CRASH DATA RESEARCH CENTER

Calspan Corporation
Buffalo, NY 14225

CALSPAN ON-SITE ADVANCED OCCUPANT PROTECTION SYSTEM CRASH INVESTIGATION

SCI CASE NO.: CA03-015

VEHICLE: 2003 FORD CROWN VICTORIA POLICE INTERCEPTOR

LOCATION: STATE OF NEW YORK

CRASH DATE: FEBRUARY 2003

Contract No. DTNH22-01-C-17002

Prepared for:

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

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

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

TECHNICAL REPORT STANDARD TITLE PAGE

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16. Abstract This on-site investigation focused on the performance of the Advanced Occupant Protection System (AOPS) that deployed in a 2003 Ford Crown Victoria Police Interceptor. The Crown Victoria was equipped dual stage driver and front right passenger air bags, a driver seat track position sensor, front safety belt retractor pretensioners, front safety belt buckle switch sensors, and a front right occupant presence sensor. The Crown Victoria was also equipped with an Event Data recorder (EDR) that was downloaded during the on-site investigation. The EDR output is included as **Attachment A** of this report. The Ford was occupied by an unrestrained 39-year-old male on-duty police officer driver. The Ford was in pursuit of a traffic violator when it impacted a 2002 Jeep (unknown model) on a local roadway. The Ford subsequently departed the roadway and impacted a parked vehicle in a residential driveway in a minor secondary impact. As a result of the crash, a stage one driver's frontal air bag was commanded to deploy. Due to unrestrained status of the driver and the unoccupied front right seat, the safety belt pretensioners did not fire. The driver of the Ford sustained minor injuries and was transported to a local hospital where he was treated and released.			
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TABLE OF CONTENTS

CALSPAN ON-SITE ADVANCED OCCUPANT PROTECTION SYSTEM CRASH INVESTIGATION
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BACKGROUND

This on-site investigation focused on the performance of the Advanced Occupant Protection System (AOPS) that deployed in a 2003 Ford Crown Victoria Police Interceptor **(Figure 1)**. The Crown Victoria was equipped dual stage driver and front right passenger air bags, a driver seat track position sensor, front safety belt retractor pretensioners, front safety belt buckle switch sensors, and a front right occupant presence sensor. The Crown Victoria was also equipped with an Event Data recorder (EDR) that was downloaded during the on-site investigation. The EDR output is included as **Attachment A** of this report. The Ford was occupied by an unrestrained 39-year-old male on-duty police officer driver. The Ford was in pursuit of a traffic violator when it impacted a 2002 Jeep (unknown model) on a local roadway. The Ford subsequently departed the roadway and impacted a parked vehicle in a residential driveway in a minor secondary impact. As a result of the crash, a stage one driver's frontal air bag was commanded to deploy. Due to unrestrained status of the driver and the unoccupied front right seat, the safety belt pretensioners did not fire. The driver of the Ford sustained minor injuries and was transported to a local hospital where he was treated and released.

Figure 1. 2003 Ford Crown Victoria Police Interceptor.

A local police department notified the Calspan Special Crash Investigations (SCI) team on February 25, 2003 of the crash. Calspan SCI forwarded the notification to NHTSA which assigned an on-site investigation on February 26, 2003 as part of the AOPS special study. The Ford and the crash site were inspected on February 26, 2003. The 2002 Jeep and the unknown secondary vehicle were not inspected.

SUMMARY

Crash Site

This crash occurred on the paved center median of a four-lane north/south roadway during the morning hours of February 2003. At the time of the crash, the weather was reported as dry with no adverse conditions. Two travel lanes in each direction comprised the roadway. The center paved median divided the north/southbound lanes. The travel lanes measured 3.2 meters (10.5 feet) in width and were separated by broken white lane

lines. The roadway was bordered by concrete barrier curbs. Grass, concrete sidewalks, and private homes extended beyond the curbs. The roadsides were equipped with overhead luminaries which were not activated at the of the time crash. The posted speed limit for the roadway was 56 km/h (35 mph). The scene schematic is included as **Figure 4** of this report.

