

**CRASH DATA RESEARCH CENTER**

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**CALSPAN ON-SITE CERTIFIED ADVANCED-208 COMPLIANT VEHICLE  
CRASH INVESTIGATION**

**SCI CASE NO. – CA06-005**

**SUBJECT VEHICLE – 2006 PONTIAC G6**

**LOCATION - STATE OF ALABAMA**

**CRASH DATE – FEBRUARY 2006**

Contract No. DTNH22-01-C-17002

Prepared for:

U.S. Department of Transportation  
National Highway Traffic Safety Administration  
Washington, D.C. 20590

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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.

## TECHNICAL REPORT STANDARD TITLE PAGE

<p>1. Report No. CA06-005</p>	<p>2. Government Accession No.</p>	<p>3. Recipient's Catalog No.</p>	
<p>4. Title and Subtitle Calspan On-Site Certified Advanced 208-Compliant Vehicle Crash Investigation Vehicle: 2006 Pontiac G6 Location: State of Alabama</p>		<p>5. Report Date: October 2006</p>	
		<p>6. Performing Organization Code</p>	
<p>7. Author(s) Crash Data Research Center</p>		<p>8. Performing Organization Report No.</p>	
<p>9. Performing Organization Name and Address Transportation Sciences Crash Data Research Center Calspan Corporation P.O. Box 400 Buffalo, New York 14225</p>		<p>10. Work Unit No. C00410.0000.0343</p>	
		<p>11. Contract or Grant No. DTNH22-01-C-17002</p>	
<p>12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590</p>		<p>13. Type of Report and Period Covered Technical Report Crash Date: February 2006</p>	
		<p>14. Sponsoring Agency Code</p>	
<p>15. Supplementary Note This on-site investigative effort focused on the Certified Advanced 208-Compliant safety system in a 2006 Pontiac G6.</p>			
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<p>17. Key Words Frontal Air Bag Deployment      Certified Advanced 208- Compliant Safety System</p>		<p>18. Distribution Statement General Public</p>	
<p>19. Security Classif. (of this report) Unclassified</p>	<p>20. Security Classif. (of this page) Unclassified</p>	<p>21. No. of Pages 20</p>	<p>22. Price</p>

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**ON-SITE CERTIFIED ADVANCED 208-COMPLIANT VEHICLE CRASH INVESTIGATION  
CALSPAN CASE NO.: CA06-005  
VEHICLE: 2006 PONTIAC G6  
LOCATION: ALABAMA  
CRASH DATE: FEBRUARY 2006**

***BACKGROUND***

This on-site investigative effort focused on the performance of the Certified Advanced 208-Compliant safety system in a 2006 Pontiac G6, **Figure 1**. A CAC vehicle is certified by the manufacturer to be compliant to Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS 208). This advanced occupant protection system was comprised of dual-stage frontal air bags, seat track position sensors for both front seats, front safety belt buckle switches and a front right occupant detection sensor. The vehicle's Sensing and Diagnostic control Module (SDM) tailored the deployment of the frontal air bags based the crash severity and inputs from these sensors. The Pontiac was not equipped with inflatable side impact protection.



**Figure 1: Right front view of the Pontiac G6.**

The Pontiac G6 was involved in an intersection crash with a 2001 Toyota Camry. The Pontiac accelerated forward directly across the path of the Toyota at a wide four-leg intersection precipitating the crash. The front of the Toyota struck the right side of the Pontiac in an 11/2 o'clock impact configuration. The force of the crash caused the frontal air bags in both vehicles' to deploy. The Pontiac was occupied by a 21 year old female driver and a 21 year old female front right passenger. The sole occupant of the Toyota was its 40 year old male driver. The female passenger in the Pontiac and the driver of the Toyota sustained police reported "A-type" visible injuries and were transported to a local hospital. The driver of the Pontiac was not injured.

This crash was identified from a list of claims provided by an insurance company to the National Highway Traffic Safety Administration (NHTSA) that identified Certified Advanced 208-Compliant vehicles that had been involved in total loss collisions. A subset of that list was forwarded to the Calspan Special Crash Investigations (SCI) team for follow-up investigation. The SCI team established cooperation with the local insurance adjuster and determined the location of the Pontiac. It was available for inspection in a local salvage yard. The Toyota Camry was also located and available for inspection. An on-site investigation was assigned to the Calspan SCI team on March 24, 2006. The vehicle and scene inspection took place the week of April 3, 2006. The Pontiac's SDM had the capabilities to record crash event data. That data was downloaded as a supplement to the SCI investigation and is attached to the end of this narrative report as Attachment A.

