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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 the frontal crash of a 2015 Nissan Armada and the alleged role of the driver's manual and supplemental restraint systems that resulted in fatal injuries to the 53-year-old female driver. The crash occurred in fog in the southbound lane of a two-lane, undivided State highway. The Nissan was a 4-door SUV driven by a 53-year-old female, who was using only the lap portion of her lap and shoulder seat belt. A belted 13-year-old male occupied the front-right seat. According to the driver's family, the driver was small-statured (150 cm [59 in], 86 kg [190 lb]) and routinely put the shoulder portion of her seat belt behind her so it wouldn't rest against the left side of her face. The Nissan was traveling west and approaching a left curve. A 2007 Hyundai Sante Fe, driven by a belted 44-year-old male, was traveling east approaching the same curve. The Hyundai traveled across the centerline into the westbound lane, where the front planes of each vehicle collided. Both drivers were fatally injured and pronounced deceased at the scene. The Nissan's front-right passenger sustained non-incapacitating injuries and was transported by ambulance to a hospital, where he was admitted for a day.

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Special Crash Investigations
On-Site Alleged Driver Air Bag Fatality Crash Investigation
Office of Defects Investigation
Case Number: CR20003
Vehicle: 2015 Nissan Armada
Location: Arkansas
Crash Date: December 2019

Background

This report documents the on-site investigation of the frontal crash of a 2015 Nissan Armada (Figure 1) and the alleged role of the driver's manual and supplemental restraint systems that resulted in fatal injuries to the 53-year-old female driver. The family of the Nissan's driver reported the crash to the National Highway Traffic Safety Administration, and the investigation was assigned to the Special Crash Investigations (SCI) team of Crash Research and Analysis, Inc., in January 2020. The crash involved the Nissan and a 2007 Hyundai Santa Fe, whose driver was also fatally injured. The crash occurred in December 2019 and was investigated by a State police agency. The SCI team contacted the driver's family and insurance company in January 2020 and received authorization to inspect the vehicles involved. Inspections of both vehicles, the crash scene, and completion of the occupant interview occurred in January 2020.

Figure 1. The 2015 Nissan Armada

The crash occurred in fog in the southbound lane of a two-lane, undivided State highway. The Nissan was a 4-door SUV driven by a 53-year-old female, who was using only the lap portion of her lap and shoulder seat belt. A belted 13-year-old male occupied the front-right seat. According to the driver's family, the driver was small-statured ([150 cm [(59 in]), 86 kg [(190 lb]) and routinely put the shoulder portion of her seat belt behind her so it wouldn't rest against the left side of her face. The Nissan was traveling west and was approaching a left curve. The Hyundai, driven by a belted 44-year-old male, was traveling east and approaching the same curve. The Hyundai crossed over the centerline and into the westbound lane, where the front planes of each vehicle collided. Both drivers were fatally injured and pronounced deceased at the scene. The Nissan's front-right passenger sustained non-incapacitating injuries and was transported by ambulance to a hospital, where he was admitted for one day.

The SCI on-site investigation consisted of the inspection of the Nissan to measure its exterior and interior damage, assess the manual and supplemental restraint systems, and identify points of occupant contact. Further attention was paid to the non-use of the shoulder belt, the position of the driver's seat track, and the adjustable foot pedal positions, as well as to the question whether these factors may have contributed to her injuries. The Nissan was equipped with an Event Data Recorder (EDR) that was supported by the Bosch Crash Data Retrieval tool and was imaged by the SCI investigator. The exterior damage of the Hyundai was measured and documented photographically. Its EDR was not supported by the Bosch Crash Data Retrieval tool. The crash site and physical environment of the roadway were photographed and mapped by the Nikon total station during the SCI inspection.

The SCI investigation revealed that the driver wore only the lap portion of her seat belt. It was determined that she submarined under the lap belt and contacted the left aspect of the instrument panel with her knees and sustained fatal blunt force trauma to her chest and abdomen from contact with the steering wheel and column.

Summary

Crash Site

The crash occurred on a two-lane, undivided State highway in the morning. The environmental conditions reported by the National Weather Service were foggy with a temperature of 7.8 ºC (46.0 ºF), 100 percent relative humidity, and no wind.

In the vicinity of the crash site, the roadway traversed in a general east-west direction with both vehicles approaching a large radius curve. Each had one 3.3 m (10.8 ft) wide bituminous lane in each direction. The roadway at the curve was level with a +6% superelevation and was bordered by bituminous shoulders measuring 0.8 m (2.6 ft) and 0.5 m (1.6 ft) for the westbound and eastbound lanes. The two lanes were separated by a solid yellow centerline for the Nissan and a dashed yellow centerline for the Hyundai. The edges of the roadway were delineated by solid white lines and rumble strips. The posted speed limit was 89 km/h (55 mph). A crash diagram is included at the end of this report.

Pre-Crash

The Nissan was traveling west, in the early stage of the left curve (Figure 2), in the westbound lane. The EDR reported a speed range of 96 km/h (60 mph) at 5 seconds to 95 km/h (59 mph) at 3 seconds prior to algorithm enable (AE). From 3 seconds prior to AE to 0 seconds, the driver initiated braking, and the vehicle's speed decreased to 60 km/h (37 mph). The driver also initiated a 26-degree left steering movement at 1 second prior to AE.

The Hyundai was traveling east, approaching the same curve (Figure 3) at an unknown speed. Based on gouge marks in the westbound lane, it appears that the Hyundai driver did not negotiate the curve and crossed over the centerline.

Figure 2. West view, the Nissan's approach to the curve/impact

Figure 3. East view, the Hyundai's travel path

Crash

The crash occurred in the westbound lane when the front of the Nissan was struck by the front of the Hyundai. Based on the on-scene images taken by the police, the front planes of each vehicle remained in contact after impact. The Nissan rotated counterclockwise slightly and came to final rest in the westbound lane (Figure 4) facing southwest. The Hyundai rotated counterclockwise and came to final rest straddling the centerline facing northeast. The crash resulted in deployment of the frontal air bags in the Nissan, as well as the front-right seat-mounted and right inflatable curtain (IC) air bag. The driver's frontal air bag in the Hyundai also deployed.

Figure 4. Final rest of the vehicles

Post-Crash

Police and rescue personnel responded to the crash site, arriving five minutes after the notification. The drivers of both vehicles were pronounced deceased at the crash site. According to the Nissan driver's family, the right-front passenger exited the vehicle under his own power and was transported by ambulance to a hospital, where he was admitted for one day. The police crash report did not include any information regarding this occupant, but according to the occupant's family, he sustained non-incapacitating injuries.

2015 Nissan Armada

Description

The Nissan was a rear-wheel drive, 4-door SUV with the Vehicle Identification Number 5N1BA0ND7FNxxxxxx, manufactured in December 2015, and was equipped with a 5.6-liter, V-8, gasoline engine linked to a 5-speed automatic transmission on a 313 cm (123.0 in) wheelbase. The curb weight was 2,517 kg (5,549 lb), and the gross vehicle weight rating (GVWR) was 3,221 kg (7,100 lb) with gross axle weight ratings of 1,542 kg (3,399 lb) front and 1,950 kg (4,299 lb) rear. The vehicle was equipped with power-assisted 4-wheel disc brakes with antilock. Additional features included stability control, emergency braking assist, and traction control. The vehicle manufacturer recommended tire size was P265/70R18 with cold tire pressures of 248 kPa (36 PSI). The Nissan was equipped with Cooper Discoverer SRX tires, all of the recommended size. All tires were in good condition.

The Nissan had seating for seven occupants with front-row bucket seats, a split-bench second-row seat with forward-folding seatbacks, and a split-bench third-row seat with forward-folding seatbacks. All seats were equipped with adjustable head restraints. The driver's seat track was motorized and, at the time of SCI inspection, was adjusted 4 cm (1.6 in) forward of the middle position. The top of the driver's head restraint was adjusted to 24 cm (9.4 in) above the top of the seatback, and the seatback was reclined 20 degrees aft of vertical. The right-front occupant's seat track was adjusted to the middle position. The head restraint was adjusted 20 cm (7.9 in) above the top of the seat back, and the seat back was reclined to 20 degrees aft of vertical.

Exterior Damage

The Nissan sustained direct damage to the entire 165 cm (65.0 in) front plane (Figure 5) during the impact with the Hyundai. Crush measurements were documented on the front bumper beam and the Field L was 108 cm (42.5 in). The crush values were C_1 = 51 cm (20.1 in), C_2 = 57 cm (22.4 in), C_3 = 57 cm (22.4 in), C_4 = 52 cm (20.5 in), C_5 = 40 (15.7 in), and C_6 = 43 cm (16.9 in). The maximum residual crush was 57 cm (22.4 in), occurring 6 cm (2.4 in) right of the centerline of the vehicle.

Figure 5. Front plane damage to the Nissan

The damage algorithm of the WinSMASH program calculated the Nissan's total delta V as 55 km/h (34 mph). The longitudinal and lateral velocity changes were -55 km/h (-34 mph) and 0 km/h, respectively. The results appear reasonable. The collision deformation classification (CDC) was 12FDEW3 (0 degree).

Event Data Recorder

The Nissan's EDR was imaged with version 19.3 of the Bosch Crash Data Retrieval software and was reported with version 21.0.1. Electrical power was supplied by an external vehicle connected to the Nissan's fuse block, and the data were imaged via connection to the diagnostic link connector. The EDR report is attached at the end of this report in Appendix A.

The data limitations state that the air bag control unit was capable of recording deployment and non-deployment events. Two events could be recorded. If additional events occur subsequently, the older of the two events already recorded is overwritten. Non-deployment events can be overwritten by another non-deployment event or a deployment event. Deployment events have a higher priority than non-deployment events and cannot be interrupted or overwritten by another event. Data pertaining to deployment events are locked after being recorded. However, a second event can still be recorded subsequently in the portion of the event memory which is not locked. The ignition cycle counter at the time of the EDR image was 10,729. The EDR data were completely recorded.

The Nissan's EDR reported two events. Event Record 2 was a historical non-deployment event that occurred on ignition cycle 2,032 and was not related to this crash. Event Record 1 was a deployment event that occurred on ignition cycle 10,727 and was attributed to this crash.

The deployment event was recorded during the Nissan's impact with the Hyundai. The frontal air bag warning lamp status was "Off," and 28 diagnostic trouble codes (DTCs) were reported at the time of retrieval, 17 from the current event, and 11 from a previous event. These can be found on Page 3 of the EDR report in Appendix A. The record reported the seat belt status of the driver as "Off (Unfastened)" and the front-right passenger as "On (Fastened)." It is unknown why the driver's seat belt status was reported as such despite the evidence that the lap belt was in use. The frontal air bag suppression switch status was "Off" (indicating the passenger's frontal air bag was not suppressed at the time of the crash), and the occupant size classification of the front-right passenger was reported as "No" (indicating the passenger was not designated as a "child"). The maximum longitudinal and lateral velocity changes were -72 km/h (-45 mph) and -7 km/h (-4 mph), respectively. These occurred at 107.5 msec and 6.5 msec after AE, respectively. The pretensioners for both front seat belts actuated, and the first stage of the driver's and passenger's frontal air bags deployed 5 msec after AE. The second stage of the frontal air bags deployed 9 msec after AE. The right-seat-mounted and IC air bags deployed 58 msec after AE. The left seat-mounted and IC air bags were not commanded to deploy.

