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CALSPAN ON-SITE SIDE IMPACT INFLATIBLE OCCUPANT PROTECTION SYSTEM CRASH INVESTIGATION

SCI CASE NO.: CA10022

VEHICLE: 2008 HONDA CIVIC SI COUPE

LOCATION: NORTH CAROLINA

CRASH DATE: MAY 2010

Contract No. DTNH22-07-C-00043

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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 are 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.

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An investigation of the intersection crash of a 2008 Honda Civic and a 2008 Dodge Caravan.

16. Abstract
This on-site investigation focused on the side impact inflatable occupant protection system of a 2008 Honda Civic Si coupe that was involved in a side impact crash with a 2008 Dodge Grand Caravan. The Honda was also involved in a secondary impact with a 1999 Pontiac Grand Am GT. The Honda was equipped with four-wheel anti-lock brakes, a Certified Advanced 208-Compliant (CAC) frontal air bag system, seat-mounted side impact air bags, and side impact Inflatable Curtain (IC) air bags. The manufacturer of the Honda has certified that the vehicle was compliant to the advanced air bag portion of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. The CAC system includes dual-stage frontal air bags for the driver and right front passenger positions, seat track positioning sensors, front seat retractor and buckle pretensioners, and a front right occupant presence sensor. The left side of the Honda was impacted by the front of the Dodge. This resulted in the deployment of the Honda's left IC air bag and left side impact air bag. The frontal air bags in the Dodge also deployed. The Honda separated from the impact with a clockwise rotation and the right front corner of the Honda impacted the right side of the Pontiac in a secondary crash. The 18-year-old male driver of the Honda was transported by air ambulance to a regional trauma center where he was hospitalized for nine days for treatment of serious injuries. The 18-year-old male front right passenger was transported by ground ambulance to a local hospital where he was treated for minor injuries and released the same day.

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TABLE OF CONTENTS

CALSPAN ON-SITE SIDE IMPACT INFLATIBLE OCCUPANT PROTECTION SYSTEM CRASH INVESTIGATION
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BACKGROUND

Figure 1: Left oblique view of the 2008 Honda Civic.

This on-site investigation focused on the side impact inflatable occupant protection system of a 2008 Honda Civic Si coupe **(Figure 1)** that was involved in a side impact crash with a 2008 Dodge Grand Caravan. The Honda was also involved in a secondary impact with a 1999 Pontiac Grand Am GT. The Honda was equipped with four-wheel anti-lock brakes, a Certified Advanced 208-Compliant (CAC) frontal air bag system, seat-mounted side impact air bags, and side impact Inflatable Curtain (IC) air bags. The manufacturer of the Honda has certified that the vehicle was compliant to the advanced air bag portion of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. The CAC system includes dual-stage frontal air bags for the driver and right front passenger positions, seat track positioning sensors, front seat retractor and buckle pretensioners, and a front right occupant presence sensor. The left side of the Honda was impacted by the front of the Dodge. This resulted in the deployment of the Honda's left IC air bag and left side impact air bag. The frontal air bags in the Dodge also deployed. The Honda separated from the impact with a clockwise rotation and the right front corner of the Honda impacted the right side of the Pontiac in a secondary crash. The 18-year-old male driver of the Honda was transported by air ambulance to a regional trauma center where he was hospitalized for nine days for treatment of serious injuries. The 18-year-old male front right passenger was transported by ground ambulance to a local hospital where he was treated for minor injuries and released the same day.

The vehicle was identified through a visit to a regional vehicle salvage facility on June 10, 2010. An image of the Honda was forwarded to the Calspan Special Crash Investigations (SCI) team and the Crash Investigation Division (CID) of the National Highway Traffic Safety Administration for review on the same day. Based on the impact location and severity of the damage, an on-site investigation of the case was assigned by the CID on June 11, 2010. The on-site investigation was initiated on June 14, 2010. The investigation involved the inspection and documentation of the Honda, Dodge and Pontiac, a detailed interview with the driver of the Honda, the documentation of the crash site, and the removal of the Event Data Recorder (EDR) from the case vehicle for imaging by Honda. Additionally, the Dodge and Pontiac's EDR's were imaged during this investigation. The imaged EDR data files are included as **Attachments A and B** of this report.

SUMMARY

Crash Site

This crash occurred during daylight hours at the intersection of a six-lane north/south roadway divided by a center turn lane and a three-lane east/west roadway. The environmental conditions were clear and dry at the time of the crash. The main roadway consisted of six asphalt travel lanes. The traffic lanes and center turn lane measured 3.6 m (11.8 ft) in width. The roadway was bordered by narrow asphalt shoulders 1.3 m (4.3 ft) in width. Grass roadsides extended outboard of the shoulders with embankments that sloped away from the roadway. In the pre-crash area for the Dodge and the Pontiac, the roadway had a level grade. The speed limit on the main roadway was 89 km/h (55 mph).

A three-lane roadway intersected the main roadway on the west side. This roadway consisted of three asphalt travel lanes and included a curve to the right with a radius of curvature of 116 m (381 ft). The intersecting roadway was bordered by narrow asphalt shoulders 1.1 m (3.6 ft) in width. The travel lanes were 5 m (16.4 ft), 3.5 m (11.5 ft), and 4.2 m (13.8 ft) in width from north to south. The grade on the intersecting roadway was negative 1.6 percent on the approach to the intersection. The speed limit on the intersecting roadway was 72 km/h (45 mph). Eastbound traffic entering the main roadway was controlled by a stop sign. The east leg of the intersection consisted of a dirt residential driveway that measured 6.7 mm (22 ft) in width. A Crash Schematic is included as **Figure 10** of this report.

Vehicle Data

2008 Honda Civic

The 2008 Honda Civic Si Coupe was manufactured in March 2008 and was identified by the Vehicle Identification Number (VIN) 2HGFG21578H (production number deleted). The vehicle had been driven approximately 48,602 km (30,200 mi) at the time of the crash.

The front-wheel drive Honda was powered by a 2.0-liter, inline four cylinder engine linked to a six-speed manual transmission. The braking system consisted of power-assisted front and rear disc brakes with four-wheel antilock and electronic brakeforce distribution. The Honda was also equipped with a direct Tire Pressure Monitoring System (TPMS) and Electronic Stability Control (ESC). The driver stated in the interview that he had not deactivated the ESC at the time of the crash. All windows were closed at the time of the crash. The Honda was equipped with four Michelin Pilot HX MXM4 tires, size P215/45R17. The tires were mounted on 17-inch five-spoke OEM alloy wheels. The tire size matched the vehicle manufacturer recommendation. The vehicle manufacturer recommended cold tire pressure was 221 kPa (32 PSI) for the front and rear. The specific tire data at the time of the SCI inspection was as follows:

Position	Measured Tire Pressure	Measured Tread Depth	Tire/Wheel Damage
Left Front	Tire flat	1 mm (1/32 in)	De-beaded
Left Rear	186 kPa (27 PSI)	2 mm (2/32 in)	None
Right Front	186 kPa (27 PSI)	2 mm (2/32 in)	None
Right Rear	186 kPa (27 PSI)	1 mm (1/32 in)	None

The interior of the Civic was configured with cloth-surfaced five-passenger seating. The front bucket seats were separated by a center console and were equipped with height adjustable head restraints. At the time of the SCI inspection, the front left head restraint was found in the full-down position and the front right head restraint was 6 cm (2.4 in) above the full-down position. The driver's seat track was jammed in place and the seat was located 11 cm (4.3 in) forward of full-rear. The seat track adjustment lever was not operational. The seat had been deformed by passenger compartment intrusion. The front left seat back was at an angle 24 degrees aft of vertical. The front right seat track was in the full rearward position, and the seat back angle measured 20 degrees aft of vertical. The second row was a single bench seat with split 60/40 folding backs and with head restraints adjusted 3 cm (1.2 in) above the full down position at all three seating positions.

The interior occupant safety systems consisted of 3-point lap and shoulder belts for all five designated seating positions, front safety belt dual pretensioners (both buckle and retractor mounted), dual-stage frontal air bags, front seat back-mounted side impact air bags and roof side rail-mounted side impact IC air bags that provide protection for the four outboard seat positions.

2008 Dodge Grand Caravan

The 2008 Dodge Grand Caravan minivan was manufactured in December 2007 and was identified by the VIN 2D8HN54X58R (production sequence deleted). The front-wheel drive Dodge was powered by a 4.0-liter, V6 engine linked to a six-speed automatic transmission. The braking system consisted of front and rear disc brakes with four-wheel antilock and electronic brakeforce distribution. The Dodge was also equipped with a direct TPMS and ESC. The ESC was reported by the EDR as not deactivated prior to the impact. The window position at the time of the crash was unknown. The windshield was fractured by the deployment of the front right passenger air bag. The side windows and backlight were undamaged. The Dodge was equipped with four Bridgestone Turanza EL400 tires with matching Tire Identification Numbers (TIN), size 225/65R17. The tires were mounted on OEM five-spoke alloy wheels. The tire size matched the vehicle manufacturer recommendation. The vehicle manufacturer recommended cold tire pressure was 248 kPa (36 PSI) for the front and rear. The specific tire data at the time of the SCI inspection was as follows:

Position	Measured Tire Pressure	Measured Tread Depth	Tire/Wheel Damage
Left Front	234 kPa (34 PSI)	6 mm (7/32 in)	None
Left Rear	241 kPa (35 PSI)	6 mm (7/32 in)	None
Right Front	207 kPa (30 PSI)	5 mm (6/32 in)	None
Right Rear	241 kPa (35 PSI)	6 mm (7/32 in)	None

1999 Pontiac Grand Am GT

The 1999 Pontiac Grand Am GT coupe was manufactured in March 1999 and was identified by the VIN 1G2NW12E3XM (production sequence deleted). The front-wheel drive Pontiac was powered by a 3.4-liter, V6 engine linked to a four-speed automatic transmission. The braking system consisted of front and rear disc brakes with four-wheel antilock. There was no glazing damage as a result of this crash. The Pontiac was equipped with four Goodyear Eagle GS-H tires. All tires were size 225/50R16, which matched the manufacturers recommended tire size. The manufacturer recommended cold tire pressure was 207 kPa (30 PSI) for the front and rear. The specific tire data at the time of the SCI inspection was as follows:

Position	Measured Tire Pressure	Measured Tread Depth	Tire/Wheel Damage
Left Front	179 kPa (26 PSI)	4 mm (5/32 in)	None
Left Rear	117 kPa (17 PSI)	4 mm (5/32 in)	None
Right Front	179 kPa (26 PSI)	4 mm (5/32 in)	None
Right Rear	Tire Flat	4 mm (5/32 in)	12 x 5 cm (4.7 x 2 in) cut in sidewall, 14 x 1 cm (5.5 x 0.4 in) section fractured from wheel edge.

