INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER

ON-SITE AMBULANCE CRASH INVESTIGATION

CASE NUMBER - IN11023
LOCATION - WISCONSIN
VEHICLE - 2010 CHEVROLET EXPRESS G3500 TYPE III AMBULANCE
CRASH DATE - July 2010

Submitted:

January 30, 2012

Contract Number: DTNH22-07-C-00044

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

Technical Report Documentation Page

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16. *Abstract*

The focus of this on-site investigation was the crash damage to a 2010 Chevrolet Express G3500 Type III ambulance. Additional focus was on the sources of the injuries to the four occupants of the ambulance. The ambulance crew were conducting a non-emergency transfer and the ambulance was operating without the emergency lights and siren activated. The ambulance was equipped with frontal air bags and a Type III patient compartment. The ambulance was occupied by a restrained 21-year-old male driver, an unrestrained 20-year-old male Emergency Medical Technician (EMT), and an unrestrained 23-year-old male EMT student. The EMTs were attending to a 19-year-old male patient. The patient was restrained on a Stryker 6500 Power Pro XT patient cot. He was being transported to a hospital for treatment of severe alcohol intoxication. He was not being administered oxygen or IV fluids. The crash occurred within a 4-leg urban intersection when the driver of a 2000 Honda Accord LX initiated a left turn in front of the ambulance. The front plane of the ambulance impacted the front plane of the Honda (event 1). The impact caused the ambulance to rotate clockwise and roll over, left side leading (event 2). As the ambulance rolled over, the left plane impacted the top plane of the Honda (event 3). The left plane of the ambulance remained on top of the Honda as the ambulance departed the south side of the roadway where the front plane impacted an electrical junction box (event 4), a 30 cm (12 in) diameter street sign pole (event 5), and the upper front right corner of the patient compartment impacted a 60 cm (23.6 in) diameter tree (event 6). The front plane of the Honda impacted the back plane of a parked 2002 Hyundai Elantra GL (event 7). This impact projected the Hyundai forward and its front plane impacted the back plane of a parked 1992 Honda Accord EX (event 8). The ambulance rolled back to the right onto its wheels and came to final rest heading south. The 2000 Honda came to final rest heading southeast. The Hyundai came to final rest heading northeast with its front plane against the back plane of the 1992 Honda, which was heading east. The EMT student, EMT, and patient were transported by ground ambulance to a hospital. The EMT student and EMT were treated in the emergency room and released. The patient was not injured and was held overnight due to his level of intoxication. The driver sustained minor injuries but he was not transported or medically treated. The vehicles were towed due to damage.

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ON-SITE AMBULANCE CRASH INVESTIGATION

CASE NUMBER - IN11023

LOCATION - INDIANA

VEHICLE - 2010 CHEVROLET EXPRESS G3500 TYPE III AMBULANCE

CRASH DATE - July 2011

BACKGROUND

The focus of this on-site investigation was the crash damage to a 2010 Chevrolet Express G3500 Type III ambulance (**Figure 1**). Additional focus was on the sources of the injuries to the four occupants of the ambulance. This crash was initiated by the National Highway Traffic Safety Administration (NHTSA) on July 5, 2011 through NHTSA's Office of Emergency Medical Services (EMS). This investigation was assigned on July 15, 2011. This crash involved the ambulance, a 2000 Honda Accord LX, a parked 2002 Hyundai Elantra GLS, and a parked 1992 Honda Accord EX. The crash occurred in July, 2011, at 2138 hours, in Wisconsin and was investigated by a municipal police department. The ambulance and crash scene were inspected July 17, 2011. The director of operations of the ambulance company was interviewed on July 17, 2011. The driver of the ambulance was interviewed on August 1, 2011. A copy of the ambulance's on-board video was obtained and reviewed.

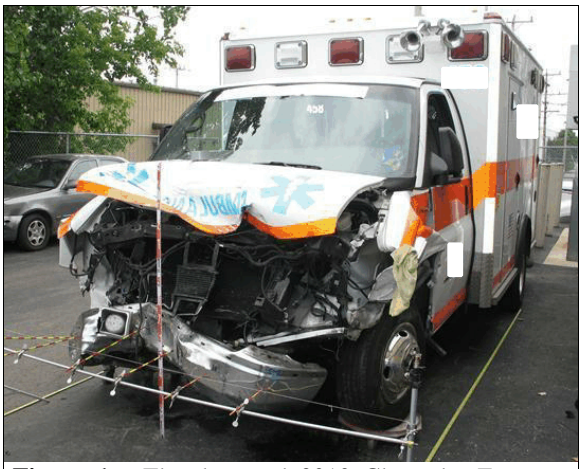


Figure 1: The damaged 2010 Chevrolet Express G3500 Type III ambulance

This crash occurred within a 4-leg urban intersection when the driver of the Honda initiated a left turn in front of the ambulance. The ambulance crew were conducting a non-emergency transfer and the ambulance was operating without the emergency lights and siren activated. The ambulance was equipped with frontal air bags and a Type III patient compartment. The ambulance was also equipped with an on-board video camera, which captured images of the crash. The ambulance was occupied by a restrained 21-year-old male driver, an unrestrained 20-year-old male Emergency Medical Technician (EMT) and an unrestrained 23-year-old male EMT student. The EMTs were attending to a 19-year-old male patient. The patient was restrained on a Stryker 6500 Power Pro XT patient cot. The patient was being transported to a hospital for treatment of severe alcohol intoxication. He was not being administered oxygen or IV fluids. The EMT student, EMT, and patient were transported by ground ambulance to a hospital for medical treatment. The EMT student and EMT were treated in the emergency room and released. The patient was not injured and was held overnight due to his level of intoxication. The driver sustained minor injuries, but he was not transported or medically treated. The Honda was a 4-door sedan, equipped with frontal air bags. The vehicle was occupied by an unrestrained 20-year-old female driver and a restrained 19-year-old female front right passenger. Both sustained "C" (possible)

injuries and were transported by ground ambulance to a hospital. Their injury and treatment status were not determined.

The ambulance was operated by a private company that provided contract ambulance service to a 4-county area coving 2,193 square kilometers (1,363 square miles). The ambulance service had been in operation since 1970 and operated a fleet of 41 ambulances. The ambulance service provided 9-1-1 emergency response as well as emergency and non-emergency transfer of patients. The company provided its drivers with an ambulance driver training course from the National Safety Council. The course consisted of approximately three hours of video instruction and 16 hours of behind-the-wheel training with an instructor.

The driver of the ambulance was an EMT and full-time employee of the ambulance company. He had been an employee for approximately two years and had been an EMT and ambulance driver for the same length of time. His total experience as an ambulance driver was also two years. His work schedule comprised a 24 hour shift, three days a week. He did not work the day prior to the crash. On the day of the crash, he began work at 0700 hours.

The EMT was seated in the front seating position of the three-person bench seat located along the right side of the patient compartment. He was a full-time employee and had worked for the ambulance service for four months. His work schedule consisted of a 24 hour shift, three days a week. He did not work the day prior to the crash. On the day of the crash, he began work at 0700 hours.

The student EMT was seated in the rear-facing seat located in the front left of the patient compartment. He was participating in a "Ride-along" as part of his EMT training. He was not an employee of the ambulance company and this was his first "Ride-along" training experience.

The patient had been attending a local music festival where he became severely intoxicated. He was being transported to a hospital for treatment of alcohol intoxication.

CRASH SUMMARY

Crash Site: This crash occurred within the 4-leg intersection of a 4-lane, undivided, city street and a 3-lane, undivided, city street. The crash occurred during nighttime hours with overhead lighting and clear weather conditions. The ambulance and the Honda were traveling in opposite directions on the 4-lane undivided city street approaching the intersection. The roadway traversed in an east-west direction and had two lanes in each direction. Each lane was approximately 3.4 m (11.2 ft) in width. The roadway pavement markings consisted of broken white lane lines and double yellow center lines. The intersecting roadway was a one-way southbound, 3-lane city street. The roadways were bordered by sidewalks and 12 cm (4.7 in) high concrete curbs. The intersection was controlled by 3-phase traffic signals. The traffic signal was on the green phase for both vehicles. The roadway surfaces were dry, level bituminous, but the area within the intersection was brick. The speed limit was 48 km/h (30 mph). The Scene Diagram is on page 16 of this report.