The EDR also recorded five seconds of pre-crash data. The Nissan's EDR-reported speed, accelerator pedal percent, engine rpm, motor rpm, service brake status, and steering input are presented in the table on the following page.

Time Stamp (sec)	Speed, Veh. Indicated (mph [km/h])	Accelerator Pedal, % full	Engine rpm	Motor rpm	Service Brake (ON, Off)	Steering Input (deg)
-5.0	60 [96]	7.5	1550	1550	Off	0
-4.5	60 [96]	7	1550	1550	Off	0
-4.0	59 [95]	6.5	1550	1550	Off	0
-3.5	59 [95]	7	1550	1550	Off	0
-3.0	59 [95]	9.5	1550	1550	Off	-2
-2.5	58 [94]	0.5	1550	1550	Off	0
-2.0	57 [92]	0	1500	1500	On	0
-1.5	50 [81]	0	1300	1300	On	8
-1.0	44 [71]	0	1150	1150	On	26
-0.5	37 [60]	0	1000	1000	On	12
0.0	37 [60]	0	1000	950-	On	12

Interior Damage

The Nissan's interior sustained minimal damage and intrusion to the occupant compartment from the frontal engagement with the Hyundai. The left toe pan/firewall was intruded longitudinally 8 cm (3.1 in) and the accelerator pedal was displaced 13 cm (5.1 in) to the left (Figure 6). Both accelerator and brake pedals were adjustable. According to family members, the driver set both pedals to their full-rear position (toward the driver), due to her short stature. At the time of the SCI inspection, the brake pedal was at its full-rear position and the accelerator pedal was at full-forward. Based on exemplary measurements, the Nissan's brake pedal assembly deformed forward 5 cm (2.0 in), indicating the driver was braking as the vehicles collided, but the adjustable brake position remained at full-rear. The accelerator pedal assembly deformed rearward 9 cm (3.5 in), also based on exemplary measurements. The movement of the accelerator pedal was likely due to toe pan/firewall intrusion. The windshield was fractured, but the remainder of the vehicle's glazing was undamaged, and all doors remained closed and operational.

Figure 6. The Nissan's displaced foot pedals

Figure 7. Lower half of the Nissan's steering wheel, deformed by the driver

The driver loaded through the deployed air bag and struck the steering wheel rim, deforming the lower half sector (Figure 7) of the rim forward approximately 13 cm (5.1 in). The driver's left

knee contacted and deformed the left aspect of the knee bolster (Figure 8). The driver's right knee also contacted and cracked the center aspect of the knee bolster**.**

Figure 8. Left instrument panel deformed by the Nissan driver's left knee

Manual Restraint Systems

The Nissan had manual 3-point lap and shoulder seat belts for the seven designated seat positions. The driver's seat belt system consisted of continuous loop webbing that retracted onto an emergency locking retractor (ELR) with a sliding latch plate, and the D-ring was adjusted to the full-down position. Both the retractor and buckle pretensioners actuated as a result of the crash. Rescue personnel cut the belt webbing to facilitate extrication.

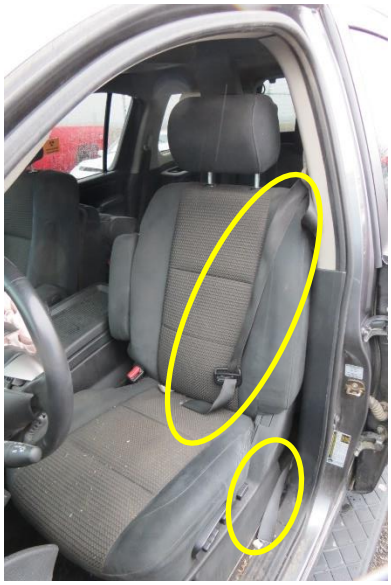


Figure 9. The Nissan driver's seat. Note cut seat belt.

The driver was using only the lap portion of her lap and shoulder seat belt system (Figure 9) and positioned the shoulder belt behind her back. Interviews with the driver's family and the investigating officer, who knew the family well, confirmed that this was routinely done by the driver due to her short stature. On-scene police images revealed that, as a result of the crash, the

lap belt rode up from the driver's waist as she translated forward and submarined the lap belt. The webbing probably folded over and cut through her t-shirt and abraded her upper abdomen. The lap belt webbing became wedged between the top of her stomach area and the bottom of her breasts. The vehicle's EDR reported the driver's seat belt as "Off (Unfastened)," but the abrasions on the driver's upper abdomen, a 10 cm (3.9 in) load mark on the belt webbing, and loading on the latch plate (Figure 10), as well as the belt being cut by rescue personnel indicate that the seat belt was worn. It remains undetermined why the EDR reported this seat belt as "Off (unfastened)." Inspection of the buckle pretensioner revealed indications that it had actuated (Figure 11). The cut seat belt webbing was in an extended position, would not retract, and was hanging from the D-ring, which indicated that the retractor had also actuated.

Figure 10. Load marks on the Nissan driver's latch plate belt guide

Figure 11. The Nissan driver's actuated buckle pretensioner

NHTSA and the vehicle manufacturer discussed the apparent disagreement between the physical evidence and the seat belt status reported in the EDR (which indicated the seat belt was not buckled); however, Nissan was unable to provide an answer. At the time of this discussion, the vehicle was no longer available for Nissan to inspect.

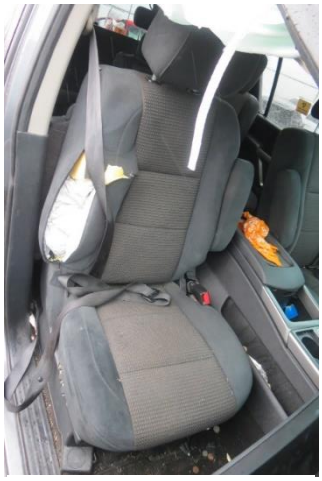


Figure 12. The Nissan's right- front seat. Note the length of the webbing to accommodate large occupant.

It should be noted that the Nissan's EDR reported that the driver's seat belt was off (unfastened). Yet the physical evidence of the SCI inspection and the driver's outcome indicate that the seat belt was buckled at the time of the crash.

The right-front passenger was restrained by his lap and shoulder belt. The seat belt system consisted of continuous loop webbing that retracted onto a switchable automatic locking retractor (ALR)/ELR with a sliding latch plate, and the upper anchor was adjusted to the full-up position. A long length of webbing was extended from the retractor due to the large size of the passenger (Figure 12). Both the retractor and buckle pretensioners actuated as a result of the crash. A 31 cm (12.2 in) long load mark was present on the belt webbing from the D-ring, 226 cm (89.0 in) from the floor anchor.

Supplemental Restraint Systems

The Nissan had six air bags consisting of dual-stage Certified Advanced 208-Compliant (CAC) frontal air bags for the driver and front-passenger positions, front-seat-mounted side-impact air bags, and dual sensing (side-impact and rollover) inflatable curtain (IC) air bags. Both frontal air bags deployed in this crash as did the right seat-mounted and IC air bags. Neither of the left-seat-mounted nor IC air bags deployed.

The driver's frontal air bag was mounted in the center hub of the steering wheel, and the module cover was a tri-flap configuration constructed of pliable vinyl. Each bottom flap measured 6 cm (2.4 in) wide at the bottom and 7 cm wide (2.8 in) at the top, and both flaps were 8.5 cm (3.1 in) high. The top flap was 13.5 cm (5.3 in) wide and 6 cm (2.4 in) high. The deflated air bag was 53 cm (20.9 in) in diameter (Figure 13). Blood stains were noted on the front-center and lower left portions as well as on the bottom of the back side. There were no discernable contacts or damage to the air bag.

Figure 13. The Nissan's deployed driver's air bag

The passenger's frontal air bag was mounted on the top of the instrument panel, and the module cover was a single flap configuration of stiff foam with a metal backing. The flap was 23 cm (9.1 in) wide and 13 cm (5.1 in) high. The deflated air bag measured 38 cm (5.3 in) in width and 52 cm (20.5 in) in height. There was no discernable occupant contact to the air bag, though there were small drops of blood on the right side of the front surface. There was also no damage to the air bag.

The front-passenger's seat-mounted air bag was located in the outboard side of the seat back and deployed through a tear seam. The deflated air bag was 27 cm (10.6 in) wide and 57 cm (22.4 in) high. There was no discernable evidence of occupant contact or damage to the air bag.

The right IC air bag was located along the roof rail inside the headliner and extended from immediately aft of the A-pillar to the C-pillar. The deflated IC air bag was 176 cm (69.3 in) in overall length, and there was a 22 cm (8.7 in) gap between the leading edge of the air bag and the bottom of the A-pillar. Vertically, the IC was 53 cm (20.9 in) high, and it extended 16 cm (6.3 in) below the beltline. The IC was tethered to the A-pillar. There was no damage to the IC air bag, though the tether had torn from the A-pillar. A small blood stain was present on the forward aspect of the IC, but no discernable contact evidence was present.

2015 Nissan Armada Occupants

Driver Demographics

Age/sex:	53 years/female
Height:	150 cm (59.0 in)
Weight:	86 kg (190 lb)
Eyewear:	None
Seat type:	Bucket with adjustable head restraint
Seat track position:	Between middle and full-forward
Manual restraint usage:	Lap belt portion only
Usage source:	SCI inspection, interview with family, investigating officer
Air bags:	Frontal deployed; seat-mounted and IC not deployed
Alcohol/drug data:	None
Egress from vehicle:	Fatal before removal
Transport from scene:	Unknown
Type of medical treatment:	None, deceased at scene

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Reported blunt force chest trauma, died without further substantiation of injury	400999.9	Tandem IPC Initial: Left air bag – steering wheel hub Secondary: Steering wheel (combination of rim and hub/spoke)	Possible Certain
2	Abrasion to upper abdomen	510202.1	Isolated Interior – Lap portion of belt restraint	Certain
3	Bruising to outer left forearm	710402.1	Isolated Front – Left instrument panel	Probable
4	Bruising to left arm above elbow	710402.1	Isolated Front – Left instrument panel	Probable
5	Bruising to knuckles of left hand	710402.1	Isolated Front – Left instrument panel	Probable

Source: surrogate interview and on-scene photos, no autopsy performed.

Driver Kinematics

The driver was seated in a normal driving posture and restrained by the lap portion of her seat belt system. The driver had a reported history of driving with the shoulder belt positioned behind

her back. This was observed in an on-scene image of the deceased driver in the vehicle prior to her removal. The driver's seat track was adjusted 4 cm (1.6 in) forward of the middle position and the seat back was reclined 20 degrees aft of vertical. The top of the head restraint was adjusted 24 cm (9.4 in) above the top of the seatback. She was dressed in blue jeans and a light blue t-shirt. It should be noted that the reported weight of the driver was estimated by a family member. Based on the estimated height and body weight, the body mass index for the driver was calculated to be 38. The lap belt appeared to have been positioned high on her abdomen at the onset of the crash.