Crash Sequence

Pre-crash

The restrained 18-year-old male driver of the Honda was operating the vehicle southbound on the six-lane highway. He received a telephone call from a relative and was asked to meet her at a location north of his current position. The driver of the Honda entered the right turn lane and turned right onto the three-lane intersecting roadway. After leaving the intersection, he executed a U-turn on the intersecting roadway. The driver of the Honda then returned to the intersection with the intention of turning left to travel north on the highway. The driver reported in the interview that he did not see any traffic that appeared close enough to prevent him from safely turning left, so he initiated a left turn from the three-lane intersecting roadway onto the six-lane highway without coming to a complete stop at the stop sign. **Figure 2** depicts the Honda's approach to the intersection after executing the U-turn. The Dodge and the Pontiac were southbound on the six-lane highway, with the Dodge traveling in the number two lane and the

Pontiac traveling in the number three lane. The Dodge was traveling at an EDR reported speed of 102 km/h (63 mph) 2.0 sec prior to Algorithm Enable (AE). The data imaged from the EDR of the Dodge indicated that the driver released the accelerator 1.8 seconds prior to AE and applied the brakes 1.6 seconds prior to AE. The Dodge slowed from 102 km/h (63 mph) to 68 km/h (42 mph) 0.2 sec prior to AE. The driver of the Honda stated that he did not have time to initiate an avoidance maneuver prior to the initial impact.

Figure 2: Pre-crash trajectory of the Honda.

Crash

The front of the Dodge impacted the left side of the Honda (Event 1). The direction of force was within the 10 o'clock sector for the Honda and the 1 o'clock sector for the Dodge. The force of the impact deployed the left side impact air bag and left IC of the Honda. The frontal air bags of the Dodge also deployed. The Honda's passenger compartment intrusion at the left B-pillar locked the safety belt retractor, but the left retractor and buckle pretensioners did not actuate. The damage algorithm of the WinSMASH program was used to calculate the severity of the crash (delta-V). The total delta-V of the Honda was 39.0 km/h (24.2 mph). The Honda's longitudinal and lateral delta-V components were -25.1 km/h (-15.6 mph) and 30.0 km/h (18.6 mph), respectively. The total delta-V for the Dodge was 26.0 km/h (16.2 mph) with a longitudinal and lateral delta-V components of -22.5 km/h (-14.0 mph) and -13.0 km/h (-8.1 mph), respectively.

The impact redirected the Honda into a clockwise (CW) rotation and southeast trajectory within the intersection. The Honda rotated approximately 40 degrees and was deflected into the path of the Pontiac. The rotation exposed the right front corner of the Honda to the right side of the Pontiac. The right rear axle area of the Pontiac impacted the right front corner are of the Honda in a secondary impact (Event 2). The driver of the Pontiac had attempted to avoid the crash by steering left. The narrow engagement/corner impact between the Honda and the Pontiac invalidated the use of the WinSMASH program for analysis of this impact. All three vehicles came to uncontrolled final rest locations on the south leg of the intersection. There was no physical evidence at the scene that documented the final rest locations of the vehicles.

Post-crash

Police, emergency medical and tow personnel responded to the crash site. The driver of the Honda was mechanically restrained in the vehicle by the jammed and intruded left door, the compressed driver's seat and the steering assembly. Emergency personnel forced open the left door to remove the driver. He was transported by air ambulance to a regional trauma center where he was admitted for treatment of a serious femur fracture, pelvic fractures and associated sift tissue injuries. The front right passenger of the Honda was able to exit the vehicle under his own power through the right door. He was transported by ground ambulance to a local hospital and was treated for soft tissue injuries. All three vehicles were towed from the scene due to disabling damage. They were all transferred from the local tow yards to two regional vehicle salvage facilities for auction, where they were inspected.

2008 Honda Civic

Exterior Damage

The left side of the Honda sustained moderate damage in this side impact crash **(Figure 3)**. On the left plane, the direct contact damage began 76 cm (30 in) forward of the vehicle's left rear axle, and extended forward 155 cm (61 in). The maximum crush was located at C3, 132 cm (51.9 in) forward of the left rear axle, and measured 48 cm (18.9 in). The combined direct and induced damage (Field L) began 20 cm (7.9 in) forward of the left rear axle and extended forward 280 cm (110.2 in). The residual crush profile measured at the mid-door was as follows: C1 = 0 cm, C2 = 5 cm (2 in), C3 = 48 cm (18.9 in), C4 = 43 cm (16.9 in), C5 = 7 cm (2.8 in), C6 = 0 cm. The left door deformed, intruded into the passenger compartment and was jammed shut post-crash. The left wheelbase was shortened by 5 cm (2 in). The windshield was fractured by the impact forces, with more significant damage along the left A-pillar and windshield header. The left side windows were disintegrated by the initial impact. The Collision Deformation Classification (CDC) assigned for this impact was 10LPEW4.

Figure 3: Left side damage to the Honda.

The direct damage on the front plane began 59 cm (23.2 in) right of the vehicle centerline and extended right 18 cm (7.1 in) to front right bumper corner. **Figure 4** depicts the damage to the front of the Honda. The combined direct and induced damage (Field L) extended from the front left bumper corner to the front right bumper corner. The maximum crush was located at C6, the front right bumper corner, and measured 8 cm (3.1 in). A residual crush profile was measured at the bumper level and was as follows: C1 = 7 cm (2.8 in), C2 = 6 cm (2.4 in), C3 = 6 cm (2.4 in), C4 = 4 cm (1.6 in), C5 = 2 cm (0.8 in), C6 = 8 cm (3.1

Figure 4: Frontal damage to the Honda.

in). The front bumper fascia was partially detached from the bumper support bar and was pressed back into place to obtain these measurements. Due to the corner type impact configuration, the direct contact damage wrapped around the corner and extended 61 cm (24.0 in) along the right plane. The right wheelbase was shortened by 9 cm (3.5 in) as a result of the longitudinal travel of the Pontiac down the right side, damaging the right front suspension. The right door remained closed during the crash and was operational post-crash. The right side windows, backlight and sunroof glazing were not damaged in this crash. The CDC assigned for this impact was 12FREE1.

There was damage present on the rear aspect of the left side of the Honda, aft of the rear axle. This damage was documented and photographed in the inspection and included a maximum crush measuring 2 cm (0.8 in) within a direct damage length of 74 cm (29.1 in). When the interview was obtained, the driver had images of the Honda taken one day post-crash. This minor left side damage was not present in the driver's images, and was considered to have occurred at the tow yard post-crash.

Interior Damage

The Honda sustained moderate severity interior damage that was attributed to passenger compartment intrusion, occupant contact and air bag deployment. The driver had loaded the left door with his left flank resulting in scuffing to the plastic door panel and compression of the rubber insulation under the plastic panel. The steering wheel was turned to 30 degrees CW at the time of the SCI inspection. The steering column was adjustable for the tilt and telescoping positions and was located in the center height adjustment and the full forward (towards instrument panel) telescoping adjustment. There was no steering rim deformation; however the entire steering column had been displaced 9 cm (3.5 in) to the right. The first scuff mark and insulation compression to the left door was located 20 cm (7.9 in) below the window sill and 38 cm (15 in) forward of the B-pillar. This contact measured 11 cm (4.3 in) in width and 12 cm (4.7 in) in height and was attributed to the driver's left elbow. The second scuff mark and insulation compression was located 18 cm (7.1 in) below the window sill and 56 cm (22 in) forward of the B-pillar. This contact measured 9 cm (3.5 in) in width and 12 cm (4.7 in) in height and was attributed to the driver's left forearm. There was a scuff mark on the left B-pillar of unknown origin. This contact measured 9 cm (3.5 in) and was located adjacent to the D-ring. The driver's right hand deposited body fluid and a scuff mark on the fabric sunroof cover 7-32 cm (2.8-12.6 in) forward of the rear of the sunroof opening and 16-24 cm (6.3-9.4 in) right of the left side of the sunroof opening. The front right passenger had loaded the center console with his left flank. The front right passenger's left side/rib cage area deposited a scuff mark on the right side of the center console. The scuff mark measured 10 cm x 4 cm (3.9 in x 1.6 in) and was located directly above the front right passenger's safety belt buckle.

The driver's seat was compressed laterally by the intrusion of the left door and B-pillar. **Figure 5** depicts the damaged front left seat. The seat back was compressed 15 cm (5.9 in) and the seat cushion was compressed 17 cm (6.7 in). There was no damage to the front right seat. The front left seat was jammed in position; the front right seat track and seat back angle adjustment were operational.

Figure 5: Front left seat compression due to left side intrusion.

