Advanced Occupant Protection System Investigation / Vehicle to Object
Dynamic Science, Inc. / Case Number: DS06007
2005 Chevrolet Malibu
California
February 2006

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

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

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16. Abstract

This on-site investigation focused on the performance of the Advanced Occupant Protection System (AOPS) in a 2005 Chevrolet Malibu. This single vehicle crash occurred in February 2006 during daylight hours in an urban area of California. The crash occurred just outside the confines of a four leg intersection. The case vehicle was being driven by a 28-year-old restrained female. The 2005 Chevrolet Malibu was traveling westbound approaching a four-leg intersection. Prior to entering the intersection, the driver looked down and the vehicle veered to the right. The vehicle departed the roadway and struck a wooden power pole. Both frontal air bags deployed at this point. The driver was apparently not injured. The Malibu was towed from the scene due to damage and was later declared a total loss. This case was identified within a group of potential cases provided to the NHTSA by Nationwide Insurance. Originally, it was believed that this vehicle was equipped with a Certified Advanced 208-Compliant air bag system. It was later determined that this was not the case. DSI received the spreadsheet containing the potential cases on March 7, 2006. DSI located and obtained permission to inspect the case vehicle on March 15, 2006. Field work was completed on March 16, 2006.

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Dynamic Science, Inc.
Crash Investigation
Case Number: DS06007

TABLE OF CONTENTS

BACKGROUND

This on-site investigation focused on the performance of the Advanced Occupant Protection System (AOPS) in a 2005 Chevrolet Malibu. This single vehicle crash occurred in February 2006 during daylight hours in an urban area of California. The crash occurred just outside the confines of a four leg intersection. The case vehicle was a 2005 Chevrolet Malibu four door sedan driven by a 28-year-old restrained female. The Malibu was traveling westbound approaching a four-leg intersection. Prior to entering the intersection, the driver looked down and the vehicle veered to the right. The vehicle departed the roadway and struck a wooden power pole. Both frontal air bags deployed at this point. The driver was apparently not injured. The Malibu was towed from the scene due to damage and was later declared a total loss.

Figure 1. 2005 Chevrolet Malibu

This case was identified within a group of potential cases provided to the NHTSA by Nationwide Insurance. Originally, it was believed that this vehicle was equipped with a Certified Advanced 208-Compliant air bag system. It was later determined that this was not the case. DSI received the spreadsheet containing the potential cases on March 7, 2006. DSI located and obtained permission to inspect the case vehicle on March 15, 2006. Field work was completed on March 16, 2006. Data from the electronic data recorder was downloaded using the Vetronix tool and is included as Attachment 2 to this report.

SUMMARY

Crash Site

This single vehicle crash occurred just outside of a four-leg intersection in February 2006. At the time of the crash, there were no adverse weather conditions and the asphalt roadway surface was dry. The outside temperature was 28 C (50 F) degrees according to the electronic data recorder. The westbound roadway was configured with three westbound travel lanes, two left turn lanes, and two eastbound travel lanes. The roadway was curved to the right. The northwest corner of the intersection was configured with a concrete sidewalk and 15.2 cm (6.0 in) concrete partition that parallels the roadway curb returns. There were two poles present in the corner, a metal traffic signal pole and a wooden power pole. The wooden pole was 7.9 m

Figure 2. Approach to area of impact (west)

(26 ft) west of the road edge. Traffic flow through the intersection was controlled by three-phase traffic signals. The posted speed limit for westbound travel was 72 km/h (45 mph).

Pre-Crash

The 2005 Chevrolet Malibu was traveling westbound in the far right lane and was approaching the intersection. For unknown reasons, the driver looked down just prior to entering the intersection. The vehicle veered to the right, crossed through the intersection, and departed the roadway at the northwest corner.

