TRANSPORTATION SCIENCES
CRASH DATA RESEARCH CENTER

Advanced Information Engineering Services
A General Dynamics Company
Buffalo, NY 14225

GENERAL DYNAMICS ON-SITE SIDE IMPACT INFLATABLE OCCUPANT PROTECTION INVESTIGATION

SCI CASE NO. – CA04-010

SUBJECT VEHICLE – 2003 FORD EXPLORER

LOCATION – STATE OF NEW YORK

CRASH DATE – MARCH 2004

Contract No. DTNH22-01-C-17002

Prepared for:

U.S. Department of Transportation
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Washington, D.C. 20590

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

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

TECHNICAL REPORT STANDARD TITLE PAGE

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16. Abstract This on-site investigation focused on the severity of the crash and the performance of the safety canopy occupant protection system in a 2003 Ford Explorer sport utility vehicle. The system consisted of safety canopy air bags that deployed from the roof side rails. The system was designed to deploy in a side impact or rollover crash. In addition, the Ford was also equipped with dual stage frontal air bags that did not deploy in this crash, power adjustable pedals, front safety belt pretensioners, and a Restraints Control Module (RCM) that had event data recording capabilities. The RCM was retrieved from the vehicle and was forward to NHTSA for download by Ford. The RCM output is summarized in the RCM section of this report. The Ford was occupied by a restrained 45-year-old female driver. The Ford was involved in an intersection crash with a 2001 Chevrolet Express cargo van and a 1996 Dodge Grand Caravan. The Ford rolled over subsequent to the right side impact with the Chevrolet. As a result of the crash, the left and right side safety canopy air bags deployed and the driver's safety belt pretensioner fired in the Ford. Also, the frontal air bags deployed in the Chevrolet. The Chevrolet was also equipped with an Event Data Recorder (EDR) that was downloaded (Deployment and Deployment Level events) during the SCI inspection and is included as **Attachment A** of this report. The driver of the Ford reported complaints of pain to the investigating police officer and was transported to a local hospital. The medical report indicated that the driver was "shaken up" as a result of the crash. She was evaluated at the hospital where no injuries were identified and was subsequently released. The driver of the Chevrolet was also transported to a local hospital for complaints of pain; he was treated and released. The driver of the Dodge was not injured or transported. The Ford and the Chevrolet sustained minor severity damage and were towed from the crash site. The Dodge sustained minor damage and was not towed.			
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BACKGROUND

This on-site investigation focused on the severity of the crash and the performance of the safety canopy occupant protection system in a 2003 Ford Explorer sport utility vehicle **(Figure 1)**. The system consisted of safety canopy air bags that deployed from the roof side rails. The system was designed to deploy in a side impact or rollover crash. In addition, the Ford was also equipped with dual stage frontal air bags that did not deploy in this crash, power adjustable pedals, front safety belt pretensioners, and a Restraints Control Module (RCM) that had event data recording capabilities. The RCM was retrieved from the vehicle and was forward to NHTSA for download by Ford. The RCM output is summarized in the RCM section of this report. The Ford was occupied by a restrained 45-year-old female driver. The Ford was involved in an intersection crash with a 2001 Chevrolet Express cargo van and a 1996 Dodge Grand Caravan. The Ford rolled over subsequent to the right side impact with the Chevrolet. As a result of the crash, the left and right side safety canopy air bags deployed and the driver's safety belt pretensioner fired in the Ford. Also, the frontal air bags deployed in the Chevrolet. The Chevrolet was also equipped with an Event Data Recorder (EDR) that was downloaded (Deployment and Deployment Level events) during the SCI inspection and is included as **Attachment A** of this report. The driver of the Ford reported complaints of pain to the investigating police officer and was transported to a local hospital. The medical report indicated that the driver was "shaken up" as a result of the crash. She was evaluated at the hospital where no injuries were identified and was subsequently released. The driver of the Chevrolet was also transported to a local hospital for complaints of pain; he was treated and released. The driver of the Dodge was not injured or transported. The Ford and the Chevrolet sustained minor severity damage and were towed from the crash site. The Dodge sustained minor damage and was not towed.

Figure 1. Subject 2003 Ford Explorer.

Notification of this crash was provided to the SCI team by the investigating police officer. The notification was forwarded to the Crash Investigation Division of the National Highway Traffic Safety Administration (NHSTA) and the crash was assigned as an on-site investigative effort due to the deployment of the safety canopy air bag system in the 2003 Ford Explorer. The vehicles were located at a local tow yard and were inspected in March 2004. The driver of the Explorer refused an interview following numerous attempts by the SCI investigator.