Pre-Crash: The ambulance was traveling east (**Figure 2**) in the second lane from the right and the driver was intending to proceed straight through the intersection. The ambulance was on a non-emergency transfer and the emergency lights and siren were not activated. The Honda was traveling west in the second lane from the right and the driver was intending to turn left at the intersection to proceed southbound. The driver of the ambulance stated during the SCI interview that he steered right and applied the brakes in an attempt to avoid the crash. The ambulance was equipped with an Event Data Recorder (EDR), which recorded 2.5 sec of pre-crash data. The EDR reported the vehicle's speed as 78.8 km/h (49 mph) at 2.5 sec prior to Algorithm Enable (AE) decelerating to 69.2 km/h (43 mph) at 0.5 seconds prior to AE, which was the limit of the recording. The EDR reported the brake switch circuit as "On" from 2.5 sec to 0.5 sec prior to AE. The EDR report is attached at the end of this report.

Figure 2: Eastbound approach of ambulance into the intersection; arrow shows approach of Honda turning left

Figure 3: Front bumper damage to the ambulance from the impact with the Honda; the front plane also sustained overlapping damage during events 4, 5, and 6.

Crash: The front plane of the ambulance (**Figure 3**) impacted the front plane of the Honda (event 1). The force direction on the ambulance was within the 11 o'clock sector and the impact triggered a first stage deployment of both frontal air bags. Both frontal air bags in the Honda also deployed. The calculated total Delta V for the ambulance was 17 km/h (10.6 mph). The longitudinal and lateral velocity changes were -13 km/h (-8.1 mph) and 11 km/h (6.8 mph), respectively. The ambulance's EDR reported the maximum longitudinal and lateral velocity changes as -15.50 km/h (-9.69 mph) and 10.67 km/h (6.63 mph). The calculated Delta V for the Honda was 63 km/h (39.1 mph). The longitudinal and lateral velocity changes were -62 km/h (-38.5 mph) and -11 km/h (-6.8 mph), respectively. The impact caused the ambulance to rotate clockwise approximately 55 degrees as it was redirected southeast approximately 9 m (30 ft) and it rolled over, left side leading (event 2). As the ambulance rolled over, the left plane impacted the top plane of the Honda (event 3). The two vehicles remained engaged as they traversed an additional 5.4 m (17.7 ft) and departed the south side of the roadway. The left plane of the ambulance remained on top the Honda as the front plane of the ambulance impacted an electrical junction box (event 4), a 30 cm (12 in) diameter street sign pole (event 5), and the upper front right corner of the patient compartment (**Figure 4**) impacted a 60 cm (23.6 in) diameter tree (event 6, **Figure 5**). The front plane of the Honda impacted the back plane of the parked Hyundai (event 7). This impact projected the Hyundai forward and its front plane impacted the back plane of a parked 1992 Honda (event 8). The ambulance rolled back to the

right onto its wheels and came to final rest heading south with the front wheels on the sidewalk and the rear wheels on the roadway. The 2000 Honda came to final rest heading southeast, with its right front wheel on the sidewalk. The Hyundai came to final rest heading northeast with its front plane against the back plane of the 1992 Honda, which was heading east at final rest.

Figure 4: Damage on the upper front right corner of the patient compartment from impact with the tree; arrow shows bark from tree

Figure 5: View southeast; arrow shows damage to the tree from the impact by the upper front right corner of the ambulance's patient compartment

Post-Crash: The police were notified of the crash at 2143 hours and arrived on scene at 2144 hours. Emergency medical and rescue services also responded to the crash scene. The driver of the ambulance exited the vehicle without assistance through the left front door. He was taken to a hospital by a non-emergency vehicle for company required drug/alcohol testing. He did not receive any medical treatment. The EMT and student EMT both exited the vehicle without assistance through the patient loading doors. They were transported by ground ambulance to a hospital where they were treated in the emergency room and released. The patient was removed from the vehicle through the patient loading doors by emergency responders. He was transported to a hospital an examined in the emergency room. He sustained no injuries and remained overnight in the emergency room due to his level of intoxication. The driver and front right passenger of the Honda sustained police reported C (possible) injuries and were transported by ambulance to a hospital. Their treatment status was not determined. All vehicles except the parked Honda were towed from the crash scene due to damage.

2010 CHEVROLET EXPRESS G3500 TYPE III AMBULANCE

DESCRIPTION

The Chevrolet was a rear-wheel drive, 2-passenger, 2-door, cutaway van (VIN: 1GB6G2B60A1xxxxxx) manufactured in August, 2009. The ambulance was assembled by LifeStar Rescue, Inc. in March, 2010 and was identified as a "remount" assembly on the manufacturer's certification placard. The vehicle was equipped with a 6.6-liter, V-8 diesel engine, a 6-speed automatic transmission, 4-wheel, anti-lock brakes with Electronic Brake force distribution, traction control, Electronic Stability Control (ESC) and an EDR. The front row was equipped with box-mounted seats, integral head restraints, lap-and-shoulder safety belts, a tilt

steering column that was adjusted to the middle position, and driver and front right passenger frontal air bags. The patient compartment was configured with a rear-facing, box-mounted seat located behind the driver. The seat was equipped with an integral head restraint and integrated lap-and-shoulder safety belt. A three passenger bench seat with lap safety belts was located along the right side of patient compartment. There was also a right side entry door, double rear doors for patient loading, and multiple storage cabinets along the left side and front. The windshield glazing was AS1 laminated. The left front, right front, right rear, and backlight glazing were all AS2 tempered. Prior to the crash, all of the glazing was either closed or fixed. The vehicle's mileage at the SCI inspection was 104,439 km/h (64,895 miles). The specified wheelbase was 353 cm (139 in).

The vehicle manufacturer's recommended tire size was LT225/75R16 for the front and rear tires. The vehicle was equipped with tires of the recommended size. The recommended cold tire pressure was 448 kPa (65 psi) for the front and rear tires. The ambulance's tire data are presented in the table below. The tire pressure for the inside rear tires could not be measured since the valve stems were not accessible.

Position	*Measured Pressure*	*Measured Tread Depth*	*Restricted*	*Damage*
LF	496 kPa (72 psi)	6 mm (7/32 in)	Yes	None
LR Outside	359 kPa (52 psi)	6 mm (7/32 in)	No	None
LR Inside	Unknown	7 mm (9/32 in)	No	None
RR Inside	Unknown	6 mm (7/32 in)	No	None
RR Outside	538 kPa (78 psi)	5 mm (6/32 in)	No	None
RF	414 kPa (60 psi)	11 mm (14/32 in)	No	None

The front row of the ambulance was equipped with box-mounted cloth covered seats with integral head restraints. The driver's seat track was adjusted 8 cm (3.5 in) forward of the rear position and the seat back was reclined 20 degrees. The front right passenger's seat track was located between the center and forward positions. The patient compartment was equipped with a vinyl covered, rear-facing, box-mounted seat. A three passenger vinyl covered bench seat was located along the right side.

EXTERIOR DAMAGE

Exterior Damage, Event 1: The ambulance sustained overlapping front plane damage during the impacts with the Honda (event 1), electrical junction box (event 4), and street sign (event 5). Analysis of the police on-scene photographs and the damage to the vehicle indicated that the crush

sustained by the bumper was primarily from the impact with the Honda. The direct damage began at the front left bumper corner and extended 161 cm (63.4 in) across the bumper. The Field L was also 161 cm (63.4 in). The crush measurements were taken at the bumper level and the maximum residual crush was 46 cm (18.1 in) occurring at C_4. The crush values were: C_1=0 cm, C_2= 6 cm (2.4 in), C_3=37 cm (14.6 in), C_4= 46 cm (18.1 in), C_5= 32 cm (12.6 in), C_6= 40 cm (15.7 in). The right side wheelbase was reduced 7 cm (2.8 in), while the left side wheelbase was extended 2 cm (0.8 in).

