

CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

**CALSPAN ON-SITE CHILD SAFETY SEAT CRASH INVESTIGATION
CASE NO: CA07-035**

VEHICLE: 2007 PONTIAC G6

LOCATION: OHIO

CRASH DATE: NOVEMBER 2007

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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<p>16. Abstract This on-site investigation focused on the use and installation of a Century Breverra forward-facing Child Safety Seat (CSS) that was present in a 2007 Pontiac G6 four-door sedan. A 2-year old male child was restrained within the CSS. The CSS was installed in the second row right position and the 3-point manual lap and shoulder belt was routed through the forward facing path. There were two additional occupants in the Pontiac; they included an unrestrained 35-year old female driver and a restrained 26-year old female front right passenger. The Pontiac was involved in a severe head-on crash with a 1992 Buick Regal. The driver of the Pontiac was traveling eastbound on a rural two-lane curved roadway when the Buick, which was traveling westbound, crossed over the roadway's centerline and impacted the Pontiac in a head-on configuration. The driver of the Pontiac sustained fatal injuries and was pronounced deceased at the scene. The front right passenger was transported to a medical facility and was then transferred to a trauma center where she hospitalized for 12 days. At impact, the 2-year child loaded the internal harness system of the CSS and the splitter plate, that is utilized to adjust the length of the harness webbing, fractured. Following the fracture of the splitter plate, the harness was pulled through the top slots and the child was displaced forward from the CSS and into the front right seat back. The child sustained incapacitating injuries and was transported to a medical facility. He was transferred to a Children's Hospital where he was hospitalized for 22 days. The Pontiac was also equipped with a Certified Advanced 208-Compliant (CAC) system that included dual stage frontal air bags for the driver and front right passenger. The manufacturer of this vehicle certified that the vehicle met the advanced air bag requirement of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. The frontal air bags deployed as a result of the severe frontal impact. The data from the Event Data Recorder (EDR) was recovered during the SCI investigation and is discussed in detail later in this report. The 21-year old female driver of the Buick also sustained fatal injuries and was pronounced deceased at the scene. Both vehicles were towed due to severe damage.</p>			
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LOCATION: OHIO

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BACKGROUND

This on-site investigation focused on the use and installation of a Century Breverra forward-facing Child Safety Seat (CSS) that was present in a 2007 Pontiac G6 four-door sedan. A 2-year old male child was restrained within the CSS. The CSS was installed in the second row right position and the 3-point manual lap and shoulder belt was routed through the forward facing belt path to secure the CSS. The Automatic Locking Retractor (ALR) feature did not appear to be used



Figure 1 - On scene view of crash site.

during the installation of the CSS. There were two additional occupants in the Pontiac; they included an unrestrained 35-year old female driver and a restrained 26-year old female front right passenger. The Pontiac was involved in a severe head-on crash with a 1992 Buick Regal. The driver of the Pontiac was traveling eastbound on a rural two-lane curved roadway when the Buick, which was traveling westbound, crossed over the roadway's centerline and impacted the Pontiac in a head-on configuration. The driver of the Pontiac sustained fatal injuries and was pronounced deceased at the scene. The front right passenger was initially transported to a local hospital and transferred to a regional trauma center where she was hospitalized for 12 days. At impact, the 2-year child loaded the internal harness system of the CSS and the splitter plate, that was utilized to connect the harness straps to the adjustment strap, fractured. Following the fracture of the splitter plate, a majority of the harness straps pulled through the top slots and the child was displaced forward from the CSS and into the front right seat back. The child sustained closed head injuries, a cervical spine fracture, extremity fractures, and soft tissue injuries. He was transported to a medical facility where he was stabilized and then transferred to a pediatric trauma center where he was hospitalized for 22 days.

The Pontiac was equipped with a Certified Advanced 208-Compliant (CAC) system that included dual stage frontal air bags for the driver and front right passenger. A CAC vehicle is certified by the manufacturer to be compliant to Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS 208). The frontal air bags deployed as a result of the severe frontal impact. The data from the Event Data Recorder (EDR) was recovered during the SCI investigation and is discussed in detail later in this report. The 21-year old female driver of the Buick also sustained fatal injuries and was pronounced deceased at the scene. Both vehicles were towed due to severe damage. **Figure 1** is an on-scene view of the crash site.

The crash was identified by the Calspan Special Crash Investigations (SCI) team through an Internet news search. Notification of the crash was forwarded to the Crash Investigation Division of the National Highway Traffic Safety Administration (NHTSA). The Calspan SCI team located the Pontiac and established cooperation with the investigating police agency. The case was assigned on November 30, 2007 for an on-site investigation. The Pontiac was located at a salvage yard and the CSS was located at the investigating police agency. The Pontiac, CSS, and scene inspections were completed on December 5, 2007. During the investigation, the EDR was also downloaded. The Buick was salvaged and crushed prior to the case assignment; however, on scene images of the vehicle allowed for an estimation of key data points.

SUMMARY

Crash Site

The crash occurred during the daylight hours in November 2007. At the time of the crash, the asphalt roadway was dry and there were no adverse weather conditions. The crash occurred on a two-lane east/west winding roadway in a rural setting. The width of the eastbound lane was 3 m (10 ft) and the width of the westbound lane was 3.3 m (10.8 ft). The travel lanes were separated by solid double yellow centerlines for eastbound traffic and solid and broken double yellow centerlines for westbound traffic. The roadside environment consisted of natural growth and 1 m (3 ft) asphalt shoulders bordered the roadway. W-beam guardrails were located 1 m (3 ft) outboard of the road edges of each travel lane. The roadway was curved at the point of impact and had a radius of 265 m (869 ft). The speed limit in the area of the crash was 89 km/h (55 mph). The Crash Schematic is included as **Figure 26** at the end of this narrative report.

Vehicle Data

Exterior Vehicle – 2007 Pontiac G6

The 2007 Pontiac G6 was identified by the Vehicle Identification Number (VIN): 1G2ZG58N274 (production number omitted). The four-door sedan was manufactured in 08/06 and had a Gross Vehicle Weight Rating (GVWR) of 2,031 kg (4,478 lb) with 1,103 kg (2,432 lb) distributed to the front axle and 928 kg (2,046 lb) distributed to the rear. The front-wheel drive vehicle was equipped with a 6-cylinder, 3.5-liter engine that was linked to an automatic transmission. The service brakes consisted of four-wheel disc brakes with an anti-lock braking system. The digital odometer could not be read due to crash related damage to the vehicle's electrical system. The Pontiac was equipped with alloy wheels and Hankook Optima P225/50R15 tires. The vehicle manufacturer recommended tire pressure was 207 kPa (30 PSI). The specific tire data at the time of the SCI inspection was as follows:

Tire	Measured Pressure	Tread Depth	Damage
LF	Tire Flat	6 mm (8/32")	Several cuts and punctures in sidewall and tread
LR	159 kPa (23 PSI)	6 mm (8/32")	None
RF	165 kPa (24 PSI)	6 mm (8/32")	None
RR	159 kPa (23 PSI)	6 mm (8/32")	None

The 2007 Pontiac G6 was equipped with bucket seats with adjustable head restraints in the front row. The driver’s head restraint was adjusted to 4 cm (1.5”) above full down and the front right head restraint was adjusted to 5 cm (2”) above full down. The front seats exhibited 23 cm (9”) of total seat track travel. The driver’s seat was adjusted to the mid-track position, 11 cm (4.5”) aft of full forward. The front right seat was adjusted to the forward position, 5 cm (2”) aft of full-forward. The second row was configured with a left-side-wide 60/40 split bench seat with adjustable head restraints for the outboard positions. Both head restraints were adjusted to the full-down position.

