forward distance to the main object being tracked by the FCW system. “FCW present but not tracking” indicates that the FCW system is not currently tracking 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 fully on with active braking as well as 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-braking” indicates that the FCW system is on with active braking enabled but there will no FCW audible or visual warnings in an FCW event. “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 as well as the audible and visual warnings enabled. SNA indicates that the vehicle is not equipped with FCW.
- Gear Position - This indicates the current transmission gear.
- Master Cylinder Pressure - This indicates the brake pressure applied to the brakes by the driver.
- 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 depressed.
- Speed, Vehicle Indicated - This indicates the average of the drive wheels. The accuracy of the recorded Speed, Vehicle Indicated will be affected if the vehicle had the tire size or the final drive axle ratio changed from the factory build specifications. 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 LOW, NORMAL, HIGH, 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 (in revolutions per minute) of a particular tire as denoted by XX.

- Tire Pressure Monitor Indicator Lamp/Faults - “On” indicates a fault in the tire pressure monitoring system. The TPM module DTC’s should be read and recorded for final system interpretation.
- "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:

- Jeep Renegade and Alfa Romeo Giulia are only CDR supported in the NAFTA market.

03002_Chrysler_ r037

System Status at Retrieval

Original VIN	2C4RDGCG9ERxxxxxx
Current VIN	2C4RDGCG9ERxxxxxx
Ignition Cycle, Download	3635
ECU Part Number	68233535AB
ECU Serial Number	T08JF321300663
Supplier Identification	Continental Corporation
ECU Supply Voltage at Time of Retrieval	12.8

System Configuration at Retrieval

Configured for Driver/Passenger Frontal Airbags	Yes
Configured for Rollover Sensing	Yes
Configured for Driver Knee Airbag	Yes
Configured for Driver/Passenger Retractor Pretensioner	Yes
Configured for Driver/Passenger Buckle Pretensioner	Yes
Configured for Driver Seat Track Position Sensor	Yes
Configured for Outboard Front Passenger Seat Track Position Sensor	No
Configured for Passenger Knee Airbag	No
Configured for Left/Right Side Seat Airbag	Yes
Configured for Left/Right Side Curtain Airbag	Yes
Configured for Left/Right Up Front Sensors	Yes
Configured for Left/Right Side Pressure Sensors	Yes
Configured for Left/Right Side B-Pillar Acceleration Sensors	Yes
Configured for Left/Right Side C-Pillar Acceleration Sensors	Yes
Configured for Left/Right Side D-Pillar Acceleration Sensors	Yes
Configured for Driver/Passenger Active Head Restraint	Yes
Configured for Passenger Buckle Switches	Yes

System Configuration at Event (Most Recent Event)

Configured for Driver Frontal Airbag	Yes
Configured for Passenger Frontal Airbag	Yes
Configured for Rollover Sensing	Yes
Configured for Driver Knee Airbag	Yes
Configured for Driver Retractor Pretensioner	Yes
Configured for Driver Seatbelt Buckle Pretensioner	Yes
Configured for Driver Seat Track Position Sensor	Yes
Configured for Outboard Front Passenger Seat Track Position Sensor	No
Configured for Outboard Front Passenger Knee Airbag	No
Configured for Outboard Front Passenger Retractor Pretensioner	Yes
Configured for Outboard Front Passenger Seatbelt Buckle Pretensioner	Yes
Configured for Left Side Seat Airbag	Yes
Configured for Left Side Curtain Airbag	Yes
Configured for Right Side Seat Airbag	Yes
Configured for Right Side Curtain Airbag	Yes
Configured for Left/Right Up Front Sensors	Yes
Configured for Left/Right Side Pressure Sensors	Yes
Configured for Left/Right Side Acceleration Sensors	Yes
Configured for Driver/Passenger Active Head Restraint	Yes
Configured for Passenger Buckle Switches	Yes

System Status at Event (Most Recent Event)

Deployment Data Status	Complete
Complete File Recorded (Yes, No)	Yes
Ignition Cycle, Crash	3630
Safety Belt Status, Driver	Buckled
Safety Belt Status, Outboard Front Passenger	Not Buckled
Frontal Airbag Warning Lamp, On/Off	Off
Seat Track Position Switch, Foremost, Status, Driver	No
Seat Track Position Switch, Foremost, Status, Outboard Front Passenger	Not Present
Maximum Delta-V Longitudinal (MPH [km/h])	-29.4 [-47]
Time, Maximum Delta-V, Longitudinal (msec)	232
Maximum Delta-V Lateral (MPH [km/h])	12.1 [19]
Time, Maximum Delta-V, Lateral (msec)	128
Time, Operation System Time (sec)	5135345.8
Time, Airbag Warning Lamp On (min)	0
Number, Event	1
Time from Event 1 to 2 (sec)	N/A
Multi-Event, Number of Events (1,2,3)	1
Number, Total Events	1
Operation Via Energy Reserve Only (Yes, No)	Yes
System Voltage at Event, Bussed (V)	14.5
Supply Voltage at Event, ECU (V)	14.4
Odometer at Event (miles [km])	40152.3 [64619]
VIN at Event (last 8 digits)	ERxxxxxx