SUMMARY

Crash Site

This intersection crash occurred during the morning hours of March 2004. At the time of the crash, the weather was clear with no adverse conditions. The crash occurred at a four-leg intersection of two local roadways **(Figure 2)**. The north/southbound roadway was configured with two travel lanes in each direction and a designated left turn lane. A double-yellow centerline and appropriate lane lines delineated the north/south roadway. The east/westbound roadway was configured with two travel lanes in each direction and a designated left turn lane. The east/west roadway was separated by a double-yellow centerline and had a slight uphill grade for eastbound travel. The four-leg roadway was bordered with mountable concrete curbs. Traffic through the intersection was controlled by overhead three-phase traffic signals. The posted speed limit for the north/south roadway was 48 km/h (30 mph). The posted speed limit for the east/west roadway was 56 km/h (35 mph). The scene schematic is included as **(Figure 18)** of this report.

Figure 2. Northeast view of the intersection.

Vehicle Data– 2003 Ford Explorer XLT

The 2003 Ford Explorer was identified by the Vehicle Identification Number (VIN): 1FMDU73KX3 (production sequence omitted). The odometer reading at the time of the inspection was 23,959 km/h (14,888 miles). The Explorer was a full-size, four-door sport utility vehicle that was equipped with a 4.0-liter, V6 flex-fuel engine, 5-speed automatic transmission, 4-wheel drive, power-front and rear disc brakes with anti-lock, OEM alloy wheels, power-steering, and a tilt steering wheel that was adjusted 1.3 cm (0.5") below the full-up position. The Ford was also equipped with power adjustable pedals that were adjusted to 1.3 cm (0.5") forward of the full-rear position in relation to the vehicle at the time of the SCI inspection. The Ford was configured with BF Goodrich tires, size P245/65R17. The maximum pressure for these tires was 303.4 kPa (44.0 PSI). The manufacturer recommended front tire pressure was 206.8 kPa (30.0 PSI) and the rear was 241.3 kPa (35.0 PSI). The specific tire data was as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	179.3 kPa (26.0 PSI)	8 mm (10/32)	No	None
LR	203.4 kPa (29.5 PSI)	8 mm (10/32)	No	None
RF	189.6 kPa (27.5 PSI)	8 mm (10/32)	No	None
RR	206.8 kPa (30.0 PSI)	7 mm (9/32)	No	None

The seating positions in the Ford were configured with front bucket seats with height adjustable head restraints. The front seat head restraints were both adjusted to the full-down positions at the time of the vehicle inspection. The second row seats were configured with a three-passenger

bench seat and height adjustable head restraints that were adjusted to the full-down positions. The third row seat was configured with a two-passenger bench seat with height adjustable head restraints. The left head restraint was adjusted 6.4 cm (2.5") above the full-down position and the right head restraint was removed.

2001 Chevrolet Express Cargo Van

The 2001 Chevrolet Express was identified by the VIN: 1GCFG25M51 (production sequence omitted). The odometer reading at the time of the inspection was 181,346 km/h (112,686 miles). The Chevrolet was a full-size cargo van that was equipped with a 5.0 liter, V8 engine linked to a four-speed automatic transmission, rear-wheel drive, and four-wheel ABS. The Chevrolet was manufactured as a cargo vehicle; therefore it was configured with front box mounted van seats and no rear seating area. The passenger compartment was divided from the cargo area by a steel cage. The manufacturer of the cage was Neuton. The cargo area contained numerous boxes of candy and toys for vending machines. The estimated cargo weight including the steel cage was approximately 450 kgs (1,000 lbs).

1996 Dodge Grand Caravan

The 1996 Dodge Grand Caravan was identified by the VIN: 2B4GP238TR (production sequence omitted). The Dodge was a minivan that was equipped with a 3.0 liter, V6 engine linked to a four-speed automatic transmission, and front-wheel drive. The seating positions in the Dodge were configured with front box mounted seats. The second row was configured with a two-passenger bench seat and the third row was configured with a three-passenger bench seat.

Crash Sequence

Pre-Crash

The restrained 45-year-old female driver of the Ford was operating the vehicle westbound **(Figure 3)** on the outboard lane, approaching the four-leg intersection. The 47-year-old male driver of the Chevrolet was traveling southbound **(Figure 4)** on the inboard lane approaching the intersection. The 62-year-old female driver of the Dodge was stopped in the left though lane at the intersection facing an easterly direction. The traffic signal was in the red phase for east/westbound travel and green for the north/southbound travel. The driver of the Ford failed to stop for the red traffic signal and entered the intersection crossing the path of the Chevrolet, which had a green signal phase.

Figure 3. Ford's westbound approach to the intersection.