Crash

The front of the Chevrolet Malibu struck the wooden pole. The impact severity was moderate and resulted in the deployment of the frontal air bags and actuation of the front seat belt pretensioners. The EDR reported a maximum longitudinal velocity change of -50.17 km/h (-31.18 mph) at 210 milliseconds. The maximum lateral change was 9.8 km/h (6.1 mph) at 210 milliseconds. The barrier routine of the WinSmash program computed a total delta V of 18.0 km/h (11.2 mph). The longitudinal and lateral components were -17.7 km/h (-11.0 mph) and 3.1 km/h (1.9 mph), respectively. The results of the barrier routine are low. This is likely due to the measurement protocols which do not account for the damage down the side and the shortening of the wheelbase. As the Malibu continued forward the front right tire struck the concrete curb, causing rim damage and flattening the tire. The vehicle began a counterclockwise rotation and struck the concrete partition with the right rear tire.

Figure 3. Area of pole and curb impacts

Post-Crash

The Chevrolet Malibu came to rest in the northwest corner of the intersection. The driver was able to exit the vehicle under her own power. She did not report any injuries. The Malibu was towed from the scene due to damage and was later declared a total loss

VEHICLE DATA -2005 Chevrolet Malibu

The 2005 Chevrolet Malibu was identified by the Vehicle Identification Number (VIN): 1G1ZS52F25Fxxxxxx. The Chevrolet Malibu is a four door sedan that was equipped with a 2.2 liter four-cylinder engine, a four speed automatic transmission, adjustable foot controls, front wheel drive, front/rear disc power brakes with ABS, and a tilt/telescoping steering column.

The 2005 Chevrolet Malibu was equipped with Bridgestone P205/65R15 tires. The manufacturer recommended cold tire pressure was 303 kPa (44 psi). The specific tire information is as follows:

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	Flat	6 mm (8/32 in)	Yes	Rim cracked
LR	193 kPa (28 psi)	6 mm (7/32 in)	No	None
RR	179 kPa (26 psi)	6 mm (8/32 in)	No	Rim dented
RF	Flat	6 mm (8/32 in)	No	Rim cracked

The seating in the 2005 Chevrolet Malibu was configured with dual cloth covered bucket seats. The seats were equipped with adjustable head restraints that were not damaged. The second row was configured as a fabric covered bench seat. The rear outboard seat positions were equipped with adjustable head restraints that were not damaged.

VEHICLE DAMAGE

Exterior Damage - 2005 Chevrolet Malibu

Damage Description:	The 2005 Chevrolet Malibu sustained moderate front end damage as a result of the impact with the wooden pole. The Malibu also sustained damage to the right front tire/rim and the right rear tire as a result of the impacts with the curb. Both front tires were flattened during the crash. The left wheelbase was shortened by 16.0 cm (6.3 in). There was a small crack near the base of the windshield as result of the crash. The doors all remained closed during the crash. The front left door was opened with some effort and would not close properly after being opened.	
CDC:	Impact 1: 12FLEN2 (pole) Impact 2: 12FLWN3 (curb) Impact 3: 02RBWN2 (curb)	
Delta V:	Total	18.0 km/h (11.2 mph)
	Longitudinal	-17.7 km/h (-11.0 mph)
	Latitudinal	3.1 km/h (1.9 mph)
	Energy	18,081 joules (12,336 ft lbs)

The direct damage for the pole impact began 22.0 cm (8.7 in) from the left front bumper corner (fascia) and extended 27.0 cm (10.6 in) laterally. Six crush measurements were documented along the backing bar as follows: C1 = 34.0 cm (13.4 in), C2 = 11.0 cm (4.3 in), C3 = 5.0 cm (2.0 in), C4 = 2.0 cm (0.8 in), C5=0.0 cm (0.0 in), C6=0.0 cm (0.0 in). The measurement for C1 was averaged with the crush at the radiator support level.

Figure 4. Impact with pole

Figure 5. Right rear tire, impact with curb

Figure 6. Front right tire, impact with curb

Interior Damage - 2005 Chevrolet Malibu

The 2005 Chevrolet Malibu sustained moderate interior damage due to occupant contacts, normal air bag deployment related damage, intrusion, and a failure of the driver's seat track.

The driver's knee bolster exhibited a faint scuff on the right side that appeared to be a knee contact. There was 5.0 cm (2.0 in) of vertical intrusion below the left instrument panel from a dislodged portion of the lower instrument panel.