Exterior Vehicle – 1992 Buick Regal

The 1992 Buick Regal was designed as a four-door sedan and identified by the VIN: 2G4WB54L5N1 (production number omitted). The front-wheel drive vehicle was equipped with a 6-cylinder, 3.8-liter engine linked to an automatic transmission. The Buick was equipped with tires from various manufacturers and of various sizes. Partial tire data was obtained from the police investigation which is detailed in the following table:

Tire	Tire Manufacturer	Measured Pressure	Tread Depth	Damage
LF	American (unknown model) P205/70R15	Tire Flat	6 mm (8/32”)	Tire cut and restricted
LR	Unknown	Tire Flat	2 mm (3/32”)	None
RF	Carlisle (unknown model)	Unknown	6 mm (8/32”)	None
RR	Uniroyal Tiger Paw P205/75R15	Unknown	6 mm (8/32”)	None

***Crash Sequence
Pre-Crash***

The 35-year old female driver of the Pontiac was operating the vehicle in an eastbound direction and was negotiating a sharp left curve (**Figure 2**). The 21-year old driver of the Buick was operating her vehicle in a westbound direction and was entering a right curve (**Figure 3**). A witness reported that the Buick had passed his vehicle earlier, 6.4 km (4 miles) from the crash site, and that the Buick was driving erratically and at a high rate of speed. The driver of the Buick was also suspected by police investigators to be driving under the influence of alcohol and narcotics. The Buick crossed the centerline of the roadway and was traveling in the eastbound lane prior to the impact. According to the vehicle’s EDR, the driver of the Pontiac was traveling 100 km/h (62 mph) at 2 seconds prior to the impact; however, the driver applied the brakes at 1 second prior to the crash and reduced the vehicle’s speed to 89 km/h (55 mph).



Figure 2 - Eastbound approach of 2007 Pontiac G6.



Figure 3 - Westbound approach of 1992 Buick Regal.

Crash

The crash occurred as the full frontal plane of the Pontiac impacted the full frontal plane of the Buick in a head-on configuration. The directions of force for both vehicles were in the 12 o'clock sector. The force of the impact was sufficient to actuate the Pontiac's seat belt pretensioners and deploy the frontal air bags. The Pontiac's EDR reported a total delta-V of -84 km/h (-52 mph) at 190 milliseconds of Algorithm Enable (AE). The Damage-Only routine of the WinSMASH program computed a total delta-V of 78 km/h (48.4 mph) for the Pontiac and 82 km/h (50.9 mph) for the Buick. The specific longitudinal and lateral velocity changes were -77 km/h (-47.8 mph) and 14 km/h (8.7 mph) for the Pontiac and -81 km/h (-50.3 mph) and -14 (-8.7 mph) for the Buick.

The force of the impact caused the front of the Pontiac to pitch down and the rear of the vehicle to lift off the ground. Simultaneously, the vehicle was redirected rearward 6 m (15 ft) and off the south roadside. While being redirected toward final rest, the Pontiac rotated counterclockwise (CCW) approximately 40 degrees from its original travel direction. The back of the Pontiac mounted the W-beam guardrail causing minor damage to the right aspect of the vehicle. The Pontiac remained mounted on the guardrail post-crash with its back plane straddling the guardrail and its front end on the eastbound travel lane. The Buick continued forward 6 m (15 ft) and rotated clockwise approximately 20 degrees. The Buick came to final rest straddling the roadway's centerline and facing in a northwest direction. Numerous gouges were located on the roadway during the on-site scene investigation beginning at the point of impact and extending west toward the final rest positions of the vehicles. The gouges were documented and placed to scale on the schematic at the end of this narrative report.

Post-Crash

Following the crash, a witness stopped and checked on the status of the occupants of the Pontiac. He noticed that the child was lying in the second row of the vehicle behind the front right seatback. Unable to open the door, the witness disintegrated the right rear glazing and removed the child from the vehicle. The front right passenger and the 2-year old child were transported to a local hospital. Once at the hospital, they were stabilized and were transferred to trauma centers in a neighboring state where they admitted for

treatment. Both drivers were pronounced deceased at the scene and transported to the coroner's office for autopsy. Both vehicles sustained disabling damage and were deemed total losses by their respective insurance companies. The Pontiac was taken to a regional salvage facility while the Buick was destroyed by another facility.

Vehicle Damage

Exterior Damage – 2007 Pontiac G6

The 2007 Pontiac G6 (**Figure 4**) sustained severe frontal damage as a result of the head-on impact with the 1992 Buick Regal. The direct contact damage encompassed the full frontal width of the vehicle and measured 92 cm (36.2"). The maximum crush was located 9 cm (3.5") left of the vehicle's centerline and measured 88 cm (34.6") in depth. The front of the Buick contacted the front left alloy rim of the Pontiac resulting in a fracture to the wheel. The fracture began at the inboard bead of the rim and encompassed approximately 60 percent of the circumferential surface. The left wheelbase was compressed 33 cm (13") from this impact. The compression of the wheelbase resulted in induced damage that extended down the left side to the B-pillar. The right wheelbase was also compressed a length of 8 cm (3") and direct contact damage was present on the right fender which extended rearward 42 cm (16.5"). The left front and left rear side windows were disintegrated and the windshield sustained stress cracks from the crushed frontal components and induced damage. Six equidistant crush measurements were documented along the bumper beam of the vehicle and were as follows: C1 = 71 cm (28"), C2 = 79 cm (31"), C3 = 88 cm (34.6"), C4 = 84 cm (33"), C5 = 68 cm (26.8"), C6 = 44 cm (17.3"). The Collision Deformation Classification (CDC) for the impact with the Buick was 12-FDEW-4.



Figure 4 - Damaged frontal plane of Pontiac.



Figure 5 - Damage to right side of Pontiac.



Figure 6 - Close-up view of right side damage.

During the impact, the front of the Pontiac pitched down and the back of the vehicle lifted off the ground. Simultaneously, the Pontiac was redirected rearward toward the south shoulder and a guardrail on the south roadside. While the back end was elevated, the vehicle mounted the guardrail, which resulted in minor damage to the vehicle's right side (**Figures 5 and 6**). The direct contact damage to the right side began 88 cm (34.6")

forward of the right rear axle and measured 16 cm (6.3”) in length. The damage was isolated to the right sill, 25 cm (9.8”) vertically from the ground. The maximum crush to the right side was 2 cm (0.8”) in depth and was located 96 cm (37.8”) forward of the rear axle. The impact was non-horizontal in orientation and the CDC was 00-RPLN-1.

Interior Damage – 2007 Pontiac G6

The interior damage to the Pontiac consisted of minor severity intrusion to the driver and front right toe and floor pans, intrusion of the instrument panel, and occupant loading of the steering assembly, knee bolsters, and instrument panel.

Despite the severity of the frontal impact, the level of intrusion inside the vehicle was moderate in comparison. The deepest area of intrusion was to the driver’s toe pan, which intruded longitudinally 21 cm (8.3”). The complete profile of intruded components identified during the SCI vehicle inspection are listed by their magnitude in the following table:

Position	Component	Magnitude	Direction
Front left	Toe pan	21 cm (8.3”)	Longitudinal
Front right	Toe pan	16 cm (6.3”)	Longitudinal
Front right	Floor pan	9 cm (3.5”)	Vertical
Front left	Steering assembly	8 – 15 cm (3 – 6”)	Longitudinal
Front left	Floor pan	7 cm (2.5”)	Vertical
Front left	Instrument panel	4 cm (1.5”)	Longitudinal
Front middle	Instrument panel	4 cm (1.5”)	Longitudinal
Front Right	Instrument panel	1 cm (0.5”)	Longitudinal

Several discernable occupant contact points were identified during the SCI vehicle inspection. The unbelted female driver of the Pontiac was displaced forward during the impact. She loaded the steering assembly and the knee bolster in two locations. As the front of Pontiac pitched down and partially underrode the Buick, the driver knees struck the padded knee bolster which resulted in pocket impressions to the bolster (**Figure 7**). The first impression was 7 cm (2.75”) in diameter and was located 20 cm (8”) inboard of the left instrument panel edge. Vertically, the impression was located 66 cm (26”) above the floor pan and was attributed to the driver’s left knee. The second impression was 5 cm (2”) in diameter and was located 47 cm (18.5”) inboard of the left instrument panel edge. Vertically, the impression was located 56 cm (22”) above the floor pan and was attributed to the driver’s right knee. As the steering assembly intruded longitudinally, the driver’s torso partially submarined the wheel, which resulted in a bent wheel rim and vertical upward deformation of the column (**Figure 8**).