Figure 4. Chevrolet's southbound approach to the intersection.

Crash

The frontal aspect of the Chevrolet impacted the right passenger compartment area of the Ford in the intersection **(Figure 5)**. The resultant directions of force were with the 11 o'clock sector for the Chevrolet and the 2 o'clock sector for the Ford. The WINSMASH program was used to compute a delta-V for this crash. The total calculated delta-V for the Ford was 18.0 km/h (11.2 mph). The longitudinal and lateral components for the Ford were -9.0 km/h (-5.6 mph) and -15.6 km/h (-9.7 mph), respectively. The total calculated delta-V for the Chevrolet was 16.0 km/h (9.9 mph). The longitudinal and lateral components for the Chevrolet were -15.0 km/h (-9.3 mph) and 5.8 km/h (3.4 mph), respectively. The frontal air bags deployed in the Chevrolet as a result of the crash. The Chevrolet was equipped with an Event Data Recorder (EDR) that was downloaded at the time of the SCI inspection. The data contained two files, Deployment and Deployment Level events. Both events yielded a maximum-recorded delta-V of -5.1 km/h (-3.18) mph at 52.5 milliseconds from Algorithm Enable.

Figure 5. Area of impact between the Ford and Chevrolet from westbound approach.

The Ford was deflected laterally left and initiated a clockwise yaw as its center of gravity continued in a southwesterly direction. A left rear tire scuffmark that measured 5.7 m (18.7') evidenced the vehicle's trajectory. The lateral forces exerted on the left side tires in combination with the vehicle's high center of gravity resulted in a un-tripped turn-over as the Ford rolled one-quarter turn onto its left side **(Figure 6)**. The Ford's RCM measured the roll rate at 75.4 degrees per second and at an rollover angle of 42.7 degrees, the safety canopy system deployed 20 milliseconds following algorithm wake-up. The Explorer slid on its left side across the eastbound travel lanes. In this attitude, the roof of the Explorer contacted the upper surface of the left front fender of the Dodge Caravan **(Figure 7)**. This impact resulted in minor damage to the Caravan and no discernable damage was evident on the Explorer.

Figure 6. Area of rollover.

Figure 7. Area of impact between the Ford and the Dodge.

Post-Crash

The driver of the Ford reported complaints of pain to the investigating police officer and was transported by ambulance to a local hospital. The medical records for the driver indicated that she exited the vehicle through the rear hatch area and was "shaken up" as a result of the crash. She was evaluated at the hospital where no injuries were identified and was subsequently released. The driver of the Chevrolet reported complaints of pain as a result of the crash and was transported to a local hospital where he was treated and released. The driver of the Dodge was not injured or transported. The Ford and Chevrolet sustained minor damage and were towed from the crash site. The Dodge sustained minor damage and was driven from the scene.

Vehicle Damage

Exterior Damage – 2003 Ford Explorer

The 2003 Ford Explorer sustained minor damage as a result of the impact with the Chevrolet **(Figure 8)**. The direct contact damage for the initial impact with the Chevrolet measured 155.5 cm (61.25") in length and began 9.6 cm (3.8") forward of the rear edge of the right front door extending rearward. The damage consisted of lateral displacement of the right front door, right rear door and right rear fender. Maximum crush was located 44.7 cm (18.0") aft of the rear edge of the front right door and measured 10.2 cm (4.0"). Six crush measurements were documented at the mid-door level using a combined direct and induced damage width of 213.4 cm (84.0") and were as follows: C1 = 0, C2 = 1.3 cm (0.5"), C3 = 7.7 cm (3.1"), C4 = 1.3 cm (0.5"), C5 = 1.9 cm (0.8"), C6 = 0. The Collision Deformation Classification (CDC) for this impact was 02-RZEW-1.

Figure 8. Damage from the impact with the Chevrolet.

The Ford sustained minor damage as a result of the rollover event. The damage consisted of superficial abrasions to the left plane **(Figure 9)**. The abrasive damage was isolated to the side sheet metal and did not involve the greenhouse area of the Ford. The direct damage measured 391.8 cm (154.25") and began 88.9 cm (35.0") forward of the forward edge of the front left door and extended rearward. The CDC for this impact was 00-LDEO-1.

Figure 9. Rollover damage to the left side of the Ford.

Figure 10. Rear roof aspect of the Explorer. Note no damage from the impact with the Dodge.

There was no residual damage from the impact with the Dodge **(Figure 10)**. Based on the final rest positions of both vehicles, the impact area would have involved the rear aspect of the roof of the Ford. The CDC for this impact was 00-TBYU-1.