Figure 7. Seat movement from seat track failure

The right driver's seat track failed during the crash causing the driver's seat to rotate in a counterclockwise direction. The seat track on the left side as measured from the back of the track rail was 9.0 cm (3.5 in). The measurement on the right side was 23.0 cm (9.0 cm). The right side was 14.0 cm (5.5 in) forward of the left.

MANUAL RESTRAINT SYSTEMS - 2005 Chevrolet Malibu

The 2005 Chevrolet Malibu was configured with manual 3-point lap and shoulder belts for each of the five seating positions. Both front seat belts were equipped with buckle pretensioners and load limiters, and seatbelt height adjusters that were in the full down position. The driver's safety belt was configured with a sliding latch plate and an emergency locking retractor (ELR). The remaining seat belts were configured with sliding latch plates and switchable retractors that were in the ELR mode.

At the time of the vehicle inspection, the driver's seat belt retractor was locked in the used position as a result of pretensioner actuation. The front right passenger's seat belt retractor was locked in the stowed position.

Supplemental Restraint System - 2005 Chevrolet Malibu

The 2005 Chevrolet Malibu was equipped with an advanced occupant protection system. The system consists of the SDM, dual-level (dual stage) driver and front right passenger air bags, and driver's and front right passenger's seat belt latch usage detectors. The system is controlled by the SDM. The primary function of the SDM is to control the deployment of the occupant protection systems. The system records the vehicle's forward velocity change. For Deployment Events and Deployment Level Events, the SDM will record 230 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 Velocity Change that is needed to record a Non-Deployment Event is 8.0 km/h (5.0 mph).

A single Deployment Event was recorded by the SDM. The Deployment Event occurred as a result of the impact with the wooden pole. The Vetronix system status at deployment report indicates that:

1. SIR warning lamp status was OFF.
2. The driver's belt switch status was BUCKLED.
3. Ignition cycles at deployment 1827.
4. Ignition cycles at investigation 1827[1].
5. Maximum SDM recorded longitudinal velocity change was -50.17 km/h (-31.18 mph) at 210 milliseconds. The maximum lateral change was 9.8 km/h (6.1 mph) at 210 milliseconds.
6. Driver first stage time algorithm enabled to deployment command criteria met was 86 milliseconds.
7. Driver second stage time algorithm enabled to deployment command criteria met was 88 milliseconds.
8. Passenger first stage time algorithm enabled to deployment command criteria met was 86 milliseconds.
9. Passenger second stage time algorithm enabled to deployment command criteria met 88 milliseconds.
10. Time between non-deployment and deployment events N/A.
11. Estimated Principal Direction of Force (PDOF) degrees is 350.
12. Event recording complete YES.
13. The vehicle speed was 89 km/h (55 mph) five seconds before AE and decelerated to 72 km/h (45 mph) at 1 second before AE.
14. The brake switch status was OFF from 5 through 1 seconds before AE.
15. The steering wheel angle was -32 degrees 1 second before AE.

[1]See page 4 of Vetronix report in Attachment 1.

The driver's air bag deployed from the center of the steering wheel hub through symmetrical I-configuration module cover flaps. Each flap measured 7.5 cm (2.9 in) in height and 13.5 cm (5.3 in) in width. The deployed driver's air bag measured 62.0 cm (24.4 in) in its deflated state. The air bag was tethered by a single internal strap. A single circular vent port was located at the 12 o'clock aspect on the rear of the air bag. There were no indication of occupant contact or damage to either the air bag or the module covers.

Figure 8. Driver's air bag

The front right passenger's air bag deployed from a front mount module with asymmetrical H-configuration module cover flaps. The top flap measured 30.0 cm (11.8 in) wide by 8.5 cm (3.3 in) high. The bottom flap measured 30.0 cm (11.8 in) wide by 5.0 cm (1.9 in) high. The deployed front right passenger's air bag measured 51.0 cm (20.0 in) wide seam to seam and was 56.0 cm (22.0 in) high. To the left of air bag itself was a separate panel made of the same material as the air bag. The panel measured 58.0 cm (22.8 in) high by 38.0 cm (14.9 in) wide. The air bag was tethered by a single internal strap. Two circular vent ports were located at the 9 and 3 o'clock aspects of each side panel of the air bag.