## ***VEHICLE DATA***

### ***2006 Pontiac G6***

The 2006 Pontiac G6 was identified by the Vehicle Identification Number (VIN): 1G2Z6558864 (production sequence deleted). The four-door, front-wheel drive sedan was equipped with a 3.5 liter/V6 engine linked to a four-speed automatic transmission with overdrive. The service brakes were a four-wheel disc system with ABS. The vehicle was configured for five passenger seating (2 front/3 rear). The five seat positions were equipped with manual three-point lap and shoulder restraints. The manual restraints for the driver and front right passenger utilized retractor pretensioners. The vehicle was equipped with advanced dual-stage driver and front right passenger air bags certified by the manufacturer to meet the requirements of the advanced FMVSS 208 standard. The vehicle was not equipped with inflatable side impact protection. The Pontiac was equipped with an Event Data Recorder (EDR) that was downloaded at the time of the SCI inspection as a supplement to the investigation. The EDR recorded a Deployment Event consistent with the dynamics of the crash. The subject G6 was manufactured in April 2005. The odometer read 48,434 km (30,096 miles) at the time of the SCI inspection.

### ***2001 Toyota Camry***

The 2001 Toyota Camry was identified by the Vehicle Identification Number (VIN): 4TIBG22K91U (production sequence deleted). The front wheel drive, four-door sedan was equipped with the LE level trim package. The power train consisted of a 2.2 liter, I4 engine linked to a four-speed automatic transmission. The service brakes were a four-wheel disc system with four-wheel ABS. The manual restraint system consisted of 3-point lap and shoulder belts for the five seat positions. The front safety belts were equipped with retractor pretensioners. The Toyota was equipped with dual-stage air bags for the driver and front right passenger. The force of the impact caused the front safety belt pretensioners to fire and deployed the frontal air bags. The vehicle's date of manufacture was June 2001. The digital odometer could not be read at the time of the inspection due to a lack of electrical power.

## ***SUMMARY***

### ***Crash Site***

This two-vehicle crash occurred during the nighttime hours of February 2006. At the time of the crash, it was dark and the area of artificially illuminated by overhead street lights. The weather was clear and no a factor. The asphalt road surface was dry. The crash occurred at the four-leg intersection of a two-lane residential north/south road and a five-lane east/west arterial road in a suburban setting. The two roads intersected at a relative angle of approximately 65 degrees. The east/west arterial road fed a north/south interstate highway that was located approximately 0.8 km (0.5 mile) west of the intersection. The five lane artery was comprised of two east/west travel lanes passing though the intersection and a center left turn only lane. It was posted with a 64 km/h (40 mph) speed limit. The east/west traffic was separated by a 1.1 m (4.0 ft) wide raised concrete median. The south side of the artery was populated by small commercial businesses. The north side of the artery was a residential area. The two-lane north/south road served as an entrance/exit into the residential area and was posted with a 40 km/h (25 mph) speed limit. The intersection was controlled by stop signs for the north/south traffic. **Figure 2** is an overall view of the intersection looking to the northeast. **Figure 3** is a view of the intersection looking to the southwest. There were no physical obstructions in the northwest intersection quadrant that would have impaired either driver's vision.



Figure 2: Northeast view into the intersection.



Figure 3: Southwest view of the intersection.

## ***CRASH SEQUENCE***

### ***Pre-Crash***

The 2001 Toyota Camry was eastbound in the arterial road's outboard lane. The Toyota was driven by a 40 year old restrained male. The driver was the vehicle's sole occupant. It was the driver's intension to pass straight through the intersection. The 2006 Pontiac G6 was southbound and was initially stopped at the stop sign. The Pontiac was driven by an unrestrained 21 year old female and was occupied by an unrestrained 21 year old female front right passenger. It was the Pontiac driver's intension to pass through the intersection and continue south on the secondary road. The crash occurred when the Pontiac accelerated forward directly across the path of the Toyota. The acceleration of the Pontiac was consistent with the downloaded EDR data. The pre-crash data indicated the Pontiac accelerated from 2 km/h to 18 km/h (1 mph to 18 mph) over the 5 seconds (T-5 to T-1) prior to Algorithm Enable (AE). The brake switch circuit status was reported as "Off" throughout the 5 second pre-crash recorded interval.

### ***Crash***

As the Pontiac crossed into the outboard eastbound lane of the road, the front plane of the Toyota struck the left side of the Pontiac in an 11/2 o'clock impact configuration. A schematic of the crash site is included at the end of this narrative summary as **Figure 12**. The force of the impact fired the safety belt pretensioners and deployed the frontal air bags in both the Toyota and Pontiac. The angular impact configuration and engagement caused both vehicles to rotation clockwise (CW) and the Toyota and Pontiac were both redirected to the southeast. The final rest locations of the vehicles were not documented by the investigating police agency and no physical evidence of the crash was identified during the SCI scene inspection due to the passage in time between the crash date and inspection. Therefore the final rest positions of the vehicles were approximate. The Toyota rotated approximately 120 degrees CW and came to rest facing south in the mouth of the intersection approximately 9.0 m (29.6 ft) from the point of impact. The Pontiac rotated approximately 110 degrees CW and came to rest off the pavement on the southeast intersection quadrant approximately 13.6 m (44.6 ft) from the impact. The severity of the crash was assessed by calculating the delta V of the respective vehicles using the Damage Algorithm of the WINSMASH model. The total delta V Pontiac was 24.2 km/h (15.0 mph).

The corresponding longitudinal and lateral components were -12.1 km/h (-7.5 mph) and -21.0 km/h (-13.0 mph) respectively. The total delta V Toyota was 28.0 km/h (17.4 mph). Its respective longitudinal and lateral components were -27.0 km/h (-16.8 mph) and 7.2 km/h (4.5 mph).