Figure 7 - Knee bolster damage from driver loading.



Figure 8 - Steering wheel rim damage from driver loading.

The front right female passenger was displaced slightly forward and her lower extremities loaded the glove compartment door resulting in abrasions to the cover (**Figures 9 and 10**). The left knee contact point was 10 cm (4") in diameter and was located 43–53 cm (17–21") inboard of the right edge of the instrument panel. Vertically, the abrasion was 54 cm (21") above the floor panel. The right knee contact point was 15 cm (5.9") in diameter and was located 13–28 cm (5–8") inboard of the right instrument panel edge. Vertically, the abrasion was 68 cm (27") above the floor pan. The front right passenger also loaded the belt system. This was evidenced by discernable loading evidence on the belt webbing and is discussed in greater detail later in the *Manual Restraints* section of this report.



Figure 9 - Damage to glove compartment cover from front right passenger loading.



Figure 10 - Damage to glove compartment cover from front right passenger loading.

The right rear male child passenger was initially seated within a forward facing CSS. At impact, the child loaded the internal harness within the CSS and the harness splitter plate fractured. Following the fracture of the splitter plate, the child was ejected from the CSS and was displaced forward. He loaded the front right seat back which resulted in a 45 x 43 cm (18 x 17") area of damage (**Figure 11**). The child's kinematics during the crash and the fracture of the CSS's splitter plate are discussed further in the *Child Safety Seat* section of this report.



Figure 11 - Damage to front right seat back from right rear passenger loading.

Exterior Damage – 1992 Buick Regal

The 1992 Buick Regal sustained severe damage as a result of the head-on impact with the Pontiac (**Figures 12 and 13**). The Buick was destroyed prior to the case assignment; however, on-scene images allowed for a partial inspection of the vehicle. The direct contact damage encompassed the full frontal width of the vehicle. The force of the impact resulted in the front of the Buick shifting slightly to the right and the left A-pillar displaced upward significantly. The left wheelbase was compressed and the left front tire was restricted and flattened. The CDC for the impact with the Pontiac was 12-FDEW-4.



Figure 12 - Frontal damage to the 1992 Buick Regal.



Figure 13 - Frontal and left side damage to the Buick Regal.

Frontal Air Bag System – 2007 Pontiac G6

The Pontiac was equipped with a Certified Advanced 208-Compliant (CAC) system for the driver and front right passenger positions. A CAC vehicle is certified by the manufacturer to be compliant to Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS 208). The system consisted of dual stage frontal air bags for the front outboard positions, seat track positioning sensors, a front right occupant presence detection system, and retractor pretensioners. During the crash, the EDR commanded a Stage 2 air bag deployment for both frontal positions at 10 milliseconds of AE. The pretensioners also actuated during the crash.

The driver's air bag (**Figure 14**) was housed within the steering wheel and was concealed by a three-piece cover flap design that was trapezoidal in shape. The top piece of the cover flap was 16 cm (6.3") horizontally and 5 cm (2") vertically. The lower side flaps were 8 cm (3") horizontally and 13 cm (5") vertically. The air bag membrane was 54 cm (21") in diameter in its deflated state and had an excursion of 25 cm (9.8"). A small tear was present on the air bag membrane (**Figure 15**). The tear was 5 cm (2") in height and was located on the vertical midpoint of the air bag 16–21 cm (6.3–8.3") above the horizontal centerline. It is probable that the tear resulted from contact with the windshield as the steering column was displaced upward.



Figure 14 – Deployed driver's air bag.



Figure 15 - Small tear in the driver's air bag membrane.

The front right passenger's air bag (**Figure 16**) deployed from a mid-mount H-configuration module configured with an asymmetrical rectangular vinyl cover flaps. The upper flap measured 30 cm (12") horizontally and 9 cm (3") vertically. The lower flap measured 30 cm (12") horizontally and 5 cm (2") vertically. The deflated air bag membrane measured 45 cm (18") horizontally and 65 cm (25.5") vertically. There was no occupant loading evidence on the front right air bag.



Figure 16 - Deployed front right passenger's air bag.

Occupant Sensing System – 2007 Pontiac G6

The CAC system was configured with a weight sensor in the front right seat cushion. The system was designed to detect occupant presence and to automatically suppress the front right air bag if it detected a weight consistent with a child safety seat, a booster seat, or a child sitting in the front seat; or if it detected that the front seat was not occupied. An indicator light located within the rear view mirror confirmed the on/off status of the passenger air bag. Since the front seat was occupied and the safety belt buckle was engaged, the CAC system deployed the front right passenger's air bag.

Manual Safety Belt Systems

The 2007 Pontiac G6 was equipped with three-point lap and shoulder belt systems for the five seating positions. All five safety belts consisted of continuous loop webbing with sliding latch plates.

The driver's safety belt retracted onto an Emergency Locking Retractor (ELR) and was configured with a height adjustable D-ring which was in the full-down position and a retractor mounted pretensioner. Rescue personnel cut the webbing during the extrication of the driver. The webbing was cut approximately 22 cm (8.7") above the anchor point. The driver did not use the safety belt in the crash. This was supported by the restricted webbing that was located in the stowed position. Frictional abrasions were present on the

webbing 5 cm (2.0”) below the D-ring on its retractor side. These abrasions occurred when the retractor pretensioner actuated and rapidly retracted the webbing through the D-ring.

The front right safety belt retracted onto a switchable ELR/Automatic Locking Retractor (ALR). The front right belt system was configured with a height adjustable D-ring which was in the full-down position and a retractor mounted pretensioner. The front right passenger used the safety belt during the crash. The usage was supported by loading evidence on the webbing, latch plate hardware, D-ring, and the actuated pretensioner. The loading evidence on the webbing consisted of a crease that was located on the lap portion of the belt system. This crease occurred from occupant loading. It measured 4 cm (1.6”) and was located from 15-19 cm (6-7.5”) above the anchor point. Plastic transfers were noted on the webbing from the frictional contact with the D-ring. The transfer measured 30 cm (11.8”) and began 112 cm (44.0”) above the anchor point and extended to 142 cm (55.9”) above the reference point.

The second row belt systems utilized switchable ELR/ALR retractors for the three seated positions. The left and center safety belts were not used during the crash.

The second row right safety belt (**Figure 17**) was used to install a Forward Facing Child Safety Seat (FFCSS). The lap and shoulder belt was threaded through the forward facing belt path. The webbing exhibited loading evidence from the CSS. This evidence consisted of creasing at two locations. A 5 cm (1.9”) area of creasing that began 10 cm (3.9”) above the stop button and ended 15 cm (5.9”) above the reference point appears to have occurred from loading of the right belt path of the CSS. The second area of creasing measured 9 cm (3.5”) and was located from 37-46 cm (14.5-18.1”) above the stop button. This area of creasing occurred from the left belt path of the CSS.



Figure 17. Rear right safety belt webbing.

Child Safety Seat

The 2-year-old male was positioned in a Century Breverra Forward Facing Child Safety Seat (FFCSS) seat and was restrained by the integrated five-point harness system (**Figure 18**). The safety seat Model Number and Date of Manufacture were not identified. The label that contained this information was curled and torn along the outer aspects where these numbers were listed. The child seat was embossed with an expiration date



Figure 18. Century Breverra FFCSS.