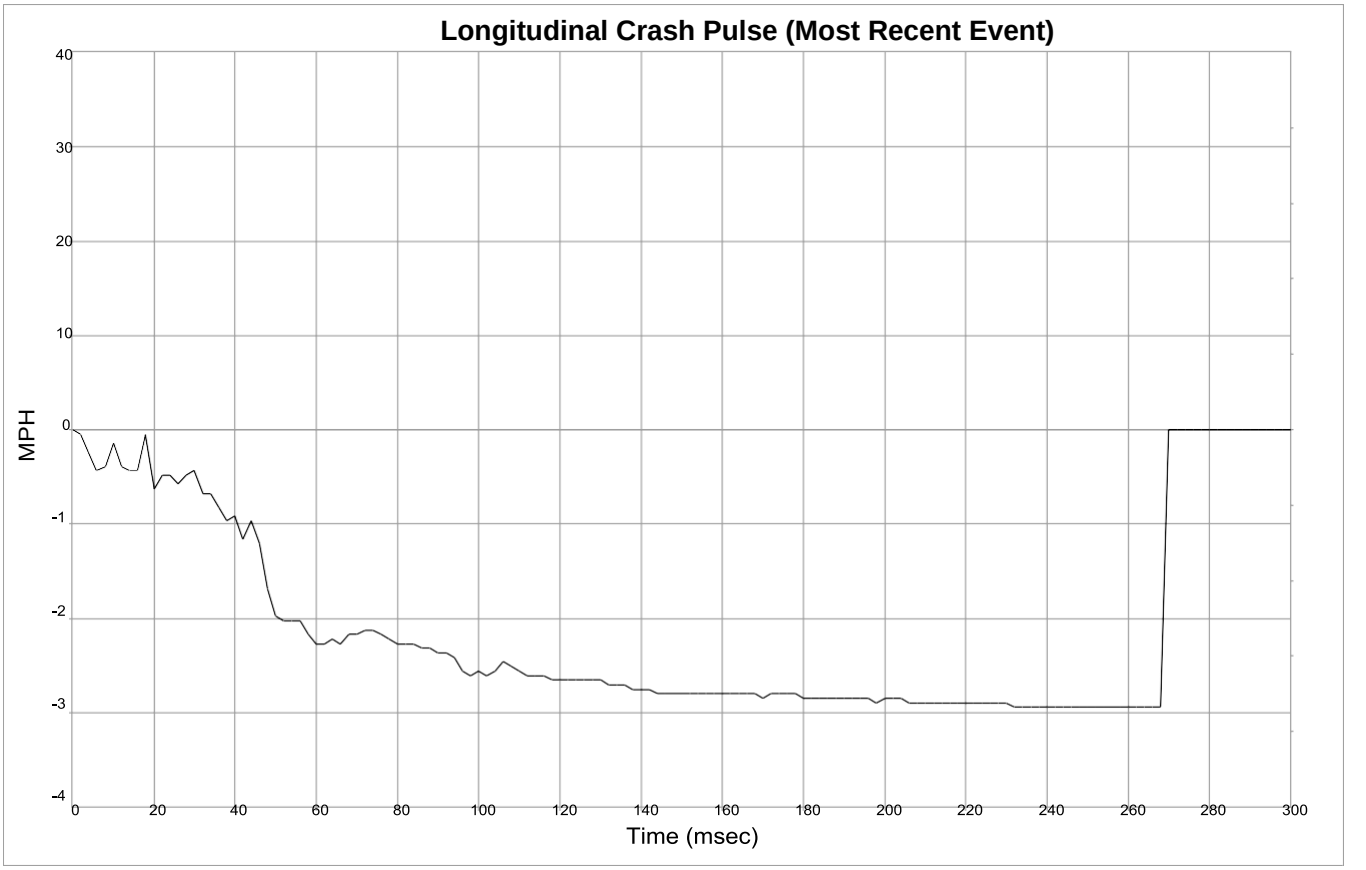
Deployment Command Data (Most Recent Event)

Frontal Airbag Deployment, 1st Stage, Driver	Yes
Frontal Airbag Deployment, 2nd Stage, Driver	Yes
Frontal Airbag Deployment, Time to First Stage Deployment, Driver (msec)	9
Frontal Airbag Deployment, Time to 2nd Stage Deployment, Driver (msec)	12
Knee Airbag Deployment, Driver	Yes
Retractor Pretensioner, Driver	Yes
Seatbelt Buckle Pretensioner, Driver	Yes
Frontal Airbag Deployment, 1st Stage, Passenger	Yes
Frontal Airbag Deployment, 2nd Stage, Passenger	Yes
Frontal Airbag Deployment, Time to First Stage Deployment, Passenger (msec)	9
Frontal Airbag Deployment, Time to 2nd Stage Deployment, Passenger (msec)	29
Retractor Pretensioner, Outboard Front Passenger	Yes
Seatbelt Buckle Pretensioner, Outboard Front Passenger	Yes
Side Seat Airbag Deployment, Left	Yes
Side Seat Airbag Deployment, Right	No
Side Curtain Airbag Deployment, Left	Yes
Side Curtain Airbag Deployment, Right	No
Active Headrest Deployment, Driver	No
Active Headrest Deployment, Passenger	No