The intrusion to the Honda is listed in the following table:

Position	Component	Direction	Magnitude
Row 1 Left	Left door rear lower quadrant	Lateral	30 cm (11.8 in)
Row 1 Left	Left door rear upper quadrant	Lateral	20 cm (7.9 in)
Row 1 Left	Left door fwd. upper quadrant	Lateral	14 cm (5.5 in)
Row 1 Left	Left door sill	Lateral	19 cm (7.5 in)
Row 1 Left	A-pillar	Lateral	10 cm (3.9 in)
Row 1 Left	Roof side rail	Lateral	9 cm (3.5 in)
Row 1 Left	Side panel, fwd. of the A-pillar	Lateral	9 cm (3.5 in)
Row 1 Left	B-pillar	Lateral	7 cm (2.8 in)
Row 2 Left	Side panel rear of B-pillar	Lateral	8 cm (3.1 in)

Manual Restraint Systems

The Honda was equipped with 3-point manual lap and shoulder belts for the five designated seating positions. All belt systems utilized continuous loop webbing and sliding latch plates. None of the upper D-rings were height adjustable. The driver's belt retracted onto an Emergency Locking Retractor (ELR), and the front right passenger's belt retracted onto a switchable ELR/Automatic Locking Retractor (ALR). The front belt systems utilized both buckle and retractor-mounted pretensioners. No pretensioners actuated in the crash. The front belts were in use at the time of the crash. Inspection revealed that the left retractor was locked due to the B-pillar damage. The front right belt operated normally at the time of the SCI inspection. The driver's belt had been cut in two locations, near the latch plate 65 cm (25.6 in) above the lower floor anchor and 2 cm below the D-ring. The driver's belt included a frictional abrasion located 54-58 cm (21.3-22.8 in) above the lower floor anchor. The front right belt webbing was free from damage or contact evidence.

The second row belt systems utilized a switchable ELR/ALR retractor. The second row was not occupied and the belts were not in use at the time of the crash.

Frontal Air Bag System

The Honda Civic was equipped with a Certified Advanced 208-Compliant (CAC) frontal air bag system that consisted of dual stage driver and front right passenger air bags, seat track positioning sensors, a front right occupant weight sensor, retractor pretensioners, and safety belt buckle switches. The manufacturer of this vehicle has certified that this vehicle was compliant with the advanced air bag portion of the Federal Motor Vehicle Safety Standard (FMVSS) Number 208.

The driver's air bag was concealed within the center hub of the three-spoke steering wheel and did not deploy in this crash. The front right air bag was mounted within the top aspect of the right instrument panel and did not deploy in this crash.

Side Impact Air Bag System

The Honda was equipped with front seat-mounted side impact air bags and roof side rail-mounted IC air bags. The left side impact air bag and left IC air deployed during the initial impact. The right side impact air bag and IC did not deploy.

The side impact air bag deployed from a 35 cm (13.8 in) long seam in the upper outboard aspect of the front left seat back. The air bag measured 60 cm (23.6 in) in height and 35 cm (13.8 in) in width. The side air bag had one vent port on the outboard aspect at the 9 o'clock position. The left side air bag **(Figure 6)** was free from contact evidence or damage.

The left IC air bag deployed from the left roof side rail. The IC measured 135 cm (53.1 in) in length. It was 40 cm (15.7 in) in height at the front seating position, including a 4 cm (1.6 in) non-inflating strip at the bottom of the air bag. In the rear seating position, the IC measured 36 cm (14.2 in) in height. Vertically, the curtain air bags extended below the belt line at each outboard position. The front inflatable section of the left IC had been cut from the vehicle by EMS to allow access to the driver. The uneven vertical cut was approximately 75 cm (29.5 in) rearward of the forward edge of the fabric (in the area of the B-pillar). The cut extended from the lower edge of the IC to the top, and then forward along the top of the fabric to the front edge of the air bag (**Figure 7**). There was a trapezoidal-shaped opening between the front edge of the air bag fabric and the A-pillar that measured 44 cm (17.3 in) in length, and 24 cm (9.4 in) and 11 cm (4.3 in) in height at the rear and front, respectively. The IC was tethered to the A-pillars by a 26 cm (10.2 in) webbing strap that was attached to the outboard side of the air bag 14 cm (5.5 in) aft of the front edge of the fabric. At the rear of the curtain, the inflatable section of the membrane measured 33 cm (13 in) in length. Forward of this inflatable section was a non-inflated panel measuring 30 cm (11.8 in) in height and length. There was an inflatable tube connecting the front and rear inflatable sections of the IC measuring 30 cm (11.8 in) in length and 6 cm (2.4 in) in height. There was no contact evidence present on the left IC.

Figure 6: Inboard side of left side air bag.

Figure 7: Forward aspect of the IC air bag cut by EMS.

2008 Dodge Grand Caravan

Exterior Damage

Figure 8: Frontal damage sustained by the Dodge minivan.

The front plane of the Dodge sustained moderate severity damage as a result of the impact with the Honda **(Figure 8)**. The bumper support bar and fascia had been removed by a repair facility post crash, however there was still direct damage evident on the hood of the vehicle. The direct contact damage and Field L was measured between the frame rail ends of the Dodge. The Field L width was 117 cm (46 in) and the maximum crush measured 10 cm (3.9 in), located at the outboard edge of the right frame rail end. A crush profile based on the positions of the frame rail ends was documented and was as follows: C1 = 6 cm (2.4 in), C2 = 8 cm (3.1 in), C3 = 9 cm (3.5 in), C4 = 9 cm (3.5 in), C5 = 9 cm (3.5 in), C6 = 10 cm (3.9 in). The CDC assigned for this impact was 01FDEW1.

1999 Pontiac Grand Am GT

Exterior Damage

Figure 9: Right side sideswipe damage to the Pontiac.

The right side of the Pontiac and the right rear suspension sustained minor damage as a result of the impact with the corner of the Honda. This damage is depicted in **Figure 9**. The direct damage began 152 cm (59.8 in) aft of the right front axle, and extended rearward 203 cm (80.0 in). The Field L began and ended at the same locations. On the right side, the maximum crush was located 220 cm

(86.6 in) aft of the right front axle and measured 5 cm (2.0 in). The right rear suspension was impacted during the sideswipe engagement, increasing the right wheelbase by 8 cm (3.1 in). A residual crush profile was documented along the right side damage and was as follows: C1 = 0 cm, C2 = 1 cm (0.4 in), C3 = 0 cm, C4 = 3 cm (1.2 in), C5 = 1 cm (0.4 in), C6 = 0 cm. The CDC assigned for this impact was 12RZEW1.

2008 Honda Civic Occupant Demographics
Driver Data

Driver Age/Sex:	18-year-old/Male
Height:	175 cm (69 in)
Weight:	79 kg (174 lb)
Eyewear:	None
Seat Track Position:	Mid-track, per inspection and interview
Manual Safety Belt Use:	Lap and shoulder
Usage Source:	SCI vehicle inspection
Egress from Vehicle:	Removed from vehicle while unconscious
Mode of Transport from Scene:	Air ambulance
Type of Medical Treatment:	Admitted 9 days to a regional trauma center.

Driver injuries

Injury	Injury Severity (AIS 2005/Update 08)	Injury Source
Left femur fracture (trochanteric)	Serious (853151.3,2)	Left door armrest - rear lower quadrant
Left comminuted acetabular fracture (involving both columns)	Moderate (856271.2,2)	Left door armrest - rear lower quadrant
Pelvic ring fractures (superior and inferior pubic rami fractures, left sacral fracture, symphysis pubis fracture)	Moderate (856151.2,4)	Left door armrest - rear lower quadrant
Small splenic hematoma	Moderate (544210.2,2)	Left door armrest - rear lower quadrant
L1 left transverse process fracture	Moderate (650620.2,8)	Left door armrest - rear lower quadrant
Mild traumatic brain injury	Minor (100099.9,0)	Front structure of the Dodge
Bilateral mandible fracture (right angle fracture, extending to the mandibular notch, and left ramus fracture extending into the adjacent unerupted third molar socket)	Minor (250605.1,3)	Front structure of the Dodge

Injury	Injury Severity (AIS 2005/Update 08)	Injury Source
Left front incisor fracture (Ellis II type)	Minor (251404.1,8)	Front structure of the Dodge
Left scalp contusion	Minor (110402.1,2)	Front structure of the Dodge
Tongue laceration	Minor (243400.1,8)	Self inflicted
Right scalp contusion	Minor (110402.1,1)	Occupant to occupant contact
Left hip contusion (anterior aspect) extending down thigh to just above knee	Minor (810402.1,2)	Left door armrest - rear lower quadrant
Left arm contusion (from shoulder down to wrist)	Minor (710402.1,2)	Left door - rear upper quadrant

Source of injury data: Medical records

Driver Kinematics

The 18-year-old male driver was seated in a mid-track position. His left hand was on the steering wheel rim and his right hand was on the transmission shift knob. He was restrained by the manual 3-point lap and shoulder belt system. The driver did not attempt any avoidance maneuver prior to the initial impact of this crash sequence.

The left side impact locked the driver's emergency locking retractor and deployed the left side impact air bag and the left IC. The driver initiated a left and slightly forward trajectory in response to the 10 o'clock direction of force. The driver loaded the deployed IC air bag with his head and face that was reinforced by the front of the Dodge, resulting in a concussion, a contusion to the left side of the head, tooth fractures and the left mandible fractures. The driver loaded the side impact air bag and left door with his left hip, as the door intruded laterally towards him. This resulted in the left pelvis, the left femur and the L1 transverse process fractures. The driver loaded the left door panel with his left arm and elbow, forward of the area protected by the side air bag. This resulted in the contusion to his left arm. The intrusion from the left side of the passenger compartment compressed and deformed the driver's seat. The driver then initiated a rebound trajectory to the right and rearward within the front left seating position. During his rebound phase, the driver's head impacted the head of the front right occupant resulting in the right head contusion.

The driver came to rest unconscious with his lower body restrained in the front left seat. He was extricated from the vehicle and transported by air ambulance to a regional trauma center where he was admitted for nine days.

Front Right Occupant Data

Occupant Age/Sex:	18-year-old/Male
Height:	178 cm (70 in)
Weight:	75 kg (165 lb)
Eyewear:	None
Seat Track Position:	Full-rear, per inspection and interview
Manual Safety Belt Use:	Lap and shoulder
Usage Source:	SCI vehicle inspection
Egress from Vehicle:	Exited under his own power
Mode of Transport from Scene:	Ground ambulance
Type of Medical Treatment:	Evaluated, treated and released from a local hospital

Front Right Occupant Injuries

Injury	Injury Severity (AIS 2005/Update 08)	Injury Source
(1) - Head laceration (1cm at the left temporal area)	Minor (110602.1,2)	Occupant to occupant contact
(1) - Left shin laceration	Minor (810602.1,2)	Center lower instrument panel
(2) - Left hip contusion	Minor (810402.1,2)	Center console

Source of injury data: Medical records (1) and interview (2)

Front Right Occupant Kinematics

The 18-year-old male front right passenger was seated in a full-rear track position and was restrained by the manual 3-point lap and shoulder belt system. As the left side of the Honda was impacted by the Dodge, the passenger initiated a left and slightly forward trajectory within the front right seating position. He impacted the center console with his left hip, resulting in contusion. His upper body slid out from under the shoulder belt webbing and wrapped over the center console. When the driver rebounded from the impact with the left door and air bags, the driver's head impacted the front right passenger's head, resulting in a 1 cm (0.4 in) left temporal scalp laceration. During the course of the impact sequence, the passenger's left lower extremity contacted the center lower instrument panel possibly resulting in a shin laceration.