### ***Post-Crash***

The police and ambulance personnel responded to the crash scene. The driver of the Pontiac exited the vehicle under her own power and was not injured. The Pontiac's front right passenger was transported by ground ambulance to a local hospital with police reported "A-type" injuries. The driver of the Toyota was also transported by ground to a local hospital with police reported "A-type" injuries. Both the Pontiac and Toyota sustained disabling damage and were towed from the scene.

### ***Exterior Damage***

#### ***2006 PONTIAC G6***

The right side of the Pontiac sustained 237 cm (93.5 in) of direct and induced damage which began 3 cm (1.2 in) aft the right front axle, **Figure 4**. The direct damage began immediately rearward of the right front wheel opening and measured 162 cm (63.6 in) in length. The residual crush was measured at the mid-door elevation. The crush profile was as follows: C1 = 0 cm (0 in), C2 = 10 cm (3.9 in), C3 = 26 cm (10.2 in), C4 = 31 cm (12.2 in), C5 = 17 cm (6.7 in), C6 = 0 cm (0 in). The maximum crush was located at the C4 mid door elevation, 93 cm (36.5 in) aft of the right front axle. The maximum crush was 31 cm (12.2 in). The right doors were jammed shut. The left doors remained closed during the crash and were operational at the time of the inspection. The right wheelbase was reduced 5 cm (1.9 in). The left wheelbase lengthened 1 cm (0.5 in) due to distortion in the vehicle's unibody construction. The right aspect of the windshield fractured and the glazing of the right windows disintegrated during the impact. The Collision Deformation Classification (CDC) of the Pontiac was 02-RYEW3. The Pontiac's Event Data Recorder measured and recorded bi-directional acceleration. The maximum longitudinal and lateral delta V components were -13.0 km/h (-8.1 mph) and -30.6 km/h (-19.0 mph).



**Figure 4: View of the right side damage.**



### *Exterior Damage*

#### **2001 TOYOTA CAMRY**

**Figure 5** is a front view of the subject Toyota Camry. The exterior damage to vehicle consisted of direct contact damage to the frontal plane that extended across its full 155 cm (61.0 in) end width. The residual crush profile was documented across the front bumper and was as follows: C1 = 19 cm (7.5 in), C2 = 17 cm (6.7 in), C3 = 18 cm (7.1 in), C4 = 20 cm (7.9 in), C5 = 23 cm (9.1 in), C6 = 26 cm (10.2 in). The maximum crush was located at C6, the front right bumper corner. The residual damage profile was biased to the left consistent with the angular orientation of the vehicles during engagement. The deformation energy was absorbed primarily by the vehicle's structures forward of the front axle location. The right wheelbase was reduced 3 cm (1.0 in). The left wheelbase was unchanged. The windshield and all side glazings remained intact. All four doors remained closed during the impact and were operational post-crash. The Collision Deformation Classification (CDC) of the vehicle was 11-FDEW2.



**Figure 5: Front view of the Toyota.**

### *Interior Damage*

#### **2006 PONTIAC G6**

The interior damage of the Pontiac G6 consisted of right interior intrusion as a result of the exterior impact force and the deployment of the vehicle's frontal air bag system. **Figure 6** is a view depicting the intrusion in the front right interior. The right front door and right B-pillar were in contact with the front passenger seat and the seat cushion was compressed into the center console. The residual lateral intrusion at the right front seat bight measured 22 cm (8.5 in). The lateral intrusion in the right foot well measured 21 cm (8.2 in). The right upper B-pillar intrusion measured at belt line was 6 cm (2.5 in).



**Figure 6: View of the front right interior.**

The front right passenger seat jammed in its at-crash position due to the deformation of the floor pan and its compression into the center console. Its seat track position measured with reference to the driver's seat. It was located in a mid-track position that measured 10 cm (4.0 in) forward of full rear. The total seat track travel measured 22 cm (8.5 in). The seat back was reclined 30 degrees. The horizontal distance from the seat back to the instrument panel at the lower flap of the front right passenger air bag module measured 102 cm (40 in).

Inspection of the right interior identified two regions of possible occupant contact. The glove box door exhibited a probable contact scuff from the front passenger's right lower leg. The contact area measured approximately 10 cm x 5 cm (4 in x 2 in) and was located immediately right of the glove box door lock. A 6 cm (2.5 in) linear scuff was identified on the right door panel and was a possible indicator contact from the right upper leg. The scuff was located 23 cm (9 in) forward of the aft aspect of the door and 14 cm (5.5 in) below the arm rest.

The driver seat was located in a rear track position that measured 6 mm (0.25in) forward of full rear. The driver's seat back was reclined 30 degrees. The horizontal distance from the seat back to the driver air bag module measured 76 cm (30 in).

The four-spoke steering wheel rim was adjusted to the full up position. There was no deformation of the steering wheel rim and no displacement of the steering column shear capsules. No occupant contacts were identified in the driver's interior space.