December 2007. It's unknown if FFCSS was purchased new or if it was involved in any previous crashes. The following was also placarded on the safety seat:

Forward Facing With The Harness:

Height between 89-109 cm (35-43")

Weight 13-18 kg (30-40 lbs)

Forward Facing Without The Harness

Height between 89-127 cm (35-50")

Weight between 13-36 kg (30-80 lbs)

The FFCSS was constructed of a plastic shell and contained a five point harness system and a retainer clip. A strap that extended from the lower front of the shell was wrapped on to a metal bar on the bottom of the shell and extended on to the rear of the FFCSS. The rear end of the strap was sewn onto a splitter plate. A locking mechanism for the harness strap was housed within the front of the shell. This strap was used to adjust the length of the harness straps by pulling or retracting the strap on the front of the FFCSS. The strap contained a label with the following information:

F12532

Lot ID# 627840-01

SP0635AA

This belt conforms to safety specifications

FMVSS 213

iMMi

Jan 01

Indiana Mills & MFG. INC

Child Safety Seat Installation

The exact installation process is not known. The tightness of the harness straps and the height location of the retainer clip could not be determined. Based on the police on-scene images, it appears that the lap and shoulder belt was routed through the forward facing belt path and the harness straps were in the top slots. Additionally, it appeared that the Automatic Locking Retractor (ALR) feature of the safety belt was not engaged during the installation.

Figure 19 depicted the police investigator moving the FFCSS forward to photograph the position of the safety belt. The slack in the safety belt was indicative that the ALR feature was not activated.



Figure 19. Police investigator moving the FFCSS post-crash.

Child Safety Seat Splitter Plate

The ends of the harness straps were sewn back onto itself to form a loop. These loops were designed to be hooked through the splitter plate on the rear aspect of the FFCSS. The splitter plate was constructed of metal and was open on the left side for entry of the harness straps. At the left side opening a hook was present to prevent the harness straps from sliding out. The right side of the splitter plate was closed capturing the harness straps. The splitter plate was approximately 5 cm (2") in height and 6 cm (2.4") in width. The following information was engraved on the splitter plate:

ST0027AB012P

Child Safety Seat Damage

During the crash phase the child passenger loaded the internal harness system. The loading of the lower left harness strap tore the cloth and foam seat cushion (**Figure 18**). The tear began at the harness strap opening on the cushion and extended forward 17 cm (6.7"). As the 2-year-old male passenger continued loading the harness system the retainer clip unlatched. The unlatching of the harness retainer clip was supported by the tearing of the cushion from loading. This tearing probably would not have occurred if the harness clip was not latched. **Figure 20** is a police post-crash image of the FFCSS which show the harness system and the harness retainer clip prior to the removal of the FFCSS from the vehicle. No damage was evident during the SCI inspection and the retainer clip functioned as designed.



Figure 20. Post crash location of the harness and the harness retainer clips.

In the course of the loading, the right side (closed end) of the splitter plate fractured (**Figure 21**). The fracture occurred approximately 0.6 cm (0.25") below the apex of the top right side aspect (**Figures 22 and 23**). **Figure 24** is of the splitter plate configuration. Due to the splitter plate fracture, the harness straps partially threaded through the top slots. The movement of the harness straps against the FFCSS shell resulted in frictional abrasions on the rear of the shell. The abrasions from the left harness strap were diagonally oriented (top left to bottom right) and began at the top slot and extended 25 cm (9.8") (**Figure 25**). Frictional abrasions were present within the right harness



Figure 21. Fractured splitter plate.



Figure 22. Bottom aspect of the splitter plate. Note the top right aspect is the area of the fracture location.

slot. In the post-crash on-scene images of the FFCSS, it did not appear that the harness straps fully threaded through the front of the safety seat. No further damage was noted to the FFCSS shell.



Figure 23. Top aspect of splitter plate. Note the right side attaches to the lower portion of the splitter plate.



Figure 24. Splitter plate configuration.



Figure 25. Loading abrasions from the harness straps.

2007 Pontiac G6 Event Data Recorder

The 2007 Pontiac G6 was equipped with an Event Data Recorder (EDR). The EDR was downloaded by the investigating police agency. A copy of the EDR file was obtained and is included as **Attachment A** of this report.

The EDR recorded a deployment file and non-deployment file, respectively. The non-deployment occurred 0.36 seconds after the deployment. Both files indicated that the driver's belt was unbuckled and the front right was buckled at the time of Algorithm Enable (AE). The deployment file shows that the pretensioners were commanded to actuate. A stage 2 deployment of the frontal air bag system was commanded deploy during the crash. The deployment times for stage 1 and stage 2 were 8 and 10 milliseconds, respectively. The maximum recorded delta V was -84 km/h (-52 mph) which occurred at 190 milliseconds. The pre-crash data shows the vehicle speed at 98 km/h (61 mph) five seconds prior to AE. The speed increased to 99 km/h (62 mph) and remained constant from four seconds to two seconds prior to AE. At one second prior to

AE the brake switch status was on and the vehicle speed had decreased 88 km/h (55 mph).

In addition to the frontal air bag data, the EDR shows that the command to deploy the left curtain air bag occurred 25 milliseconds after AE. Based on the SCI vehicle inspection, the left curtain air bag did not deploy during the crash. Although the command to deploy was given, it could not be determined why the curtain air bag did not deploy. Non-deployment of the curtain air bag is suggestive that the vehicle does not retain reserve electrical power to deploy the side impact protection system. Refer to the EDR printout attached to this report for further EDR data.

2007 Pontiac G6 Side Impact Air Bags

The 2007 Pontiac G6 was equipped with roof side rail mounted inflatable curtain air bags. Although the EDR commanded the deployment of the left curtain air bag, the left and right curtain air bags did not deploy during the crash. The G6 was not equipped with seat back mounted side impact air bags. The seat back mounted air bags are optional equipment; however, curtain air bags are standard equipment.

Occupant Demographics/Data

Driver Demographics

Age/Sex: 35-year-old/Female
 Height: 163 cm (64")
 Weight: 93 kg (206 lb)
 Seat Track Position: Mid track position
 Eyewear: Unknown
 Manual Safety Belt Usage: None used
 Usage Source: Vehicle inspection
 Egress from Vehicle: Fatal, removed from vehicle
 Mode of Transport from Scene: Body transported to morgue
 Type of Medical Treatment: Not treated; pronounced deceased at scene

Driver Injuries

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Complete avulsion of the descending aorta located 5 cm distal to the left subclavian branch	Critical (420210.5,4)	Steering wheel rim/hub
Complete fracture of T-1 with transection of the underlying spinal cord	Critical (640464.5,7)	Steering wheel rim/hub
Multiple bilateral rib fractures; left 1-9 lateral and 1-4 posterior, right 1-7 lateral and posterior	Severe (450240.4,3)	Steering wheel rim/hub

Acute subdural hemorrhage within the posterior cranial fossa	Severe (140650.4,9)	Windshield
Acute hemorrhage within the lateral third and fourth cerebral ventricles	Severe (140678.4,9)	Windshield
Type 1 hinge fracture of the basilar skull	Serious (150200.3,8)	Windshield
13 cm laceration of the lower lobe of the right lung	Serious (441414.3,1)	Steering wheel rim
Open fracture of the left distal femur with displacement of the patella	Serious (851801.3,2)	Lower left instrument panel/knee bolster
Open fracture of the distal right femur with displacement of the patella	Serious (851801.3,1)	Lower left instrument panel/knee bolster
Closed fracture of the left mid shaft humerus	Moderate (752602.2,2)	Upper left instrument panel
Fracture of the right sternoclavicular junction with soft tissue hemorrhage	Moderate (751230.2,1)	Steering wheel rim
Multiple superficial lacerations of the anterior right lobe of the liver	Moderate (541822.2,1)	Steering wheel rim
Fracture of the superior right and left pubic rami	Moderate (852602.2,5)	Steering wheel rim
Closed fracture with deformity of the left ankle (NFS)	Minor (850299.1,2)	Toe pan
Multiple red abrasions of the right forehead and right cheek w/glass fragments overlying face neck and within hair	Minor (290202.1,7; 290202.1,1)	Windshield
Contusion of the right lateral forehead	Minor (290402.1,7)	Windshield
Multiple irregular and linear abrasions of the left breast and lower chest	Minor (490202.1,2)	Steering wheel rim
Multiple abrasions of the upper, mid, and lower abdomen	Minor (590202.1,0)	Steering wheel rim
Multiple abrasions of the dorsal right wrist	Minor 790202.1,1)	Center instrument panel