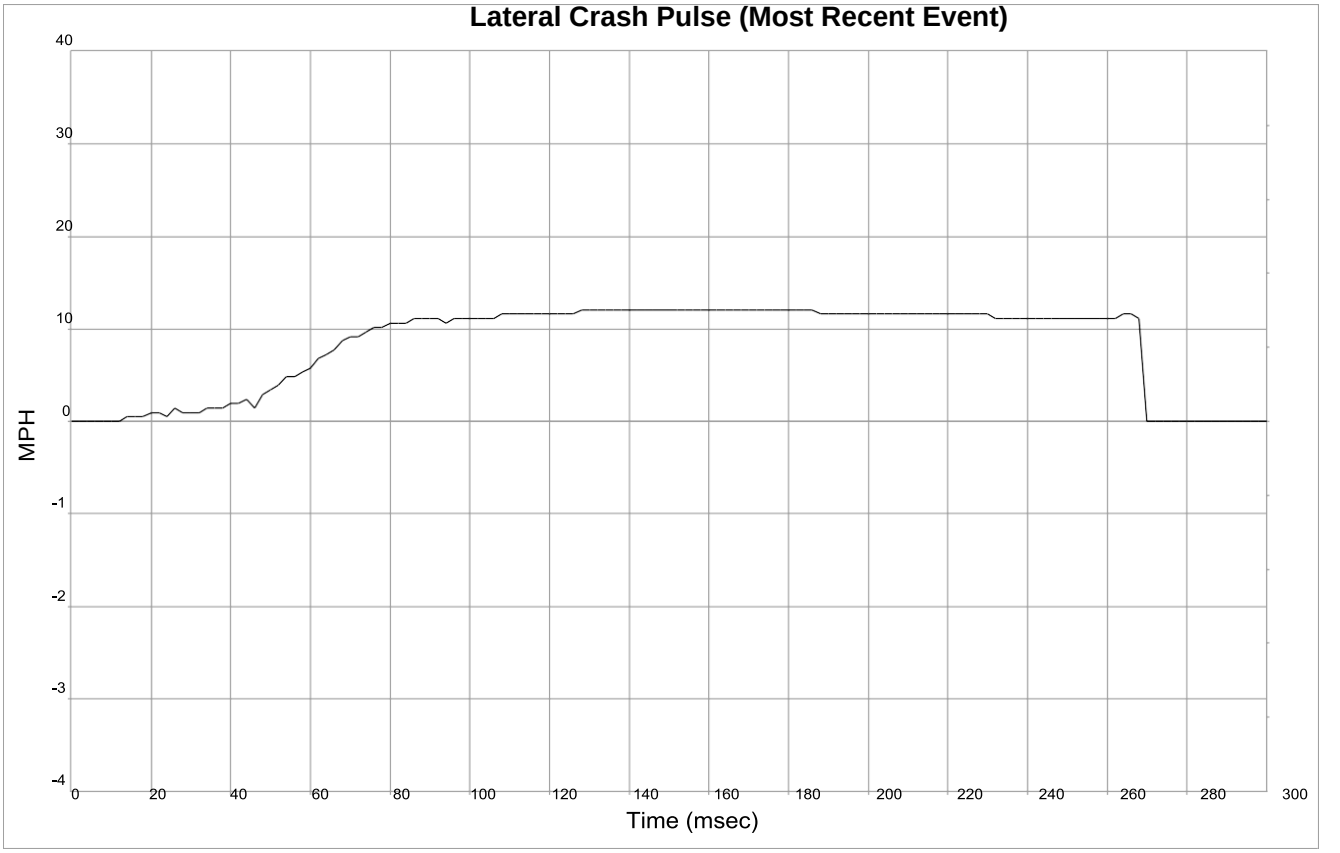
DTCs Present at Start of Event (Most Recent Event)

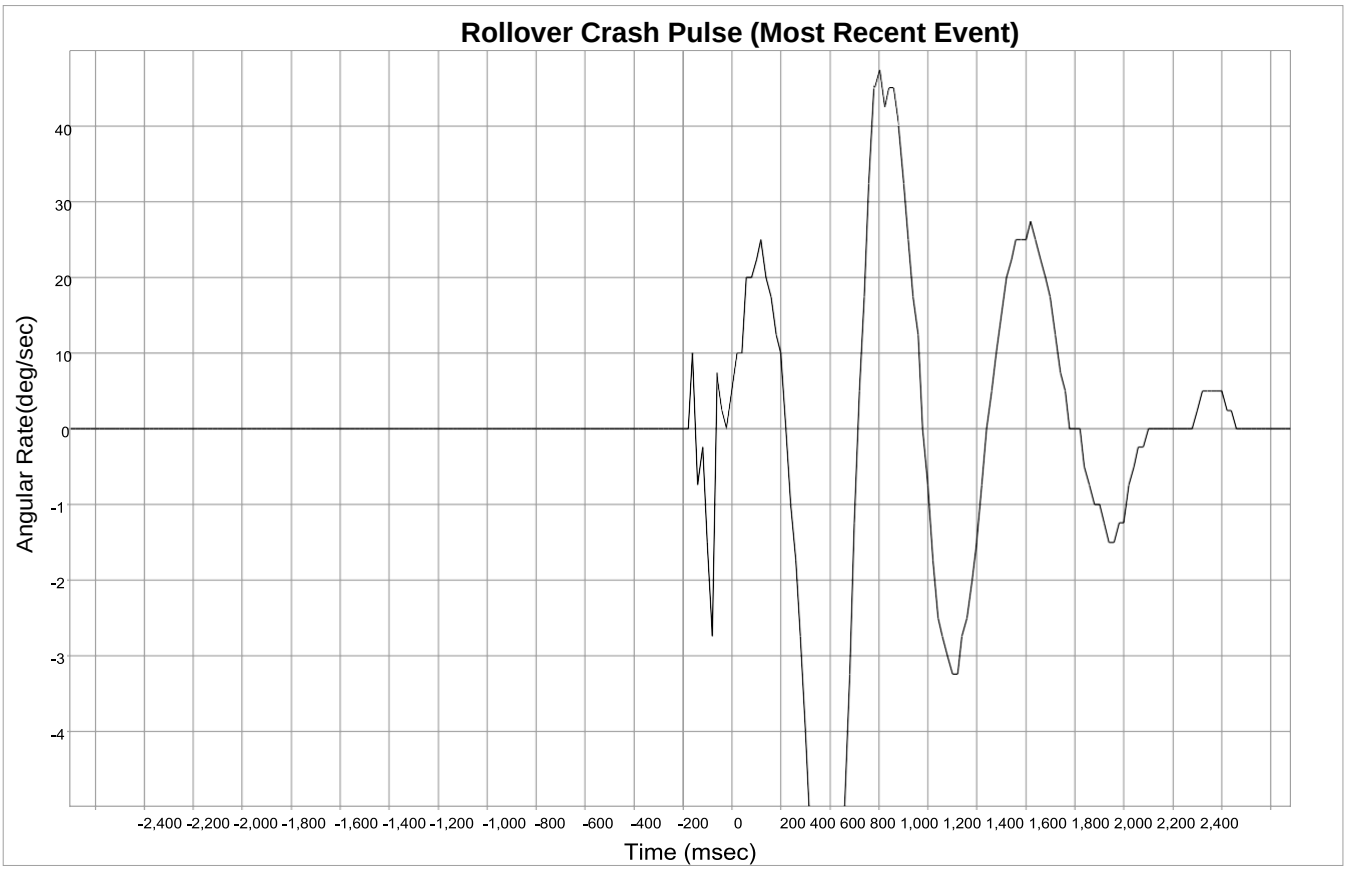
No DTCs Present

Longitudinal Crash Pulse (Most Recent Event)



Lateral Crash Pulse (Most Recent Event)