Damage Classification, Event 1: The Collision Deformation Classification (CDC) for the impact with the Honda was 11FDEW3 (320 degrees). The Missing Vehicle Algorithm of the WinSMASH program calculated the total Delta V as 17 km/h (10.6 mph). The longitudinal and lateral velocity changes were -13 km/h (8.1 mph) and 11 km/h (6.8 mph) respectively. The vehicle's EDR reported the maximum longitudinal and lateral velocity changes as -15.6 km/h (-9.69 mph) and 10.67 km/h (6.63 mph), respectively.

Exterior Damage, Events 2 and 3: When the ambulance rolled over (event 2), left side leading, the left plane impacted the top plane of the Honda (event 3). The ambulance sustained direct damage to the left side of the patient compartment from this impact. The left plane of the ambulance did not impact the ground during the rollover. The direct damage on the left plane began 156 cm (61.4 in) rear of the left front axle and extended 276 cm (108.7 in) rearward along the patient compartment. The Field L was also 276 cm (108.7 in). The crush measurements were taken at the upper door level and the maximum residual crush was 3 cm (1.2 in) occurring at C_3. The crush values were: C_1=0 cm, C_2= 1 cm (0.4 in), C_3=3 cm (1.2 in), C_4= 1 cm (0.4 in), C_5= 0 cm, C_6= 0 cm.

Damage Classification, Events 2 and 3: The CDC for the rollover was 00LZH01. The CDC for the left plane damage from the impact with the Honda was 00LZHW1. The severity of the damage was minor for both events.

Exterior Damage, Event 4: The ambulance sustained a non-horizontal front plane impact with the electrical junction box. Based on the scene evidence, the ambulance was on its left plane on the top plane of the Honda when this impact occurred. The impact involved the front left corner of the vehicle. The direct damage could not be separated due to overlapping damage.

Damage Classification, Event 4: The CDC was 00FL9999. Columns 5, 6, and 7 were coded unknown since there was overlapping damage. The severity of the damage was minor.

Exterior Damage, Event 5: The ambulance sustained non-horizontal damage to the front plane when it impacted the street sign pole. The damage occurred above the bumper and overlapped the damage from the other front plane impacts. The ambulance was on its left plane on the top plane of the Honda when this impact occurred.

Damage Classification, Event 5: The CDC was 00F99999. Columns 4, 5, 6, and 7 were coded unknown since there was overlapping damage. The severity of the damage was minor.

Exterior Damage, Event 6: The ambulance also sustained non-horizontal damage to the front of the patient compartment when it impacted a 60 cm (23.6 in) diameter tree while the ambulance was on its left plane on the top plane of the Honda. The siren horns and top right corner of the patient compartment were damaged.

Damage Classification, Event 6: The CDC was 00FDGW8. The severity of the damage was minor.

EVENT DATA RECORDER

The ambulance's EDR was imaged using version 3.8 of the Bosch Crash Data Retrieval (CDR) software via connection to the Diagnostic Link Connector (DLC) and reported with version 4.3. The EDR reported a deployment event and a non-deployment event. The deployment event was related to the frontal impact with the Honda (event 1). The non-deployment event was related to this crash since the ignition cycle count was the same as for the deployment event. It is not known which of the crash events was associated with the non-deployment event.

For the Deployment Event, the Supplemental Inflatable Restraint (SIR) warning lamp was reported as "Off" and the driver's safety belt switch circuit status was reported as "Buckled." The driver's and front right passenger's pretensioners were reported as not commanded to deploy; however, the vehicle was not equipped with pretensioners. The time from AE to the deployment command criteria being met for stage one of the driver's and front right passenger's frontal air bags was 27.5 msec. No diagnostic trouble codes were reported. The maximum longitudinal velocity change was reported as -15.59 km/h (-9.69 mph), occurring 80 ms after AE. The maximum recorded lateral velocity change was reported as 10.67 km/h (6.63 mph), occurring 100 ms after AE.

For the Non-Deployment event, the SIR warning lamp was reported as "On" and three diagnostic trouble codes were reported, which were related to the deployment of the frontal air bags. The system status at non-deployment record reported the maximum velocity change as 11.92 km/h (7.41 mph). The maximum velocity change reported on the longitudinal velocity change graph was -6.63 mph occurring at 160 msec following AE. The maximum velocity change was reported on the lateral velocity change graph was 4.10 km/h (2.55 mph) occurring at 100 msec following AE.

The pre-crash data was discussed in the pre-crash section of this report on page 2. The EDR report is attached at the end of this report.

INTERIOR DAMAGE

The patient compartment sustained minor damage from occupant contact during the crash. The patient compartment was configured with storage cabinets on the left side with plexiglass sliding doors. Storage cabinets without doors were also located at the front right. All the medical supplies had been removed from the cabinets prior to the SCI inspection. The sliding door for the forward lower cabinet on the left side was cracked, possibly from contact by the patient's right

arm. The remaining cabinets were undamaged. The left side panel in the EMT work area adjacent to the rear-facing seat was displaced, probably from contact by the student EMT, who was seated in the rear-facing seat. An exterior storage compartment for an oxygen cylinder was located at the center left side of the patient compartment. This door was locked and not accessible. The oxygen line within the patient compartment was undamaged. The right side entry door to the patient compartment and the patient loading doors remained closed and operational. There were no intrusions to the patient compartment.

Figure 6: Patient compartment of the ambulance and the net at the front end of bench seat

A nylon net was located on the forward end of the bench seat (**Figure 6**). It was attached to the ceiling, right wall of the patient compartment, and the header panel on the base of the bench seat. The header panel was glued to the base of the bench seat, which was constructed of plywood. The unrestrained EMT, who was seated in the front seating position on the bench seat, contacted the net during the impact with the Honda (event 1), which separated the header panel from the base of the bench seat (**Figure 7**). The EMT contacted the roof to the right of the rear-facing seat during the rollover leaving two scuff marks on the roof.

Figure 7: The displaced header panel at the front end of the bench seat

Patient Cot: The cot that was used to transport the patient was a Stryker 6500 Power-Pro XT (**Figure 8**), serial number 101140625. The cot was an aluminum X-frame design and its maximum weight capacity was 318 kg (700 lb). It was equipped with a 24 volt battery hydraulic lift system. The standard length and width of the cot was 206 cm (81 in) and 58 (23 in), respectively. It's lowest adjustable position was 36 cm (14 in) and the highest was 105 cm (41 in). The cot was equipped with two torso restraints, two shoulder straps, and leg restraints. A removable oxygen cylinder was located at the head of the cot. It was not in use at the time of the crash. The ambulance driver stated during the SCI interview that the patient was positioned on the cot on his left side with the backrest adjusted to the full-down position. The patient was secured by the shoulder, torso, and leg restraints.

Figure 8: The Stryker 6500 Power Pro XT patient cot

The cot was secured by the ambulance's antler bracket and rail clamp. The antler bracket secures the head of the cot by restraining the undercarriage using the wheel frames as anchor points. The rail clamp secured the frame of the cot. The cot remained secured throughout the crash and was not damaged. The antler bracket and rail clamp were not damaged (**Figures 9** and **10**).

Figure 9: The antler bracket

Figure 10: The rail clamp

MANUAL RESTRAINT SYSTEMS

The front row was equipped with driver and front right passenger lap-and-shoulder safety belts. The driver's safety belt was equipped with continuous loop belt webbing, a sliding latch plate, an adjustable upper anchor that was in the full-up position, and an Emergency Locking Retractor (ELR). The front right safety belt was equipped with continuous loop belt webbing, a sliding latch plate, an adjustable upper anchor that was in the full-down position, and a switchable ELR/Automatic Locking Retractor (ALR). Neither safety belt was equipped with a pretensioner.

Inspection of the driver's safety belt assembly revealed historic usage scratches on the latch plate. No load marks were observed on the latch plate belt guide, D-ring, or belt webbing. The EDR reported the driver's safety belt switch circuit status as "Buckled." The driver stated during the SCI interview that he was restrained. The on-board video also showed that the driver was restrained.