### ***Manual Restraint Systems***

The manual restraint system in the Pontiac consisted of three-point lap and shoulder belts with continuous loop webbing, B-pillar mounted retractors, adjustable D-rings and sliding latch plates in the five seat positions. The front restraints were equipped with retractor pretensioners. Upon inspection, both of the front restraints were stowed in their respective retractors and the webbings were taut and locked. During the crash event, the pretensioners fired while the webbings were stowed. Neither occupant was restrained during the crash. The EDR data downloaded during the inspection indicated the occupants were not buckled. It should be noted that the Police Report indicated the occupants of the Pontiac were restrained.

### ***Certified Advanced 208-Compliant Air Bag System***

The CAC frontal air bag in the Pontiac G6 consisted of advanced dual-stage air bags for the driver and front right passenger, a seat track position sensor for the front right seat, front safety belt buckle switches, front safety belt retractor pretensioners and a front right occupant detection sensor. The frontal air bag system was certified by the manufacturer to have met the requirements of the advanced Federal Motor Vehicle Safety Standard 208. The system was controlled and monitored by a Sensing and Diagnostic control Module (SDM) located under the center console. The SDM had the capabilities to record data related to the crash.

The driver and front right passenger air bag deployed as a result of the angular crash event, **Figure 7**. The driver air bag was housed within an I-configuration module designed into the center hub of the steering wheel. The diameter of the deployed air bag measured 58 cm (23 in). It was tethered by two straps and vented by a single 3 cm (1.2 in) diameter port on the back side of the bag's 12 o'clock sector. No evidence of occupant contact was identified on the driver air bag or its associated components.



**Figure 7: View of the deployed air bags.**

The front right passenger air bag was a top-mount design located in the right aspect of the instrument panel. The air bag deployed as designed from the H-configuration module. The membrane measured 46 cm x 51 cm (18 in x 20 in), width by height. The excursion measured 58 cm (23 in) from the module. It was tethered by a single full-width tether and vented by two ports located on the side panels. There was no evidence of occupant contact on the air bag.

***Event Data Recorder***

The Pontiac’s Event Data Recorder (EDR) was downloaded at the time of the inspection as a supplement to the reconstruction of the crash. Inspection of the vehicle’s electrical system determined the system was intact with sufficient battery power to download the data. The data was downloaded utilizing the Vetronix Crash Data Retrieval Tool’s “CAN Plus” hardware and software version 2.8. The data was accessed through the Diagnostic Link Connector (DLC) located under the left aspect of the instrument panel. The entire EDR report is attached to the end of this narrative report.

The EDR recorded a single deployment event that was related to the subject crash. As previously reported, the EDR recorded five seconds of pre-crash acceleration by the Pontiac as it attempted to pass-through the intersection. The speed of the Pontiac increased from 1 mph to 18 mph over the interval. The engine RPM, Percent Throttle, and Accelerator Pedal Position were all consistent with the movement of the vehicle. A brake application was not recorded during the five second pre-crash interval. The EDR reported that the seat belt switch status for both the driver and the front right passenger was unbuckled and that the seat belt pretensioners had fired. A Stage 1 air bag deployment was commanded 38 milliseconds after Algorithm Enable (AE). The EDR was capable of measuring and recording biaxial acceleration. The maximum longitudinal and lateral components of the delta V were -13.0 km/h (-8.1 mph) and -30.6 km/h (-19.0 mph), respectively. The maximum delta V’s occurred 130 milliseconds after AE. The delta V curves each reached a plateau at that time indicating the entire crash pulse had been recorded. The EDR estimated Principle Direction of Force (PDOF) was 65 degrees. This estimate was consistent with the 60 degree reconstructed PDOF (2 o’clock).

***OCCUPANT DEMOGRAPHICS***

	<i>Driver</i>	<i>Front Right Passenger</i>
Age/Sex:	21 year old/Female	21 year old/Female
Height:	Not Reported	Not Reported
Weight:	Not Reported	Not Reported
Seat Track Position:	Rear track	Mid Track
Restraint Use:	None	None
Usage Source:	SCI inspection, EDR	SCI inspection, EDR
Medical Treatment:	None, not injured	Transported via ground ambulance, treated and released

***DRIVER INJURY***

The driver was not injured in the crash.

### ***DRIVER KINEMATICS***

The 21 year old driver seated in a rear track position and was unrestrained. At impact, the driver air bag deployed. The driver responded to the 2 o'clock direction of the impact by exhibiting a rightward and forward trajectory. It was probable that her right hip and right lower extremity contacted the center console; however, no evidence of this contact was identified during the SCI inspection. The driver's face and upper chest contacted the deployed driver air bag and she rode down the force of the crash. She then rebounded back into the seat and exited the vehicle under her own power.

### ***FRONT RIGHT PASSENGER INJURY***

The front right passenger sustained unknown police reported "A-type" injuries. Medical records were requested from the hospital; however, the records were not returned to the SCI team for inclusion in this report.