Multiple irregular abrasions of the antero-lateral right calf	Minor (890202.1,1)	Lower left instrument panel/knee bolster
Irregular abrasions of the lateral right ankle	Minor (890202.1,1)	Toe pan
Abrasion of the posterior and proximal right thigh	Minor (890202.1,1)	Seat cushion
Multiple contusions of the medial, proximal, and flexor surfaces of the left forearm	Minor (790402.1,2)	Steering wheel rim
3 cm abrasion of the volar left wrist	Minor (790202.1,2)	Air bag
Irregular abrasion of the left elbow	Minor (790202.1,2)	Upper left instrument panel
Abrasion and contusion of the extensor surface of the left forearm and dorsal second left finger	Minor (790202.1,2; 790402.1,2)	Upper left instrument panel
Multiple contusions and abrasions over the anterior proximal left tibia	Minor (890402.1,1; 890202.1,1)	Lower left instrument panel/knee bolster
Two contusions of the dorsal left foot	Minor (890402.1,2)	Foot pedals

Source – Autopsy

Driver Kinematics

The 35-year-old female driver of the 2007 Pontiac G6 was seated in an unknown driving posture and was not restrained by the manual belt system. The driver’s seat was adjusted to a mid track position.

At impact with the Buick, the frontal air bags deployed and the safety belt pretensioners actuated. Based on the EDR data, the first stage of the frontal air bags deployed at 8 milliseconds from AE with the second stage deployed at 10 milliseconds from AE. As the air bag expanded it contacted and abraded the driver’s left wrist.

The driver initiated a forward trajectory in response to the 12 o’clock direction of force and loaded the deployed air bag. During her forward motion, her right thigh slid against the seat cushion. The friction from this motion resulted in an abrasion of the posterior and proximal right thigh.

As the vehicles continued to crush, the left instrument panel, steering wheel, and toe pan began to intrude rearward and upward. As her torso continued forward, she began a vertical trajectory that was influenced by the vertically displaced steering column. This trajectory allowed her head to strike the windshield. This contact resulted in a subdural

hemorrhage, hemorrhage of the cerebral ventricles, multiple facial abrasions, and a forehead contusion. As she continued to move forward, her head was extended rearward causing the hinge fracture of the basilar skull.

The unrestrained driver contacted and loaded the lower aspect of the air bag membrane. Although no contact evidence was present on the air bag membrane, her torso compressed the air bag and deformed the lower aspect of the steering wheel rim. The interaction with the steering wheel rim resulted in avulsion of the descending aorta, fracture of T-1 with transection of the underlying spinal cord, multiple bilateral rib fractures, right sternoclavicular fracture, multiple liver lacerations, laceration of the lower lobe of the right lung, right and left pubic rami fractures, multiple contusions of the left forearm, and abrasions to the chest and abdomen.

As the driver's torso loaded the steering wheel, her arms contacted the upper left and center instrument panels, respectively. Due to these contacts, the driver sustained a left mid shaft humerus fracture and abrasions to multiple areas of the left arm and hand. The center instrument panel contact resulted in an abrasion to the right wrist.

The driver's knees and lower legs contacted and deformed the lower left instrument panel/knee bolster resulting in the left femur fracture, right femur fracture, right calf abrasions, and the contusion and abrasions to the left tibia. The intruding toe pan fractured the driver's left ankle abraded her right ankle. Additionally, two contusions were noted on dorsal aspect of the driver's left foot. These contusions were attributed to contact with the foot controls.

As a result of the injuries, the driver expired at the crash site.

Front Right Passenger Demographics

Age/Sex: 26-year-old/Female
 Height: Unknown
 Weight: Unknown
 Seat Track Position: Forward track position
 Restraint Use: Manual lap and shoulder belt
 Usage Source: Vehicle inspection
 Egress from Vehicle: Unknown
 Mode of Transport from Scene: Transported by ambulance, transferred to a regional trauma center
 Type of Medical Treatment: Treated unknown if hospitalized

Front Right Passenger Injuries

Injury	Injury Severity (AIS 90, Update 98)	Injury Source
Right pneumothorax	Serious (442202.3,1)	Shoulder belt
Anterior moderate spleen laceration	Serious (544224.3,2)	Seat back reinforced by the right rear child passenger

Omentum hematoma 3.8 x 3.1 cm (1.5 x 1.2”) with omentum bleed and active extravasation	Moderate (542210.2,8)	Lap belt
Comminuted and impacted fracture of the right first metatarsal	Moderate (852200.2,1)	Toe pan
Displaced and comminuted fracture of the left fifth digit	Minor (752404.1,2)	Roof (deflected by deploying front right air bag)
Laceration and ecchymosis of the left fifth digit	Minor (790602.1,2 790402.1,2)	Roof (deflected by deploying front right air bag)
Abrasion of the right lower shin and knee	Minor (890202.1,1)	Lower right instrument panel
Small laceration of the left elbow	Minor (790602.1,2)	Flying glass
Abrasion of the left cheek	Minor (290202.1,2)	Air bag membrane
Bilateral superficial abrasions of the iliac crest	Minor (890202.1,3)	Lap belt
Bilateral pelvis ecchymosis	Minor (890402.1,3)	Lap belt
Ecchymosis and edema of the right foot	Minor (890202.1,1)	Toe pan
Abrasion and contusion of the left posterior abdomen	Minor (590202.1,2 590402.1,2)	Lap belt
Acute tear of the right internal oblique muscle	Minor (590600.1,1)	Lap belt

Source – Hospital records

Front Right Passenger Kinematics

The 26-year-old female front right passenger was seated in an unknown posture with the seat adjusted to a forward track position. She was restrained by the manual safety belt system, which was supported by the loading evidence on the belt system. At impact, the front right air bag deployed and the safety belt pretensioner actuated. The passenger responded to the 12 o’clock crash forces by initiating a forward trajectory. She loaded the safety belt system resulting in the right pneumothorax, omentum hematoma 3.8 x 3.1 cm (1.5 x 1.2”) with omentum bleed and active extravasation, bilateral superficial abrasions of the iliac crest, bilateral pelvis ecchymosis, an acute tear of the right internal oblique muscle, and an abrasion and contusion of the left posterior abdomen.

Her head flexed over the shoulder belt and contacted the air bag membrane resulting in an abrasion to her left cheek. The expanding air bag membrane deflected her left hand upward into the roof area. Her left hand struck the roof resulting in the laceration and ecchymosis of the left fifth digit and the displaced and comminuted fracture of the left fifth digit. Associative evidence was not present on the air bag membrane to support this contact.

During her forward motion, her right lower shin and knee contacted the lower right instrument panel resulting in abrasions to her right lower extremity. Her right foot contacted and loaded the toe pan as it began to intrude into the passenger space. During this loading, she sustained a comminuted and impacted fracture of the right first metatarsal and ecchymosis and edema of the right foot.

At this point, the rear right child passenger was ejected from the CSS and was displaced against the rear aspect of the right front seat back. The child loaded the rear of this seat as the front right passenger remained engaged with the safety belt. The loading from the child was evidenced by pocketing where the child struck the seat back and forward deformation. As the child continued loading the seat back, the front right passenger's torso was compressed between the safety belt and the seat back resulting in the anterior moderate spleen laceration.

The front right passenger was initially transported to a local hospital for treatment. She was transferred to a regional trauma center in a neighboring state and was hospitalized at this trauma center for 12 days.