Rollover Crash Pulse (Most Recent Event)
Angular Rate(deg/sec)
40
30
20
10
0
-1
-2
-3
-4
-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])
0	0.0 [0]
2	-0.5 [-1]
4	-2.4 [-4]
6	-4.3 [-7]
8	-3.9 [-6]
10	-1.4 [-2]
12	-3.9 [-6]
14	-4.3 [-7]
16	-4.3 [-7]
18	-0.5 [-1]
20	-6.3 [-10]
22	-4.8 [-8]
24	-4.8 [-8]
26	-5.8 [-9]
28	-4.8 [-8]
30	-4.3 [-7]
32	-6.8 [-11]
34	-6.8 [-11]
36	-8.2 [-13]
38	-9.7 [-16]
40	-9.2 [-15]
42	-11.6 [-19]
44	-9.7 [-16]
46	-12.1 [-19]
48	-16.9 [-27]
50	-19.8 [-32]
52	-20.3 [-33]
54	-20.3 [-33]
56	-20.3 [-33]
58	-21.7 [-35]
60	-22.7 [-37]
62	-22.7 [-37]
64	-22.2 [-36]
66	-22.7 [-37]
68	-21.7 [-35]
70	-21.7 [-35]
72	-21.2 [-34]
74	-21.2 [-34]
76	-21.7 [-35]
78	-22.2 [-36]
80	-22.7 [-37]
82	-22.7 [-37]
84	-22.7 [-37]
86	-23.2 [-37]
88	-23.2 [-37]
90	-23.7 [-38]
92	-23.7 [-38]
94	-24.1 [-39]
96	-25.6 [-41]
98	-26.1 [-42]
100	-25.6 [-41]
102	-26.1 [-42]
104	-25.6 [-41]
106	-24.6 [-40]
108	-25.1 [-40]
110	-25.6 [-41]
112	-26.1 [-42]
114	-26.1 [-42]
116	-26.1 [-42]
118	-26.6 [-43]
120	-26.6 [-43]
122	-26.6 [-43]
124	-26.6 [-43]
126	-26.6 [-43]
128	-26.6 [-43]
130	-26.6 [-43]
132	-27.0 [-44]
134	-27.0 [-44]
136	-27.0 [-44]
138	-27.5 [-44]
140	-27.5 [-44]
142	-27.5 [-44]
144	-28.0 [-45]
146	-28.0 [-45]
148	-28.0 [-45]
150	-28.0 [-45]
152	-28.0 [-45]
154	-28.0 [-45]
156	-28.0 [-45]
158	-28.0 [-45]
160	-28.0 [-45]
162	-28.0 [-45]
164	-28.0 [-45]
166	-28.0 [-45]
168	-28.0 [-45]
170	-28.5 [-46]
172	-28.0 [-45]
174	-28.0 [-45]
176	-28.0 [-45]
178	-28.0 [-45]
180	-28.5 [-46]
182	-28.5 [-46]
184	-28.5 [-46]
186	-28.5 [-46]
188	-28.5 [-46]
190	-28.5 [-46]
192	-28.5 [-46]
194	-28.5 [-46]
196	-28.5 [-46]
198	-29.0 [-47]
200	-28.5 [-46]
202	-28.5 [-46]
204	-28.5 [-46]
206	-29.0 [-47]
208	-29.0 [-47]
210	-29.0 [-47]
212	-29.0 [-47]
214	-29.0 [-47]
216	-29.0 [-47]
218	-29.0 [-47]
220	-29.0 [-47]
222	-29.0 [-47]
224	-29.0 [-47]
226	-29.0 [-47]
228	-29.0 [-47]
230	-29.0 [-47]
232	-29.4 [-47]
234	-29.4 [-47]
236	-29.4 [-47]
238	-29.4 [-47]
240	-29.4 [-47]
242	-29.4 [-47]
244	-29.4 [-47]
246	-29.4 [-47]
248	-29.4 [-47]
250	-29.4 [-47]
252	-29.4 [-47]
254	-29.4 [-47]
256	-29.4 [-47]
258	-29.4 [-47]
260	-29.4 [-47]
262	-29.4 [-47]
264	-29.4 [-47]
266	-29.4 [-47]
268	-29.4 [-47]
270	0.0 [0]
272	0.0 [0]
274	0.0 [0]
276	0.0 [0]
278	0.0 [0]
280	0.0 [0]
282	0.0 [0]
284	0.0 [0]
286	0.0 [0]
288	0.0 [0]
290	0.0 [0]
292	0.0 [0]
294	0.0 [0]
296	0.0 [0]
298	0.0 [0]
300	0.0 [0]

Lateral Crash Pulse (Most Recent Event)

Time (msec)	Delta-V, Lateral (MPH [km/h])
0	0.0 [0]
2	0.0 [0]
4	0.0 [0]
6	0.0 [0]
8	0.0 [0]
10	0.0 [0]
12	0.0 [0]
14	0.5 [1]
16	0.5 [1]
18	0.5 [1]
20	1.0 [2]
22	1.0 [2]
24	0.5 [1]
26	1.4 [2]
28	1.0 [2]
30	1.0 [2]
32	1.0 [2]
34	1.4 [2]
36	1.4 [2]
38	1.4 [2]
40	1.9 [3]
42	1.9 [3]
44	2.4 [4]
46	1.4 [2]
48	2.9 [5]
50	3.4 [5]
52	3.9 [6]
54	4.8 [8]
56	4.8 [8]
58	5.3 [9]
60	5.8 [9]
62	6.8 [11]
64	7.2 [12]
66	7.7 [12]
68	8.7 [14]
70	9.2 [15]
72	9.2 [15]
74	9.7 [16]
76	10.1 [16]
78	10.1 [16]
80	10.6 [17]
82	10.6 [17]
84	10.6 [17]
86	11.1 [18]
88	11.1 [18]
90	11.1 [18]
92	11.1 [18]
94	10.6 [17]
96	11.1 [18]
98	11.1 [18]