### ***FRONT RIGHT PASSENGER KINEMATICS***

The 21 year old female front right passenger was unrestrained and seated in a mid-track position at the time of the crash. Upon impact, the front right passenger air bag deployed. The passenger responded to the 2 o'clock direction of the impact force by initiating a rightward and forward trajectory. The passenger's right lower leg contacted the glove box door evidenced by the contact scuff and her right flank loaded the intruding door panel. The passenger's face and chest contacted the deployed front right passenger air bag and the passenger rode down the force of the impact. As the Pontiac rotated clockwise and slid to final rest, the passenger rebounded back into the seat. She was removed from the vehicle and transported by ground ambulance to a local hospital where she was treated and released.



**ATTACHMENT A**

EDR Data

## CDR File Information

Vehicle Identification Number	1G2ZG558864*****
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	CA06-005 G6.CDR
Saved on	Monday, April 3 2006 at 11:04:26 AM
Collected with CDR version	Crash Data Retrieval Tool 2.800
Collecting program verification number	9238B95E
Reported with CDR version	Crash Data Retrieval Tool 2.800
Reporting program verification number	9238B95E
Interface used to collected data	Block number: 00 Interface version: 4A Date: 11-08-05 Checksum: 7500
Event(s) recovered	Deployment

## SDM Data Limitations

### SDM Recorded Crash Events:

There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to “wake up” the sensing algorithm but not severe enough to deploy the air bag(s). It can 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 forward velocity change. This event will be cleared by the SDM after the ignition has been cycled 250 times.

The second type of SDM recorded crash event is the Deployment Event. It also can contain Pre-Crash and Crash data. The SDM can store up to two different Deployment Events, if they occur within five seconds of one another. Deployment Events cannot be overwritten or cleared from the SDM. Once the SDM has deployed the air bag, the SDM must be replaced. The data in the Non-Deployment Event file will be locked after a Deployment Event, if the Non-Deployment Event occurred within 5 seconds before the Deployment Event unless a Deployment Level Event occurs within 5 seconds after the Deployment Event, then the Deployment Level Event will overwrite the Non-Deployment Event file.

### SDM Data Limitations:

- SDM Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Forward 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. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change. For Deployment Events and Deployment Level 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 will record up to the first 300 milliseconds of data after algorithm enable. The minimum SDM Recorded Vehicle Forward Velocity Change, that is needed to record a Non-Deployment Event, is 5 MPH.
- Maximum Recorded Vehicle Velocity Change is the maximum recorded velocity change in the vehicle’s combined “X” and “Y” axis.
- Calculated Principal Direction of Force (PDOF) is the arctangent of the maximum observed lateral velocity change divided by the maximum observed longitudinal velocity change. PDOF is displayed where zero degrees is located at the front of the vehicle, with 90 degrees is displayed to the right side of the vehicle and so on, clockwise around the vehicle.
- 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 if the vehicle has had the tire size or the final drive axle ratio changed from the factory build specifications.
- Brake Switch Circuit Status indicates the status of the brake switch circuit.
- Pre-Crash Electronic Data Validity Check Status indicates “Data Invalid” if the SDM receive an invalid message from the module sending the pre-crash data.
- Driver’s and Passenger’s Belt Switch Circuit Status indicates the status of the seat belt switch circuit. The Passenger Belt Switch Circuit Status for 2006 Chevrolet Cobalt Sport Coupe (AP) model vehicles, with the option package that includes Recaro brand seats (RPO ALV), will always report a default value of “Buckled”.
- The Time Between Non-Deployment and Deployment Events is displayed in seconds. If the time between the two events is greater than 5 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-modding messages, on the GMLAN communication bus, to increment the counter. Applying and removing of battery power to the module will not increment the

ignition counter.

SDM 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.



### System Status At AE

Vehicle Identification Number	**2ZG558*6*****
Low Tire Pressure Warning Lamp (If Equipped)	Invalid
Vehicle Power Mode Status	Run
Remote Start Status (If Equipped)	Inactive
Run/Crank Ignition Switch Logic Level	Active
Brake System Warning Lamp (If Equipped)	OFF

### System Status At 1 second

Transmission Range (If Equipped)	Shift in Progress
Transmission Selector Position (If Equipped)	Drive
Traction Control System Active (If Equipped)	Invalid
Service Engine Soon (Non-Emission Related) Lamp	OFF
Service Vehicle Soon Lamp	OFF
Outside Air Temperature (degrees F) (If Equipped)	42.8
Left Front Door Status (If Equipped)	Closed
Right Front Door Status (If Equipped)	Closed
Left Rear Door Status (If Equipped)	Unused
Right Rear Door Status (If Equipped)	Unused
Rear Door(s) Status (If Equipped)	Closed