Rear Right Child Passenger

Age/Sex: 2-year-old/Male
 Height: Unknown
 Weight: 11 kg (25 lbs)
 Seat Track Position: N/A, fixed
 Eyewear: None
 Child Restraint Use: Forward facing child safety seat with 5-point harness
 Usage Source: Vehicle inspection
 Egress from Vehicle: Removed by a passer-by
 Mode of Transport from Scene: Ambulance to hospital, transferred to a regional pediatric trauma center
 Type of Medical Treatment: Hospitalized for 22 days

Rear Right Child Injuries

Injury	Injury Severity AIS90/Update 98	Injury Source
Mild brain edema, NFS	Serious (140660.3,9)	Front right seat back
Mild brain subarachnoid hemorrhage	Serious (140684.3,9)	Front right seat back
Displaced fracture of the right proximal humerus	Serious (752604.3,1)	Front right seat back
Displaced mid-shaft femur fracture with medial displacement	Serious (851814.3,1)	Front right seat back
Occipitocervical dislocation (cranial fusion performed)	Moderate (650208.2,6)	Front right seat back

Abrasions to both axilla	Minor (790202.1,3)	CSS harness straps
Abrasion to the left side of the neck	Minor (390202.1,2)	Left CSS harness strap
Right shoulder contusion	Minor (790402.1,1)	Right CSS harness strap
Right thigh contusion	Minor (890402.1,1)	Right CSS harness strap

Source = Hospital records

Rear Right Child Kinematics

The 2-year-old male passenger was seated in a Century Breverra FFCSS and was restrained by the integrated five-point harness system. The vehicles lap and shoulder belt system was used to secure the FFCSS to the rear right position of the Pontiac. The safety belt was routed through the forward facing belt path. Although the safety belt retractor was equipped with the ALR, its unknown if this feature was engaged as the FFCSS was removed from the vehicle prior to the SCI inspection. At impact, the child initiated a forward trajectory in response to the 12 o'clock direction of force and loaded the internal harness system. The loading of the harness system resulted in the abrasions to both axilla, an abrasion to the left side of the neck, a right shoulder contusion, and the right thigh contusion.

As the child loaded the harness system, the FFCSS engaged the vehicle safety belt system. As the child continued to load the harness system, the CSS shell began to pivot in a downward motion at the belt path. The child's continued loading of the internal harness system fractured the splitter plate located on the rear of the FFCSS. The loading of the harness system resulted in the straps to partially thread through the top harness slots in the shell. As the harness strap passed through the slots, the child passenger was no longer effectively restrained and was ejected from the FFCSS. He continued his forward motion and impacted and deformed the rear aspect of the front right seat back. This interaction resulted in a mild brain edema, mild brain subarachnoid hemorrhage, displaced mid-shaft femur fracture with medial displacement, occipitocervical dislocation.

Due to the injuries, the child passenger was transported to a local hospital for treatment. Once at the hospital, he was stabilized and transferred to a regional pediatric trauma center in an adjacent state where he hospitalized for 22 days.

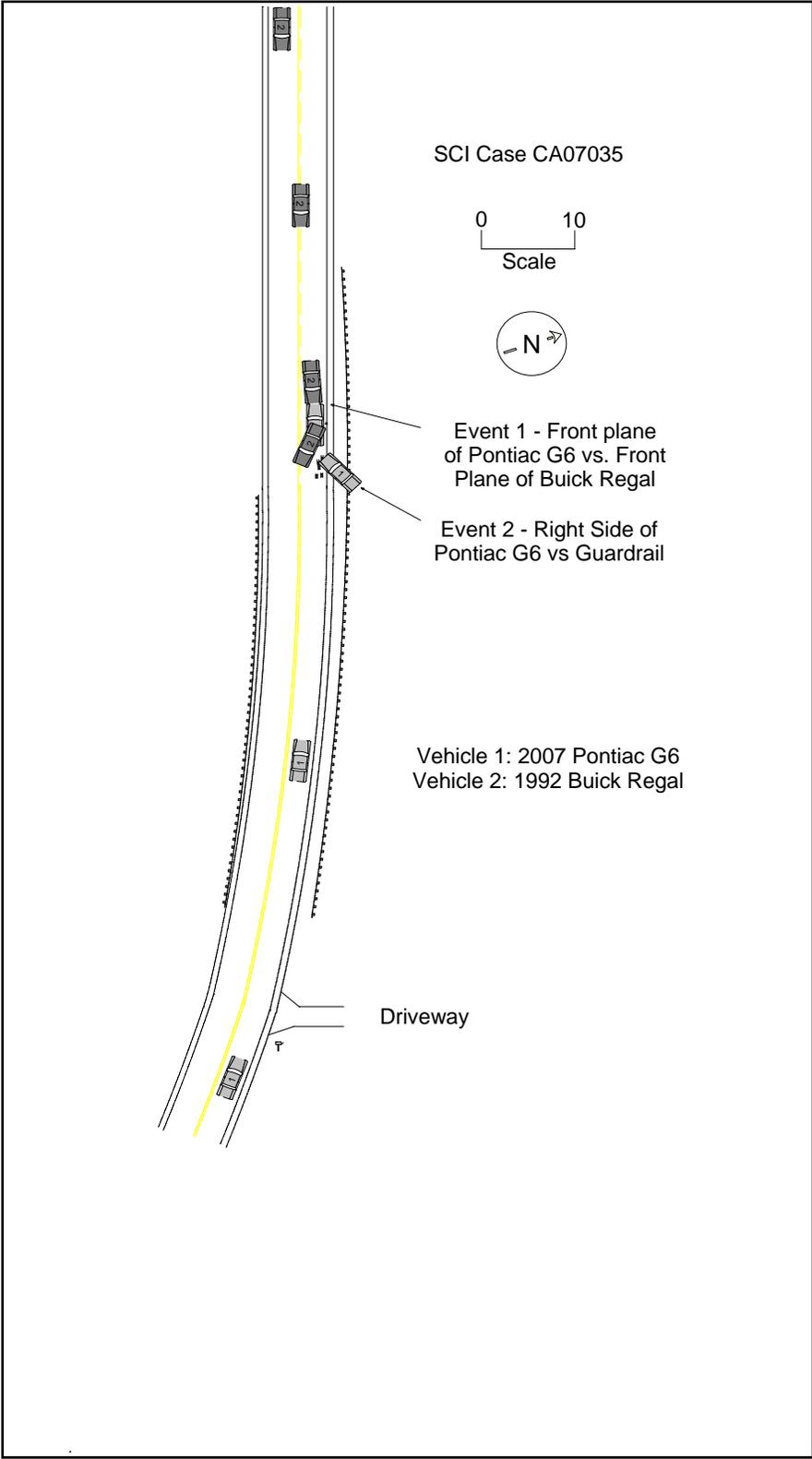


Figure 26: Scene Schematic

Attachment A: EDR Data

CDR File Information

Vehicle Identification Number	1G2ZG58N274*****
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	
Saved on	
Collected with CDR version	Crash Data Retrieval Tool 2.900
Reported with CDR version	Crash Data Retrieval Tool 2.900
Event(s) recovered	Deployment Non-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.
- 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 2005 vehicles is only available on the Cadillac STS. Also, 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-modng 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.
- Steering Wheel Angle data is displayed as a positive value, when the steering wheel is turned to the right, and a negative value, when the steering wheel is turned to the left.

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.

Multiple Event Data

Associated Events Not Recorded	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

System Status At AE

Vehicle Identification Number	**2ZG58N*7*****
Low Tire Pressure Warning Lamp (If Equipped)	OFF
Vehicle Power Mode Status	Run
Remote Start Status (If Equipped)	Inactive
Run/Crank Ignition Switch Logic Level	Active
Brake System Warning Lamp (If Equipped)	OFF

System Status At 1 second

Transmission Range (If Equipped)	Fourth Gear
Transmission Selector Position (If Equipped)	Fourth Gear
Traction Control System Active (If Equipped)	No
Service Engine Soon (Non-Emission Related) Lamp	OFF
Service Vehicle Soon Lamp	OFF
Outside Air Temperature (degrees F) (If Equipped)	50
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)	61	62	62	62	55
Engine Speed (RPM)	1728	1728	1728	1792	1408
Percent Throttle	33	33	32	27	13
Brake Switch Circuit Status	OFF	OFF	OFF	OFF	ON
Accelerator Pedal Position (percent)	24	24	21	16	0
Antilock Brake System Active (If Equipped)	No	No	No	No	No
Lateral Acceleration (feet/s ²) (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)	Invalid	Invalid	Invalid	Invalid	Invalid