The front right passenger reportedly exited the vehicle under his own power but was unable to function well enough or reach a cellular phone to summon help. He was transported by ground ambulance to a local hospital where he was treated in the emergency department and released the same day.

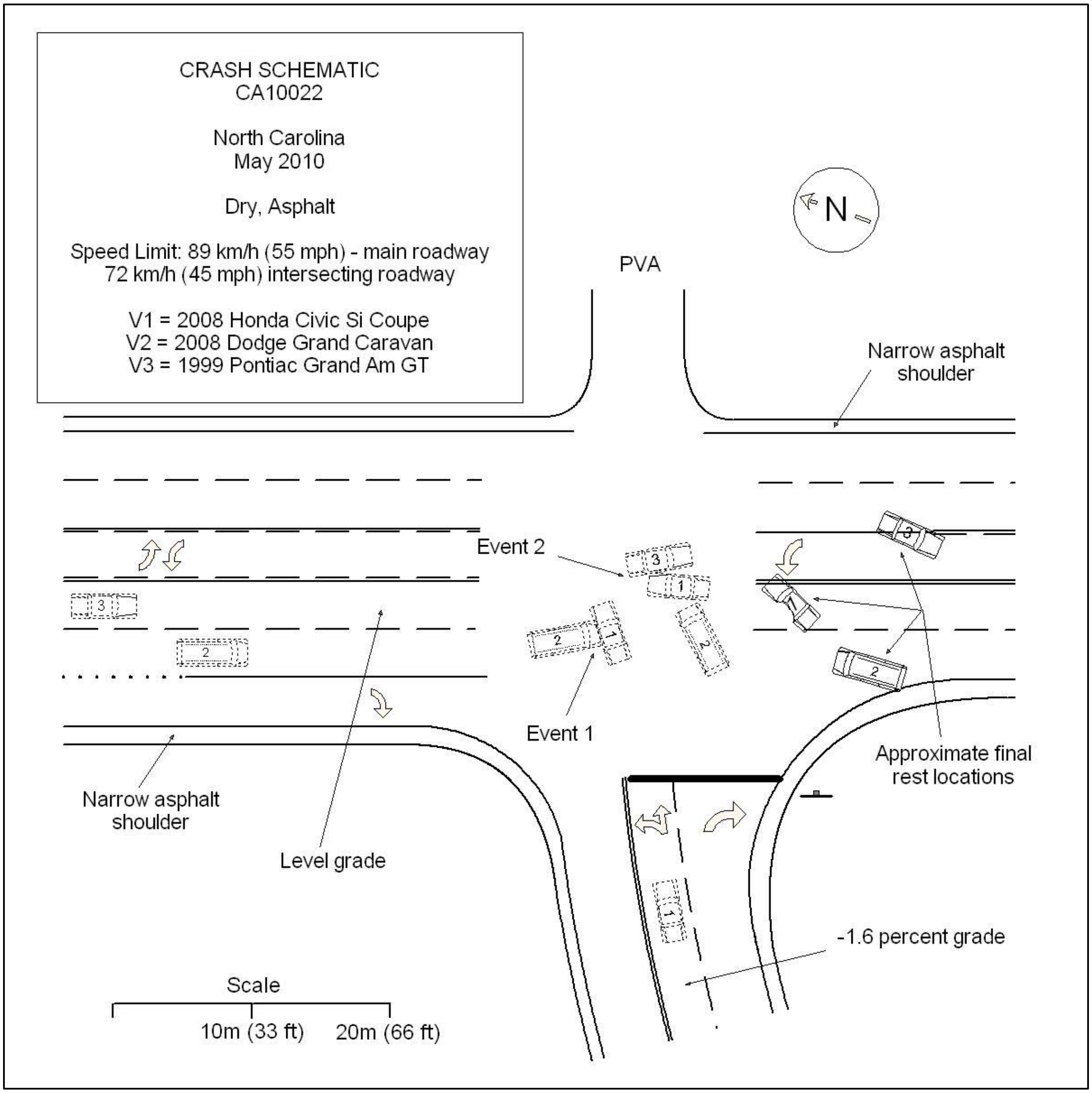


Figure 10: Crash Schematic

Attachment A

2008 Dodge Caravan EDR Data

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	2D8HN54X58R******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CA10022 CDR DODGE.CDR
Saved on	Wednesday, June 23 2010 at 09:09:39 AM
Collected with CDR version	Crash Data Retrieval Tool 3.3
Reported with CDR version	Crash Data Retrieval Tool 3.4
EDR Device Type	airbag control module
Event(s) recovered	Event Record 1

Comments

No comments entered.

Data Limitations

AIRBAG CONTROL MODULE (ACM) DATA LIMITATIONS:

GENERAL INFORMATION:

CAUTION: During Bench top imaging, make sure the ACM is not moved, tilted or turned over while connected to and powered by the CDR Interface Module. Also, after a CDR imaging process, wait 2 minutes after power is removed from the ACM before attempting to move the module. Not following these general ACM guidelines for bench top imaging could cause new events to be recorded in the ACM.

The ACM current fault status will be altered if the ACM is powered-up without having all of the other vehicle inputs connected (e.g., bench top imaging). This situation will occur when the CDR tool is connected directly to the ACM. This will not affect any of the stored fault data information in any of the Event Records. Always make a note in the CDR case comments page when an ACM bench top imaging process is performed.

The recorded Deployment Event will contain Pre-Crash data.

- T0 (where '0' is subscript) (-.01 sec.) is defined as the last sample point in the vehicle data buffer when the ACM commanded a deployment for all vehicles except the 2008 - 2010 Dodge Grand Caravan, 2008-2010 Chrysler Town and Country and 2009-2010 Dodge Journey. In these vehicles, T0 (where '0' is subscript) is defined as the algorithm wakeup. Please note that the algorithm wakeup may be different for front, side, and roll-over events and their associated parameters.
- The VIN is captured by the ACM and then recorded as the Original VIN after 10 consecutive ignition cycles of capturing the same number. Once it has been recorded, this number can not be modified.

CDR FILE INFORMATION:

Event(s) Recovered definitions:

- None - There are no stored events in the Airbag Control Module (ACM)
- Not Retrievable - Event Data is stored in the ACM but is not retrievable by the CDR tool.
- For Continental ACMs:
  - Event Record 1 - Data from an event is stored in the ACM (not necessarily in chronological order)
  - Event Record 2 - Data from another event is stored in the ACM (not necessarily in chronological order)
  - Event Record 3 - Data from another event is stored in the ACM (not necessarily in chronological order)
- For all other ACMs:
  - Most Recent Event - Data of the most recent event is displayed in the report
  - 1st Prior Event - Two events are stored in the ACM, Data displayed is of the first prior event.
  - 2nd Prior Event - Three events are stored in the ACM, Data displayed is of the second prior event.
  - Etc., (for modules with 3 to 5 stored events)

CDR RECORD INFORMATION:

- If power to the ACM is lost during a deployment event, all or part of the event data record may not be recorded. "Interrupted" will be displayed for Vehicle Event Recorder Status.
- The Airbag Control Module Configuration indicates the inputs and outputs that the ACM for a particular vehicle monitors and/or controls.

- For applicable vehicles, the “Event Number” in the System Status at Event section of the report indicates the order of the events.
- For applicable vehicles, the “Total Number of Events Recorded” in the System Status at Event section of the report indicates the total number of events that the ACM has recorded.
- For applicable vehicles, a “Yes” for a particular item in the Deployment Command Data section of the report indicates that the ACM commanded the deployment of the associated device.
- Vehicle Data (Pre-Crash) is transmitted to the Airbag Control Module, by various vehicle control modules, via the vehicle’s communication network.
- On 2006-2009 Dodge Ram 2500/3500, the Engine RPM recorded is limited to a maximum of 4080 RPM. On the 2008 - 2010 Dodge Grand Caravan, 2008-2010 Chrysler Town and Country and 2009-2010 Dodge Journey, the engine RPM resolution is 256 rpm. On all other vehicles, the resolution is 32 rpm.
- If a recorded event has Engine RPM equal to SNA and Speed, Vehicle Indicated equals SNA for each time stamp, then the data is default data and the event stored in the ACM is not valid.
  - The accuracy of the recorded Speed, Vehicle Indicated will be affected if the vehicle had the tire size or the final drive axle ratio changed from the factory build specifications.
  - Speed, Vehicle Indicated is reported as an average of the drive wheels.
- On the 2008 - 2010 Dodge Grand Caravan, 2008-2010 Chrysler Town and Country and 2009-2010 Dodge Journey, the vehicle speed resolution is 2 kph. On all other vehicles, the resolution is 1 kph.
- The MIL (Malfunction Indicator Lamp) Status for the various recorded systems indicates the state of the applicable malfunction indicator lamp at the time that the data was captured. Note: Some fault codes could be stored due to component/system damage from the accident.

NOTE: A StarScan Tool should be used to read any stored Diagnostic Trouble Codes (DTC’s) in the various electronic modules (ACM, PCM, ABS, TCM, etc., where applicable) for use in interpretation of some vehicle specific recorded data.