The head-on crash with the Hyundai resulted in the deployment of the driver's frontal air bag and the actuation of the retractor and buckle pretensioners. The driver was displaced forward in response to the 12 o'clock crash forces. Due to the high position of the lap belt pre-crash, the driver submarined the lap belt. As her lower body translated forward, the lap belt cut through her t-shirt and abraded her upper abdomen and rode up from her waist. The lap belt folded over and became wedged between the top of her upper abdomen and the bottom of her breasts. Her abdomen loaded through the deployed air bag and engaged the steering assembly, displacing the lower half of the steering wheel rim forward 13 cm (5.1 in) and displaced the steering column upward. Her left knee contacted and deformed the left instrument panel, and her right knee contacted and cracked the knee bolster. Based on the on-scene image taken by the police, she sustained bruising to the outside of her left forearm and a small bruise above her left elbow, both of which were probably caused by contact to the left instrument panel. Abrasions to her left knuckles are also visible in the image, also likely caused by contact to the left instrument panel. The driver's family stated during the SCI interview that they had received information that the driver sustained blunt force trauma to her chest as a result of the contact to the steering assembly.

The Nissan rotated slightly counterclockwise after impact, and the driver rebounded rearward, coming to rest with her buttocks on the forward edge of the seat cushion and her shoulders against the lower seatback. The driver was pronounced deceased before removal from the vehicle. She did not receive any medical treatment, and an autopsy was not performed.

Front-Right Passenger Demographics

Age/sex:	13 years/male
Height:	178 cm (70 in)
Weight:	141 kg (311 lb)
Eyewear:	None
Seat type:	Bucket with adjustable head restraint
Seat track position:	Middle
Manual restraint usage:	Lap and shoulder belt
Usage source:	SCI inspection
Air Bags:	Frontal, seat back-mounted, and IC deployed
Alcohol/drug data:	None
Egress from vehicle:	Exited under own power
Transport from scene:	Ambulance to hospital
Medical treatment:	Admitted for 1 day

Front-Right Passenger Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Laceration to right eyelid and periocular regions, 1.5 cm long, 1 cm deep	210602.1	Isolated IPC Right Air Bag – Right top instrument panel	Probable
2	Laceration to posterior right elbow, 2 cm	710602.1	Isolated IPC Right door panel – unknown quadrant	Possible
3	Chest contusion	410402.1	Isolated IPC Interior – Shoulder portion of belt restraint	Certain
4	Abdominal contusion	510402.1	Isolated IPC Interior – Lap portion of belt restraint	Certain
5	Abdominal abrasion on right lower quadrant	510202.1	Isolated IPC Interior – Lap portion of belt restraint	Certain

Source: hospital records.

Front-Right Passenger Kinematics

The front-right passenger was restrained by the lap and shoulder seat belt. The seat track was adjusted to the middle position, and the seatback was reclined 20 degrees aft of vertical. The top of the head restraint was 20 cm (7.9 in) from the top of the seatback.

The front plane impact with the Hyundai resulted in the actuation of the occupant's retractor and buckle seat belt pretensioners and the deployment of the frontal, seat back-mounted, and IC air bags. The occupant was displaced forward, and he loaded his lap and shoulder seat belt. According to the family, he sustained contusions from his right shoulder to his left hip and from hip to hip from loading the lap and shoulder belt. He sustained a 1.5 cm (0.6 in) laceration near the right eye from contact to the deploying air bag. He also sustained a 2 cm (0.8 in) laceration on the posterior of the right elbow, possibly from contact with the right door panel. The occupant was transported by ambulance to a hospital and later transferred to a children's hospital, where he was admitted for one day.

2007 Hyundai Santa Fe

Description

The Hyundai (Figure 14) was a front-wheel drive, 5-occupant, 4-door SUV identified by Vehicle Identification Number 5NMSG13D47Hxxxxxx. It was manufactured in November 2006, equipped with a 2.7-liter, V-6 engine and a 4-speed transmission. The vehicle was also equipped with 4-wheel antilock brakes with stability control and electronic brake force distribution, and it was configured on a 270 cm (106.3 in) wheelbase. The manufacturer's listed curb weight was 1,721 kg (3,793 lb). The gross vehicle weight rating was 2,320 kg (5,115 lb) with front and rear gross axle ratings of 1,350 kg (2,976 lb) and 1,450 (3,197 lb), respectively. The manufacturer's recommended tire size was P235/70R16 front and rear. The front tires were Firestone Transforce HT, size LT225/75R16. These tires were extremely worn, with tread depths of 2.4 mm (2/32 in) left front and 0 mm on the right tire. Steel cords were protruding through inside edge of the right front tire. The rear tires were General Grabber HTS, size LT225/75R16. Both of these tires were in good condition prior to the crash.

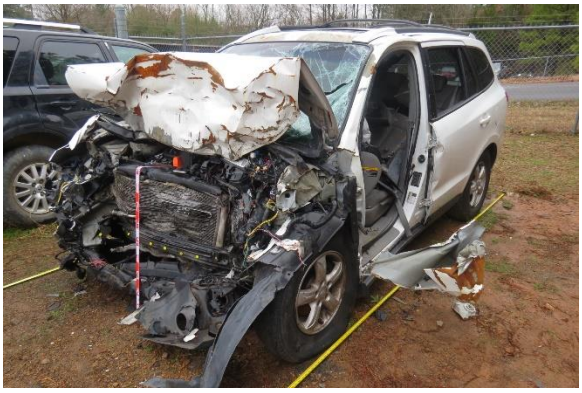


Figure 14. The 2007 Hyundai Santa Fe's front plane damage

Exterior Damage

The Hyundai sustained direct contact to the front plane as a result of impact with the front plane of the Nissan. The direct contact damage extended across the entire front plane, 170 cm (66.9 in). The Field L was 107 cm (42.1 in). Crush measurements were taken on the front bumper bar, and the maximum residual crush was 81 cm (31.9 in), occurring 52 cm (20.5 in) left of the centerline of the vehicle. The crush values were C_1 = 81 cm (31.9 in), C_2 = 71 cm (28.0 in), C_3 = 61 cm (24.0 in), C_4 = 56 cm (22.0 in), C_5 = 56 cm (22.0 in), and C_6 = 14 cm (5.5 in). The driver's frontal air bag deployed.

The damage algorithm of the WinSMASH program calculated the total delta V as 88 km/h (54.7 mph). The longitudinal and lateral velocity changes were -88 km/h (54.7 mph) and 0 km/h. The results appeared reasonable. The CDC for this impact was 12FDEW4 (0 degree).

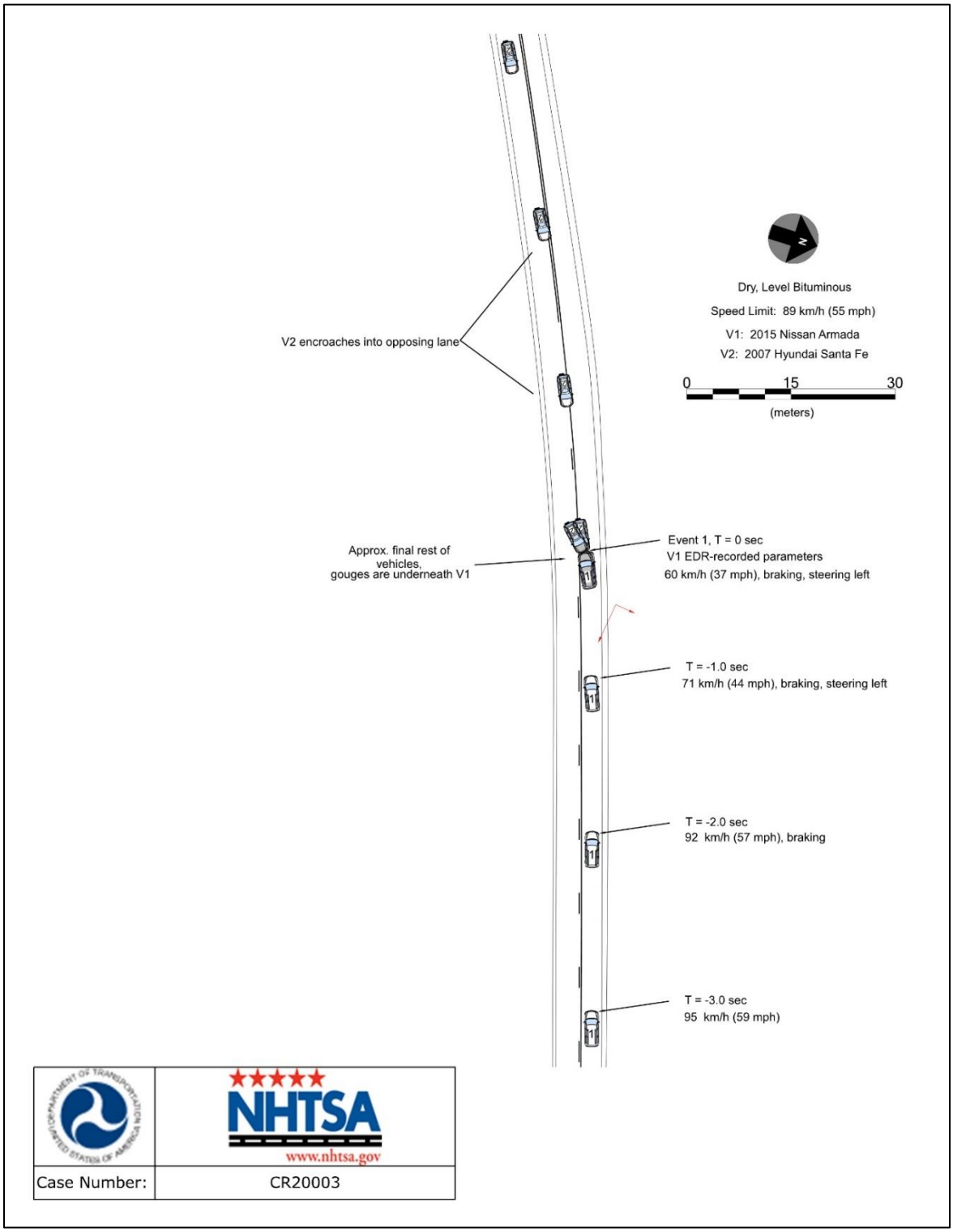
Event Data Recorder

This vehicle was not equipped with an EDR.

Occupant Data

The Hyundai was driven by a 44-year-old male who was restrained by his lap and shoulder seat belt, according to the police crash report. The driver sustained fatal injuries and had expired prior to removal from the vehicle.

Crash Diagram



Appendix A: Event Data Recorder Report for 2015 Nissan Armada[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	5N1BA0ND7FN******
User	
Case Number	
EDR Data Imaging Date	01/28/2020
Crash Date	
Filename	CR20003V1_ACM.CDRX
Saved on	Tuesday, January 28 2020 at 12:17:13
Imaged with CDR version	Crash Data Retrieval Tool 19.3
Imaged with Software Licensed to (Company Name)	NHTSA
Reported with CDR version	Crash Data Retrieval Tool 21.0.1
Reported with Software Licensed to (Company Name)	NHTSA
EDR Device Type	Airbag Control Module
Event(s) recovered	Event Record 1, Event Record 2

Comments

No comments entered.