Time (msec)	Delta-V, Lateral (MPH [km/h])
100	11.1 [18]
102	11.1 [18]
104	11.1 [18]
106	11.1 [18]
108	11.6 [19]
110	11.6 [19]
112	11.6 [19]
114	11.6 [19]
116	11.6 [19]
118	11.6 [19]
120	11.6 [19]
122	11.6 [19]
124	11.6 [19]
126	11.6 [19]
128	12.1 [19]
130	12.1 [19]
132	12.1 [19]
134	12.1 [19]
136	12.1 [19]
138	12.1 [19]
140	12.1 [19]
142	12.1 [19]
144	12.1 [19]
146	12.1 [19]
148	12.1 [19]
150	12.1 [19]
152	12.1 [19]
154	12.1 [19]
156	12.1 [19]
158	12.1 [19]
160	12.1 [19]
162	12.1 [19]
164	12.1 [19]
166	12.1 [19]
168	12.1 [19]
170	12.1 [19]
172	12.1 [19]
174	12.1 [19]
176	12.1 [19]
178	12.1 [19]
180	12.1 [19]
182	12.1 [19]
184	12.1 [19]
186	12.1 [19]
188	11.6 [19]
190	11.6 [19]
192	11.6 [19]
194	11.6 [19]
196	11.6 [19]
198	11.6 [19]

Time (msec)	Delta-V, Lateral (MPH [km/h])
200	11.6 [19]
202	11.6 [19]
204	11.6 [19]
206	11.6 [19]
208	11.6 [19]
210	11.6 [19]
212	11.6 [19]
214	11.6 [19]
216	11.6 [19]
218	11.6 [19]
220	11.6 [19]
222	11.6 [19]
224	11.6 [19]
226	11.6 [19]
228	11.6 [19]
230	11.6 [19]
232	11.1 [18]
234	11.1 [18]
236	11.1 [18]
238	11.1 [18]
240	11.1 [18]
242	11.1 [18]
244	11.1 [18]
246	11.1 [18]
248	11.1 [18]
250	11.1 [18]
252	11.1 [18]
254	11.1 [18]
256	11.1 [18]
258	11.1 [18]
260	11.1 [18]
262	11.1 [18]
264	11.6 [19]
266	11.6 [19]
268	11.1 [18]
270	0.0 [0]
272	0.0 [0]
274	0.0 [0]
276	0.0 [0]
278	0.0 [0]
280	0.0 [0]
282	0.0 [0]
284	0.0 [0]
286	0.0 [0]
288	0.0 [0]
290	0.0 [0]
292	0.0 [0]
294	0.0 [0]
296	0.0 [0]
298	0.0 [0]
300	0.0 [0]

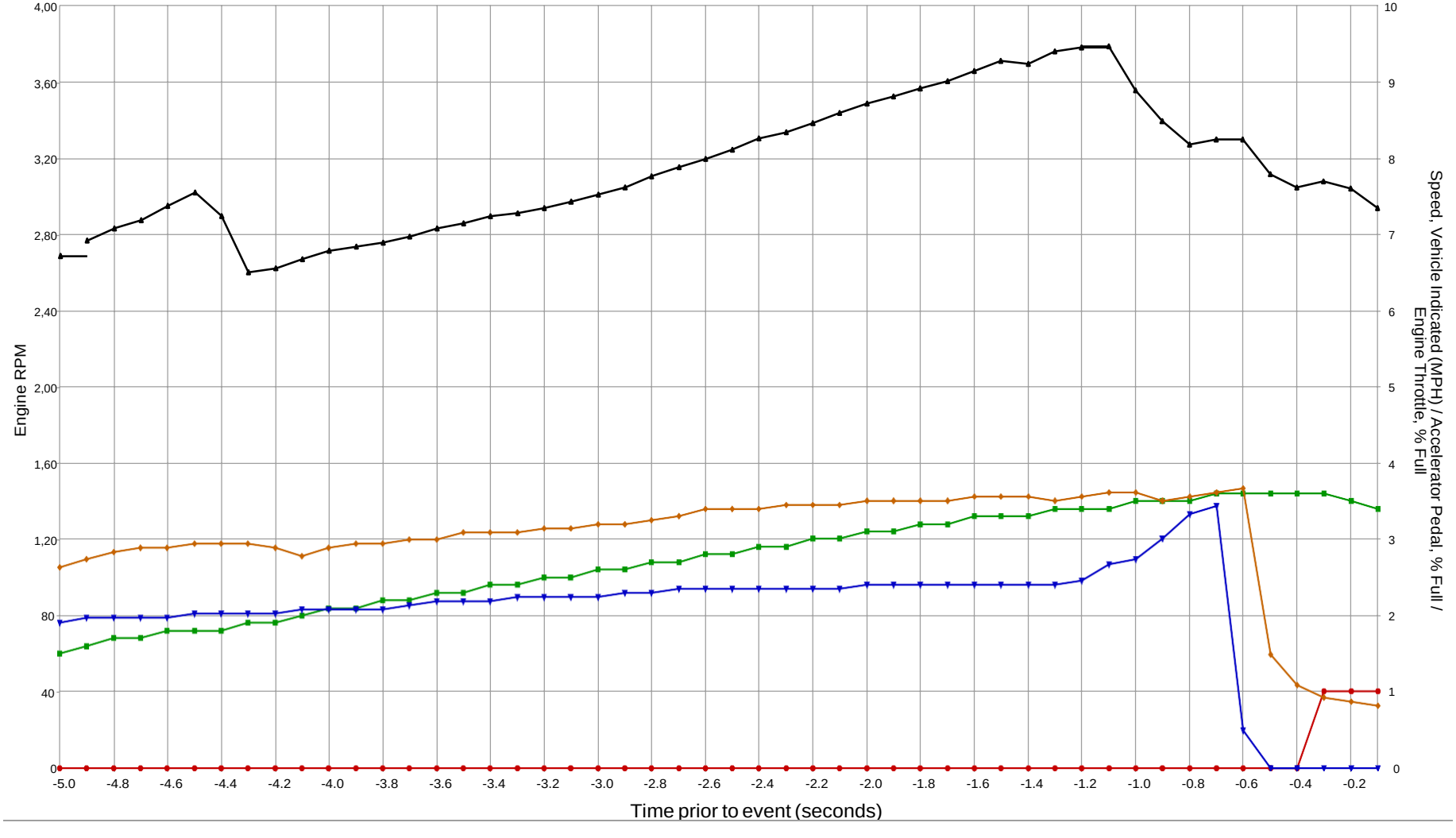
Rollover Crash Pulse (Most Recent Event) (if equipped)