Figure 9. Front right passenger's air bag

OCCUPANT DEMOGRAPHICS - 2005 Chevrolet Malibu

	Driver
Age/Sex:	28/Female
Seated Position:	Front left
Seat Type:	Fabric covered bucket seat, seat adjusted to between forward and middle track position
Height:	160 cm (63 in)
Weight:	59 kg (130 lbs)
Occupation:	Unknown
Pre-existing Medical Condition:	None noted
Alcohol/Drug Involvement:	None
Driving Experience:	>10 years
Body Posture:	Normal, upright
Hand Position:	Both hands on steering wheel, unknown clock direction
Foot Position:	Right foot on brake
Restraint Usage:	3-point manual lap and shoulder belt available, used
Air bag:	Driver's air bag available, deployed

OCCUPANT INJURIES -2005 Chevrolet Malibu

Driver: Not injured.

OCCUPANT KINEMATICS - 2005 Chevrolet Malibu

The female driver of the case vehicle was seated in an upright posture in the cloth covered bucket seat and was restrained by the 3-point manual lap and shoulder belt. The shoulder belt anchorage was in the full down position. The seat track was adjusted to between the forward most and mid track position. The seat back was at a 75 degree angle, and the seat bottom was at a 10 degree angle. At impact with the pole, the frontal air bags deployed and the safety belt pretensioners actuated. The driver initiated a forward trajectory. She loaded the tensioned safety belt and likely engaged the deployed driver's air bag. The seat track on the right side failed and the driver's seat rotated slightly in a counterclockwise direction. The impact to the curb with the front right tire likely did not cause much driver movement. As the vehicle was penetrated by the pole the vehicle began a counterclockwise rotation. The driver pitched slightly to the right both due to rotation and the minor right side contact of the right rear tire to the curb. The driver came to rest in her seat. She was able to exit the vehicle under her own power. There were no reported injuries.