In the patient compartment, the rear-facing seat was equipped with an integrated lap-and-shoulder safety belt with a sliding latch plate and an ELR. There were three lap safety belts on the bench seat equipped with ALRs and sewn latch plates. Three safety belt buckles were also located on the vertical front surface of the box on which the bench seat was mounted. They were for securing a patient in the supine position on the bench seat.

Inspection of the lap-and-shoulder safety belt for the rear-facing seat showed no historical usage scratches on the latch plate and no load marks on the latch plate belt guide or on the belt port at the top of the seat back. The driver stated during the SCI interview that the student was seated in the rear-facing seat and was not restrained. Inspection of the lap safety belts on the bench seat revealed no evidence of usage. The driver stated that the EMT, who was seated in the front seating position of the bench seat, was not restrained at the time of the crash.

The ambulance was equipped with dual stage driver and front right passenger frontal air bags. The front right passenger's air bag was equipped with an on/off switch, which was in the "on" position at the SCI vehicle inspection. The driver's and front right passenger's frontal air bags deployed in this crash.

The driver's air bag was located within the steering wheel hub. The air bag module cover was a two-flap configuration with a vertical tear seam and was constructed of pliable vinyl. The flaps were 17 cm (6.7 in) in width at the top and 10 cm (3.9 in) at the bottom. Each flap was 19 cm (7.5 in) in height. The cover flaps opened at the designated tear points and were undamaged. The deployed air bag was 62 cm (24.4 in) in diameter and had two 3 cm (1.2 in) vent ports on the back of the air bag at the 11 and 1 o'clock positions. There were also two tethers sewn to the center ring of the air bag. Each tether was 12 cm (4.7 in) in width. Inspection of the air bag revealed possible scuff marks from occupant contact at the top and lower left quadrant of the air bag.

The front right passenger's frontal air bag was located within the middle of the right instrument panel. The air bag module cover was a single flap constructed of metal covered by thin foam padding. The flap was 31 cm (12.2 in) in width and 12 cm (4.7 in) in height. The cover flap opened at the designated tear points and was undamaged. The deployed air bag was 60 cm (23.6 in) in width and 58 cm (22.8 in) in height. There was a 2 cm (0.79 in) vent port located on the each side of the air bag at the 12 0'clock position. The air bag had no internal tethers. The air bag was not damaged during the crash.

2010 CHEVROLET EXPRESS G3500 TYPE III AMBULANCE OCCUPANTS

DRIVER DEMOGRAPHICS

Age/Sex:	21 years/male
Height:	188 cm (74 in)
Weight:	104 kg (230 lbs)
Eyewear:	Glasses
Seat Type:	Box mounted bucket
Seat Track Position:	8 cm (3.1 in) forward of rear position
Manual Restraint Usage:	Lap-and-shoulder
Usage Source:	Driver interview
Air Bags	Frontal, deployed
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Exited without assistance through left front door
Transport from Scene:	None
Medical Treatment:	None

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Contusion, 12.7 cm (5 in) in diameter, on top of left hip, not further specified	510402.1,2	Left front hardware/armrest, rear upper quadrant	Certain
2	Abrasions, 7.6 to 10.2 cm (3-4 in) long on inside of each forearm, not further specified	710202.1,3	Air bag, driver's	Certain

Sources: Emergency Room Laboratory Record and Interviewee Data–Same Person. Injury Numbers 1 and 2 came from ***Interviewee data****.*

DRIVER KINEMATICS

The driver was seated in an upright position and restrained by the lap-and-shoulder safety belt. He stated during the SCI interview that just prior to the impact with the Honda, he had both hands of the steering wheel at the 10 and 2 o'clock positions as he initiated a right steering maneuver and was bracing for impact against the steering wheel. The on-board video of the crash supported the driver's statement. The impact with the Honda displaced the driver forward and to the left within the safety belt and he contacted the deployed frontal air bag. He sustained an abrasion on the inside of both forearms from contacting the deploying air bag. As the vehicle rolled over to the left and impacted the top plane of the Honda, the driver was redirected toward the left front door. His left hip contacted the armrest, which caused a 12.7 cm (5 in) diameter contusion. He was redirected to the right as the vehicle rolled back onto its wheels. The driver exited the vehicle without assistance through the left front door. He was taken to a hospital by a non-emergency vehicle for company required drug/alcohol testing. He did not receive any medical treatment.

OTHER ROW PASSENGER, STUDENT EMT DEMOGRAPHICS

Age/Sex:	23 years/male
Height:	168 cm (66 in)
Weight:	82 kg (180 lbs)
Eyewear:	None
Seat Type:	Rear-facing box mount
Seat Track Position:	Fixed
Manual Restraint Usage:	None
Usage Source:	Vehicle inspection/SCI interview
Air Bags	None
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Exited without assistance through patient loading doors
Transport from Scene:	Ground ambulance to hospital
Medical Treatment:	Treated in emergency room and released

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Abrasion on nose not further specified	210202.1,4	Interior object: other occupant-EMT seated on bench seat–front position, on right side of ambulance compartment	Probable
2	Strain, cervical (with tenderness, stiffness over upper C-spine), not further specified	640278.1,6	Seat back, rear-facing, within ambulance compartment, located behind driver	Probable
3	Strain, lumbar (lumbosacral paravertebral spasm on right and left side of low back), not further specified	640678.1,8	Seat back, rear-facing, within ambulance compartment, located behind driver	Probable

Sources: Emergency Room Records, EMS treatment Record, and Interviewee Data–Driver. Injury Numbers 1-3 came from ***Emergency Room Records****.*

OTHER ROW PASSENGER, STUDENT EMT KINEMATICS

The student EMT was unrestrained and seated in the rear-facing seat located behind the driver. The student was leaning over the patient attempting to calm him down when the impact occurred. The on-board video showed that the impact displaced the student forward and to the left and his back contacted the seat back causing cervical and lumbar strains. The second EMT was also redirected forward and to the left off the bench seat on the right side of the patient compartment and he impacted the student EMT, which caused an abrasion on the student's nose. As the ambulance rolled over to the left, the student was redirected toward the top left corner of the patient compartment and contacted the work area and left side of the patient compartment adjacent to his seat. The student remained in his seating area as the vehicle rolled back onto its wheels. The student exited the vehicle without assistance through the patient loading doors and was transported by ground ambulance to a hospital where he was treated in the emergency room and released.

OTHER ROW PASSENGER, PATIENT DEMOGRAPHICS

Age/Sex:	19 years/male
Height:	183 cm (72 in)
Weight:	91 kg (200 lbs)
Eyewear:	None
Seat Type:	On left side on patient cot
Seat Track Position:	N/A
Manual Restraint Usage:	Cot restraints at shoulder, torso, and legs
Usage Source:	SCI interview
Air Bags	None

Alcohol/Drug Involvement:	Alcohol intoxication, Blood Alcohol Content 0.28
Egress from Vehicle:	Removed by emergency responders
Transport from Scene:	Ground ambulance to hospital
Medical Treatment:	Examined in emergency room and released

OTHER ROW PASSENGER, PATIENT INJURIES

Examined in hospital emergency room. No injuries were diagnosed.

OTHER ROW PASSENGER, PATIENT KINEMATICS

The patient was positioned on the cot facing the back of the patient compartment. He was on his left side restrained by the shoulder, torso, and leg restraints and the back rest was in the full-down position. The impact with the Honda displaced the patient forward within the restraints. The patient cot remained attached by the antler bracket and rail clamp throughout the crash and the patient remained restrained on the cot. He was removed from the ambulance by emergency responders through the patient loading doors and was transported by ground ambulance to a hospital where he was examined in the emergency room. He sustained no injuries as a result of the crash and remained in the emergency room due to his level of intoxication. He was released at 06:45 hours the following morning.