VEHICLE DATA DEFINITIONS:

Vehicle Event Recorder Status definitions:

- For additional definitions, please refer to the CDR Help File Glossary
- ABS MIL status - This indicates the ABS fault indicator lamp status. It will only be illuminated when there is a fault in the ABS system. The Electronic brake module DTC’s should be read and recorded for final system interpretation.
- ESP MIL status - This indicates the ESP/BAS fault indicator lamp status. It will only be illuminated when there is a fault or thermal model shutdown in the ESP system. The ESP module DTC’s should be read and recorded for final system interpretation. This is only valid for vehicles equipped with ESP.
- ESP Lamp Steady State Requested - This is the status of the ESP symbol - “car with squiggly lines” indicator lamp. “Yes” indicates ESP has been turned off by the driver or has reduced performance and is not an indication of a fault in the system. This is only valid for vehicles equipped with ESP.
- ESP Lamp Flashing Requested - If “Yes”, then an ESP, Traction Control or Trailer Sway Control (if equipped) event was active at the time of data capture. This is only valid for vehicles equipped with ESP.
- ESP Disabled - “Yes” indicates that ABS & ESP have been disabled by the driver or due to system performance. This is only valid for vehicles equipped with ESP.
- Traction Control Button - When the button is "ON", (driver has pushed the button), the Traction Control system is "Disabled". When the button is "OFF", the Traction Control system is "Enabled".
- ESP Active - “YES” indicates that the ESP system is intervening with wheel specific braking/engine control. This is only valid for vehicles equipped with ESP.
- Panic Brake Assist Active - “Yes” indicates that all four of the brake circuits are under going ABS control. This is only valid for vehicles equipped with ESP.
- Steering Input (deg) if equipped:
  - Steering Input polarity is positive for right turns on:
    - o 2005 - 2007 Grand Cherokee
    - o 2006 - 2007 Commander
    - o 2005 - 2010 300, Magnum, and Charger
    - o 2008 - 2010 Challenger
  - Steering Input polarity is negative for right turns on:
    - o All other vehicles and model years not specified above
- Yaw Rate (Degrees) if equipped: All vehicles have negative yaw rate when making a right turn.
- ETC Lamp Status - Lamp “ON “ indicates there is an active Electronic Throttle DTC. This is only valid for vehicles equipped with ETC.
- ETC Lamp Flashing - If “Yes”, then the ETC is in the limp-in mode. This is only valid for vehicles equipped with ETC.
- Engine Torque Applied - If “No”, then no engine torque output was applied (as in Park/Neutral for Automatic transmissions or clutch depressed on manual or during an ESP/Traction Control event), If “Yes”, then engine torque output was applied.
- Tire 1 (2) Location - This indicates the location of the tire pressure sensor data. Default is used to indicate that the location of the tire pressure sensor is unknown or there is no tire pressure sensor in the wheel. Vehicles with Base Tire Pressure Monitoring systems will display SNA for both Tire Locations as these vehicles do not send actual pressure values across the communication bus.
- Tire 1 (2) Pressure Status - This indicates the actual pressure status of the Tire Location defined in the previous column. Possible values are LOW, NORMAL, HIGH, or SNA for this parameter. Vehicles with Base Tire Pressure Monitoring systems will display NORMAL even though these vehicles do not send actual pressure values across the communication bus.
- Tire 1 (2) Pressure (psi) - This indicates the actual tire pressure value of the Tire Location defined. Vehicles with Base Tire Pressure Monitoring systems will display N/A for this parameter as these vehicles do not send actual pressure values across the communication bus.
- Cruise Control System - “Yes” indicates that the Cruise Control system is turned on.
- Cruise Control Active - “Yes” indicates the Cruise Control system is actively controlling vehicle speed. “No” indicates the system is NOT controlling vehicle speed.

APPLICATION INFORMATION:

- 2005 - 2010 Durango's equipped with side airbags have EDR data that can be imaged by the CDR tool. Durango's not equipped with side airbags have EDR Data that might be imaged by the CDR tool and can always be imaged by the supplier.
- For 2006 MY, some Chrysler 300, Dodge Magnum, Dodge Charger, Jeep Grand Cherokee, and Jeep Commander models may contain EDR data that can not be imaged by the CDR tool.
- For 2007 MY, some PT Cruiser models may contain EDR data that can not be imaged by the CDR tool.
- EDR Data is only recorded for frontal deployments in the following vehicles:

- 2005-2007	Durango
- 2007	Aspen
- 2006-2007	Ram 1500
- 2006-2009	Ram 2500/3500 Heavy Duty
- 2007	Caliber, Compass, Patriot
- 2007	Sebring
- 2007	Nitro
- 2007	Wrangler