The Ford's glazing remained intact and all doors remained closed during the crash and operational post-crash.

2001 Chevrolet Express Cargo Van

The 2001 Chevrolet Express sustained minor damage as a result of the impact with the Ford **(Figure 11)**. The direct damage measured 134.4 cm (52.9") and began 83.1 cm (32.75") left of the centerline and extended to 51.3 cm (21.2") right of the centerline. The damage involved the bumper, grille, and hood. Six crush measurements were documented along the front bumper using a combined direct and induced damage with of 185.4 cm (73.0") and were as follows: C1 = 15.0 cm (5.9"), C2 = 16.5 cm (6.5"), C3 = 13.2 cm (5.2"), C4 = 13.9 cm (5.5"), C5 = 12.1 cm (4.8"), C6 = 11.0 cm (4.3"). The CDC for the impact with the Ford was 11-FDEW-1.

Figure 11. Damaged 2001 Chevrolet Express cargo van.

1996 Dodge Grand Caravan

The 1996 Dodge Grand Caravan sustained minor damage as a result of the impact with the Ford **(Figures 12 and 13)**. The damage consisted of a dent and a lateral black scuffmark on the front left fender. The direct damage measured 25.0 cm (9.8") and began 18.0 cm (7.1") forward of the left front axle. No crush measurements were documented for this impact. The CDC for this impact was 09-LFMN-1.

Figure 12. 1996 Dodge Grand Caravan.

Figure 13. Damage sustained from the impact with the Ford.

Interior Damage –2003 Ford Explorer

The 2003 Ford Explorer sustained minor interior damage that was related to intrusion of the passenger compartment. The right rear sill intruded 2.5 cm (1.0") laterally into the right rear

occupant space. No occupant contact points were present in the vehicle. During the crash, a drink cup spilled and loose candy was scattered in the front occupant positions.

Safety Canopy Air Bag System – 2003 Ford Explorer

The 2003 Ford Explorer was equipped with safety canopy air bags for the left and right outboard seating positions. The system consisted of curtain-type air bags that deployed from the roof side rails. The canopy air bags were designed to deploy in the event of a side impact or rollover crash. The air bags were designed to remain inflated for a period of six seconds following deployment. In the subject crash, the left and right canopy air bags deployed **(Figures 14 and 15)** simultaneously and the driver's safety belt pretensioner fired as result of the rollover event. The left and right canopy air bags were rectangular in shape and measured 40.6 cm (16.0") vertically from the roof side rail and 147.3 cm (58.0") in length. The air bags were tethered at the A- and C-pillars. The tethers were a rope-type tether and measured 43.2 cm (17.0") in length at the A-pillar and 7.6 cm (3.0") in length at the C-pillar. No occupant contacts were noted to the canopy air bags; however, the left canopy air bag contained spilled coffee and candy residue. Also present on the left air bag were dirt marks from post-crash handling by tow personnel.

Figure 14. Deployed left side safety canopy air bag.

Figure 15. Deployed right side safety canopy air bag.

Frontal Air Bags - 2003 Ford Explorer

The 2003 Ford Explorer was equipped with dual-stage frontal air bags that did not deploy in this crash **(Figure 16)**. The driver's frontal air bag was located in the center of the steering wheel hub. The front right air bag was mid-mounted on the front right instrument panel.

Figure 16. Ford's instrument panel, no frontal air bag deployment.

Restraints Control Module – 2003 Ford Explorer

The 2003 Ford Explorer was equipped with a Restraints Control Module (RCM) that had event data recording capabilities. The RCM was removed by the body shop with permission from the insurance company. The SCI investigator forwarded the RCM to NHTSA for download by Ford. The RCM data indicated that the driver's pretensioner fired during the deployment of the canopy air bags. The front right pretensioner did not fire due to the safety belt unbuckled status. The data also indicated that the safety canopy air bags deployed 20.0 milliseconds after Algorithm Enable (AE) initiated. The recorded roll angle was 42.7 degrees at deployment and the roll rate was 75.4 degrees per second. The maximum accumulated roll angle was 96.3 degrees, which correlated with the reconstructed one-quarter-turn rollover of the SCI investigator. The lateral change in velocity at the deployment time was a calculated 0.31 meters per second (1.1 km/h). This calculation was based on the measured lateral acceleration within the RCM.