OTHER ROW PASSENGER, EMT DEMOGRAPHICS

Age/Sex:	20 years/male
Height:	168 cm (66 in)
Weight:	73 kg (170 lbs)
Eyewear:	None
Seat Type:	Inward-facing bench seat along right side of patient compartment
Seat Track Position:	Fixed
Manual Restraint Usage:	None
Usage Source:	Vehicle inspection/SCI interview/on-board video
Air Bags	None
Alcohol/Drug Involvement:	None
Egress from Vehicle:	Exited without assistance through patient loading doors
Transport from Scene:	Ground ambulance to hospital
Medical Treatment:	Treated in emergency room and released

Injury Number	Injury	AIS 2005/08	Injury Source	Confidence Level
1	Strain, lumbar (left lower back), not further specified	640678.1,8	Interior object: other occupant-Student EMT who had been seated in rear-facing seat on left side of ambulance compartment	Possible
2	Abrasion, small, right elbow, not further specified	710202.1,1	Interior object: netting that was located on the front of the bench seat occupied by this occupant	Probable

*Sources: Emergency Room Records, EMS treatment Record, and Interviewee Data–Driver. Injury Number 1 came from **Emergency Room Records**, and Injury Number 2 came from a combination of **EMS Treatment** and **ER Records**.*

OTHER ROW PASSENGER, EMT KINEMATICS

The unrestrained EMT was seated in the front seating position of the bench seat located along the right side of the patient compartment. At the time of the crash, he was leaning forward attempting to calm down the patient. The impact with the Honda displaced the EMT forward and to the left and he contacted the nylon net at the front end of the bench seat. The contact with the net separated the plywood header panel that the netting was anchored to from the base of the bench seat (**Figure 11**). The EMT sustained an abrasion on the right elbow from contacting the net. The EMT separated from the net and the onboard video showed that he continued forward and to the left and contacted the student EMT. The EMT sustained a lumbar strain from the contact. As the vehicle rolled over to the left, the EMT was redirected toward the roof where he probably contacted the roof to the right of the rear-facing seat. Following the crash, the EMT exited the ambulance without assistance through the patient loading doors. He was transported by ground ambulance to a hospital where he was treated in the emergency room and released.

Figure 11: The displaced anchor panel for the netting at the front of the bench seat located on the right side of the patient compartment

2000 HONDA ACCORD LX

DESCRIPTION

The Honda was a front wheel drive, 5-passenger, 4-door sedan (VIN: 1HGCG5642YAxxxxxx), equipped with a 2.3-liter, I-4 engine, 5-speed manual transmission and dual frontal air bags. This vehicle could not be located and was not inspected.

The Missing Vehicle algorithm of the WinSMASH program calculated the total Delta V for the Honda as 65 km/h (40.1 mph). The longitudinal and lateral velocity changes were -65 km/h (40.1 mph) and 0 km/h, respectively. The results are borderline.

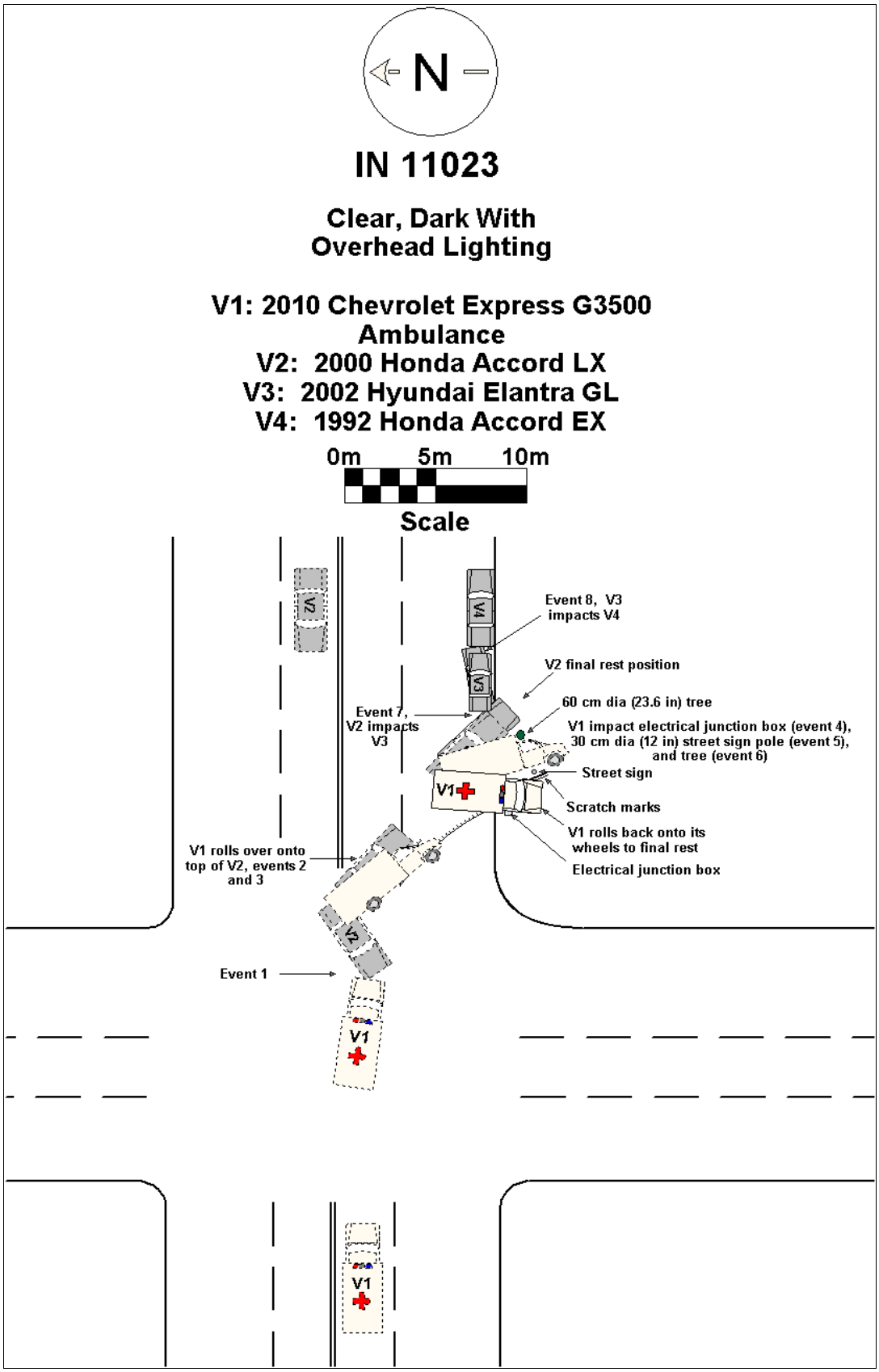
OCCUPANT DATA

Driver: The driver of the Honda (20-year-old female) was not restrained by her lap-and-shoulder safety belt. Her frontal air bag deployed as a result of the crash. She was transported by ground ambulance to a hospital. Her injury and treatment status were not determined.

Front Right Passenger: The front right passenger of the Honda (19-year-old female) was restrained by her lap-and-shoulder safety belt and her frontal air bag. She was transported by ground ambulance to a hospital. Her injury and treatment status were not determined.

2002 HYUNDA ELANTRA GL AND 1992 HONDA ACCORD EX

The Hyundai was parked on the right side of the street and was unoccupied. It was impacted on the back plane by the front plane of the 2001 Honda and displaced forward into the back plane of a parked, unoccupied 1992 Honda Accord EX, which was also unoccupied. Neither of these vehicles were inspected.


N
IN 11023
Clear, Dark With
Overhead Lighting
V1: 2010 Chevrolet Express G3500
Ambulance
V2: 2000 Honda Accord LX
V3: 2002 Hyundai Elantra GL
V4: 1992 Honda Accord EX
0m 5m 10m
Scale
Event 8, V3
impacts V4
V2 final rest position
60 cm dia (23.6 in) tree
Event 7,
V2 impacts
V3
V1 impact electrical junction box (event 4),
30 cm dia (12 in) street sign pole (event 5),
and tree (event 6)
Street sign
Scratch marks
V1 rolls back onto its
wheels to final rest
Electrical junction box
V1 rolls over onto
top of V2, events 2
and 3
Event 1
V1
V2
V3
V4

Attachment A
2010 Chevrolet Express G3500 Type III Ambulance
Event Data Recorder (EDR) 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	1GB6G2B60A1******
User	
Case Number	
EDR Data Imaging Date	07/18/2011
Crash Date	
Filename	IN11023_V1_ACM.CDRX
Saved on	Monday, July 18 2011 at 10:04:44
Collected with CDR version	Crash Data Retrieval Tool 3.8
Reported with CDR version	Crash Data Retrieval Tool 4.3
EDR Device Type	Airbag Control Module
Event(s) recovered	Deployment Non-Deployment

Comments

No comments entered.