Data Limitations

General Information:

Data limitations are intended to assist in reading event data that has been imaged from the vehicle's Air bag Control Unit (ACU). Event data should be considered in conjunction with other available physical evidence from the vehicle and scene.

Airbag Control Unit (ACU)

- The Air bag Control Unit (ACU) can store two types of events: Non-Deployment Events and Deployment.
    - A Non-Deployment Event is a crash or other physical occurrence which causes the ACU algorithm to be activated, but in which deployment thresholds are not reached.
    - A Deployment Event is a crash or other physical occurrence which causes ACU deployment thresholds to be reached or exceeded. Depending on the vehicle model, one or more of the following may be activated during a Deployment Event: front air bags, seat-mounted side airbags, roof-mounted or door-mounted curtain air bags, pretensioners, or pop-up roll bars.

- The ACU can record up to two events. If additional events occur subsequently, the older of the two events already recorded (i.e. the one which occurred first) is overwritten.
    - A Non-Deployment Event can be overwritten by another Non-Deployment event, or by a Deployment Event.
    - A Deployment Event has higher priority than a Non-Deployment Event, and cannot be interrupted or overwritten by another event.
    - The data pertaining to a Deployment Event is locked after being recorded. However, a second event can still be recorded subsequently in the portion of the event memory which is not locked.

- Event data includes both pre-crash data and crash data.
    - If the power supply to the ACU is lost during an event, all or part of the event data may not be recorded.
    - In addition to the recording of event data, the ACU has the ability to perform diagnostics and record Diagnostic Trouble Codes (DTCs).

Data Element Sign Convention:

The following table provides an explanation of the sign convention for data elements in the CDR report.

Data Element Name	Positive Sign Notation Indicates
Longitudinal Acceleration	Forward
Delta-V, Longitudinal	Forward
Maximum Delta-V, Longitudinal	Forward
Lateral Acceleration	Left to Right
Delta-V, Lateral	Left to Right
Maximum Delta-V, Lateral	Left to Right
Vehicle Roll Angle	Left to Right Rotation
Steering Input	Left Turn

- “Life Time Counter (sec)” indicates the elapsed time, in seconds, from the vehicle’s first ignition activation until the start of the first recorded event. The counter is incremented whenever the vehicle’s ignition is on. The counter is reset to 0 if the ACU is replaced.
- "Complete File Recorded" indicates whether a complete EDR data set has been stored after the event. "Yes" indicates that a complete data set has been recorded. "No" indicates that only a portion of the data set has been recorded, for example due to the power to the ACU being lost during the event.
- "Multi-Event, Number of Events (1, 2)" indicates the number of events which are stored during a given ignition cycle. A Multi-Event occurs whenever the time between Event 2 trigger threshold and Event 1 trigger threshold is less than or equal to 5 seconds during the same ignition cycle, and "2" will be recorded in this case. Otherwise, "1" will be recorded.
- "Air Bag Warning Lamp (On, Off)" indicates whether the ACU was in trouble mode or in normal operation mode at the time of the event. "On" indicates that the air bag warning lamp was illuminated at the time of the event, and the ACU was in trouble mode. "Off" indicates that the air bag warning lamp was not illuminated at the time of the event, and the ACU was in normal operation mode.
- "Frontal Air Bag Suppression Switch Status" indicates whether front passenger air bag deployment was suppressed at the time of the event. "On" indicates that the front passenger air bag was suppressed at the time of the event (deployment inhibited). "Off" indicates that the front passenger air bag was not suppressed at the time of the event (deployment enabled). This data will not be available for all vehicles.
- "Delta-V, Longitudinal" indicates the cumulative change in velocity along the longitudinal direction.
- "Acceleration, Longitudinal" indicates the rate of change of velocity with time along the longitudinal direction.
- "Delta-V, Lateral" indicates the cumulative change in velocity along the lateral direction.
- "Acceleration, Lateral" indicates the rate of change of velocity with time along the lateral direction.
- "Engine Throttle, % full" indicates the position of the accelerator pedal as a percentage of the fully depressed position.
- "Service Brake (On, Off)" indicates whether the service brake is activated ("On") or not activated ("Off").
- "Steering Input (deg)" indicates the angular displacement of the steering wheel measured in degrees. -250 deg indicates a 250 degree turn to the right of the steering wheel, 0 deg indicates the straight-ahead steering wheel position, and 250 deg indicates a 250 degree turn to the left of the steering wheel.
- The notation "CLP" indicates that the measurement captured by a sensor exceeded the design range of the sensor.
- “Seat Track Position Switch, Foremost, Status, Driver (Yes/No)” indicates whether the driver’s seat is positioned within a designated threshold value of the most forward adjustment position. “Yes” indicates that the driver’s seat is positioned within a designated threshold value of the most forward adjustment position. For all other adjustment positions, “No” is displayed. This data will not be available if the seat track position switch is not installed in the vehicle.
- “Occupant Size Classification, Right Front Passenger, Child (Yes/No)” indicates whether or not the right front passenger is classified as a child (as defined in 49 CFR part 572, subpart N or smaller). This data will not be available for all vehicles.
- “e-pedal ON/OFF Status” indicates whether “e-pedal” is activated (ON), or not activated (OFF). This data will not be available for all vehicles.
- “ABS Warning lamp, on/off” indicates whether “Anti-lock Brake System” was in trouble mode or in normal operation mode at the time of the event. This data will not be available for all vehicles.
- “AEB/FCW switch status ON/OFF (from ADAS)” indicates whether the switch of “Automatic Emergency Braking or Forward Collision Warning controlled by ADAS unit” was ON, or OFF at the time of the event. This data will not be available for all vehicles.
- “AEB Warning lamp (from ADAS)” indicates whether “Automatic Emergency Braking controlled by ADAS unit” was in trouble mode or in normal operation mode at the time of the event. This data will not be available for all vehicles.
- “ABS regulation status” indicates whether “Anti-lock Brake System” was activated (ABS in regulation), or not activated (no ABS regulation). This data will not be available for all vehicles.
- “VDC switch status ON/OFF” indicates whether the switch of “Vehicle Dynamic Control” in ON, or OFF. This data will not be available for all vehicles.
- “VDC status/warning” indicates whether “Vehicle Dynamic Control” was in normal operation mode and not activated (No failure and no control), in trouble mode and not activated (Failure), or in normal mode and activated (In active control). This data will not be available for all vehicles.
- “Adaptive Cruise Control status” indicates whether “Intelligent Cruise Control status” was activated (ACC activated), waiting (ACC waiting), suspended (ACC suspended), or not activated (No display request). This data will not be available for all vehicles.
- “AEB operating capability” indicates whether “Automatic Emergency Braking” was in trouble mode (Impossible to execute request) or in normal operation mode (Braking fully operational). This data will not be available for all vehicles.
- “AEB Brake request (from ADAS)” indicates whether “Automatic Emergency Braking controlled by ADAS unit” was activated (Brake Torque AEB Maximum), or not activated (No Brake Request). This data will not be available for all vehicles.

Hexadecimal Data:
All data that has been specified for retrieval is shown in the Hexadecimal Data section of this report. However, the Hexadecimal Data section may contain data that is not translated by the CDR tool.

Data Sources:
- Crash data is measured internally in the ACU.
- Pre-crash data is not measured internally in the ACU, but is transmitted from other control units through the Controller Area Network (CAN).
- Pre-crash data and crash data are asynchronous.

0701_Nissan001_r008

DTCs at Time of Retrieval

DTC	Status	Description
B1421	Current	FRONTAL COLLISION DETECTION
B1422	Current	SIDE COLLISION DETECTION
B0094	Current	CRASH ZONE SENSOR [DISCONNECT]
U1000	Current	(CAN COMMUNICATION FAILER)
B0001	Current	DRIVER AIRBAG MODULE CIRCUIT [GND-SHORT]
B0002	Current	DRIVER AIRBAG MODULE 2ND CIRCUIT [GND-SHORT]
B0010	Current	ASSIST AIRBAG MODULE CIRCUIT [OPEN]
B0011	Current	ASSIST AIRBAG MODULE 2ND CIRCUIT [OPEN]
B1431	Current	FRONT PRE-TEN RH CIRCUIT [OPEN]
B1430	Current	FRONT PRE-TEN LH CIRCUIT [OPEN]
B1433	Current	FRONT PRE-TEN2 RH CIRCUIT [OPEN]
B1432	Current	FRONT PRE-TEN2 LH CIRCUIT [OPEN]
B0028	Current	SIDE AIRBAG MODULE RH CIRCUIT [GND-SHORT]
B0029	Current	CURTAIN AIRBAG MODULE RH CIRCUIT [OPEN]
B002A	Current	FR CURTAIN AIRBAG MODULE RH CIRCUIT [OPEN]
B1421	Past	FRONTAL COLLISION DETECTION
B0093	Trouble Diag. Record	DOOR SATELLITE SENSOR LH [DISCONNECT]
B0098	Trouble Diag. Record	DOOR SATELLITE SENSOR RH [DISCONNECT]
B0001	Trouble Diag. Record	DRIVER AIRBAG MODULE CIRCUIT [OPEN]
B0002	Trouble Diag. Record	DRIVER AIRBAG MODULE 2ND CIRCUIT [OPEN]
B1433	Trouble Diag. Record	FRONT PRE-TEN2 RH CIRCUIT [OPEN]
B1432	Trouble Diag. Record	FRONT PRE-TEN2 LH CIRCUIT [OPEN]
B0028	Trouble Diag. Record	SIDE AIRBAG MODULE RH CIRCUIT [OPEN]
B0020	Trouble Diag. Record	SIDE AIRBAG MODULE LH CIRCUIT [OPEN]
B00A0	Trouble Diag. Record	OCCUPANT DETECTION SENSOR UNIT [NO DATA]
B142A	Trouble Diag. Record	IGN VOLTAGE [LOW]
B142B	Trouble Diag. Record	IGN VOLTAGE [LOW]

System Status at Event (Event Record 1)

Life Time Counter (sec)	11132412
Complete File Recorded (Yes/No)	Yes (Complete)
Ignition Cycle, Crash	10727
Ignition Cycle, Download	10729
Multi-Event, Number of Events (1, 2)	1
Time from Event 1 to 2 (sec)	N/A
Safety Belt Status, Driver	Off (Unfastened)
Safety Belt Status, Right Front Passenger	On (Fastened)
Frontal Air Bag Warning Lamp (On, Off)	Off
Frontal Air Bag Suppression Switch Status	Off (AS airbag deploy)
Maximum Delta-V, Longitudinal (MPH [km/h])	-45 [-72]
Time, Maximum Delta-V, Longitudinal (msec)	107.5
Maximum Delta-V, Lateral (MPH [km/h])	-4 [-7]
Time, Maximum Delta-V, Lateral (msec)	67.5
Maximum Acceleration, Longitudinal (g)	-60 (clp)
Time, Maximum Acceleration, Longitudinal (msec)	42.5
Maximum Acceleration, Lateral (g)	-25.5
Time, Maximum Acceleration, Lateral (msec)	30
Seat Track Position Switch, Foremost, Status, Driver (Yes/No)	N/A
Occupant Size Classification, Right Front Passenger, Child (Yes/No)	No