Manual Restraints Systems – 2003 Ford Explorer

The 2003 Ford Explorer was equipped with manual 3-point lap and shoulder safety belts for all seven seating positions. The second row center seat was an integrated lap and shoulder safety belt. The driver's safety belt was configured with a sliding latch plate, Emergency Locking Retractor (ELR), buckle mounted pretensioner which fired during the crash, and a height adjustable D-ring that was adjusted to the full-up position. Historical usage evidence was noted to the latch plate, which consisted of minor scratches. The investigating police officer noted that the driver utilized the safety belt in this crash **(Figure 17)**, however, no crash related evidence (e.g. stretching, transfers etc.) were present on the safety belt. The front right safety belt was configured with a sliding latch plate, a switchable ELR/Automatic Locking Retractor (ALR), buckle mounted pretensioner that did not fire, and an adjustable D-ring that was adjusted to the mid position. The second row outboard safety belts were configured with sliding latch plates, switchable ELR/Automatic Locking Retractors (ALR), and height adjustable D-rings that were adjusted to the full-down position. The second row center safety belt was configured with a sliding latch plate and switchable ELR/Automatic Locking Retractor (ALR). The third row safety belts were configured with sliding latch plates and switchable ELR/Automatic Locking Retractors.

Figure 17. Driver's safety belt.

Event Data Recorder – 2001 Chevrolet Express

The 2001 Chevrolet Express was equipped with an Event Data Recorder (EDR). The EDR was downloaded during the SCI inspection and the printout is included as **Attachment A** of this report. The downloaded data consisted of two events, a Deployment and Deployment Level event. The maximum-recorded delta-V for both events was -5.1 km/h (-3.18 mph) at 52.5 milliseconds from Algorithm Enable. The EDR also indicated that the driver's safety belt was not buckled at the time of the crash and the passenger air bag was not suppressed. Although the EDR recorded Deployment and Deployment Level events, the recorded data was the same which

possibly suggested that the EDR recorded the same event twice. Furthermore, the vehicle sustained only one impact during this crash.

Occupant Demographics – 2003 Ford Explorer

Driver

Age/Sex:	45-year-old/Female
Height:	168.0 cm (66.0”)
Weight:	59.0 kgs (130.0 lbs)
Seat Track Position:	Rear third track position. [Total track travel was 24.4 cm (9.6”).]
Manual Restraint Use:	Manual 3-point lap and shoulder belt
Usage Source:	Vehicle inspection / Police Report
Eyewear:	Unknown
Type of Medical Treatment:	Transported by ambulance to a local hospital where she was evaluated for possible injury and released.

Injury	Injury Severity (AIS 90/Update 98)	Injury Mechanism
Not injured	N/A	N/A

Driver Kinematics

The 45-year-old female driver of the 2003 Ford Explorer was seated in a presumed upright posture with the seat track adjusted to a rear third track position. The driver of the Explorer was restrained by the 3-point lap and shoulder belt system. There was no loading evidence to verify restraint usage in this minor severity crash. At impact with the Chevrolet, she initiated a forward and lateral trajectory to the right and loaded the belt system. The Ford was deflected to its left and began a clockwise yaw and overturned onto its left side. As a result of the rollover, the canopy air bags deployed and the driver’s safety belt pretensioner fired. The driver was redirected to her left in response to the rollover. The driver’s torso loaded the left door panel and her head contacted the deployed left canopy air bag. The driver reported complaints of pain to the investigating police officer and was transported to a local hospital. The medical reported indicated that the driver was “shaken up” as a result of the crash and she exited the vehicle through the rear hatch area. She was evaluated at the hospital where no injuries were identified and was subsequently released. The safety belt usage and the deployment of the safety canopy air bags protected the driver from potential injury.