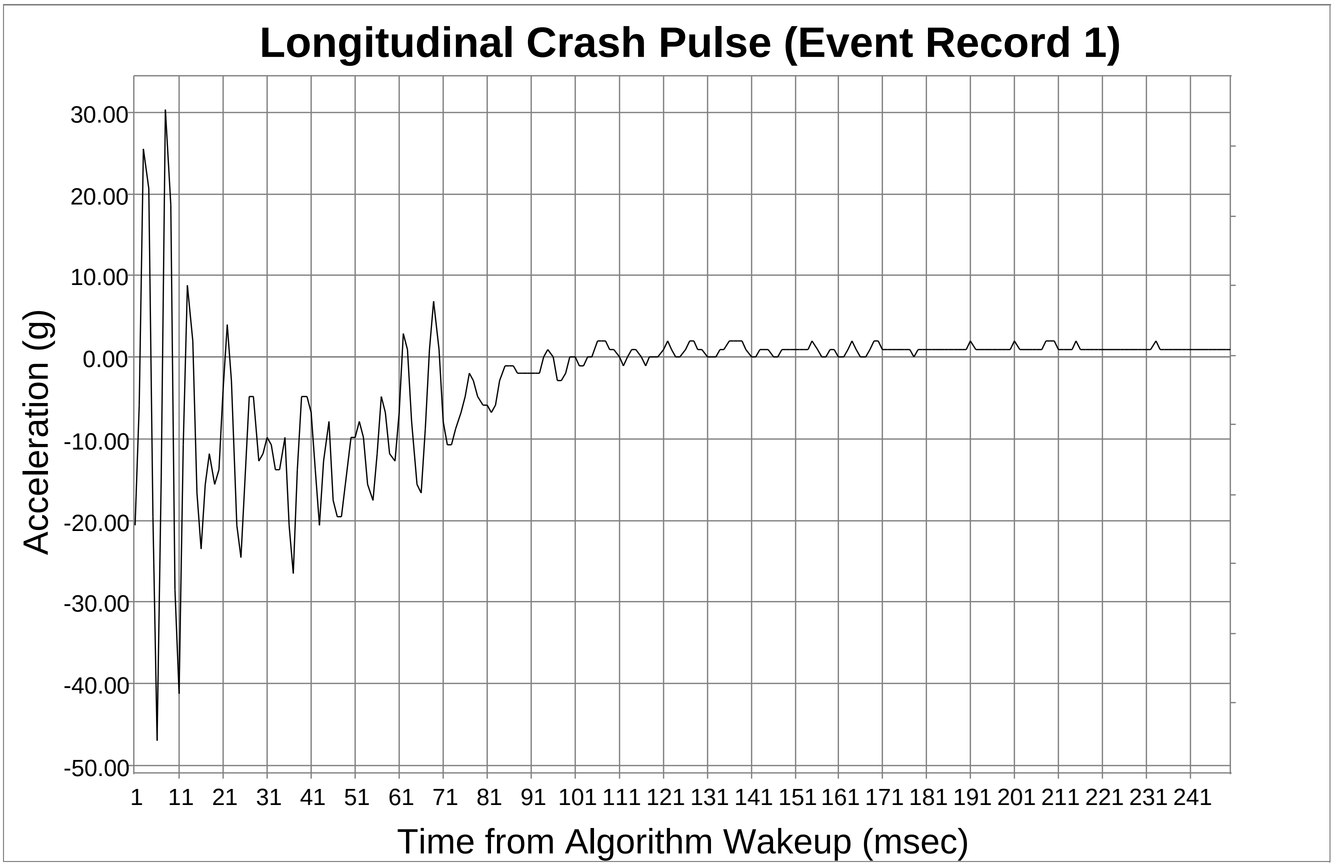
03001_Chrysler_r003

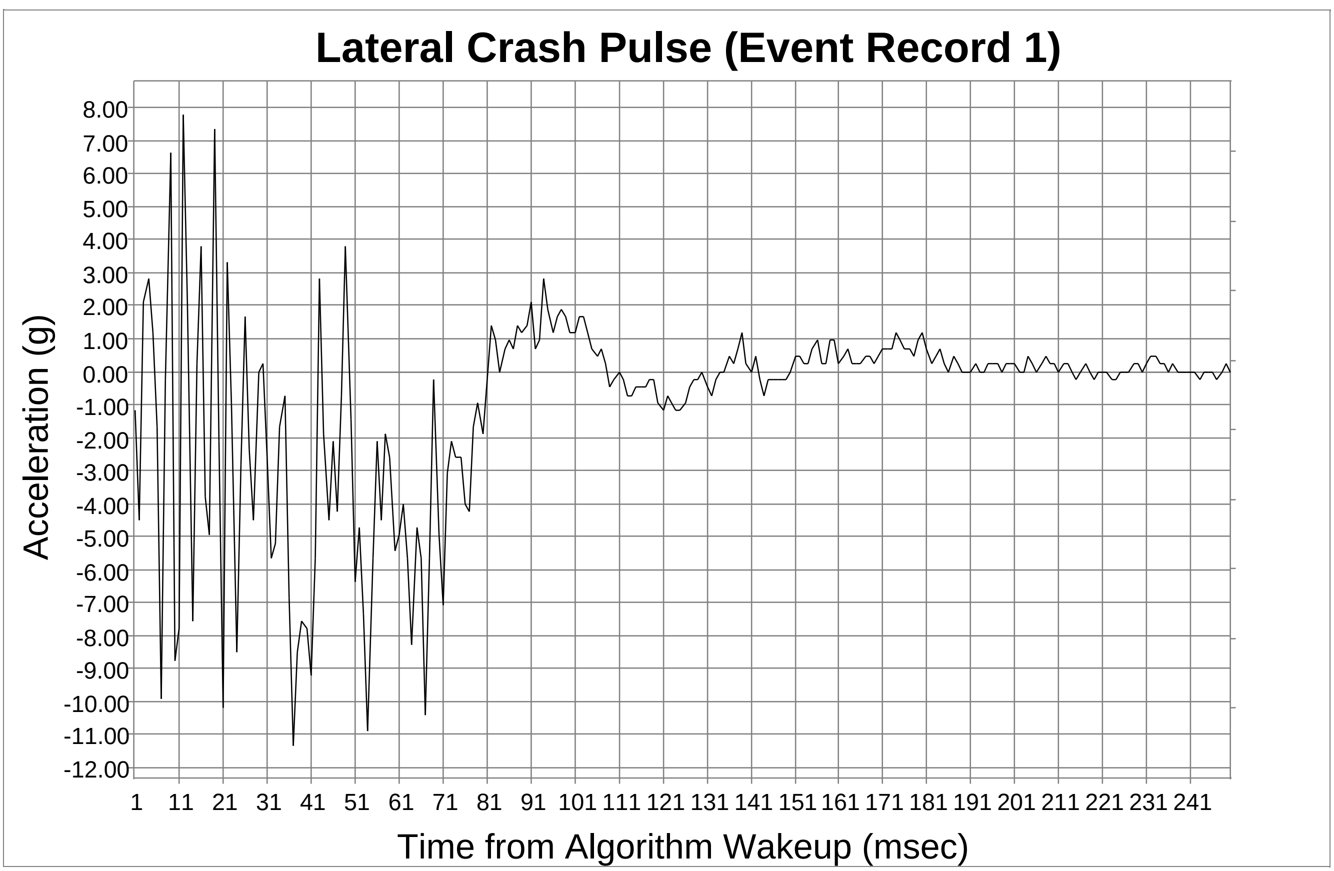
System Status at Retrieval

Original VIN	2D8HN54X58R******
Airbag Control Module Part Number	05094018AK
Airbag Control Module Serial Number	T15JF341709128
Airbag Control Module Supplier	Continental Corporation

System Configuration at Retrieval

Configured for Front Driver Seatbelt Switch	No
Configured for Front Center Seatbelt Switch	No
Configured for Front Passenger Seatbelt Switch	Yes
Configured for 2nd Row Left Seatbelt Switch	No
Configured for 2nd Row Center Seatbelt Switch	No
Configured for 2nd Row Right Seatbelt Switch	No
Configured for 3rd Row Left Seatbelt Switch	No
Configured for 3rd Row Center Seatbelt Switch	No
Configured for 3rd Row Right Seatbelt Switch	No
Configured for Driver Inflatable Knee Bolster	No
Configured for Left Curtain #1	Yes
Configured for Right Curtain #1	Yes
Configured for Left Curtain #2	No
Configured for Right Curtain #2	No
Configured for Front Driver Seatbelt Pretensioner	Yes
Configured for Front Center Seatbelt Pretensioner	No
Configured for Front Passenger Seatbelt Pretensioner	Yes
Configured for 2nd Row Left Seatbelt Pretensioner	No
Configured for 2nd Row Center Seatbelt Pretensioner	No
Configured for 2nd Row Right Seatbelt Pretensioner	No
Configured for 3rd Row Left Seatbelt Pretensioner	No
Configured for 3rd Row Center Seatbelt Pretensioner	No
Configured for 3rd Row Right Seatbelt Pretensioner	No
Configured for Left Side Sensor #1	Yes
Configured for Left Side Sensor #2	Yes
Configured for Left Side Sensor #3	Yes
Configured for Right Side Sensor #1	Yes
Configured for Right Side Sensor #2	Yes
Configured for Right Side Sensor #3	Yes
Configured for Left Up Front Sensor	Yes
Configured for Right Up Front Sensor	Yes
Configured for Front Driver Digressive Load Limiter	No
Configured for Front Passenger Digressive Load Limiter	No
Configured for Driver Seat Track Position Sensor	Yes
Configured for Passenger Seat Track Position Sensor	Yes
Configured for Driver Airbag Disable Switch	No
Configured for Passenger Airbag Disable Switch	No
Configured for Passenger Occupant Classification System	No
Configured for Right Side Thorax	No
Configured for Left Side Thorax	No
Configured for Passenger Inflatable Knee Bolster	No
Configured for Passenger Belt Tension Sensor	No
Configured for Driver Belt Tension Sensor	No
Configured for Occupant Detection Sensor	No
Configured for DOC Disable Switch	No


Longitudinal Crash Pulse (Event Record 1)
Acceleration (g)
30.00
20.00
10.00
0.00
-10.00
-20.00
-30.00
-40.00
-50.00
1 11 21 31 41 51 61 71 81 91 101 111 121 131 141 151 161 171 181 191 201 211 221 231 241
Time from Algorithm Wakeup (msec)


Lateral Crash Pulse (Event Record 1)
Acceleration (g)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
-7.00
-8.00
-9.00
-10.00
-11.00
-12.00
1 11 21 31 41 51 61 71 81 91 101 111 121 131 141 151 161 171 181 191 201 211 221 231 241
Time from Algorithm Wakeup (msec)

Longitudinal Crash Pulse (Event Record 1)

Time from Algorithm Wakeup (msec)	Longitudinal Acceleration (g)
1	-20.59
2	-5.88
3	25.49
4	20.59
5	-19.61
6	-47.06
7	-14.71
8	30.39
9	18.63
10	-28.43
11	-41.18
12	-10.78
13	8.82
14	1.96
15	-16.67
16	-23.53
17	-15.69
18	-11.76
19	-15.69
20	-13.73
21	-3.92
22	3.92
23	-2.94
24	-20.59
25	-24.51
26	-14.71
27	-4.90
28	-4.90
29	-12.75
30	-11.76
31	-9.80
32	-10.78
33	-13.73
34	-13.73
35	-9.80
36	-20.59
37	-26.47
38	-13.73
39	-4.90
40	-4.90
41	-6.86
42	-13.73
43	-20.59
44	-12.75
45	-7.84
46	-17.65
47	-19.61
48	-19.61
49	-15.69
50	-9.80

Time from Algorithm Wakeup (msec)	Longitudinal Acceleration (g)
51	-9.80
52	-7.84
53	-9.80
54	-15.69
55	-17.65
56	-11.76
57	-4.90
58	-6.86
59	-11.76
60	-12.75
61	-6.86
62	2.94
63	0.98
64	-7.84
65	-15.69
66	-16.67
67	-8.82
68	0.98
69	6.86
70	0.98
71	-7.84
72	-10.78
73	-10.78
74	-8.82
75	-6.86
76	-4.90
77	-1.96
78	-2.94
79	-4.90
80	-5.88
81	-5.88
82	-6.86
83	-5.88
84	-2.94
85	-0.98
86	-0.98
87	-0.98
88	-1.96
89	-1.96
90	-1.96
91	-1.96
92	-1.96
93	-1.96
94	0.00
95	0.98
96	0.00
97	-2.94
98	-2.94
99	-1.96
100	0.00

Time from Algorithm Wakeup (msec)	Longitudinal Acceleration (g)
101	0.00
102	-0.98
103	-0.98
104	0.00
105	0.00
106	1.96
107	1.96
108	1.96
109	0.98
110	0.98
111	0.00
112	-0.98
113	0.00
114	0.98
115	0.98
116	0.00
117	-0.98
118	0.00
119	0.00
120	0.00
121	0.98
122	1.96
123	0.98
124	0.00
125	0.00
126	0.98
127	1.96
128	1.96
129	0.98
130	0.98
131	0.00
132	0.00
133	0.00
134	0.98
135	0.98
136	1.96
137	1.96
138	1.96
139	1.96
140	0.98
141	0.00
142	0.00
143	0.98
144	0.98
145	0.98
146	0.00
147	0.00
148	0.98
149	0.98
150	0.98

Longitudinal Crash Pulse (Event Record 1)

Time from Algorithm Wakeup (msec)	Longitudinal Acceleration (g)	Time from Algorithm Wakeup (msec)	Longitudinal Acceleration (g)
151	0.98	201	1.96
152	0.98	202	0.98
153	0.98	203	0.98
154	0.98	204	0.98
155	1.96	205	0.98
156	0.98	206	0.98
157	0.00	207	0.98
158	0.00	208	1.96
159	0.98	209	1.96
160	0.98	210	1.96
161	0.00	211	0.98
162	0.00	212	0.98
163	0.98	213	0.98
164	1.96	214	0.98
165	0.98	215	1.96
166	0.00	216	0.98
167	0.00	217	0.98
168	0.98	218	0.98
169	1.96	219	0.98
170	1.96	220	0.98
171	0.98	221	0.98
172	0.98	222	0.98
173	0.98	223	0.98
174	0.98	224	0.98
175	0.98	225	0.98
176	0.98	226	0.98
177	0.98	227	0.98
178	0.00	228	0.98
179	0.98	229	0.98
180	0.98	230	0.98
181	0.98	231	0.98
182	0.98	232	0.98
183	0.98	233	1.96
184	0.98	234	0.98
185	0.98	235	0.98
186	0.98	236	0.98
187	0.98	237	0.98
188	0.98	238	0.98
189	0.98	239	0.98
190	0.98	240	0.98
191	1.96	241	0.98
192	0.98	242	0.98
193	0.98	243	0.98
194	0.98	244	0.98
195	0.98	245	0.98
196	0.98	246	0.98
197	0.98	247	0.98
198	0.98	248	0.98
199	0.98	249	0.98
200	0.98	250	0.98