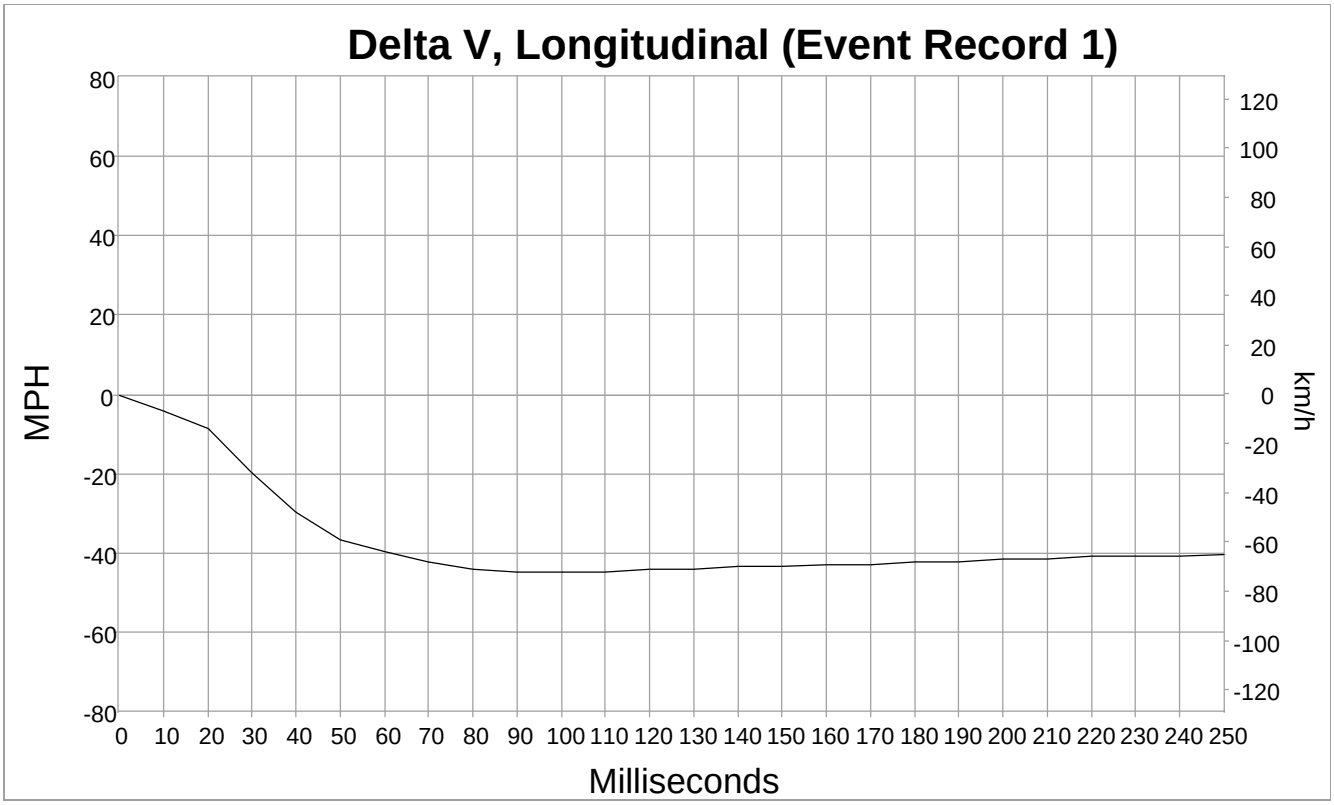
Deployment Command Data (Event Record 1)

Frontal Air Bag Deployment, Time to Deploy/First Stage, Driver (msec)	5
Frontal Air Bag Deployment, Time to Deploy/First Stage, Passenger (msec)	5
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (msec)	9
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (msec)	9
Side Air Bag Deployment, Time to Deploy, Driver (msec)	N/A
Side Air Bag Deployment, Time to Deploy, Right Front Passenger (msec)	58
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Driver Side (msec)	N/A
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Right Side (msec)	58
Pretensioner Deployment, Time to Fire, Driver (msec)	5
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	5

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

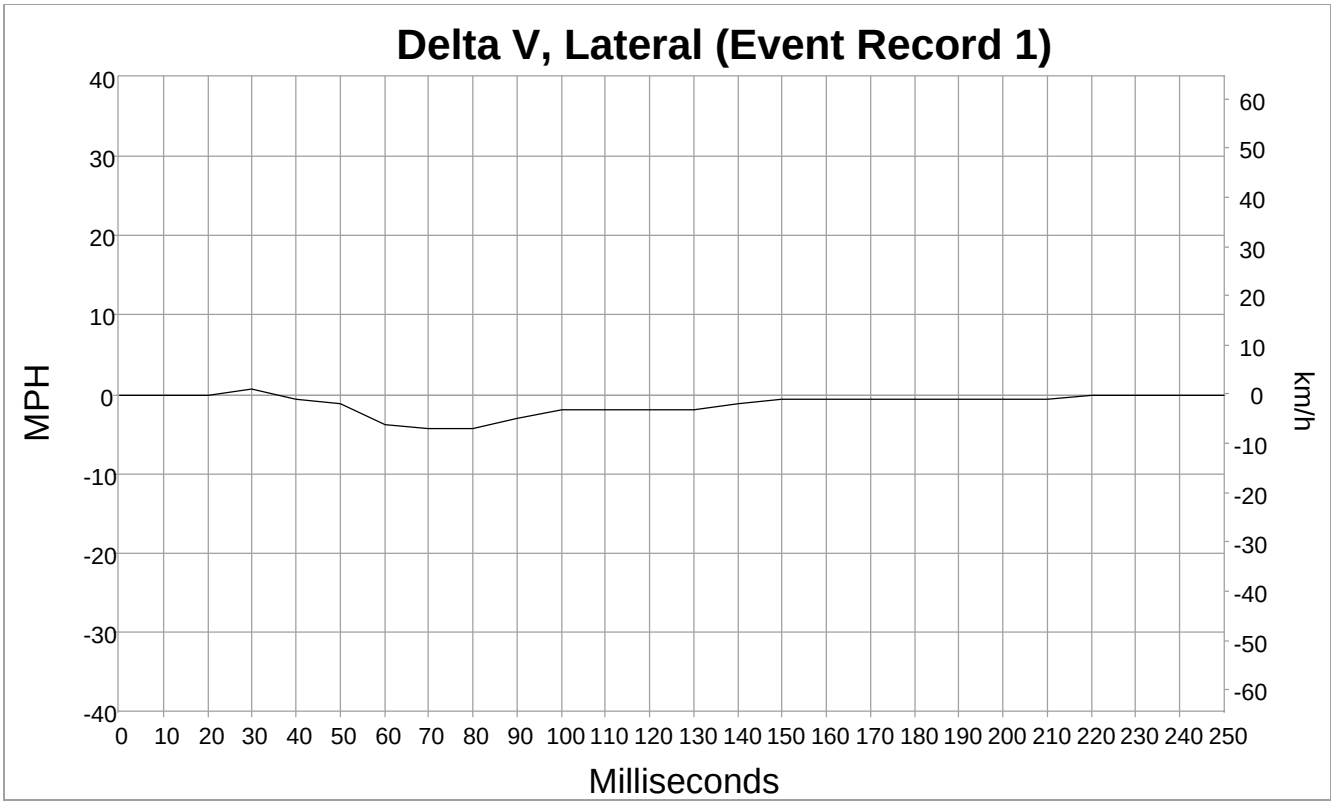
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % full	Engine RPM	Motor RPM	Service Brake (On, Off)	Steering Input (deg)
-5.0	60 [96]	7.5	1550	1550	Off (Brake Not Activated)	0
-4.5	60 [96]	7	1550	1550	Off (Brake Not Activated)	0
-4.0	59 [95]	6.5	1550	1550	Off (Brake Not Activated)	0
-3.5	59 [95]	7	1550	1550	Off (Brake Not Activated)	0
-3.0	59 [95]	9.5	1550	1550	Off (Brake Not Activated)	-2
-2.5	58 [94]	0.5	1550	1550	Off (Brake Not Activated)	0
-2.0	57 [92]	0	1500	1500	On (Brake Activated)	0
-1.5	50 [81]	0	1300	1300	On (Brake Activated)	8
-1.0	44 [71]	0	1150	1150	On (Brake Activated)	26
-0.5	37 [60]	0	1000	1000	On (Brake Activated)	12
0.0	37 [60]	0	1000	950	On (Brake Activated)	12



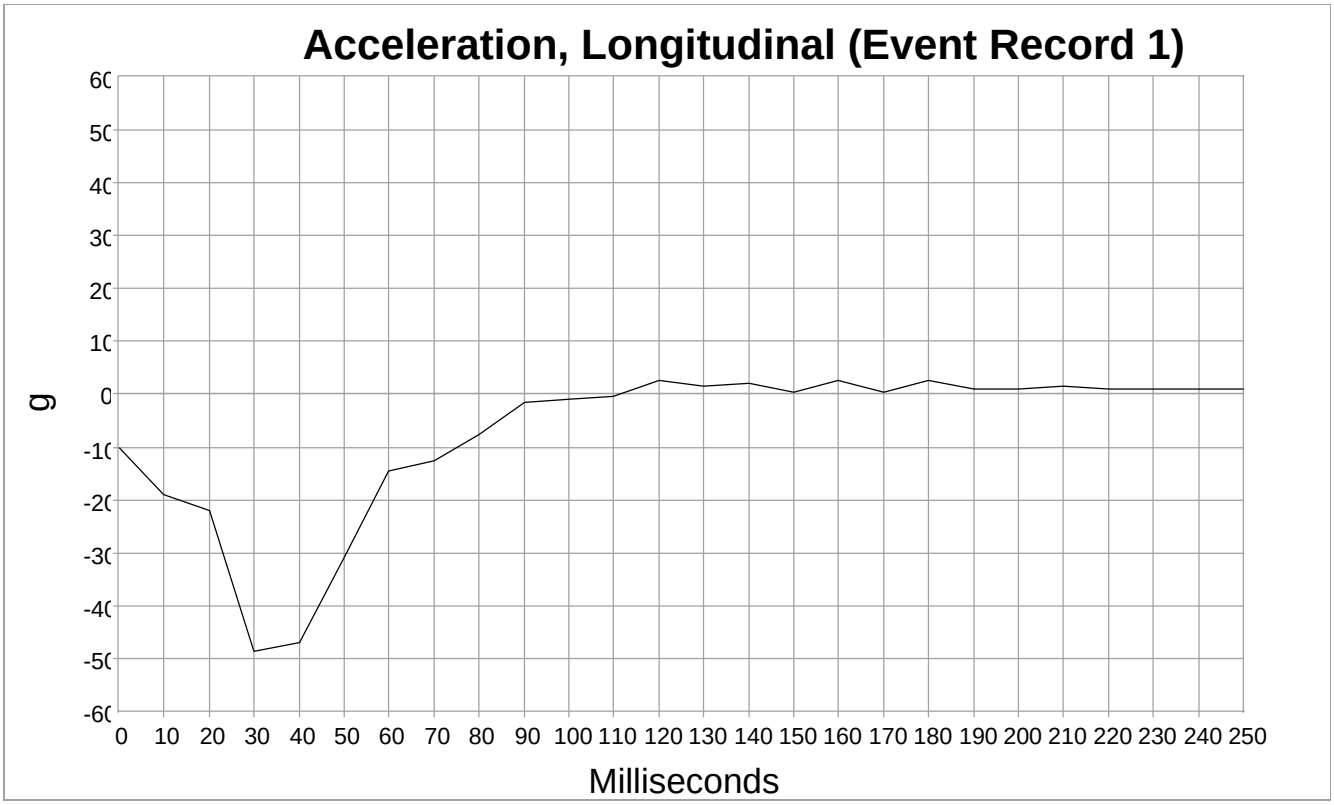
Longitudinal Delta V (Event Record 1)