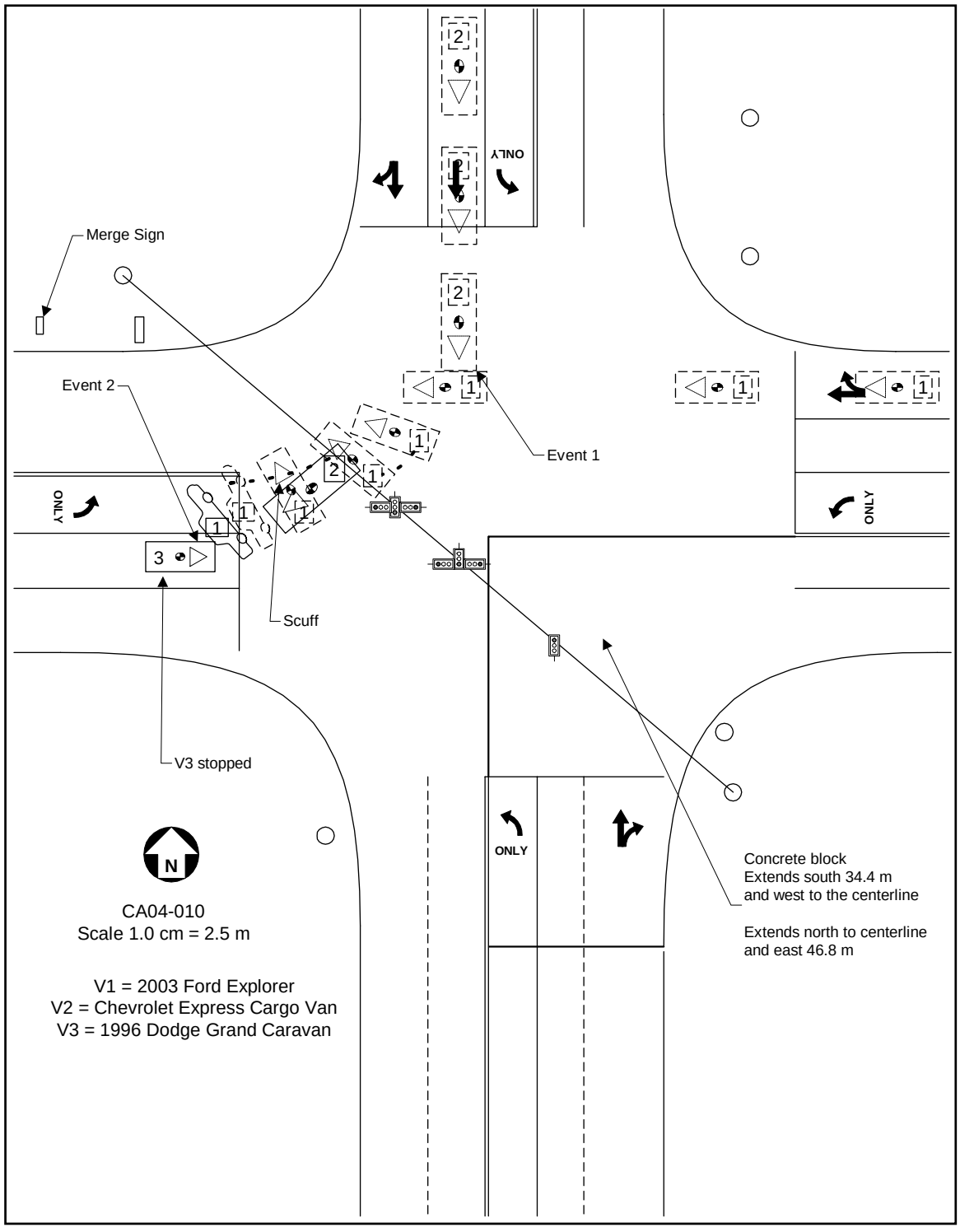


Figure 18. Scene schematic

Attachment A: Chevrolet's EDR Printout

CDR File Information

Vehicle Identification Number	1GCFG25M511xxxxxx
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	
Saved on	
Data check information	31641DFB
Collected with CDR version	Crash Data Retrieval Tool 2.10
Collecting program verification number	B6B4FDF8
Reported with CDR version	Crash Data Retrieval Tool 2.70
Reporting program verification number	70812808
Interface used to collected data	Block number: 00 Interface version: 35 Date: 01-02-03 Checksum: 6200
Event(s) recovered	Deployment Deployment Level