Vehicle Data

2003 Ford Crown Victoria Police Interceptor

The subject vehicle in this crash was a 2003 Ford Crown Victoria Police Interceptor. The Vehicle Identification Number (VIN) that identified the vehicle was 2FAFP71W43X1 (production number deleted). The odometer reading at the time of the SCI inspection was 36,275 kilometers (22,540 miles). The vehicle was a four-door sedan that was equipped with a 4.6-liter, V8 engine linked to a four-speed automatic transmission, rear-wheel drive, and a column mounted transmission shifter. The service brakes were four wheel disc with antilock. The vehicle was equipped with OEM steel wheels with plastic hub caps on P225/60R16 tires. The left front, right front, and left rear tires on the Ford were Goodyear Eagle RSA Plus. The right rear tire was a Goodyear Eagle Ultra Grip. The manufacturer recommended front and rear tire pressure was 241 kPa (35 PSI). The specific tire data at the time of the SCI inspection was a follows:

Position	Measured Tire Pressure	Measured Tread Depth	Damage
Left Front	255 kPa (37 PSI)	4 mm (5/32”)	Cut
Left Rear	228 kPa (33 PSI)	3 mm (4/32”)	None
Right Front	228 kPa (33 PSI)	3 mm (4/32”)	None
Right Rear	241 kPa (35 PSI)	8 mm (4/32”)	None

The interior of the Ford was configured with cloth surfaced front bucket seats with height adjustable head restraints that were in the full-down positions. The front left seat was equipped with an aftermarket seat cover. The rear seat was a three-passenger bench seat. The front and second rows were separated by a safety cage. The safety cage was mounted aft of the front seats and was bolted to the floor panel. The construction of the safety cage consisted of steel with a plastic glazing which allowed for visibility to the rear of the vehicle.

2002 Jeep

The 2002 Jeep could not be located for this on-site investigation; therefore, it was not inspected.

Crash Sequence

Pre-Crash

The 39-year-old male driver of the Ford was operating the vehicle northbound on the roadway and was in pursuit of a traffic violator. The police officer driver of the Ford had activated the siren and overhead emergency lights at the on-set of this pursuit. As the driver of the Ford continued the northbound travel, he entered the center median to bypass non-contact traffic **(Figure 2)**. Coincident to this, the 2002 Jeep operated by a 25-year-old female initiated a left turn from a driveway on the east roadside and entered the roadway. The Jeep traversed the northbound lanes, entered the center median and stopped due to on-coming traffic in southbound lanes. At this point, the Ford was passing the non-contact traffic in the center median. The driver of the Ford observed the Jeep entering the median and applied a rapid right steering input and a level of braking in an attempt to avoid an impact with the Jeep.

Figure 2. Ford's pre-impact travel in the center median.

Crash

The front left of the Ford impacted the left rear side of the Jeep. The resultant directions of force were 12 o'clock for the Ford and 10 o'clock for the Jeep. The force of the impact commanded a stage one deployment of the driver's frontal air bag in the Ford. The force of the impact aft of the Jeeps center of gravity caused it to rotate counterclockwise. The 2003 Jeep came to rest immediately north of the impact location, straddling the center median and inboard southbound travel lane.

The Ford was deflected in a northeast direction and departed the east roadside 15 meters (49 feet) from the approximate point of impact. The front of the Ford subsequently contacted a 1994 Jeep that was parked in a driveway.

The missing vehicle algorithm of the WINSMASH program was used to calculate a delta-V for this impact. The total calculated delta-V for the Ford was 12.0 km/h (7.5 mph) with longitudinal and lateral components of -11.8 km/h (-7.3 mph) and -2.1 km/h (-1.3 mph), respectively. The total calculated delta-V for the Jeep was 13.0 km/h (8.1 mph). The longitudinal component was -8.4 km/h (-5.2) and lateral component was 10.0 km/h (6.2 mph). The EDR maximum recorded cumulative longitudinal delta-V for the Ford was -11.3 km/h (-7 mph) at 65.6 milliseconds.