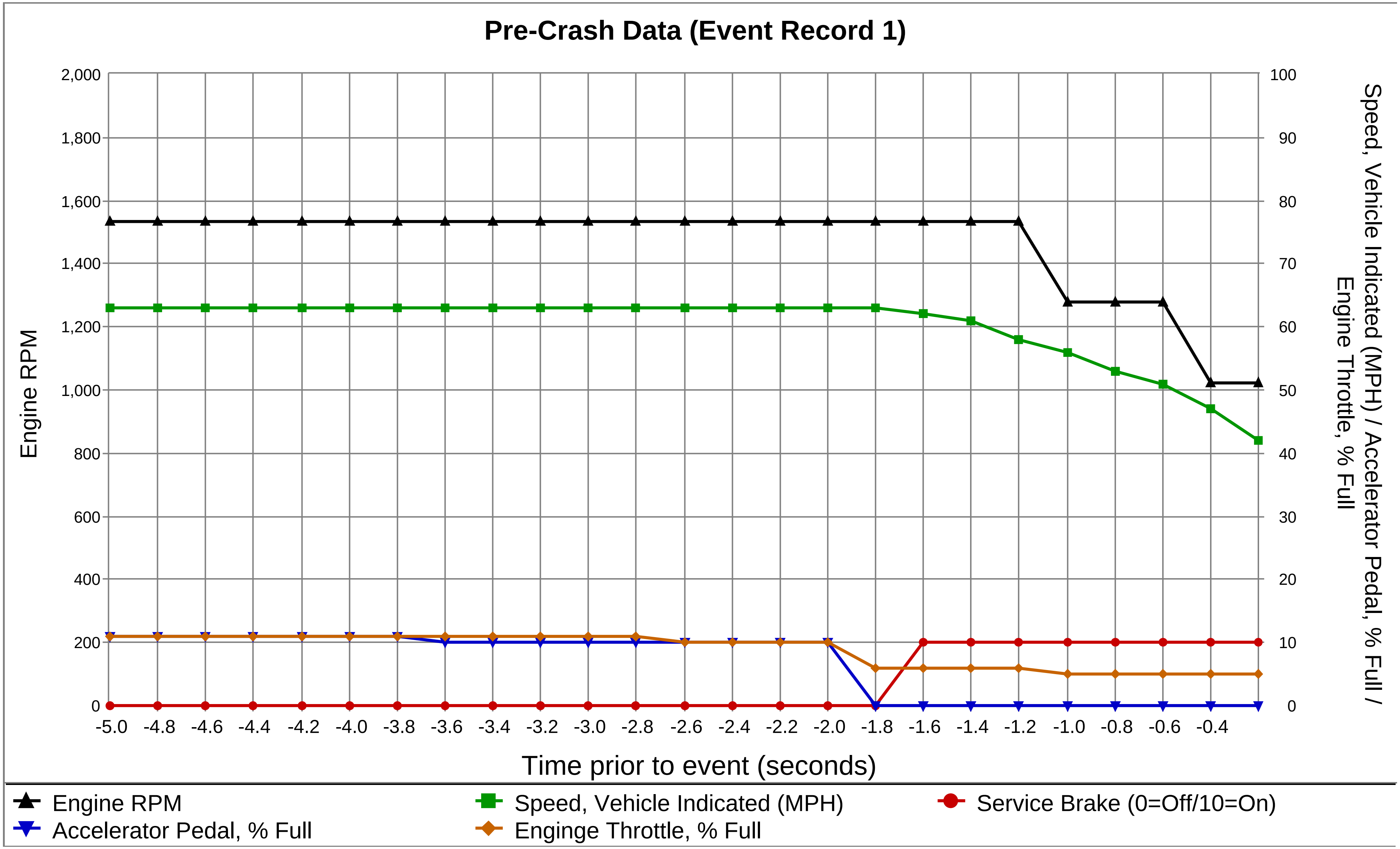
Lateral Crash Pulse (Event Record 1)

Time from Algorithm Wakeup (msec)	Lateral Acceleration (g)	Time from Algorithm Wakeup (msec)	Lateral Acceleration (g)	Time from Algorithm Wakeup (msec)	Lateral Acceleration (g)
1	-1.18	51	-6.39	101	1.18
2	-4.50	52	-4.73	102	1.66
3	2.13	53	-7.34	103	1.66
4	2.84	54	-10.89	104	1.18
5	1.18	55	-5.68	105	0.71
6	-1.66	56	-2.13	106	0.47
7	-9.94	57	-4.50	107	0.71
8	-0.24	58	-1.89	108	0.24
9	6.63	59	-2.60	109	-0.47
10	-8.76	60	-5.45	110	-0.24
11	-7.81	61	-4.97	111	0.00
12	7.81	62	-4.02	112	-0.24
13	2.13	63	-5.68	113	-0.71
14	-7.58	64	-8.29	114	-0.71
15	0.24	65	-4.73	115	-0.47
16	3.79	66	-5.68	116	-0.47
17	-3.79	67	-10.42	117	-0.47
18	-4.97	68	-5.68	118	-0.24
19	7.34	69	-0.24	119	-0.24
20	-2.13	70	-4.97	120	-0.95
21	-10.18	71	-7.10	121	-1.18
22	3.31	72	-3.08	122	-0.71
23	-0.95	73	-2.13	123	-0.95
24	-8.52	74	-2.60	124	-1.18
25	-2.84	75	-2.60	125	-1.18
26	1.66	76	-4.02	126	-0.95
27	-2.37	77	-4.26	127	-0.47
28	-4.50	78	-1.66	128	-0.24
29	0.00	79	-0.95	129	-0.24
30	0.24	80	-1.89	130	0.00
31	-2.60	81	-0.24	131	-0.47
32	-5.68	82	1.42	132	-0.71
33	-5.21	83	0.95	133	-0.24
34	-1.66	84	0.00	134	0.00
35	-0.71	85	0.71	135	0.00
36	-6.87	86	0.95	136	0.47
37	-11.36	87	0.71	137	0.24
38	-8.52	88	1.42	138	0.71
39	-7.58	89	1.18	139	1.18
40	-7.81	90	1.42	140	0.24
41	-9.23	91	2.13	141	0.00
42	-5.68	92	0.71	142	0.47
43	2.84	93	0.95	143	-0.24
44	-1.89	94	2.84	144	-0.71
45	-4.50	95	1.89	145	-0.24
46	-2.13	96	1.18	146	-0.24
47	-4.26	97	1.66	147	-0.24
48	-0.71	98	1.89	148	-0.24
49	3.79	99	1.66	149	-0.24
50	-1.42	100	1.18	150	0.00

Lateral Crash Pulse (Event Record 1)

Time from Algorithm Wakeup (msec)	Lateral Acceleration (g)
151	0.47
152	0.47
153	0.24
154	0.24
155	0.71
156	0.95
157	0.24
158	0.24
159	0.95
160	0.95
161	0.24
162	0.47
163	0.71
164	0.24
165	0.24
166	0.24
167	0.47
168	0.47
169	0.24
170	0.47
171	0.71
172	0.71
173	0.71
174	1.18
175	0.95
176	0.71
177	0.71
178	0.47
179	0.95
180	1.18
181	0.71
182	0.24
183	0.47
184	0.71
185	0.24
186	0.00
187	0.47
188	0.24
189	0.00
190	0.00
191	0.00
192	0.24
193	0.00
194	0.00
195	0.24
196	0.24
197	0.24
198	0.00
199	0.24
200	0.24

Time from Algorithm Wakeup (msec)	Lateral Acceleration (g)
201	0.24
202	0.00
203	0.00
204	0.47
205	0.24
206	0.00
207	0.24
208	0.47
209	0.24
210	0.24
211	0.00
212	0.24
213	0.24
214	0.00
215	-0.24
216	0.00
217	0.24
218	0.00
219	-0.24
220	0.00
221	0.00
222	0.00
223	-0.24
224	-0.24
225	0.00
226	0.00
227	0.00
228	0.24
229	0.24
230	0.00
231	0.24
232	0.47
233	0.47
234	0.24
235	0.24
236	0.00
237	0.24
238	0.00
239	0.00
240	0.00
241	0.00
242	0.00
243	-0.24
244	0.00
245	0.00
246	0.00
247	-0.24
248	0.00
249	0.24
250	0.00


Pre-Crash Data (Event Record 1)
Engine RPM
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
100
90
80
70
60
50
40
30
20
10
0
Speed, Vehicle Indicated (MPH) / Accelerator Pedal, % Full / Engine Throttle, % Full
-5.0 -4.8 -4.6 -4.4 -4.2 -4.0 -3.8 -3.6 -3.4 -3.2 -3.0 -2.8 -2.6 -2.4 -2.2 -2.0 -1.8 -1.6 -1.4 -1.2 -1.0 -0.8 -0.6 -0.4
Time prior to event (seconds)
Engine RPM
Speed, Vehicle Indicated (MPH)
Service Brake (0=Off/10=On)
Accelerator Pedal, % Full
Enginge Throttle, % Full

Pre-Crash Data (Event Record 1 - table 1 of 5)
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Vehicle Event Recorder Status	Engine RPM	Speed, Vehicle Indicated (MPH [km/h])	Engine Throttle, % Full	Accelerator Pedal, % Full	Raw Manifold Pressure (kPa)	Service Brake	Brake Switch #2 Status	Brake Lamps On
-5.0	Complete	1,536	63 [102]	11.0	11.0	62	Off	Open	No
-4.8	Complete	1,536	63 [102]	10.6	11.0	61	Off	Open	No
-4.6	Complete	1,536	63 [102]	10.6	10.6	60	Off	Open	No
-4.4	Complete	1,536	63 [102]	10.6	10.6	60	Off	Open	No
-4.2	Complete	1,536	63 [102]	10.6	10.6	59	Off	Open	No
-4.0	Complete	1,536	63 [102]	10.6	10.6	59	Off	Open	No
-3.8	Complete	1,536	63 [102]	10.6	10.6	59	Off	Open	No
-3.6	Complete	1,536	63 [102]	10.6	10.2	59	Off	Open	No
-3.4	Complete	1,536	63 [102]	10.6	10.2	58	Off	Open	No
-3.2	Complete	1,536	63 [102]	10.6	10.2	58	Off	Open	No
-3.0	Complete	1,536	63 [102]	10.6	10.2	58	Off	Open	No
-2.8	Complete	1,536	63 [102]	10.6	10.2	58	Off	Open	No
-2.6	Complete	1,536	63 [102]	10.2	10.2	58	Off	Open	No
-2.4	Complete	1,536	63 [102]	10.2	10.2	58	Off	Open	No
-2.2	Complete	1,536	63 [102]	10.2	10.2	58	Off	Open	No
-2.0	Complete	1,536	63 [102]	10.2	9.8	58	Off	Open	No
-1.8	Complete	1,536	63 [102]	5.9	0.0	45	Off	Open	No
-1.6	Complete	1,536	62 [100]	5.9	0.0	35	On	Closed	Yes
-1.4	Complete	1,536	61 [98]	5.9	0.0	32	On	Closed	Yes
-1.2	Complete	1,536	58 [94]	5.5	0.0	30	On	Closed	Yes
-1.0	Complete	1,280	56 [90]	5.1	0.0	29	On	Closed	Yes
-0.8	Complete	1,280	53 [86]	5.1	0.0	29	On	Closed	Yes
-0.6	Complete	1,280	51 [82]	5.1	0.0	29	On	Closed	Yes
-0.4	Complete	1,024	47 [76]	5.1	0.0	30	On	Closed	Yes
-0.2	Complete	1,024	42 [68]	5.1	0.0	31	On	Closed	Yes