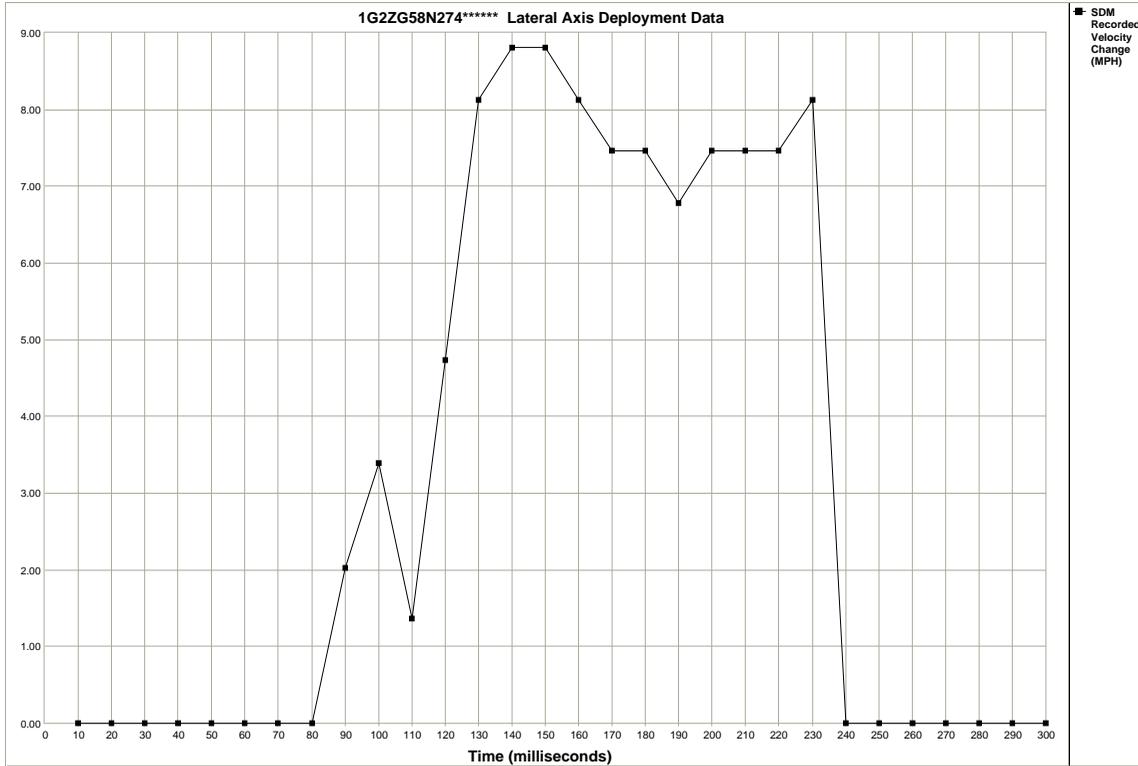
Parameter	-5 sec	-4 sec	-3 sec	-2 sec	-1 sec
Vehicle Dynamics Control Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid

System Status At Deployment

Ignition Cycles At Investigation	1948
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON/OFF Time (seconds)	655200
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	1947
Ignition Cycles At Event	1948
Ignition Cycles Since DTCs Were Last Cleared	254
Driver's Belt Switch Circuit Status	UNBUCKLED
Passenger's Belt Switch Circuit Status	BUCKLED
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 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	8
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	10
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	8
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	10
Driver Side or Roof Rail/Head Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	25
Passenger Side or Roof Rail/Head Curtain Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Time Between Events (sec)	-.36
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	Yes
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	No
Passenger 2nd Stage Deployment Loop Commanded for Disposal	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



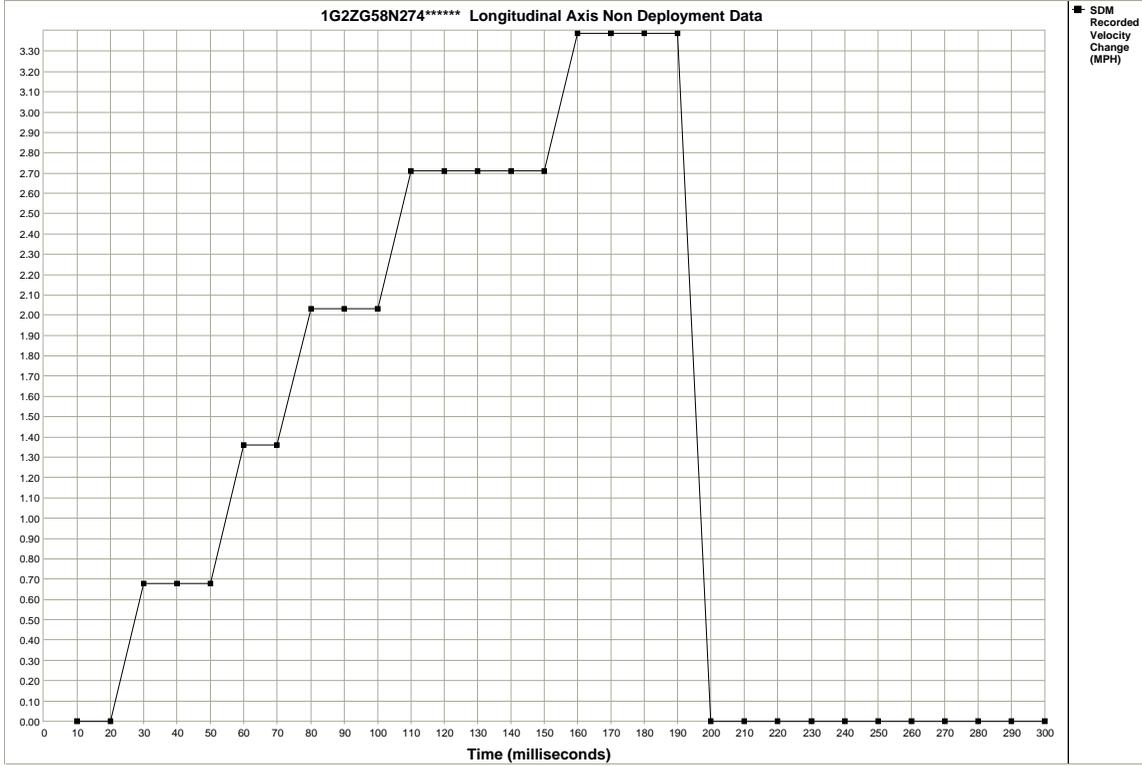
Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Longitudinal Axis Recorded Velocity	0.00	0.00	0.00	0.00	0.00	0.00	-2.03	-6.10	-17.62	-29.82	-39.31	-43.38	-46.09	-47.45	-48.80
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Longitudinal Axis Recorded Velocity	-49.48	-50.84	-51.52	-52.19	-52.19	-52.19	-52.19	-52.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00