### Pre-crash data

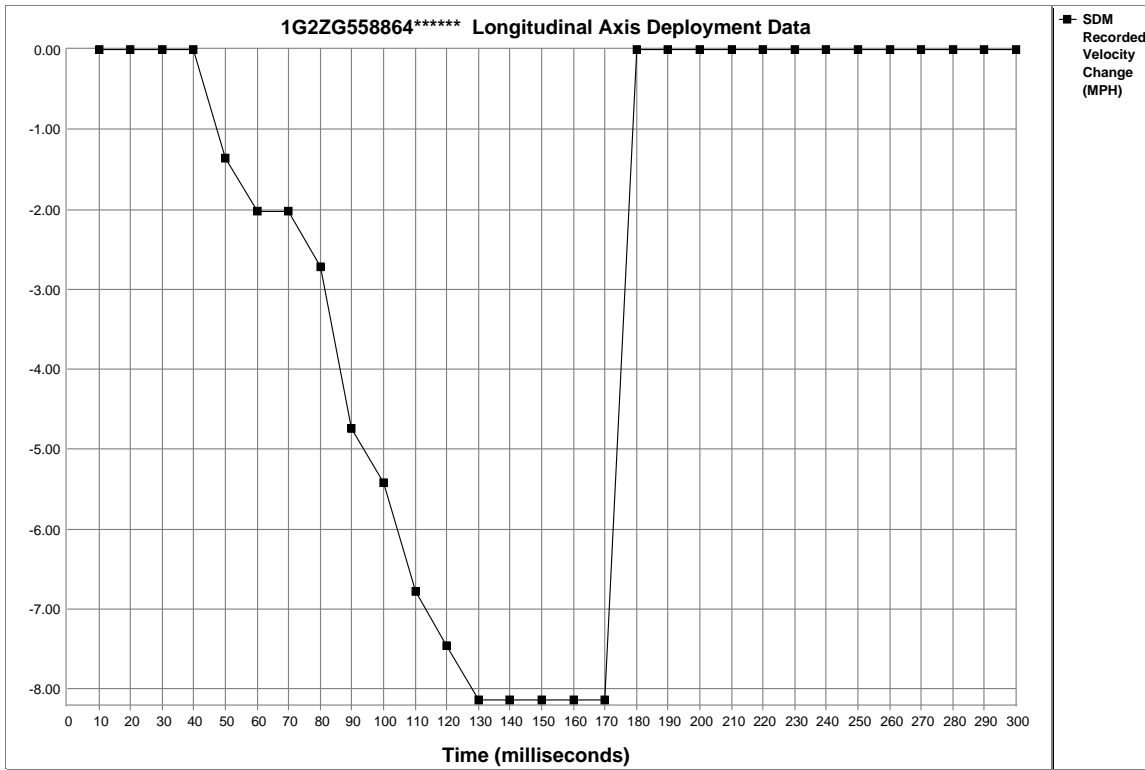
Parameter	-2 sec	-1 sec
Reduced Engine Power Mode	OFF	OFF
Cruise Control Active (If Equipped)	No	No
Cruise Control Resume Switch Active (If Equipped)	No	No
Cruise Control Set Switch Active (If Equipped)	No	No

### Pre-crash data

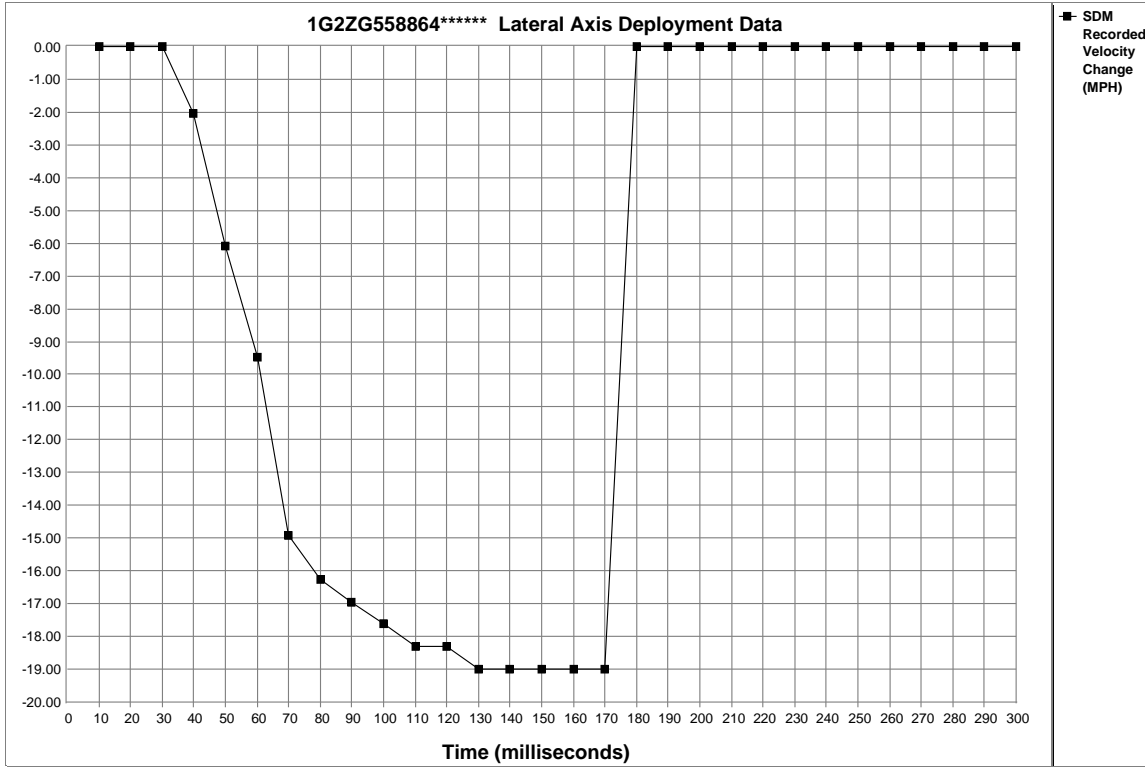
Parameter	-5 sec	-4 sec	-3 sec	-2 sec	-1 sec
Vehicle Speed (MPH)	1	6	11	15	18
Engine Speed (RPM)	832	1664	1984	2304	2496
Percent Throttle	7	23	28	30	25
Brake Switch Circuit Status	OFF	OFF	OFF	OFF	OFF
Accelerator Pedal Position (percent)	14	20	29	33	24
Antilock Brake System Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Lateral Acceleration (feet/s <sup>2</sup> )(If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Yaw Rate (degrees per second) (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Steering Wheel Angle (degrees) (If Equipped)	-32	-32	-16	-32	16
Vehicle Dynamics Control Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid

## System Status At Deployment

Ignition Cycles At Investigation	2551
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON/OFF Time (seconds)	655200
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	2540
Ignition Cycles At Event	2542
Ignition Cycles Since DTCs Were Last Cleared	254
Driver's Belt Switch Circuit Status	UNBUCKLED
Passenger's Belt Switch Circuit Status	UNBUCKLED
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
Automatic Passenger SIR Suppression System Validity Status at AE	Valid
Automatic Passenger SIR Suppression System Status at AE	Air Bag Not Suppressed
Automatic Passenger SIR Suppression System Validity Status at First Deployment Command	Valid
Automatic Passenger SIR Suppression System Status at First Deployment Command	Air Bag Not Suppressed
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	38
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	Disposal
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	38
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	Disposal
Time Between Events (sec)	N/A
Driver First Stage Deployment Loop Commanded	Yes
Driver Second Stage Deployment Loop Commanded	Yes
Driver Side Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop Commanded	Yes
Driver (Initiator 1) Roof Rail/Head Curtain Loop Commanded	No
Driver (Initiator 2) Roof Rail/Head Curtain Loop Commanded	No
Driver Knee Deployment Loop Commanded	No
Passenger First Stage Deployment Loop Commanded	Yes
Passenger Second Stage Deployment Loop Commanded	Yes
Passenger Side Deployment Loop Commanded	No
Passenger Pretensioner Deployment Loop Commanded	Yes
Passenger (Initiator 1) Roof Rail/Head Curtain Loop Commanded	No
Passenger (Initiator 2) Roof Rail/Head Curtain Loop Commanded	No
Passenger Knee Deployment Loop Commanded	No
Second Row Left Side Deployment Loop Commanded	No
Second Row Left Pretensioner Deployment Loop Commanded	No
Third Row Left Roof Rail/Head Curtain Loop Commanded	No
Second Row Right Side Deployment Loop Commanded	No
Second Row Right Pretensioner Deployment Loop Commanded	No
Third Row Right Roof Rail/Head Curtain Loop Commanded	No
Second Row Center Pretensioner Deployment Loop Commanded	No
Driver 2nd Stage Deployment Loop Commanded for Disposal	Yes
Passenger 2nd Stage Deployment Loop Commanded for Disposal	Yes
Multiple Event Counter	0
An Event(s) Preceded the Recorded Event(s)	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
Crash Record Locked	Yes
Vehicle Event Data (Pre-Crash) Associated With This Event	Yes
Deployment Event Recorded in the Non-Deployment Record	No
Event Recording Complete	Yes
Estimated Principal Direction of Force (PDOF) degrees	65



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Longitudinal Axis Recorded Velocity	0.00	0.00	0.00	0.00	-1.36	-2.03	-2.03	-2.71	-4.74	-5.42	-6.78	-7.46	-8.13	-8.13	-8.13
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Longitudinal Axis Recorded Velocity	-8.13	-8.13	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



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	-2.03	-6.10	-9.49	-14.91	-16.27	-16.95	-17.62	-18.30	-18.30	-18.98	-18.98	-18.98
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Lateral Axis Recorded Velocity Change (MPH)	-18.98	-18.98	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