Data Limitations

Recorded Crash Events:

There are two types of recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event records data but does not deploy the air bag(s). The minimum SDM Recorded Vehicle Velocity Change, that is needed to record a Non-Deployment Event, is five MPH. A Non-Deployment Event may contain Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded vehicle velocity change. This event will be cleared by the SDM, after approximately 250 ignition cycles. This event can be overwritten by a second Deployment Event, referred to as Deployment Event #2, if the Non-Deployment Event is not locked. The data in the Non-Deployment Event file will be locked, if the Non-Deployment Event occurred within five seconds of a Deployment Event. A locked Non Deployment Event cannot be overwritten or cleared by the SDM.
The second type of SDM recorded crash event is the Deployment Event. It also may contain Pre-Crash and Crash data. The SDM can store up to two different Deployment Events. If a second Deployment Event occurs any time after the Deployment Event, the Deployment Event #2 will overwrite any non-locked Non-Deployment Event. Deployment Events cannot be overwritten or cleared by the SDM. Once the SDM has deployed an air bag, the SDM must be replaced.

Data:

-SDM Recorded Vehicle Velocity Change reflects the change in velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. For Deployment Events, the SDM will record 220 milliseconds of data after Deployment criteria is met and up to 70 milliseconds before Deployment criteria is met. For Non-Deployment Events, the SDM can record up to the first 300 milliseconds of data after algorithm enable. Velocity Change data is displayed in SAE sign convention.

-The CDR tool displays time from Algorithm Enable (AE) to time of Deployment command in a Deployment event and AE to time of maximum SDM recorded vehicle velocity change in a Non-Deployment event. Time from AE begins when the first air bag system enable threshold is met and ends when Deployment command criteria is met or at maximum SDM recorded vehicle velocity change. Air bag systems such as frontal, side, or rollover, may be a source of an enable. The time represented in a CDR report can be that of the enable of one air bag system to the Deployment time of another air bag system.

-Maximum Recorded Vehicle Velocity Change is the maximum square root value of the sum of the squares for the vehicle's combined "X" and "Y" axis change in velocity.

-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.

-SDM Recorded Vehicle Speed accuracy can be affected by various factors, including but not limited to the following:

- -Significant changes in the tire's rolling radius
- -Final drive axle ratio changes
- -Wheel lockup and wheel slip

-Brake Switch Circuit Status indicates the open/closed state of the brake switch circuit.

-Pre-Crash data is recorded asynchronously.
-Pre-Crash Electronic Data Validity Check Status indicates “Data Invalid” if:
    -The SDM receives a message with an “invalid” flag from the module sending the pre-crash data
    -No data is received from the module sending the pre-crash data
    -No module is present to send the pre-crash data
-Driver’s and Passenger’s Belt Switch Circuit Status indicates the status of the seat belt switch circuit.
-The Time Between Non-Deployment to Deployment Events is displayed in seconds. If the time between the two events is greater than five seconds, “N/A” is displayed in place of the time. If the value is negative, then the Deployment Event occurred first. If the value is positive, then the Non-Deployment Event occurred first.
-If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded.
-The ignition cycle counter relies upon the transitions through OFF->RUN->CRANK power-moding messages, on the GMLAN communication bus, to increment the counter. Applying and removing of battery power to the module will not increment the ignition cycle counter.
-All data should be examined in conjunction with other available physical evidence from the vehicle and scene

Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Status Data (Pre-Crash) is transmitted to the SDM, by various vehicle control modules, via the vehicle’s communication network.
-The Belt Switch Circuit is wired directly to the SDM.

01006_SDMCG_r002

Multiple Event Data

Associated Events Not Recorded	0
Event(s) was an Extended Concatenated Event	No
An Event(s) was in Between the Recorded Event(s)	No
An Event(s) Followed the Recorded Event(s)	No
The Event(s) Not Recorded was a Deployment Event(s)	No
The Event(s) Not Recorded was a Non-Deployment Event(s)	No

System Status At AE

Low Tire Pressure Warning Lamp (If Equipped)	OFF
Vehicle Power Mode Status	Run
Remote Start Status (If Equipped)	Inactive
Run/Crank Ignition Switch Logic Level	Active

Pre-crash data

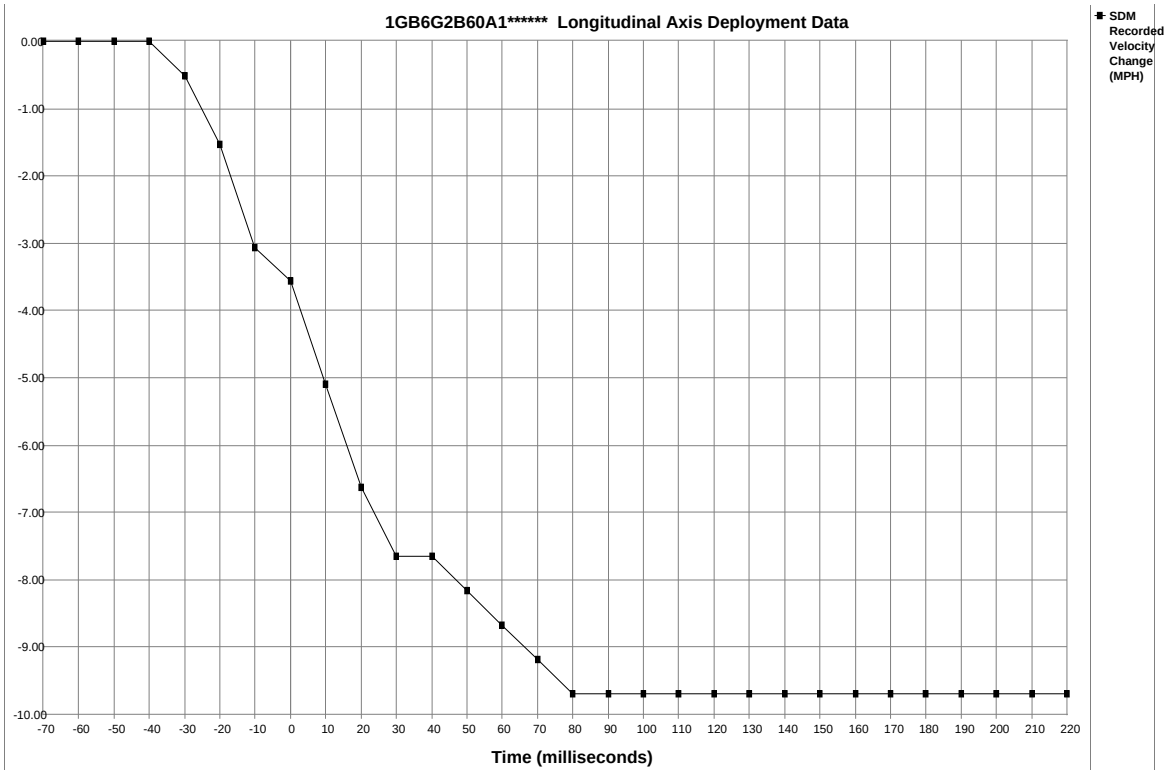
Parameter	-1.0 sec	-0.5 sec
Reduced Engine Power Mode	OFF	OFF
Cruise Control Active (If Equipped)	No	No
Cruise Control Resume Switch Active (If Equipped)	No	No
Cruise Control Set Switch Active (If Equipped)	No	No
Engine Torque (foot pounds)	-91.09	-89.62