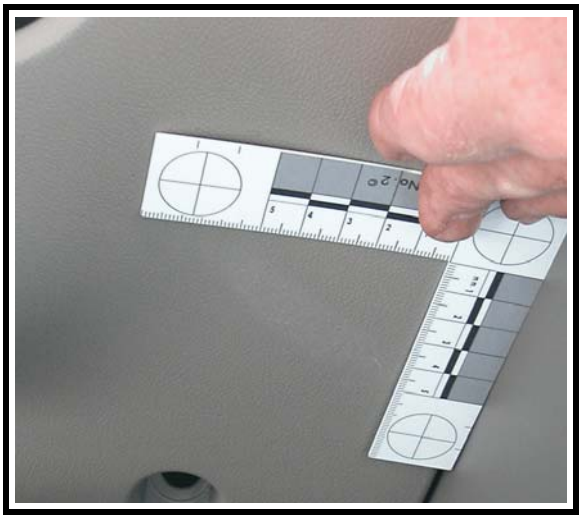
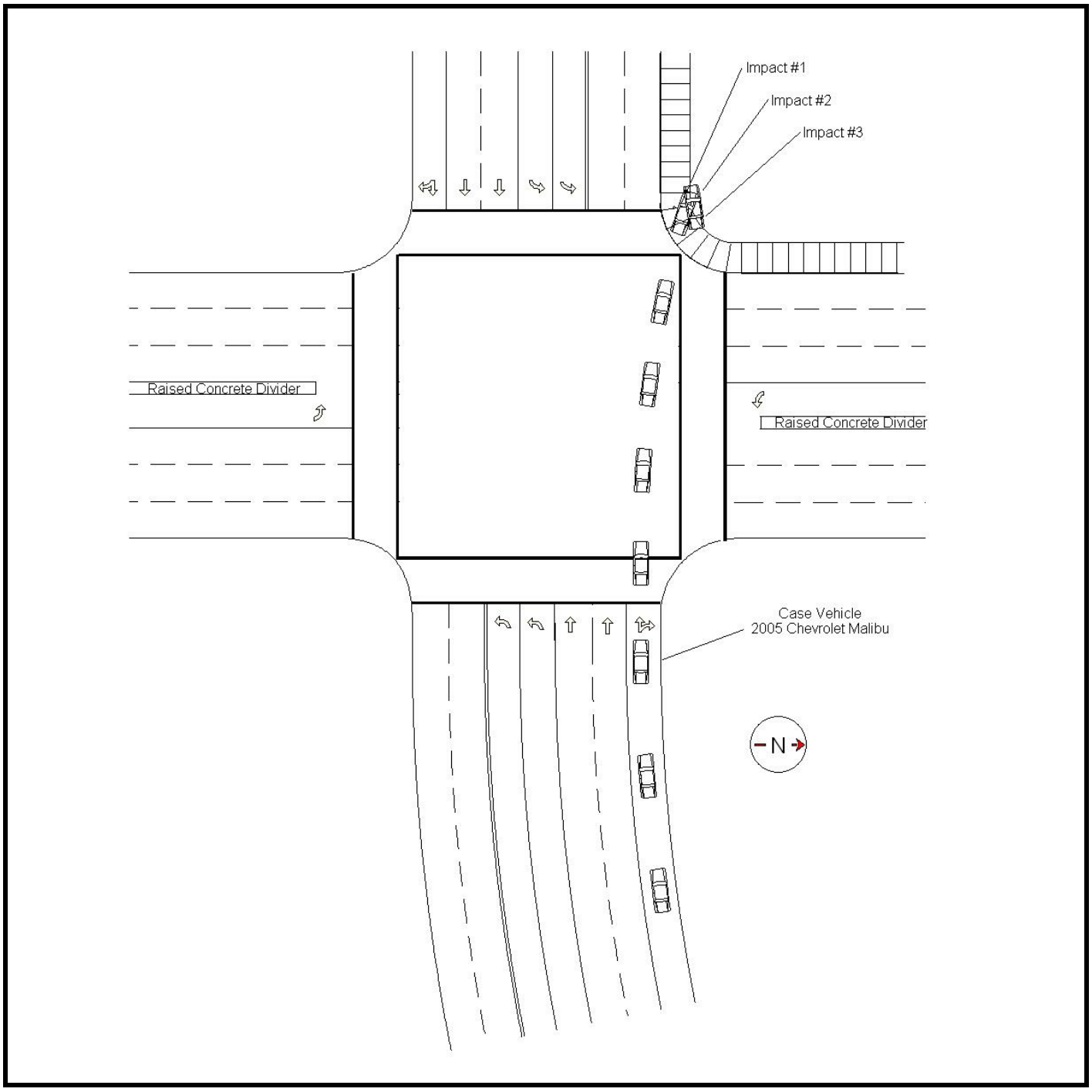


Figure 10. Right knee contact to lower instrument panel

Attachment 1. Scene Diagram



Attachment 2. Vetronix Report

Vetronix

CDR CRASH DATA RETRIEVAL SYSTEM

CDR File Information

Vehicle Identification Number	1G1ZS52F25F
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	
Saved on	Thursday, March 16 2006 at 10:43:26 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-moding messages, on the GMLAN communication bus, to increment the counter. Applying and removing of battery power to the module will not increment the ignition 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.

Vetronix CDR CRASH DATA RETRIEVAL SYSTEM

System Status At AE

Vehicle Identification Number	**1ZS52F*5*;
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)	Fourth Gear
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)	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)	55	53	52	48	45
Engine Speed (RPM)	1728	1600	1536	1472	1344
Percent Throttle	8	9	8	8	8
Accelerator Pedal Position (percent)	0	0	0	0	0
Antilock Brake System Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid
Lateral Acceleration (feet/s²)(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)	0	-16	-16	-16	-32
Vehicle Dynamics Control Active (If Equipped)	Invalid	Invalid	Invalid	Invalid	Invalid

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CDR CRASH DATA RETRIEVAL SYSTEM