SDM Data Limitations

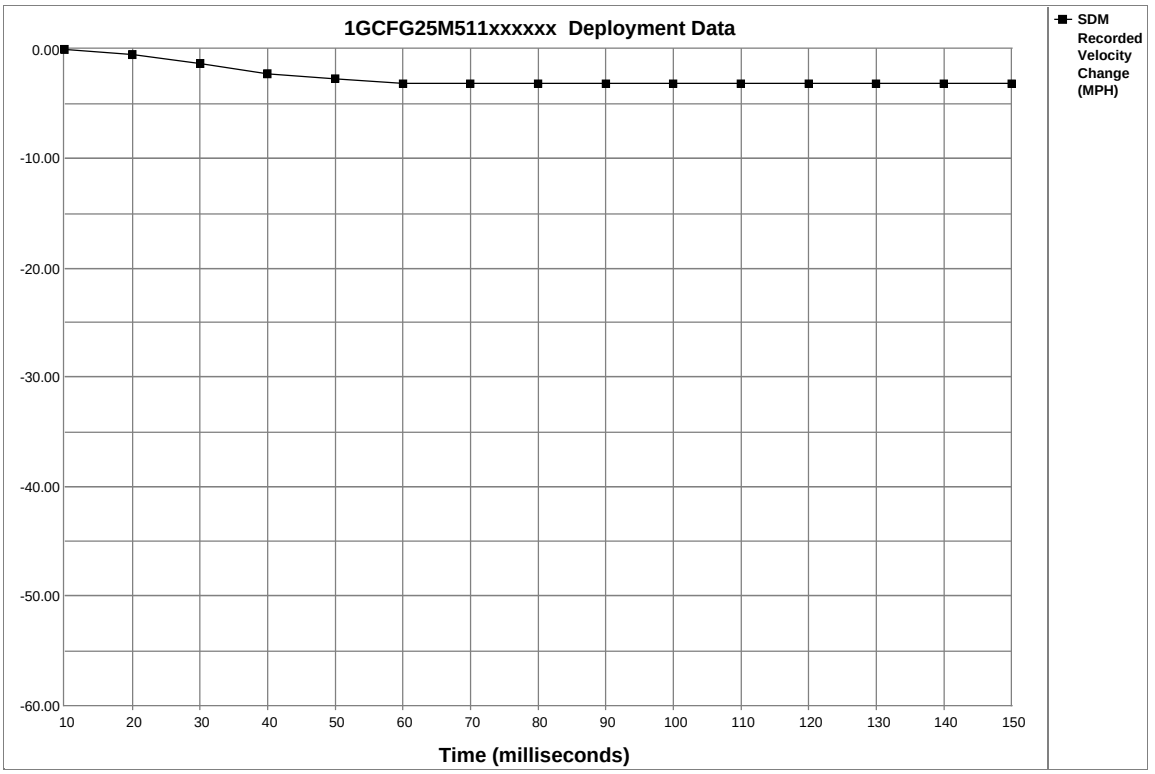
SDM Recorded Crash Events:
There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to "wake up" the sensing algorithm but not severe enough to deploy the air bag(s). It contains Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event may be overwritten by another Non-Deployment event. 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 contains 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 file will be locked after a deployment, if the non-deployment occurred within 5 seconds before the deployment or a deployment level event occurs within 5 seconds after the deployment.

SDM Data Limitations:
-SDM Recorded Vehicle Forward Velocity Change is one of the measures used to make air bag deployment decisions. 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 deployments and deployment level events, the SDM will record 100 milliseconds of data after deployment criteria is met and up to 50 milliseconds before deployment criteria is met. For non-deployments, the SDM will record the first 150 milliseconds of data after algorithm enable.
-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 does not receive a valid message.
-Driver's Belt Switch Circuit Status indicates the status of the driver's seat belt switch circuit
-Passenger Front Air Bag Suppression Switch Circuit Status indicates the status of the suppression switch circuit.
-The Time Between Non-Deployment and Deployment Events is displayed in seconds. If the time between the two events is greater than five seconds, "N/A" is displayed in place of the time.
-If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded.

SDM Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Speed, Engine Speed, and Percent Throttle data are transmitted once a second by the Powertrain Control Module (PCM), via the Class 2 data link, to the SDM.
-Brake Switch Circuit Status data is transmitted once a second by either the ABS module or the PCM, via the Class 2 data link, to the SDM. Depending on vehicle option content, the Brake Switch Circuit Status data may not be available.
-If the vehicle is a 2000 - 2002 Chevrolet Cavalier Z24 or a Pontiac Sunfire GT, with a manual transmission (RPO MM5) and a 2.4L engine (RPO LD9), the Brake Switch Circuit Status data will be reported in the opposite state than what actually occurred, e.g. an actual brake switch status of "ON" will be reported as "OFF".
-In most vehicles, the Driver's Belt Switch Circuit is wired directly to the SDM. In some vehicles, the Driver's Belt Switch Circuit Status data is transmitted from the Body Control Module (BCM), via the Class 2 data link, to the SDM.
-The Passenger Front Air Bag Suppression Switch Circuit is wired directly to the SDM.