## Hexadecimal Data

This page displays all the data retrieved from the air bag module.  
It contains data that is not converted by this program.

```
$01 08 00 00 00 00 00 00
$02 30 00 00 00 00 00 00
$03 00 00 00 00 00 00 00
$04 04 00 00 00 00 00 00
$05 00 00 00 00 00 00 00
$06 00 0A 00 03 0A 00 00
$07 00 20 00 00 00 00 00
$08 00 00 00 00 00 00 00
$09 00 00 00 00 00 00 00
$0A 00 00 00 00 00 00 00
$0B 00 00 01 0F 00 00 00
$0C 00 00 00 00 00 00 00
$0D 00 00 40 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 00 00 00 00 00 00 00
$12 00 00 00 00 00 00 00
$13 00 00 00 00 00 00 00
$14 00 00 00 00 00 00 00
$15 00 00 00 00 00 00 00
$16 03 06 0C 16 34 00 00
$17 00 00 00 00 00 00 00
$18 00 00 00 00 00 00 00
$19 00 00 00 00 00 00 00
$1B 3F 00 00 67 00 7A 00
$1C 3F 00 00 06 00 1A 00
$1D 00 00 00 00 00 00 00
$1E 00 00 00 00 00 00 00
$1F 28 00 00 00 00 00 00
$20 40 00 00 00 00 00 00
$21 00 00 00 00 F0 00 00
$22 00 8A 00 00 00 00 00
$24 00 00 00 00 00 00 00
$25 00 00 00 00 00 00 00
$26 00 00 00 00 00 00 00
$27 FF 00 FF 00 00 00 00
$2A 00 00 00 00 00 00 00
$2B 00 00 00 00 00 00 00
$2D 00 00 00 00 00 00 00
$2E 80 00 51 00 09 00 00
$2F 00 FE 09 F7 00 00 00
$30 9D 00 00 00 00 00 00
$31 3C 54 4A 34 23 00 00
$32 00 00 00 00 00 00 00
$33 3F 4D 47 3A 13 00 00
$34 27 24 1F 1A 0D 00 00
$35 1D 18 11 0A 02 00 00
$36 01 FE FF FE FE 00 00
$37 00 00 00 00 0B 00 E2
$38 5C 00 40 00 03 C0 00
$39 00 00 00 00 00 80 00
$3A 00 00 00 00 00 80 00
$3B 03 06 0C 00 00 00 00
$3C 00 00 00 00 00 00 C0
$3D 32 5A 47 35 35 38 00
$3E 36 10 19 68 00 00 00
$3F 00 00 90 00 00 00 00
$40 00 00 00 00 00 00 00
$41 F8 F8 90 00 00 00 00
$42 80 FF FF FF FF 00 00
```

```
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$49 FF FF FF FF FF FF 00
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$4B FF FF FF FF FF FF 00
$4C FF FF FF FF FF FF 00
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$4E FF FF FF FF FF FF 00
$4F FF FF FF FF FF FF 00
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$51 F0 00 00 F0 00 00 00
$52 81 FF FF FF 00 00 00
$53 FF FF FF 00 00 00 00
$54 82 FF FF 00 00 00 00
$55 FF FF FF FF FF FF 00
$67 A0 A5 00 00 00 00 00
$68 D0 D0 00 C0 00 00 00
$69 00 FF F0 09 EC 00 00
$6A FE 09 EE 00 00 00 00
$6B 00 00 00 00 00 00 00
$6C 00 00 00 00 00 00 00
$6D 00 00 00 00 00 00 00
$6E 00 00 00 00 00 00 00
$6F FD 00 F7 FE F2 FD 00
$70 EA FD E8 FC E7 F9 00
$71 E6 F8 E5 F6 E5 F5 00
$72 E4 F4 E4 F4 E4 F4 00
$73 E4 F4 E4 F4 00 00 00
$74 00 00 00 00 00 00 00
$75 00 00 00 00 00 00 00
$76 00 00 00 00 00 00 00
$77 00 00 00 00 00 00 00
$78 50 00 00 00 00 00 00
$79 01 00 00 00 00 00 00
$7A 02 00 00 00 00 00 00
$7B 13 45 13 45 00 00 00

$01 41 55 01 02 03 04 52 53 41 32 03 09 01 AA AA 01
$02 01 02 03 04
$03 41 54 01 02 03 04 52 53 41 32 03 09 01 AA AA 01
$04 01 02 03 04
$05 42 55 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
$06 FF FF FF FF
$07 42 54 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
$08 FF FF FF FF
$0D 41 48 36 34 37 33 52 35 30 34 38 33 30 37 42 50
$0E 01 5A 39 A4
$0F 41 4A 36 34 37 33 52 35 30 34 38 32 30 34 44 36
$10 01 5A 39 A4
$13 42 52 39 38 32 30 44 31 35 30 38 39 30 34 38 54
$14 16 46 3D 35
$17 42 54 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
$18 FF FF FF FF
$21 32 16 B8 0B 5E 11 91 9A
$22 53 52
$23 32 5A FA FA FA FA FA
$24 32 5A FA FA FA FA FA
$25 32 5A FA FA FA FA FA
$26 32 5A FA FA FA FA FA
$40 00 00
$41 3F 00 00 06 00 1A
$42 D0 E4
$43 00 00 8E 80
$44 C6 00 00 FC 80 C0
1G2ZG558864*****
```

```
$45 07 01 07 01 05 01
$46 00 0F 0F 64 64
$47 0A 64 04 04 04 05 0A 06 04 0A 00 00 FA 00 00 FF 04 64
$48 18 08 08
$B0 58
$B1 FD FE 00
$B2 FF FF FF FF FF
$B4 41 53 35 33 35 32 32 31 30 35 39 4E 20 20 20 20
$B7 50 AA 01 0F 02
$B8 54 41 68 06 15
$C1 30 46 30 32
$CA 30 46 30 32
$CB 00 F0 B6 78
$CC 00 F0 B6 78
$D1 00 00
$DB 00 00
$DC 00 00
```

## Comments