Post-Crash

Emergency Medical Services (EMS) personnel responded to the crash site. The drivers of the Ford and Jeep were evaluated at the crash site. It was determined by the EMS personnel that the drivers sustained minor severity injuries; therefore, they were transported to a local hospital where they were treated and released.

Vehicle Damage

Exterior - 2003 Ford Crown Victoria Police Interceptor

The 2003 Ford sustained moderate severity damage to the frontal area as a result of the crash with the Jeep **(Figure 3)**. The damage was contained within the front left area of the vehicle. The direct contact damage measured 79 cm (31") and began 3 cm (1") right of the centerline and extended to the front left bumper corner. The maximum crush measured 14 cm (5.4") and was located at the left end of the bumper beam. A crush profile was documented across the 140 cm (55.5") width front bumper beam and was as follows: C1 = 14 cm (5.4"), C2 = 1 cm (0.5") C3 = 0 cm, C4 = 0 cm, C5 = 0 cm, C6 = 0 cm. The Collision Deformation Classification (CDC) for this impact was 12-FYEW-1. The secondary impact with the parked Jeep did not result in residual damage to the Ford. This resulted in the assignment of a partial CDC of 12-F999-9.

Figure 3. Resultant frontal damage to the Ford.

The four doors remained closed during crash and were operational post-crash. All glazing was free of damage.

Interior

The minor impact did not result in intrusion of the passenger compartment. The interior components exhibited no occupant contact. The left outboard aspect of the rear seatback was loaded by the truck contents. This loading resulted in 8 cm (3") of forward displacement of the left rear seatback.

Advanced Occupant Protection System

The 2003 Ford Crown Victoria was equipped with an Advanced Occupant Protection System (AOPS). The AOPS system consisted of dual stage driver and front right passenger air bags, a driver seat track position sensor, front safety belt retractor pretensioners, front safety belt buckle switch sensors, and a front right occupant presence sensor. As a result of the crash, the driver's frontal air bag system deployed. The driver's air bag was conventionally located within the steering wheel hub and was concealed by a single cover flap. The cover flap measured 14 cm (5.6) in width and 12 cm (4.75") in height. The air bag membrane measured 56 cm (22") in diameter in its deflated state and was vented by two vent ports. The vent ports were located on the rear panel at the 11 and 1 o'clock sectors. There no occupant contact points on the air bag membrane. The air bag membrane and its components were not damaged.

The front right air bag deployment was suppressed by the front right occupant detection sensor.

Event Data Recorder

The 2003 Ford Crown Victoria was equipped with an Event Data Recorder (EDR) that was downloaded during this on-site investigation. The EDR data reported that the front safety belts were not buckled at the time of crash; therefore, the pretensioners did not fire. Had the safety belts been in use, the data indicated that the pretensioners would have fired. The driver's seat track was not in the forward position. The front right occupant classification status was recorded as off indicating that the front seat was not occupied at the time of the crash. The unoccupied front right seat suppressed the frontal air bag deployment in this position.

The data indicated that a stage one driver air bag deployment was commanded 26.4 milliseconds after crash recognition. Stage two of the dual stage deployment was disposed of 100 milliseconds later (126.4 ms). The EDR recorded longitudinal acceleration and cumulative longitudinal delta-V. The maximum recorded longitudinal acceleration was 12.8 g's at 24.8 milliseconds. The maximum recorded cumulative longitudinal delta-V was -11.3 km/h (-7 mph) at 65.6 milliseconds. There was good agreement between the recorded delta-V and the WINSMASH calculated delta-V. The EDR output is included as **Attachment A** of this report.

Manual Safety Belt Systems

The 2003 Ford Crown Victoria was equipped with manual three-point lap and shoulder belts for the five seating positions. The driver's safety belt was equipped with a sliding latch plate, Emergency Locking Retractor (ELR), height adjustable D-ring that was in the full-down position, and a retractor mounted pretensioner. The driver did not use the safety belt at the time of the crash. This was supported by the lack of loading evidence to the belt system and the EDR recorded unbuckled status of this belt system.