System Status At Deployment

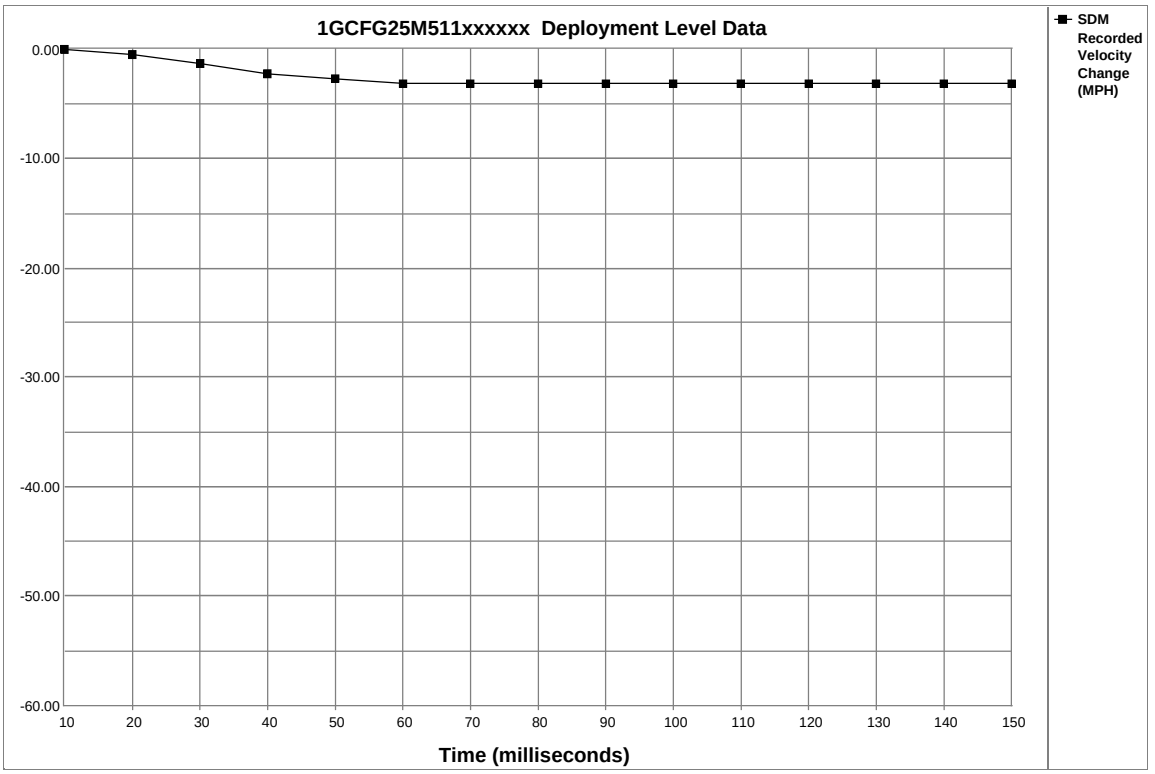
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	UNBUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Deployment	8835
Ignition Cycles At Investigation	8843
Maximum SDM Algorithm Forward Velocity Change (MPH)	-3.18
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	52.5
Time Between Non-Deployment And Deployment Events (sec)	N/A
Time From Algorithm Enable to Deployment Command Criteria Met (msec)	42.5



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Recorded Velocity Change	0.00	-0.44	-1.32	-2.19	-2.63	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07

System Status At Deployment Level

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	UNBUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Deployment Level	8835
Ignition Cycles At Investigation	8843
Maximum SDM Algorithm Forward Velocity Change (MPH)	-3.18
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	52.5
Time From Algorithm Enable to Deployment Command Criteria Met (msec)	42.5
Time Between Deployment And Deployment Level Events (sec)	N/A



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Recorded Velocity Change	0.00	-0.44	-1.32	-2.19	-2.63	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07	-3.07

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 23 00 00
$02  9B 4A
$03  41 53 31 30 39 39
$04  4B 32 36 41 43 33
$05  00
$06  15 07 14 21
$10  FB AE F8
$11  84 04 86 7C 8C 00
$14  03 82 80 80
$18  86 85 86 BE FF 00
$1C  FA FA FA FA FA FA
$1D  FA FA FA FA FA FA
$1E  FA FA
$1F  FF 02 00 00 00
$20  A0 00 00 FF 66 FE
$21  FF BF FF FF FF FF
$22  FF FF FF FF FF FF
$23  FC 22 00 E8 00 00
$24  01 03 05 06 07 07
$25  07 07 07 07 07 07
$26  07 07 00 00 00 00
$27  00 00 00 00 00 00
$28  00 00 00 00 00 00
$29  00 00 00 00 00 FB
$2A  AF F8 FF FF FF FF
$2B  FF FF FF 00 00 04
$2C  00 00 1F 03
$2D  15 24 14 11
$30  A0 00 00 FF 66 FE
$31  FF BF FF FF FF FF
$32  FF FF FF FF FF FF
$33  FC 1F 03 00 00 01
$34  03 05 06 07 07 07
$35  07 07 07 07 07 07
$36  07 00 22 00 E8 00
$37  00 00 00 00 00 00
$38  00 00 00 00 00 00
$39  00 00 00 00 00 00
$3A  00 FB AF F8 32 00
$3B  00 04 00
$3C  11 15 24 14
$40  FF FF FF FF FF FF
$41  FF FF FF FF FF FF
$42  FF FF FF FF FF FF
$43  FF
```