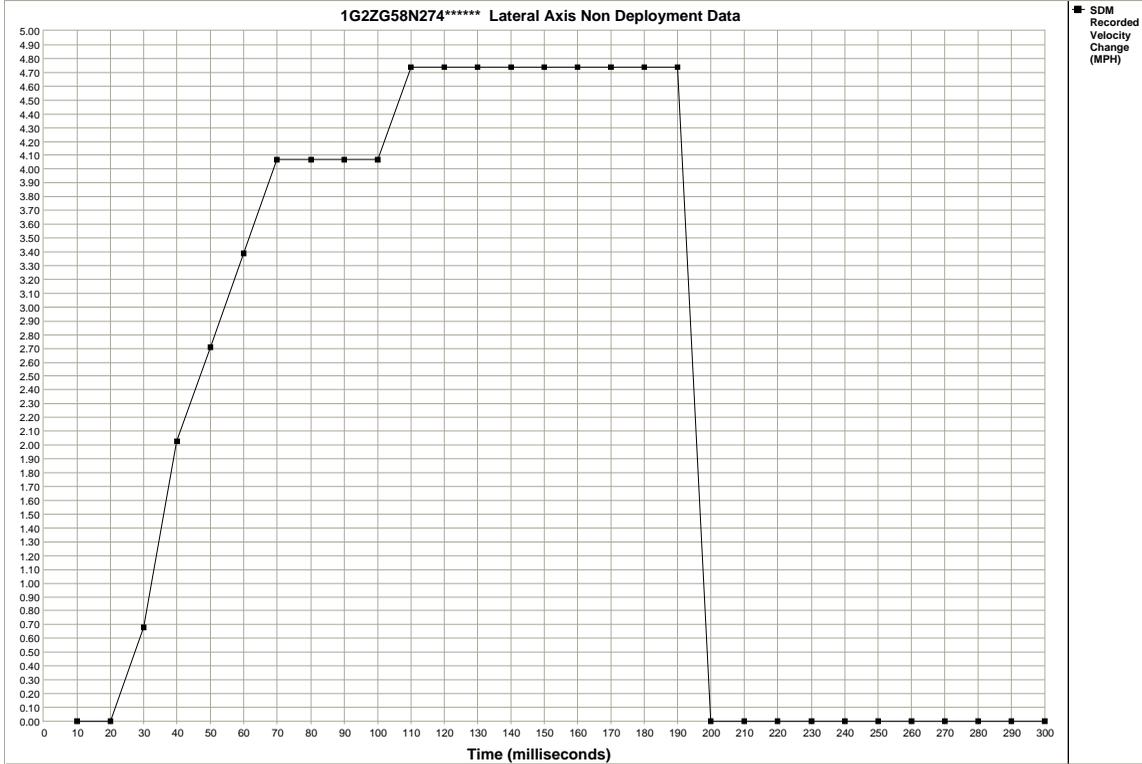
Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Lateral Axis Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.03	3.39	1.36	4.74	8.13	8.81	8.81
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Lateral Axis Recorded Velocity Change (MPH)	8.13	7.46	7.46	6.78	7.46	7.46	7.46	8.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00

System Status At Non-Deployment

Ignition Cycles At Investigation	1948
SIR Warning Lamp Status	ON
SIR Warning Lamp ON/OFF Time (seconds)	0
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	0
Ignition Cycles At Event	1948
Ignition Cycles Since DTCs Were Last Cleared	254
Driver's Belt Switch Circuit Status	UNBUCKLED
Passenger's Belt Switch Circuit Status	BUCKLED
Diagnostic Trouble Codes at Event, fault number: 1	B0052
Diagnostic Trouble Codes at Event, fault number: 2	B0086
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	Invalid
Automatic Passenger SIR Suppression System Status at AE	Air Bag Not Suppressed
Automatic Passenger SIR Suppression System Validity Status at First Deployment Command	Invalid
Automatic Passenger SIR Suppression System Status at First Deployment Command	Air Bag Not Suppressed
Maximum SDM Recorded Velocity Change (MPH)	5.58
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	160
Driver First Stage Deployment Loop Commanded	No
Driver Second Stage Deployment Loop Commanded	No
Driver Side Deployment Loop Commanded	No
Driver Pretensioner Deployment Loop Commanded	No
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	No
Passenger Second Stage Deployment Loop Commanded	No
Passenger Side Deployment Loop Commanded	No
Passenger Pretensioner Deployment Loop Commanded	No
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
Crash Record Locked	Yes
Vehicle Event Data (Pre-Crash) Associated With This Event	No
Deployment Event Recorded in the Non-Deployment Record	No
Event Recording Complete	Yes



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	0.68	0.68	0.68	1.36	1.36	2.03	2.03	2.03	2.71	2.71	2.71	2.71	2.71
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Longitudinal Axis Recorded Velocity	3.39	3.39	3.39	3.39	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	0.68	2.03	2.71	3.39	4.07	4.07	4.07	4.07	4.74	4.74	4.74	4.74	4.74
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Lateral Axis Recorded Velocity Change (MPH)	4.74	4.74	4.74	4.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hexadecimal Data

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$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 00 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 0F 0F 03 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 30 00 67 00 7A 00
$1C 3F 30 00 66 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 BE 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 00 FF F0 07 9B 00 00
$2F 00 FE 07 9C 00 00 00
$30 9D 00 00 00 00 00 00
$31 00 2A 36 3D 3C 00 00
$32 80 00 00 00 00 00 00
$33 22 45 51 55 53 00 00
$34 16 1C 1B 1B 1B 00 00
$35 58 64 63 63 62 00 00
$36 00 00 00 00 00 80 00
$37 00 00 00 04 04 00 20
$38 64 00 00 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 38 4E 00
$3E 37 13 95 37 00 00 00
$3F 00 00 90 00 00 00 00
$40 80 A5 00 00 00 00 00
$41 00 00 00 00 00 00 00
$42 80 00 00 00 00 00 00
$43 FE 07 9C 00 00 00 00
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$44 80 52 00 80 86 04 00
$45 00 00 00 00 00 00 00
$46 00 00 00 00 00 00 00
$47 00 00 00 00 01 01 00
$48 03 01 04 01 05 02 00
$49 06 02 06 03 06 03 00
$4A 06 03 07 04 07 04 00
$4B 07 04 07 04 07 04 00
$4C 07 05 07 05 07 05 00
$4D 07 05 00 00 00 00 00
$4E 00 00 00 00 00 00 00
$4F 00 00 00 00 00 00 00
$50 00 00 00 00 00 00 00
$51 70 00 00 00 00 00 00
$52 81 00 00 10 00 00 00
$53 10 00 4A 00 00 00 00
$54 00 00 00 00 00 00 00
$55 00 00 00 00 00 00 00
$67 A0 A5 00 00 00 00 00
$68 D8 D0 00 00 00 00 00
$69 00 FF F0 07 9B 00 00
$6A FE 07 9C 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 00 00 00 00 00 00 00
$70 00 FD 00 F7 03 E6 00
$71 05 D4 02 C6 07 C0 00
$72 0C BC 0D BA 0D B8 00
$73 0C B7 0B B5 0B B4 00
$74 0A B3 0B B3 0B B3 00
$75 0B B3 0C B3 00 00 00
$76 00 00 00 00 00 00 00
$77 00 00 00 00 00 00 00
$78 70 00 00 00 00 00 00
$79 01 00 00 10 00 00 00
$7A 02 00 00 00 00 00 00
$7B 04 05 04 05 14 00 F7

$01 41 55 36 34 37 32 52 36 31 38 30 33 34 4C 33 44
$02 41 05 94 61
$03 41 54 36 34 37 32 52 36 31 38 35 32 34 52 47 36
$04 41 05 94 61
$05 42 55 FF FF
$06 FF FF FF FF
$07 42 54 FF FF
$08 FF FF FF FF
$0D 41 48 36 34 37 33 52 36 31 35 39 33 47 44 53 56
$0E 01 5A 39 A4
$0F 41 4A 36 34 37 33 52 36 31 36 34 33 47 47 5A 35
$10 01 5A 39 A4
$13 42 52 39 38 32 30 44 31 36 32 32 33 36 4B 37 53
$14 16 46 3D 35
$17 42 54 FF FF
$18 FF FF FF FF
$21 32 16 B8 0B 5E 11 91 9A
$22 60 06
$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 30 00 66 00 1A
$42 D0 E4
$43 00 00 8E 80
$44 C6 00 00 FC 80 C0
```

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$45 07 01 07 01 05 01
$46 00 0F 0F 64 64
$47 0A 64 02 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 36 30 30 36 32 31 30 48 43 56 20 20 20 20
$B7 50 AA 01 0F 02
$B8 4C 54 69 09 30
$C1 30 46 30 32
$CA 30 46 30 32
$CB 00 E8 C9 C6
$CC 00 E8 C9 C6
$D1 00 00
$DB 00 00
$DC 00 00
```

Comments

SDM from a 2007 Pontiac G6

Module was removed from vehicle and downloaded at teh Lisbon Patrol Post on 11-23-07. Module obtained through consent of the vehicle owner: Jonathan S. Pelley. Consent obtained by Tpr. T.C. Jones (OSHP-Lisbon), the original investigating officer.

Module appeared in good condition at timeof download.