Pre-Crash Data

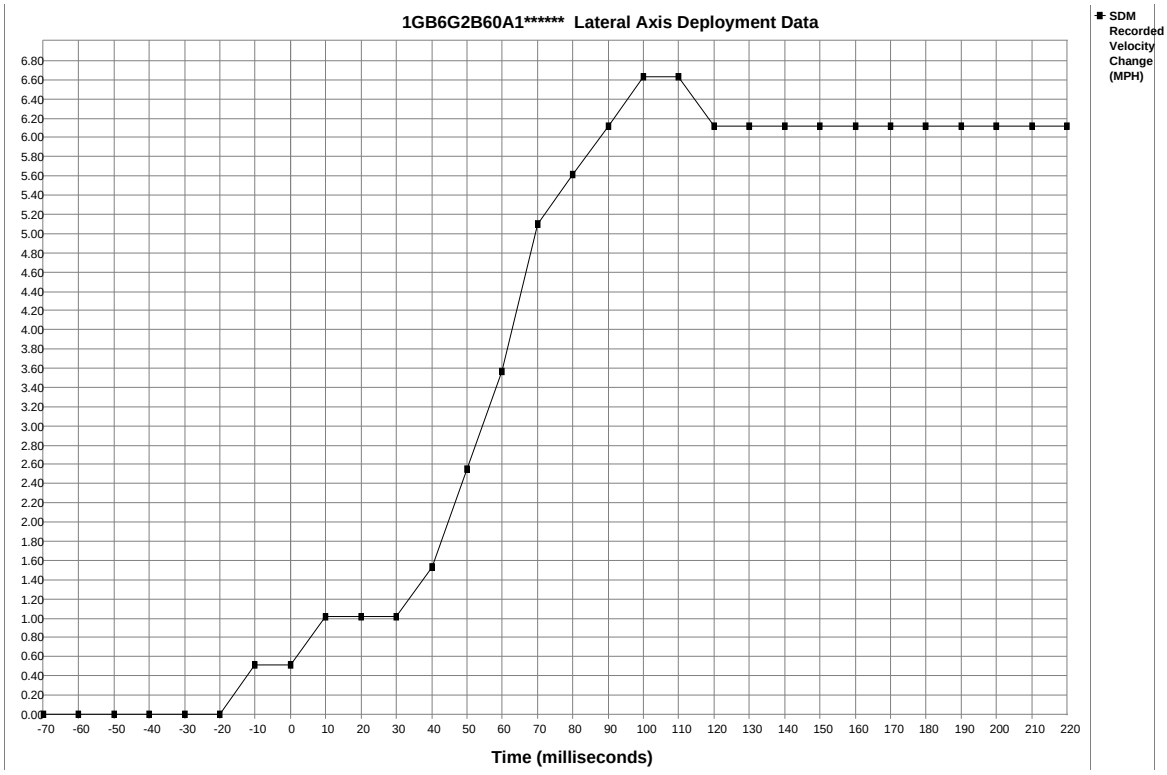
Parameter	-2.5 sec	-2.0 sec	-1.5 sec	-1.0 sec	-0.5 sec
Accelerator Pedal Position (percent)	0	0	0	0	0
Vehicle Speed (MPH)	49	48	47	45	43
Engine Speed (RPM)	1280	1152	1216	1216	1152
Percent Throttle	0	0	0	0	0
Brake Switch Circuit State	ON	ON	ON	ON	ON

System Status At Deployment

Ignition Cycles At Investigation	8403
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON/OFF Time Continuously (seconds)	655350
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	8394
Ignition Cycles At Event	8398
Ignition Cycles Since DTCs Were Last Cleared	255
Driver's Belt Switch Circuit Status	BUCKLED
Passenger Air Bag Indicator Status at Event Enable	Undefined
Passenger SIR Suppression Switch Circuit Status	Air Bag Not Suppressed
Diagnostic Trouble Codes at Event, fault number: 1	N/A
Diagnostic Trouble Codes at Event, fault number: 2	N/A
Diagnostic Trouble Codes at Event, fault number: 3	N/A
Diagnostic Trouble Codes at Event, fault number: 4	N/A
Diagnostic Trouble Codes at Event, fault number: 5	N/A
Diagnostic Trouble Codes at Event, fault number: 6	N/A
Diagnostic Trouble Codes at Event, fault number: 7	N/A
Diagnostic Trouble Codes at Event, fault number: 8	N/A
Diagnostic Trouble Codes at Event, fault number: 9	N/A
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	27.5
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	27.5
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Driver Side or Roof Rail/Head Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Passenger Side or Roof Rail/Head Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Crash Record Locked	Yes
Multiple Event Data/Vehicle Event Data (Pre-Crash) Associated With This Event	Yes
Time Between Events (sec)	0
Event Recording Complete	Yes
Driver First Stage Deployment Loop Commanded	Yes
Passenger First Stage Deployment Loop Commanded	Yes
Driver Second Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded for Disposal	No
Passenger Second Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded for Disposal	No
Driver Pretensioner Deployment Loop Commanded (If Equipped)	No
Passenger Pretensioner Deployment Loop Commanded (If Equipped)	No
Driver Side Deployment Loop Commanded (If Equipped)	No
Passenger Side Deployment Loop Commanded (If Equipped)	No
Second Row Left Side Deployment Loop Commanded (If Equipped)	No
Second Row Right Side Deployment Loop Commanded (If Equipped)	No
Driver (Initiator 1) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 1) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver (Initiator 2) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 2) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver (Initiator 3) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 3) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Second Row Left Pretensioner Deployment Loop Commanded (If Equipped)	No
Second Row Right Pretensioner Deployment Loop Commanded (If Equipped)	No
Second Row Center Pretensioner Deployment Loop Commanded (If Equipped)	No



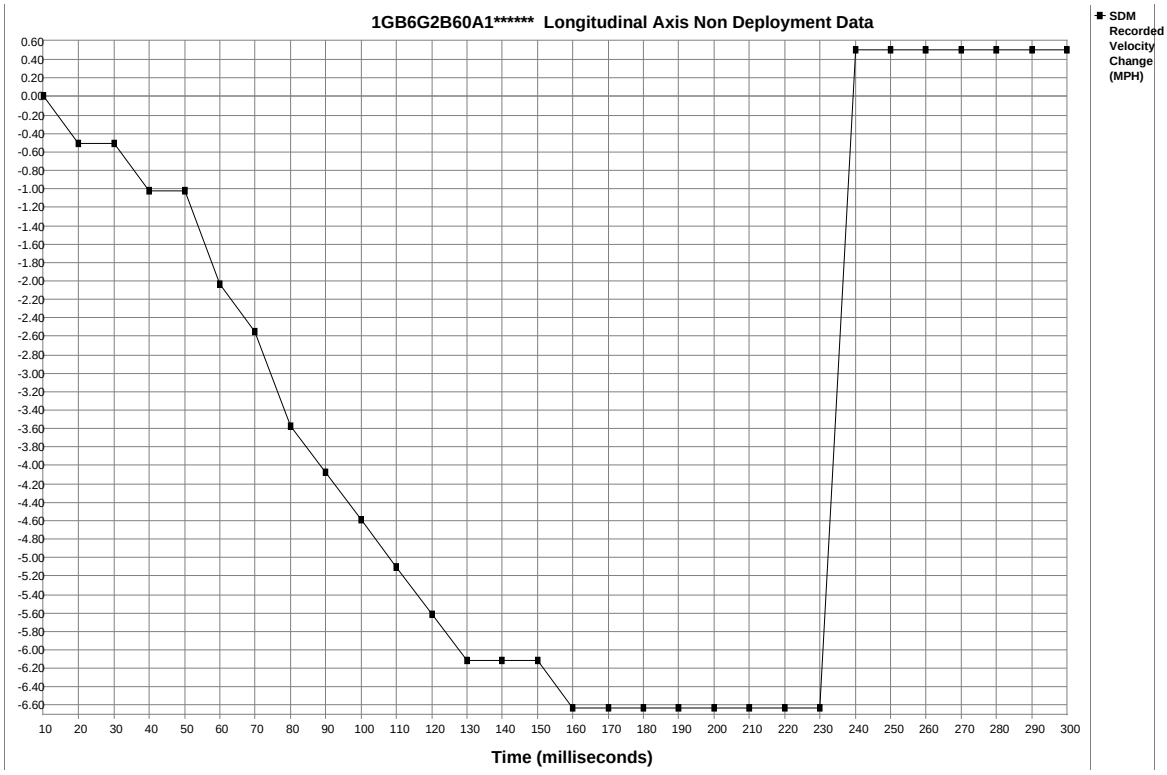
Time (milliseconds)	-70	-60	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70
SDM Longitudinal Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	-0.51	-1.53	-3.06	-3.57	-5.10	-6.63	-7.65	-7.65	-8.16	-8.67	-9.18
Time (milliseconds)	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
SDM Longitudinal Axis Recorded Velocity Change (MPH)	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69	-9.69