Time (msec)	MPH [km/h]
0	0 [0]
10	-4 [-7]
20	-9 [-14]
30	-20 [-32]
40	-30 [-48]
50	-37 [-59]
60	-40 [-64]
70	-42 [-68]
80	-44 [-71]
90	-45 [-72]
100	-45 [-72]
110	-45 [-72]
120	-44 [-71]
130	-44 [-71]
140	-43 [-70]
150	-43 [-70]
160	-43 [-69]
170	-43 [-69]
180	-42 [-68]
190	-42 [-68]
200	-42 [-67]
210	-42 [-67]
220	-41 [-66]
230	-41 [-66]
240	-41 [-66]
250	-40 [-65]



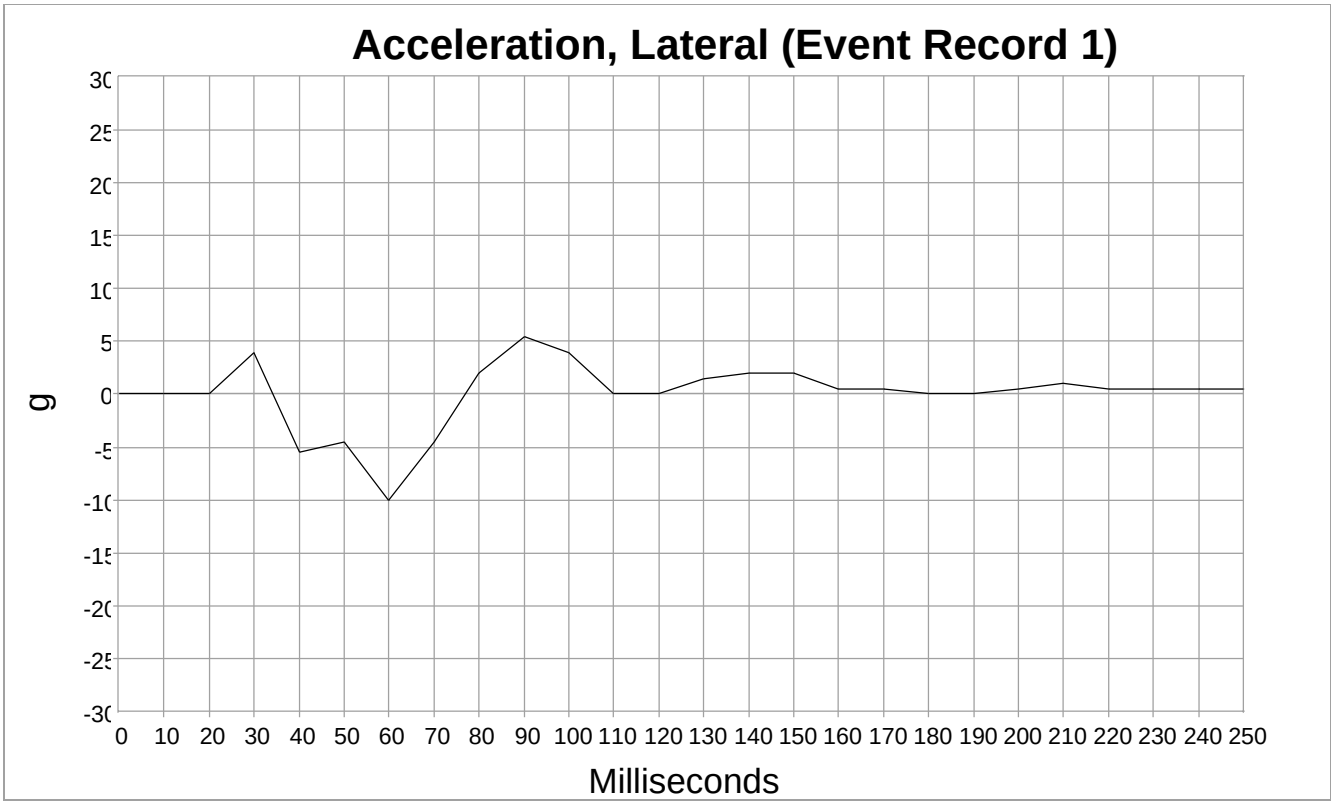
Lateral Delta V (Event Record 1)

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



Longitudinal Acceleration (Event Record 1)

Time (msec)	g
0	-10
10	-19
20	-22
30	-48.5
40	-47
50	-31
60	-14.5
70	-12.5
80	-7.5
90	-1.5
100	-1
110	-.5
120	2.5
130	1.5
140	2
150	.5
160	2.5
170	.5
180	2.5
190	1
200	1
210	1.5
220	1
230	1
240	1
250	1



Lateral Acceleration (Event Record 1)

Time (msec)	g
0	0
10	0
20	0
30	4
40	-5.5
50	-4.5
60	-10
70	-4.5
80	2
90	5.5
100	4
110	0
120	0
130	1.5
140	2
150	2
160	.5
170	.5
180	0
190	0
200	.5
210	1
220	.5
230	.5
240	.5
250	.5

System Status at Event (Event Record 2)

Life Time Counter (sec)	2332746
Complete File Recorded (Yes/No)	Yes (Complete)
Ignition Cycle, Crash	2032
Ignition Cycle, Download	10729
Multi-Event, Number of Events (1, 2)	1
Time from Event 1 to 2 (sec)	N/A
Safety Belt Status, Driver	On (Fastened)
Safety Belt Status, Right Front Passenger	Off (Unfastened)
Frontal Air Bag Warning Lamp (On, Off)	Off
Frontal Air Bag Suppression Switch Status	On (AS airbag inhibit)
Maximum Delta-V, Longitudinal (MPH [km/h])	-3 [-5]
Time, Maximum Delta-V, Longitudinal (msec)	300
Maximum Delta-V, Lateral (MPH [km/h])	1 [1]
Time, Maximum Delta-V, Lateral (msec)	197.5
Maximum Acceleration, Longitudinal (g)	-2.5
Time, Maximum Acceleration, Longitudinal (msec)	175
Maximum Acceleration, Lateral (g)	-3.5
Time, Maximum Acceleration, Lateral (msec)	212.5
Seat Track Position Switch, Foremost, Status, Driver (Yes/No)	N/A
Occupant Size Classification, Right Front Passenger, Child (Yes/No)	No

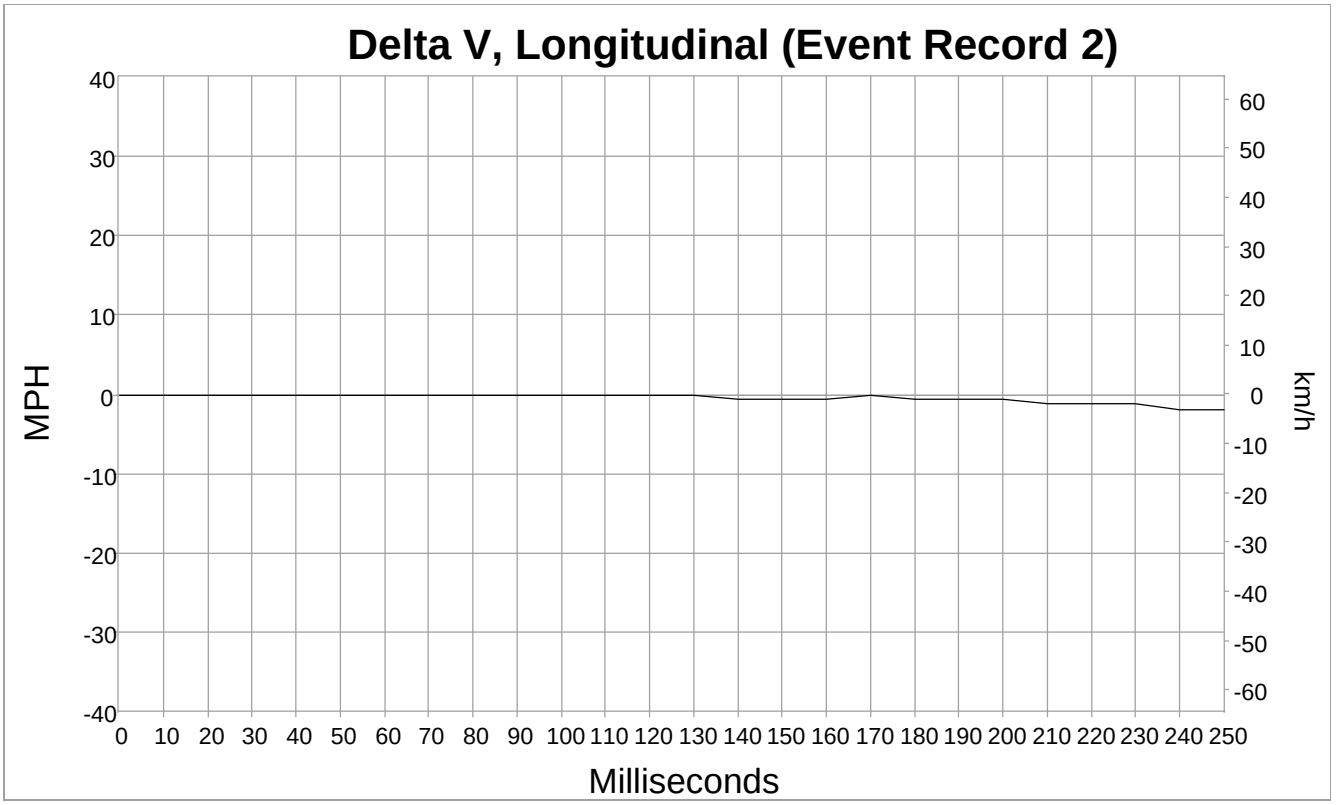
Deployment Command Data (Event Record 2)

Frontal Air Bag Deployment, Time to Deploy/First Stage, Driver (msec)	N/A
Frontal Air Bag Deployment, Time to Deploy/First Stage, Passenger (msec)	N/A
Frontal Air Bag Deployment, Time to 2nd Stage, Driver (msec)	N/A
Frontal Air Bag Deployment, Time to 2nd Stage, Right Front Passenger (msec)	N/A
Side Air Bag Deployment, Time to Deploy, Driver (msec)	N/A
Side Air Bag Deployment, Time to Deploy, Right Front Passenger (msec)	N/A
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Driver Side (msec)	N/A
Side Curtain/Tube Air Bag Deployment, Time to Deploy, Right Side (msec)	N/A
Pretensioner Deployment, Time to Fire, Driver (msec)	N/A
Pretensioner Deployment, Time to Fire, Right Front Passenger (msec)	N/A