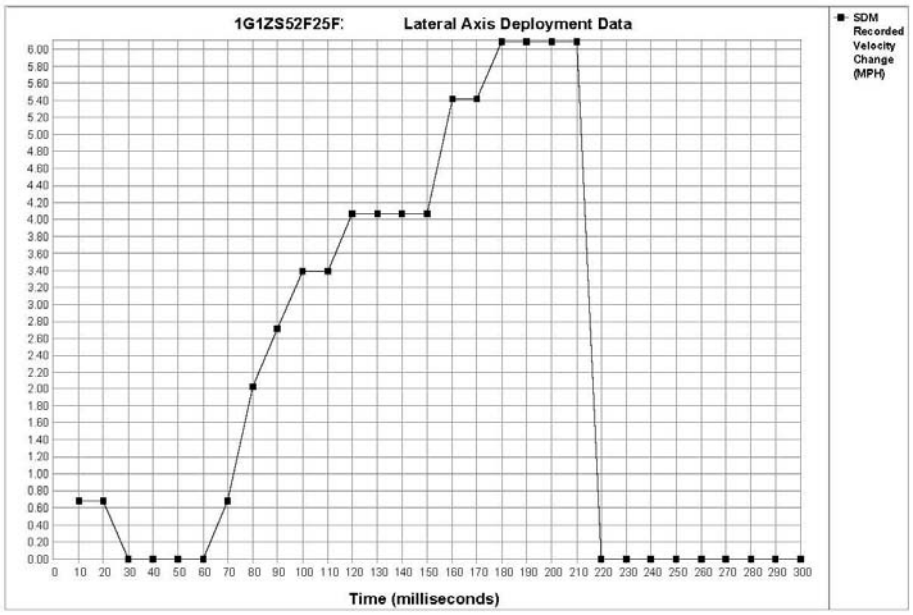
System Status At Deployment

Ignition Cycles At Investigation	1827
SIR Warning Lamp Status	OFF
SIR Warning Lamp ON/OFF Time (seconds)	655200
Number of Ignition Cycles SIR Warning Lamp was ON/OFF Continuously	1733
Ignition Cycles At Event	1827
Ignition Cycles Since DTCs Were Last Cleared	254
Driver'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
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	86
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	88
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	86
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	88
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	No
Passenger 2nd Stage Deployment Loop Commanded for Disposal	No
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	350

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Longitudinal Axis Recorded Velocity	-0.68	0.00	0.00	0.00	-1.36	-2.71	-2.71	-4.07	-5.42	-8.13	-8.81	-12.88	-16.95	-20.34	-23.72
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Longitudinal Axis Recorded Velocity	-27.11	-29.15	-30.50	-30.50	-30.50	-31.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vetronix

CDR CRASH DATA RETRIEVAL SYSTEM



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Lateral Axis Recorded Velocity Change (MPH)	0.68	0.68	0.00	0.00	0.00	0.00	0.68	2.03	2.71	3.39	3.39	4.07	4.07	4.07	4.07
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Lateral Axis Recorded Velocity Change (MPH)	5.42	5.42	6.10	6.10	6.10	6.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Vetronix

CDR CRASH DATA RETRIEVAL SYSTEM

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	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	05	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	30	00	67	00	7A	00
$1C	3F	00	00	06	00	18	00
$1D	00	00	00	00	00	00	00
$1E	00	00	00	00	00	00	00
$1F	20	00	00	00	00	00	00
$20	40	00	00	00	00	00	00
$21	00	00	00	00	F0	00	00
$22	00	A1	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	06	C4	00	00
$2F	00	FE	07	23	00	00	00
$30	9D	00	00	00	00	00	00
$31	00	00	00	00	00	00	00
$32	00	00	00	00	00	00	00
$33	15	15	15	16	14	00	00
$34	15	17	18	19	1B	00	00
$35	48	4E	53	56	58	00	00
$36	FE	FF	FF	FF	00	00	00
$37	00	00	00	04	0B	00	E2
$38	64	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	31	5A	53	35	32	46	00
$3E	35	26	60	52	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

Vetronix CDR CRASH DATA RETRIEVAL SYSTEM

Vetronix CDR CRASH DATA RETRIEVAL SYSTEM

```
$44  C6 00 00 FC C0 C0
$45  07 01 07 01 05 01
$46  00 0F 0F 64 64
$47  0A 64 06 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 37 32 37 38 32 33 32 41 52 46 20 20 20 20
$B7  50 AA 01 0F 01
$B8  54 41 68 02 11
$C1  30 46 30 31
$CA  30 46 30 31
$CB  01 5A CA 6E
$CC  01 5A CA 6E
$D1  00 00
$DB  00 00
$DC  00 00
```