Time (msec)	Angular Rate (deg/sec)	Time (msec)	Angular Rate (deg/sec)	Time (msec)	Angular Rate (deg/sec)
-2500	0.00	-1500	0.00	-500	0.00
-2480	0.00	-1480	0.00	-480	0.00
-2460	0.00	-1460	0.00	-460	0.00
-2440	0.00	-1440	0.00	-440	0.00
-2420	0.00	-1420	0.00	-420	0.00
-2400	0.00	-1400	0.00	-400	0.00
-2380	0.00	-1380	0.00	-380	0.00
-2360	0.00	-1360	0.00	-360	0.00
-2340	0.00	-1340	0.00	-340	0.00
-2320	0.00	-1320	0.00	-320	0.00
-2300	0.00	-1300	0.00	-300	0.00
-2280	0.00	-1280	0.00	-280	0.00
-2260	0.00	-1260	0.00	-260	0.00
-2240	0.00	-1240	0.00	-240	0.00
-2220	0.00	-1220	0.00	-220	0.00
-2200	0.00	-1200	0.00	-200	0.00
-2180	0.00	-1180	0.00	-180	0.00
-2160	0.00	-1160	0.00	-160	0.00
-2140	0.00	-1140	0.00	-140	0.00
-2120	0.00	-1120	0.00	-120	0.00
-2100	0.00	-1100	0.00	-100	0.00
-2080	0.00	-1080	0.00	-80	0.00
-2060	0.00	-1060	0.00	-60	0.00
-2040	0.00	-1040	0.00	-40	0.00
-2020	0.00	-1020	0.00	-20	0.00
-2000	0.00	-1000	0.00	0	0.00
-1980	0.00	-980	0.00	20	0.00
-1960	0.00	-960	0.00	40	10.00
-1940	0.00	-940	0.00	60	-7.50
-1920	0.00	-920	0.00	80	-2.50
-1900	0.00	-900	0.00	100	-15.00
-1880	0.00	-880	0.00	120	-27.50
-1860	0.00	-860	0.00	140	7.50
-1840	0.00	-840	0.00	160	2.50
-1820	0.00	-820	0.00	180	0.00
-1800	0.00	-800	0.00	200	5.00
-1780	0.00	-780	0.00	220	10.00
-1760	0.00	-760	0.00	240	10.00
-1740	0.00	-740	0.00	260	20.00
-1720	0.00	-720	0.00	280	20.00
-1700	0.00	-700	0.00	300	22.50
-1680	0.00	-680	0.00	320	25.00
-1660	0.00	-660	0.00	340	20.00
-1640	0.00	-640	0.00	360	17.50
-1620	0.00	-620	0.00	380	12.50
-1600	0.00	-600	0.00	400	10.00
-1580	0.00	-580	0.00	420	0.00
-1560	0.00	-560	0.00	440	-10.00
-1540	0.00	-540	0.00	460	-17.50
-1520	0.00	-520	0.00	480	-27.50