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

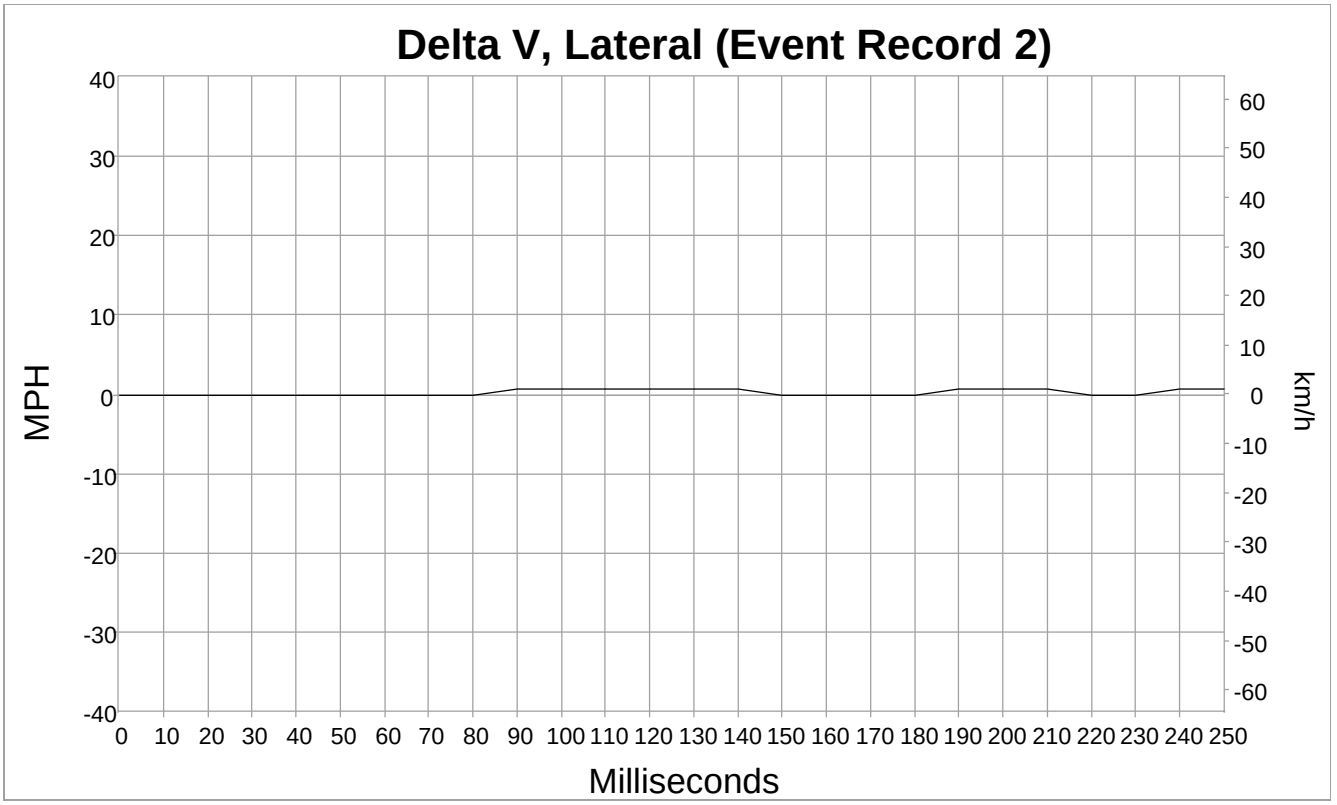
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Speed, Vehicle Indicated (MPH [km/h])	Accelerator Pedal, % full	Engine RPM	Motor RPM	Service Brake (On, Off)	Steering Input (deg)
-5.0	31 [50]	10	1400	950	Off (Brake Not Activated)	-10
-4.5	31 [50]	8.5	1350	1000	Off (Brake Not Activated)	-10
-4.0	31 [50]	9	1250	1000	Off (Brake Not Activated)	-10
-3.5	31 [50]	7	1250	950	Off (Brake Not Activated)	-8
-3.0	30 [48]	0	950	950	Off (Brake Not Activated)	-2
-2.5	30 [49]	100 (clp)	1750	950	Off (Brake Not Activated)	96
-2.0	30 [48]	100 (clp)	1650	950	Off (Brake Not Activated)	124
-1.5	29 [46]	100 (clp)	1900	1300	Off (Brake Not Activated)	92
-1.0	33 [53]	100 (clp)	2300	2200	Off (Brake Not Activated)	44
-0.5	29 [47]	100 (clp)	2350	2200	Off (Brake Not Activated)	52
0.0	30 [49]	100 (clp)	2400	2250	Off (Brake Not Activated)	46



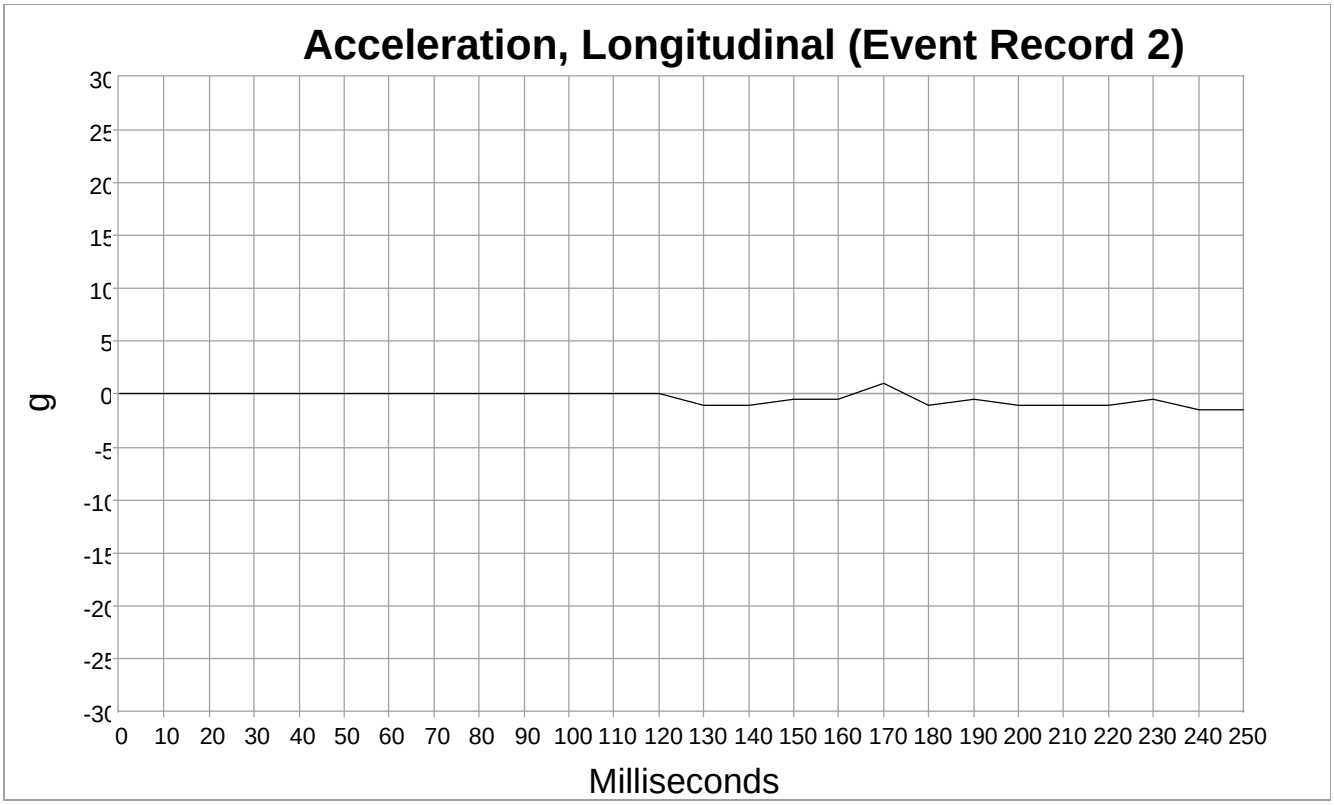
Longitudinal Delta V (Event Record 2)

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



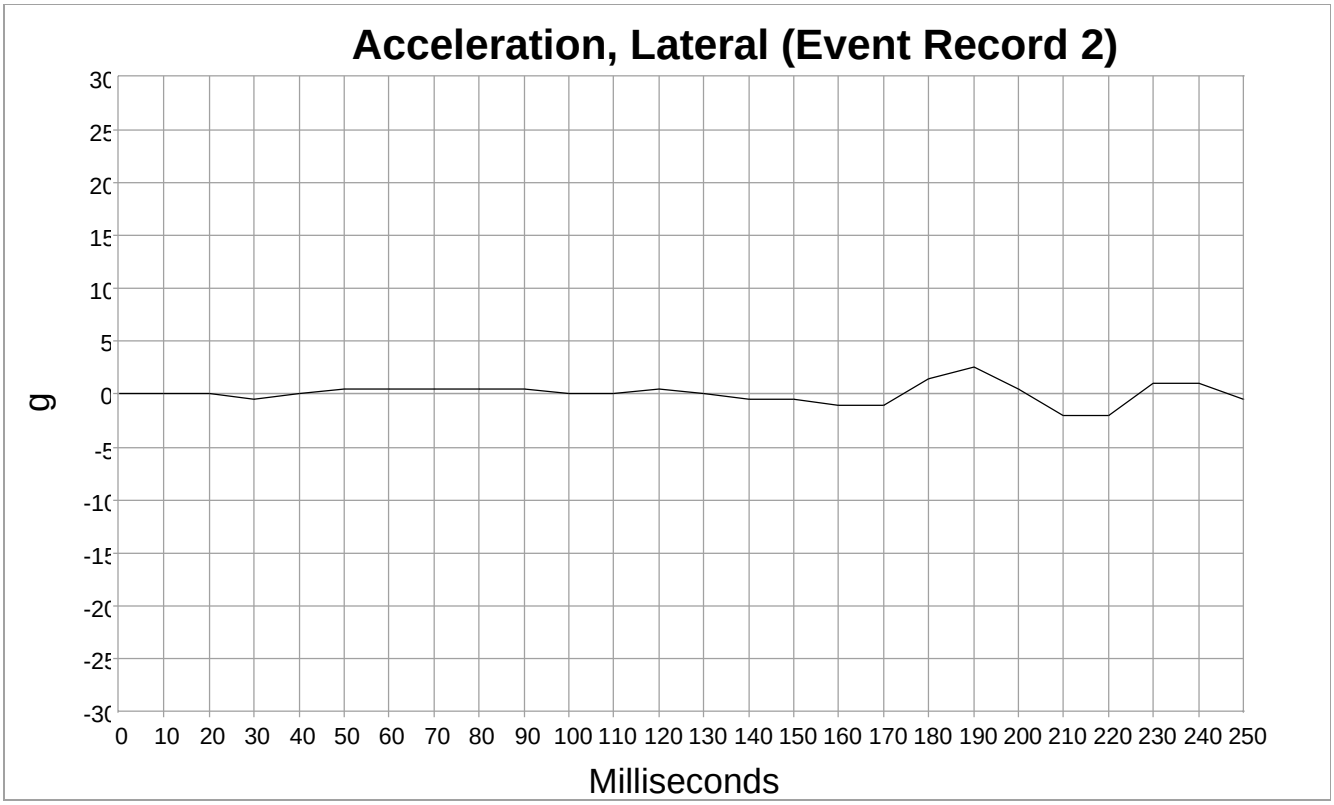
Lateral Delta V (Event Record 2)