The front right safety belt was configured with a sliding latch plate, a switchable ELR/Automatic Locking Retractor (ALR), height adjustable D-ring that was adjusted to 2 cm (0.75") above the full-down position, and a retractor mounted pretensioner. This seating position was not occupied during the crash; therefore, the safety belt was used.

The rear safety belts of the Ford were equipped with sliding latch plates and switchable ELR/ALR. These safety belts were not in use at the time of the crash.

Occupant Demographics/Data

Driver Demographics

Age/Sex:	39-year-old/Male
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Full-rear track position
Eyewear:	Unknown
Manual Safety Belt Usage:	None used
Usage Source:	Vehicle inspection
Egress from Vehicle:	Exited without assistance
Mode of Transport from Scene:	Transported by ambulance to a hospital
Type of Medical Treatment:	Treated and released

Driver Injuries

Injury	**Injury Severity AIS90/Update 98**	**Injury Source**
Minor injuries, NFS	Unknown	Unknown

Source – Police report

Driver Kinematics

The unrestrained 39-year-old male driver of the Ford was seated in presumed upright posture with the seat track adjusted to the full-rear position. Prior to the impact, the driver applied a level of braking displacing him slightly forward. At impact with the Jeep, stage one of the driver's frontal air bag deployed. The driver initiated a forward trajectory in response to the 12 o'clock direction of force. He loaded the deployed air bag and came to rest within the front left seating position. As a result of the crash, the driver sustained minor severity injuries and was transported to a local hospital where he was treated and released.