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

Time (msec)	Angular Rate (deg/sec)	Time (msec)	Angular Rate (deg/sec)
500	-40.00	1500	17.50
520	-52.50	1520	12.50
540	-65.00	1540	7.50
560	-75.00	1560	5.00
580	-82.50	1580	0.00
600	-82.50	1600	0.00
620	-77.50	1620	0.00
640	-65.00	1640	-5.00
660	-50.00	1660	-7.50
680	-32.50	1680	-10.00
700	-12.50	1700	-10.00
720	5.00	1720	-12.50
740	17.50	1740	-15.00
760	32.50	1760	-15.00
780	45.00	1780	-12.50
800	47.50	1800	-12.50
820	42.50	1820	-7.50
840	45.00	1840	-5.00
860	45.00	1860	-2.50
880	40.00	1880	-2.50
900	32.50	1900	0.00
920	25.00	1920	0.00
940	17.50	1940	0.00
960	12.50	1960	0.00
980	0.00	1980	0.00
1000	-7.50	2000	0.00
1020	-17.50	2020	0.00
1040	-25.00	2040	0.00
1060	-27.50	2060	0.00
1080	-30.00	2080	0.00
1100	-32.50	2100	2.50
1120	-32.50	2120	5.00
1140	-27.50	2140	5.00
1160	-25.00	2160	5.00
1180	-20.00	2180	5.00
1200	-15.00	2200	5.00
1220	-7.50	2220	2.50
1240	0.00	2240	2.50
1260	5.00	2260	0.00
1280	10.00	2280	0.00
1300	15.00	2300	0.00
1320	20.00	2320	0.00
1340	22.50	2340	0.00
1360	25.00	2360	0.00
1380	25.00	2380	0.00
1400	25.00	2400	0.00
1420	27.50	2420	0.00
1440	25.00	2440	0.00
1460	22.50	2460	0.00
1480	20.00	2480	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 RPM	Engine Throttle, % Full	Raw Manifold Pressure (kPa)	Service Brake	Brake Lamp On
-5.0	Complete	15 [25]	19	2,690	26	88	Off	Brake Off
-4.9	Complete	16 [26]	20	2,772	27	89	Off	Brake Off
-4.8	Complete	17 [27]	20	2,836	28	88	Off	Brake Off
-4.7	Complete	17 [27]	20	2,878	29	88	Off	Brake Off
-4.6	Complete	18 [28]	20	2,952	29	88	Off	Brake Off
-4.5	Complete	18 [29]	20	3,023	29	88	Off	Brake Off
-4.4	Complete	18 [30]	20	2,900	29	88	Off	Brake Off
-4.3	Complete	19 [31]	20	2,602	29	89	Off	Brake Off
-4.2	Complete	19 [31]	20	2,623	29	90	Off	Brake Off
-4.1	Complete	20 [32]	21	2,674	28	89	Off	Brake Off
-4.0	Complete	21 [33]	21	2,718	29	89	Off	Brake Off
-3.9	Complete	21 [34]	21	2,737	29	89	Off	Brake Off
-3.8	Complete	22 [35]	21	2,761	29	89	Off	Brake Off
-3.7	Complete	22 [36]	21	2,791	30	89	Off	Brake Off
-3.6	Complete	23 [37]	22	2,833	30	89	Off	Brake Off
-3.5	Complete	23 [37]	22	2,860	31	88	Off	Brake Off
-3.4	Complete	24 [38]	22	2,900	31	89	Off	Brake Off
-3.3	Complete	24 [39]	22	2,916	31	89	Off	Brake Off
-3.2	Complete	25 [40]	22	2,942	31	89	Off	Brake Off
-3.1	Complete	25 [41]	22	2,975	31	89	Off	Brake Off
-3.0	Complete	26 [41]	22	3,014	32	89	Off	Brake Off
-2.9	Complete	26 [42]	23	3,052	32	89	Off	Brake Off
-2.8	Complete	27 [43]	23	3,107	32	89	Off	Brake Off
-2.7	Complete	27 [44]	23	3,157	33	89	Off	Brake Off
-2.6	Complete	28 [45]	23	3,201	34	89	Off	Brake Off
-2.5	Complete	28 [45]	23	3,250	34	88	Off	Brake Off
-2.4	Complete	29 [46]	23	3,305	34	88	Off	Brake Off
-2.3	Complete	29 [47]	23	3,338	35	88	Off	Brake Off
-2.2	Complete	30 [48]	23	3,386	35	88	Off	Brake Off
-2.1	Complete	30 [49]	23	3,444	35	88	Off	Brake Off
-2.0	Complete	31 [49]	24	3,490	35	87	Off	Brake Off
-1.9	Complete	31 [50]	24	3,528	35	87	Off	Brake Off
-1.8	Complete	32 [51]	24	3,573	35	86	Off	Brake Off
-1.7	Complete	32 [52]	24	3,609	35	86	Off	Brake Off
-1.6	Complete	33 [53]	24	3,662	36	86	Off	Brake Off
-1.5	Complete	33 [53]	24	3,714	36	86	Off	Brake Off
-1.4	Complete	33 [54]	24	3,702	36	86	Off	Brake Off
-1.3	Complete	34 [54]	24	3,763	35	86	Off	Brake Off
-1.2	Complete	34 [55]	25	3,786	36	85	Off	Brake Off
-1.1	Complete	34 [55]	27	3,790	36	85	Off	Brake Off
-1.0	Complete	35 [56]	27	3,561	36	87	Off	Brake Off
-0.9	Complete	35 [56]	30	3,401	35	88	Off	Brake Off
-0.8	Complete	35 [56]	33	3,276	36	89	Off	Brake Off
-0.7	Complete	36 [57]	34	3,303	36	90	Off	Brake Off
-0.6	Complete	36 [58]	5	3,301	37	87	Off	Brake Off
-0.5	Complete	36 [58]	0	3,118	15	57	Off	Brake Off
-0.4	Complete	36 [58]	0	3,052	11	46	Off	Brake Off
-0.3	Complete	36 [58]	0	3,080	9	38	On	Brake On
-0.2	Complete	35 [56]	0	3,045	9	33	On	Brake On
-0.1	Complete	34 [55]	0	2,941	8	30	On	Brake On

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

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

Time Stamp (sec)	Panic Brake Assist Active (if equip.)	PCM MIL	ABS MIL	ESP MIL	Stability Control	Steering Input (deg)	Yaw Rate (deg/sec) (if equip.)
-5.0	False	Off	Off	Off	On	29	2.57
-4.9	False	Off	Off	Off	On	33	3.05
-4.8	False	Off	Off	Off	On	38	3.91
-4.7	False	Off	Off	Off	On	40	4.77
-4.6	False	Off	Off	Off	On	40	5.62
-4.5	False	Off	Off	Off	On	39	5.50
-4.4	False	Off	Off	Off	On	39	5.38
-4.3	False	Off	Off	Off	On	39	5.62
-4.2	False	Off	Off	Off	On	39	5.87
-4.1	False	Off	Off	Off	On	39	5.62
-4.0	False	Off	Off	Off	On	39	5.62
-3.9	False	Off	Off	Off	On	38	5.99
-3.8	False	Off	Off	Off	On	37	6.23
-3.7	False	Off	Off	Off	On	37	5.87
-3.6	False	Off	Off	Off	On	37	5.99
-3.5	False	Off	Off	Off	On	35	5.87
-3.4	False	Off	Off	Off	On	33	5.99
-3.3	False	Off	Off	Off	On	30	5.62
-3.2	False	Off	Off	Off	On	25	4.89
-3.1	False	Off	Off	Off	On	23	4.03
-3.0	False	Off	Off	Off	On	22	3.42
-2.9	False	Off	Off	Off	On	21	3.30
-2.8	False	Off	Off	Off	On	20	3.54
-2.7	False	Off	Off	Off	On	15	3.30
-2.6	False	Off	Off	Off	On	8	2.57
-2.5	False	Off	Off	Off	On	3	0.86
-2.4	False	Off	Off	Off	On	2	-0.49
-2.3	False	Off	Off	Off	On	3	-0.73
-2.2	False	Off	Off	Off	On	4	-0.37
-2.1	False	Off	Off	Off	On	4	0.00
-2.0	False	Off	Off	Off	On	5	0.24
-1.9	False	Off	Off	Off	On	6	0.00
-1.8	False	Off	Off	Off	On	8	-0.12
-1.7	False	Off	Off	Off	On	9	0.61
-1.6	False	Off	Off	Off	On	9	1.22
-1.5	False	Off	Off	Off	On	9	1.10
-1.4	False	Off	Off	Off	On	9	1.10
-1.3	False	Off	Off	Off	On	10	1.22
-1.2	False	Off	Off	Off	On	10	1.10
-1.1	False	Off	Off	Off	On	10	1.34
-1.0	False	Off	Off	Off	On	10	1.47
-0.9	False	Off	Off	Off	On	10	1.47
-0.8	False	Off	Off	Off	On	10	1.34
-0.7	False	Off	Off	Off	On	10	1.10
-0.6	False	Off	Off	Off	On	7	1.22
-0.5	False	Off	Off	Off	On	0	0.86
-0.4	False	Off	Off	Off	On	-1	-0.24
-0.3	False	Off	Off	Off	On	2	-0.73
-0.2	False	Off	Off	Off	On	6	-0.37
-0.1	False	Off	Off	Off	On	9	0.49