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



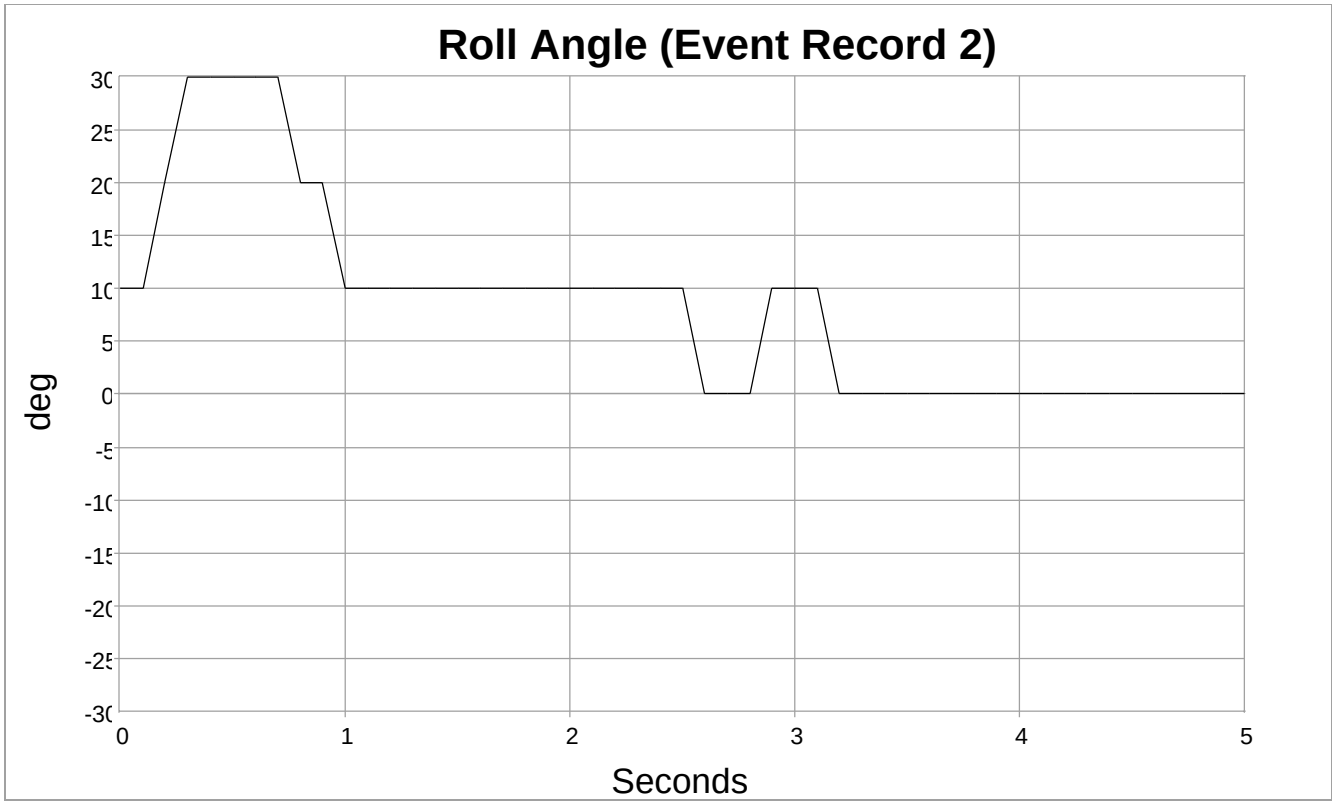
Longitudinal Acceleration (Event Record 2)

Time (msec)	g
0	0
10	0
20	0
30	0
40	0
50	0
60	0
70	0
80	0
90	0
100	0
110	0
120	0
130	-1
140	-1
150	-.5
160	-.5
170	1
180	-1
190	-.5
200	-1
210	-1
220	-1
230	-.5
240	-1.5
250	-1.5



Lateral Acceleration (Event Record 2)

Time (msec)	g
0	0
10	0
20	0
30	-.5
40	0
50	.5
60	.5
70	.5
80	.5
90	.5
100	0
110	0
120	.5
130	0
140	-.5
150	-.5
160	-1
170	-1
180	1.5
190	2.5
200	.5
210	-2
220	-2
230	1
240	1
250	-.5



Roll Angle (Event Record 2)

Time (sec)	deg
0.0	10
0.1	10
0.2	20
0.3	30
0.4	30
0.5	30
0.6	30
0.7	30
0.8	20
0.9	20
1.0	10
1.1	10
1.2	10
1.3	10
1.4	10
1.5	10
1.6	10
1.7	10
1.8	10
1.9	10
2.0	10
2.1	10
2.2	10
2.3	10
2.4	10
2.5	10
2.6	0
2.7	0

2.8	0
2.9	10
3.0	10
3.1	10
3.2	0
3.3	0
3.4	0
3.5	0
3.6	0
3.7	0
3.8	0
3.9	0
4.0	0
4.1	0
4.2	0
4.3	0
4.4	0
4.5	0
4.6	0
4.7	0
4.8	0
4.9	0
5.0	0

Hexadecimal Data


```
61 01 00 01 00 94 21 00 94 22 00 80 94 88 D0 00 01 80 01 11 80 02 11 80 10 13 80 11 13 94
31 13 94 30 13 94 33 13 94 32 13 80 28 11 80 29 13 80 2A 13 00 00 00 14 01 01 44 FF 00 01

61 02 80 93 88 00 10 01 02 00 00 27 00 80 98 88 00 10 01 02 00 00 27 00 80 01 13 00 00 01
04 00 00 27 00 80 02 13 00 00 01 04 00 00 27 00 94 33 13 00 00 01 04 00 00 27 00 94 32 13
00 00 01 04 00 00 27 00 80 28 13 00 00 01 05 00 00 27 00 80 20 13 00 00 01 05 00 00 27 00
80 A0 88 00 06 01 12 00 00 27 00 94 2A 16 00 00 01 0A 00 00 27 00 94 2B 16 00 00 01 0A 00
00 27 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

61 03 94 21 00 00 00 01 21 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

61 04 00 00 01 43 00 00 14 00 00 00 00 00 00

61 06 00 01 05 09 09 09 09 06 06 09 09 09 09 0D 0D 0A 0F 0A 0F 0A 0E 0A 0E FF FF FF 10 10
FF 32 3E FF FF FF FF FF 10 FF FF FF FF FF FF FF FF 3F 3F FF FF 00 00 00 00 00 00 00 00 00
00 00 00 00 FF FF FF FF FF FF 18 FF 00 00 00 00 FF FF FF 00 FF 10 10 08 10 10 1A FF 18 1A
0B 10 19 FF 30 81 00 8B 80 55 55 55 55 00 00 00

61 19 00 00 80 00 00 00 80 00 00 00 80 00 00 00 40 00 00 00 40 00 00 00 40 00 00 00 80 00
00 00 80 00 00 19 00 00 00 05 00 00 FF FF CC CD 00 00 40 00 00 00 40 00 00 19 00 00

61 1A 00 F9 F2 E0 D0 C5 C0 BC B9 B8 B8 B8 B9 B9 BA BA BB BB BC BC BD BD BE BE BE BF B8 2B
00 60 00 60 00 5F 00 5F 00 5F 00 5E 00 5C 00 51 00 47 00 3C 00 3C 00 0F 00 0E 00 0D 00 0E
00 13 00 01 00 00 00 00 00 00 00 00 00 00 01 01 01 01 01 01 00 00 00 00 00 29 E7 29 E9 01
01 05 05 01 FF 00 00 01 09 09 00 3A 00 3A 05 05 00 00 00 08 F5 F7 EC F7 04 0B 08 00 00 03
04 04 01 01 00 00 01 02 01 01 01 01

61 1B EC DA D4 9F A2 C2 E3 E7 F1 FD FE FF 05 03 04 01 05 01 05 02 02 03 02 02 02 02 00 00
00 01 FF FE FA F9 F9 FB FD FD FD FD FE FF FF FF FF FF FF FF 00 00 00 00 F9 1B 00 1F 00 1F
00 1F 00 1F 00 1F 00 1F 00 1E 00 1A 00 17 00 14 00 14

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7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F 7F
7F 7F 7F 00 00 00 00 00 00 00 00 00 00 01 00 00 00 00 FF FC FF F3 FF FA FF FA 88 11 CD 0C 00
1F 00 1F 00 1F 00 1F 00 1F 00 1F 00 1E 00 1A 00 17 00 14 00 13 FF FF 01 FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF 00 A9 DD FC

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00 00 00 C8 00 C8 00 C8 00 C8 00 C8 00 C8 01 01 01 01 01 01 01 01 01 01 01 07 F0 29 E9 00
01 00 00 01 FF 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 FF 00 01 01 01 01 01 00 00 01 00
FF FF FE FE 03 05 01 FC FC 02 02 FF

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00 00 00 00 00 00 00 01 01 01 01 01 01 00 00 00 00 01 01 01 00 00 01 01 01 4F 00 1C 00 1B
00 19 00 19 00 13 00 23 00 21 00 26 00 2E 00 2F 00 30

61 1F 00 00 01 01 01 01 01 01 01 02 01 01 02 03 03 03 03 03 02 02 01 01 01 01 01 01 01 01
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00 00 00 00 05 00 05 00 05 00 04 00 01 FF D0 FF C2 FF D2 FF EA FF E6 FF E9 FB 46 F9 55 00
13 00 14 00 14 00 13 00 13 00 13 00 13 00 1A 00 2C 00 2C 00 2D FF FF 01 FF FF FF FF FF FF
FF FF FF FF FF FF FF FF FF FF FF FF FF 00 23 98 4A

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0x04001E40 07 FF FF FF
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0x04001FCC 07 FF FF FF

0x04001EA2 00 09

0x04001EA6 00 09

0x04001EA4 00 11

0x04001EA8 00 11

0x04001EB8 00 00

0x04001EB6 00 73

0x04001EC0 00 00

0x04001EBE 00 73

0x04001EAC 00 09

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0x0400204C 00 00

0x0400204A 00 00

0x04002038 00 00

0x04002036 00 00

0x04001E3C 00 03 80 1A

0x04001FC8 10 01 80 52

59 02 09 94 21 00 09 94 22 00 09 80 94 88 09 D0 00 01 09 80 01 11 09 80 02 11 09 80 10 13
09 80 11 13 09 94 31 13 09 94 30 13 09 94 33 13 09 94 32 13 09 80 28 11 09 80 29 13 09 80
2A 13 09

59 02 09 94 21 00 08

59 0F 08 80 93 88 08 80 98 88 08 80 01 13 08 80 02 13 08 94 33 13 08 94 32 13 08 80 28 13
08 80 20 13 08 80 A0 88 08 94 2A 16 08 94 2B 16 08

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of Transportation

**National Highway
Traffic Safety
Administration**

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