Pre-Crash Data (Event Record 1 - table 2 of 5)

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

Time Stamp (sec)	Panic Brake Assist Active (if equip.)	ABS MIL (if equip.)	ESP MIL (if equip.)	ESP Lamp (if equip.)	ESP Lamp Flashing Requested (if equip.)	ESP Disabled (if equip.)	Traction Control Button (if equip.)	ESP Active (if equip.)
-5.0	No	Off	Off	No	No	No	Off	Yes
-4.8	No	Off	Off	No	No	No	Off	Yes
-4.6	No	Off	Off	No	No	No	Off	Yes
-4.4	No	Off	Off	No	No	No	Off	Yes
-4.2	No	Off	Off	No	No	No	Off	Yes
-4.0	No	Off	Off	No	No	No	Off	Yes
-3.8	No	Off	Off	No	No	No	Off	Yes
-3.6	No	Off	Off	No	No	No	Off	Yes
-3.4	No	Off	Off	No	No	No	Off	Yes
-3.2	No	Off	Off	No	No	No	Off	Yes
-3.0	No	Off	Off	No	No	No	Off	Yes
-2.8	No	Off	Off	No	No	No	Off	Yes
-2.6	No	Off	Off	No	No	No	Off	Yes
-2.4	No	Off	Off	No	No	No	Off	Yes
-2.2	No	Off	Off	No	No	No	Off	Yes
-2.0	No	Off	Off	No	No	No	Off	Yes
-1.8	No	Off	Off	No	No	No	Off	Yes
-1.6	No	Off	Off	No	No	No	Off	Yes
-1.4	No	Off	Off	No	No	No	Off	Yes
-1.2	No	Off	Off	No	No	No	Off	Yes
-1.0	No	Off	Off	No	No	No	Off	Yes
-0.8	No	Off	Off	No	No	No	Off	Yes
-0.6	No	Off	Off	No	No	No	Off	Yes
-0.4	No	Off	Off	No	No	No	Off	Yes
-0.2	No	Off	Off	No	No	No	Off	Yes

Pre-Crash Data (Event Record 1 - table 3 of 5)
(the most recent sampled values are recorded prior to the event)

Time Stamp (sec)	Steering Input (deg) (if equip.)	Yaw Rate (deg/sec) (if equip.)	Wheel Speed LF (RPM) (if equip.)	Wheel Speed RF (RPM) (if equip.)	Wheel Speed LR (RPM) (if equip.)	Wheel Speed RR (RPM) (if equip.)
-5.0	1	0	772	772	770	770
-4.8	1	0	771	770	769	771
-4.6	1	0	773	772	770	771
-4.4	1	0	771	772	770	772
-4.2	1	0	772	772	770	770
-4.0	1	0	772	773	771	771
-3.8	1	0	772	771	768	772
-3.6	1	0	772	771	770	768
-3.4	1	0	772	772	770	772
-3.2	1	0	772	771	771	771
-3.0	1	0	772	773	769	772
-2.8	1	0	772	772	770	770
-2.6	1	0	771	772	770	770
-2.4	4	0	770	771	769	771
-2.2	4	0	772	770	770	769
-2.0	7	0	770	771	769	771
-1.8	8	1	771	771	769	771
-1.6	7	1	757	761	764	766
-1.4	24	2	737	741	742	744
-1.2	40	8	706	724	706	723
-1.0	39	11	654	694	669	693
-0.8	42	11	647	654	634	661
-0.6	19	6	608	622	610	627
-0.4	30	0	539	565	579	573
-0.2	23	3	502	524	522	501

Pre-Crash Data (Event Record 1 - table 4 of 5)

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

Time Stamp (sec)	ETC Lamp	ETC Lamp Flashing	Engine Torque Applied	Shift Gear Position (if equip.)	Cruise Control System	Cruise Control Active
-5.0	Off	No	Yes	Drive	Off	No
-4.8	Off	No	Yes	Drive	Off	No
-4.6	Off	No	Yes	Drive	Off	No
-4.4	Off	No	Yes	Drive	Off	No
-4.2	Off	No	Yes	Drive	Off	No
-4.0	Off	No	Yes	Drive	Off	No
-3.8	Off	No	Yes	Drive	Off	No
-3.6	Off	No	Yes	Drive	Off	No
-3.4	Off	No	Yes	Drive	Off	No
-3.2	Off	No	Yes	Drive	Off	No
-3.0	Off	No	Yes	Drive	Off	No
-2.8	Off	No	Yes	Drive	Off	No
-2.6	Off	No	Yes	Drive	Off	No
-2.4	Off	No	Yes	Drive	Off	No
-2.2	Off	No	Yes	Drive	Off	No
-2.0	Off	No	Yes	Drive	Off	No
-1.8	Off	No	Yes	Drive	Off	No
-1.6	Off	No	Yes	Drive	Off	No
-1.4	Off	No	Yes	Drive	Off	No
-1.2	Off	No	Yes	Drive	Off	No
-1.0	Off	No	Yes	Drive	Off	No
-0.8	Off	No	Yes	Drive	Off	No
-0.6	Off	No	Yes	Drive	Off	No
-0.4	Off	No	Yes	Drive	Off	No
-0.2	Off	No	Yes	Drive	Off	No

Pre-Crash Data (Event Record 1 - table 5 of 5)

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

Time Stamp (sec)	Tire Pressure Monitor Faults (if equip.)	Tire 1 Location (if equip.)	Tire 1 Pressure Status (if equip.)	Tire 1 Pressure (psi) (if equip.)	Tire 2 Location (if equip.)	Tire 2 Pressure Status (if equip.)	Tire 2 Pressure (psi) (if equip.)
-5.0	No	LR	Normal	40	RR	Normal	40
-4.8	No	LF	Normal	37	RF	Normal	38
-4.6	No	LF	Normal	37	RF	Normal	38
-4.4	No	LF	Normal	37	RF	Normal	38
-4.2	No	LF	Normal	37	RF	Normal	38
-4.0	No	LR	Normal	40	RR	Normal	40
-3.8	No	LR	Normal	40	RR	Normal	40
-3.6	No	LR	Normal	40	RR	Normal	40
-3.4	No	LR	Normal	40	RR	Normal	40
-3.2	No	LR	Normal	40	RR	Normal	40
-3.0	No	LF	Normal	37	RF	Normal	38
-2.8	No	LF	Normal	37	RF	Normal	38
-2.6	No	LF	Normal	37	RF	Normal	38
-2.4	No	LF	Normal	37	RF	Normal	38
-2.2	No	LF	Normal	37	RF	Normal	38
-2.0	No	LR	Normal	40	RR	Normal	40
-1.8	No	LR	Normal	40	RR	Normal	40
-1.6	No	LR	Normal	40	RR	Normal	40
-1.4	No	LR	Normal	40	RR	Normal	40
-1.2	No	LR	Normal	40	RR	Normal	40
-1.0	No	LF	Normal	37	RF	Normal	38
-0.8	No	LF	Normal	37	RF	Normal	38
-0.6	No	LF	Normal	37	RF	Normal	38
-0.4	No	LF	Normal	37	RF	Normal	38
-0.2	No	LF	Normal	37	RF	Normal	38

Attachment B

1999 Pontiac Grand AM EDR Data

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	1G2NW12E3XM******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	CA10022 CDR PONTIAC.CDR
Saved on	Monday, June 14 2010 at 04:35:21 PM
Collected with CDR version	Crash Data Retrieval Tool 3.3
Reported with CDR version	Crash Data Retrieval Tool 3.4
EDR Device Type	airbag control module
Event(s) recovered	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 SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded longitudinal 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 a Deployment Level Event, 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 before 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. The SDM can store up to two different Deployment Events, if they occur within five seconds of one another. If a Deployment Level Event occurs within five seconds after the Deployment Event, the Deployment Level Event 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 Longitudinal Velocity Change reflects the change in longitudinal velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Longitudinal Velocity Changeis 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. The SDM records the first 300 milliseconds of Vehicle Longitudinal Velocity Change after Algorithm Enable. The maximum value that can be recorded for Vehicle Longitudinal Velocity Change is 56 MPH. Velocity Change data is displayed in SAE sign convention.
-Driver's Belt Switch Circuit Status indicates the status of the driver's seat belt switch circuit.
-The Time between Non-Deployment and 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 power to the SDM is lost during a crash event, all or part of the crash record may not be recorded. An indication of a loss of power would be if the ignition cycles at the event is recorded as zero. Data recorded after that may not be reliable, such as Time Between Non-Deployment and Deployment Events, Driver Belt Switch Circuit Status, and Passenger SIR Suppression Switch Circuit Status.
-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:
-The Driver's Belt Switch Circuit is wired directly to the SDM.
-The Passenger Front Air Bag Suppression Switch Circuit is wired directly to the SDM.

01033_SDMRSDD_r001

System Status At Non-Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Passenger SIR Suppression Switch Circuit Status (if equipped)	Air Bag Not Suppressed
Ignition Cycles At Non-Deployment	15328
Ignition Cycles At Investigation	15344
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	47.5
Maximum SDM Recorded Velocity Change (MPH)	-1.97
A Deployment was Commanded Prior to this Event	No

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.22	-0.22	-1.10	-1.32	-1.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00