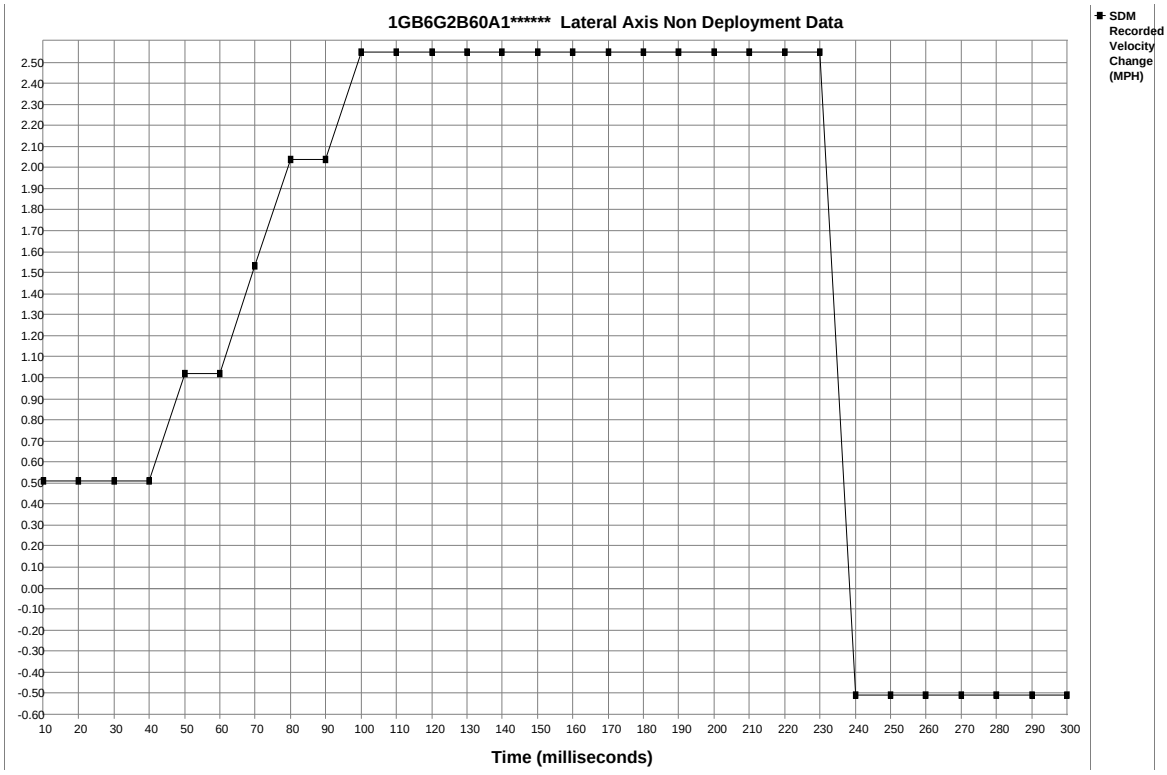
Time (milliseconds)	-70	-60	-50	-40	-30	-20	-10	0	10	20	30	40	50	60	70
SDM Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.51	1.02	1.02	1.02	1.53	2.55	3.57	5.10
Time (milliseconds)	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
SDM Lateral Axis Recorded Velocity Change (MPH)	5.61	6.12	6.63	6.63	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.12	6.12

System Status At Non-Deployment

Ignition Cycles At Investigation	8403
SIR Warning Lamp Status	ON
SIR Warning Lamp ON/OFF Time Continuously (seconds)	0
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	0
Ignition Cycles At Event	8398
Ignition Cycles Since DTCs Were Last Cleared	255
Driver's Belt Switch Circuit Status	BUCKLED
Diagnostic Trouble Codes at Event, fault number: 1	B0012
Diagnostic Trouble Codes at Event, fault number: 2	B0019
Diagnostic Trouble Codes at Event, fault number: 3	B0052
Diagnostic Trouble Codes at Event, fault number: 4	N/A
Diagnostic Trouble Codes at Event, fault number: 5	N/A
Diagnostic Trouble Codes at Event, fault number: 6	N/A
Diagnostic Trouble Codes at Event, fault number: 7	N/A
Diagnostic Trouble Codes at Event, fault number: 8	N/A
Diagnostic Trouble Codes at Event, fault number: 9	N/A
Maximum SDM Recorded Velocity Change (MPH)	7.41
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	210
Crash Record Locked	Yes
Deployment Event Recorded in the Non-Deployment Record	No
Multiple Event Data/Vehicle Event Data (Pre-Crash) Associated With This Event	No
Event Recording Complete	Yes
Driver First Stage Deployment Loop Commanded	No
Passenger First Stage Deployment Loop Commanded	No
Driver Second Stage Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded for Disposal	No
Passenger Second Stage Deployment Loop Commanded	No
Passenger 2nd Stage Deployment Loop Commanded for Disposal	No
Driver Pretensioner Deployment Loop Commanded (If Equipped)	No
Passenger Pretensioner Deployment Loop Commanded (If Equipped)	No
Driver Side Deployment Loop Commanded (If Equipped)	No
Passenger Side Deployment Loop Commanded (If Equipped)	No
Second Row Left Side Deployment Loop Commanded (If Equipped)	No
Second Row Right Side Deployment Loop Commanded (If Equipped)	No
Driver (Initiator 1) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 1) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver (Initiator 2) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 2) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver (Initiator 3) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Passenger (Initiator 3) Roof Rail/Head Curtain Loop Commanded (If Equipped)	No
Driver Knee Deployment Loop Commanded (If Equipped)	No
Passenger Knee Deployment Loop Commanded (If Equipped)	No
Second Row Left Pretensioner Deployment Loop Commanded (If Equipped)	No
Second Row Right Pretensioner Deployment Loop Commanded (If Equipped)	No
Second Row Center Pretensioner Deployment Loop Commanded (If Equipped)	No



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Longitudinal Axis Recorded Velocity Change (MPH)	0.00	-0.51	-0.51	-1.02	-1.02	-2.04	-2.55	-3.57	-4.08	-4.59	-5.10	-5.61	-6.12	-6.12	-6.12
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
SDM Longitudinal Axis Recorded Velocity Change (MPH)	-6.63	-6.63	-6.63	-6.63	-6.63	-6.63	-6.63	-6.63	0.51	0.51	0.51	0.51	0.51	0.51	0.51



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Lateral Axis Recorded Velocity Change (MPH)	0.51	0.51	0.51	0.51	1.02	1.02	1.53	2.04	2.04	2.55	2.55	2.55	2.55	2.55	2.55
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
SDM Lateral Axis Recorded Velocity Change (MPH)	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51	-0.51

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.

```
$01  02 02 00 01 00 00 00
$02  47 42 36 47 32 42 36
$03  30 41 31 31 30 31 36
$04  35 35 00 00 00 00 00
$05  80 66 00 00 00 00 00
$06  C5 00 00 00 00 00 00
$0A  00 00 00 00 00 00 00
$0B  01 01 00 00 00 00 00
$0C  00 00 00 00 00 00 00
$0D  00 06 78 00 00 00 00
$0E  00 00 00 00 00 00 00
$0F  00 00 00 00 00 00 00
$10  00 00 00 00 00 00 00
$11  07 FF FF 00 91 00 00
$12  FF 00 F0 F0 E0 00 00
$13  C0 00 80 20 20 00 00
$14  C0 00 80 20 20 00 00
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$16  00 00 00 00 00 00 00
$17  00 00 00 00 00 00 00
$18  02 0A 0A 0A 0A 0A 0A
$19  07 07 00 00 00 00 00
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$1B  00 00 00 00 00 00 00
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