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

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

Time Stamp (sec)	Wheel Speed LF (RPM)	Wheel Speed RF (RPM)	Wheel Speed LR (RPM)	Wheel Speed RR (RPM)	ETC Lamp	ETC Lamp Flashing	Engine Torque Applied	Gear Position Display (Auto Trans. Only)
-5.0	185	188	184	186	Off	No	Yes	Drive
-4.9	193	195	190	193	Off	No	Yes	Drive
-4.8	200	203	197	201	Off	No	Yes	Drive
-4.7	205	210	202	208	Off	No	Yes	Drive
-4.6	212	215	209	214	Off	No	Yes	Drive
-4.5	217	221	214	220	Off	No	Yes	Drive
-4.4	223	227	221	225	Off	No	Yes	Drive
-4.3	230	232	226	230	Off	No	Yes	Drive
-4.2	235	238	233	236	Off	No	Yes	Drive
-4.1	242	246	238	242	Off	No	Yes	Drive
-4.0	249	253	244	250	Off	No	Yes	Drive
-3.9	255	260	251	256	Off	No	Yes	Drive
-3.8	262	266	259	263	Off	No	Yes	Drive
-3.7	268	273	265	270	Off	No	Yes	Drive
-3.6	275	279	271	276	Off	No	Yes	Drive
-3.5	282	285	278	282	Off	No	Yes	Drive
-3.4	287	290	282	289	Off	No	Yes	Drive
-3.3	293	297	290	294	Off	No	Yes	Drive
-3.2	300	301	296	300	Off	No	Yes	Drive
-3.1	306	308	303	306	Off	No	Yes	Drive
-3.0	312	313	308	312	Off	No	Yes	Drive
-2.9	317	320	314	317	Off	No	Yes	Drive
-2.8	324	326	318	323	Off	No	Yes	Drive
-2.7	329	333	325	328	Off	No	Yes	Drive
-2.6	336	337	333	334	Off	No	Yes	Drive
-2.5	343	342	338	338	Off	No	Yes	Drive
-2.4	348	347	345	345	Off	No	Yes	Drive
-2.3	354	352	350	350	Off	No	Yes	Drive
-2.2	359	360	357	357	Off	No	Yes	Drive
-2.1	367	368	361	363	Off	No	Yes	Drive
-2.0	374	373	368	368	Off	No	Yes	Drive
-1.9	377	377	374	375	Off	No	Yes	Drive
-1.8	385	386	380	381	Off	No	Yes	Drive
-1.7	391	391	386	387	Off	No	Yes	Drive
-1.6	396	397	392	393	Off	No	Yes	Drive
-1.5	402	403	397	399	Off	No	Yes	Drive
-1.4	406	406	402	403	Off	No	Yes	Drive
-1.3	408	409	406	407	Off	No	Yes	Drive
-1.2	412	413	407	411	Off	No	Yes	Drive
-1.1	416	415	413	413	Off	No	Yes	Drive
-1.0	417	421	416	417	Off	No	Yes	Drive
-0.9	425	424	418	420	Off	No	Yes	Drive
-0.8	426	425	422	423	Off	No	Yes	Drive
-0.7	432	432	427	428	Off	No	Yes	Drive
-0.6	435	435	431	434	Off	No	Yes	Drive
-0.5	436	438	435	436	Off	No	Yes	Drive
-0.4	437	435	437	436	Off	No	Yes	Drive
-0.3	436	439	437	436	Off	No	Yes	Drive
-0.2	426	422	432	430	Off	No	Yes	Drive
-0.1	412	412	418	415	Off	No	Yes	Drive

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

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

Time Stamp (sec)	Cruise Control Status	Cruise Control Engaged
-5.0	Off	Not Engaged
-4.9	Off	Not Engaged
-4.8	Off	Not Engaged
-4.7	Off	Not Engaged
-4.6	Off	Not Engaged
-4.5	Off	Not Engaged
-4.4	Off	Not Engaged
-4.3	Off	Not Engaged
-4.2	Off	Not Engaged
-4.1	Off	Not Engaged
-4.0	Off	Not Engaged
-3.9	Off	Not Engaged
-3.8	Off	Not Engaged
-3.7	Off	Not Engaged
-3.6	Off	Not Engaged
-3.5	Off	Not Engaged
-3.4	Off	Not Engaged
-3.3	Off	Not Engaged
-3.2	Off	Not Engaged
-3.1	Off	Not Engaged
-3.0	Off	Not Engaged
-2.9	Off	Not Engaged
-2.8	Off	Not Engaged
-2.7	Off	Not Engaged
-2.6	Off	Not Engaged
-2.5	Off	Not Engaged
-2.4	Off	Not Engaged
-2.3	Off	Not Engaged
-2.2	Off	Not Engaged
-2.1	Off	Not Engaged
-2.0	Off	Not Engaged
-1.9	Off	Not Engaged
-1.8	Off	Not Engaged
-1.7	Off	Not Engaged
-1.6	Off	Not Engaged
-1.5	Off	Not Engaged
-1.4	Off	Not Engaged
-1.3	Off	Not Engaged
-1.2	Off	Not Engaged
-1.1	Off	Not Engaged
-1.0	Off	Not Engaged
-0.9	Off	Not Engaged
-0.8	Off	Not Engaged
-0.7	Off	Not Engaged
-0.6	Off	Not Engaged
-0.5	Off	Not Engaged
-0.4	Off	Not Engaged
-0.3	Off	Not Engaged
-0.2	Off	Not Engaged
-0.1	Off	Not Engaged

DOT HS 813 084
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**National Highway
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