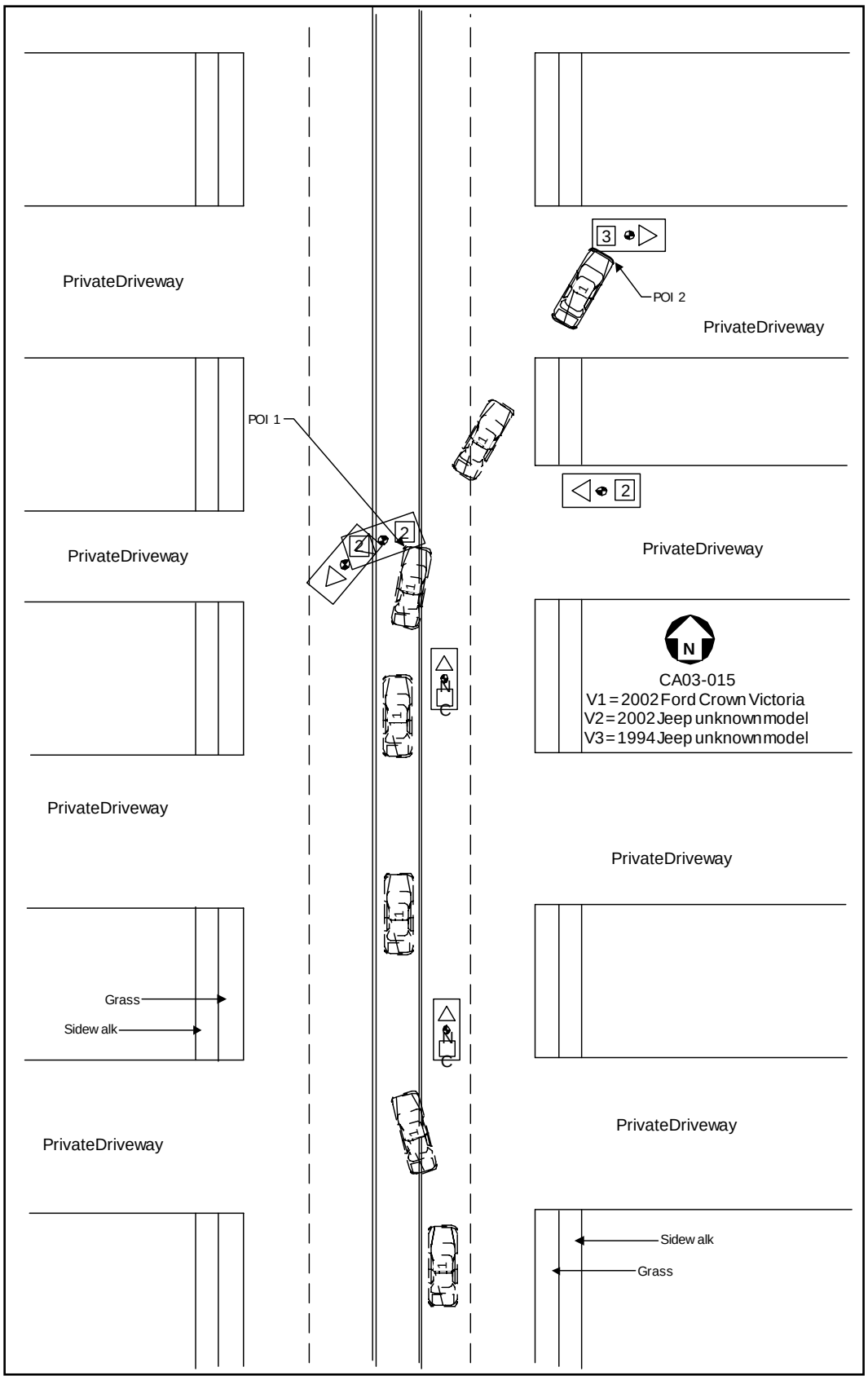

Figure 4: Scene Schematic

Attachment A: EDR Output

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CDR CRASH DATA RETRIEVAL SYSTEM

CDR File Information

Vehicle Identification Number	
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	
Saved on	
Data check information	
Collected with CDR version	Crash Data Retrieval Tool 1.670
Collecting program verification number	4209D064
Reported with CDR version	Crash Data Retrieval Tool 1.999919
Reporting program verification number	265E05B8
Interface information	Block number: 00 Interface version: 34 Date: 09-30-02 Checksum: 6300
Event(s) recovered	Pretensioner Deployment

Module Information

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a subpoena or search warrant, as indicated by the CDR tool user on February 26, 2003, at 12:19 PM.

Important Limitations on Vetronix Crash Data Retrieval (CDR) Tool Capabilities.

Disclaimer: This Restraint Control Module (RCM) records longitudinal deceleration data for the purpose of understanding the input data the Restraint Control Module used to determine whether or not to deploy restraint devices. This module does not record vehicle speed, throttle position, brake on-off, and other data, which may be recorded in some 1999 model year and later General Motors modules. The deceleration data recorded by Ford's module during a crash can subsequently be mathematically integrated into a longitudinal Delta-V. Delta-V is the change in velocity during the recording time and is NOT the speed the vehicle was traveling before the accident, and is also not the *Barrier Equivalent Velocity. The Vetronix CDR Tool will read and interpret both acceleration in G's and Delta-V in mph.* RCM's in Ford vehicles that can be read by the Vetronix CDR tool are listed in the Vetronix Help Files.

Important

If there is any question that the restraint system did not perform as it was designed to perform, please read the system only through the diagnostic link connector. The Vetronix CDR kit provides an RCM interface cable to plug directly into the restraint control module. The Vetronix CDR RCM Interface Cable connects only power, ground, and memory read pins to the relevant vehicle restraint control module. The other RCM pins normally connect to inputs, such as sensors, and outputs, such as airbags, are not connected when you use the RCM Interface Cable to plug directly into the module. Since the vehicle restraint control module is constantly monitoring airbag system readiness, it will detect that the sensors and airbags are not connected. The restraint control module may record a new diagnostic trouble code into memory for each device that is not connected. These new diagnostic trouble codes may record over previously written diagnostic trouble codes present prior to the accident and spoil evidence necessary to determine if the restraint system performed in the accident as it was designed to perform. Not only could this prevent Ford from being able to determine if the system performed as it was designed to perform, but, regardless of innocent inadvertence, you could raise issues of evidence spoliation in any litigation that may arise out of the accident. If you cannot read the module via the diagnostic link connector, and if you suspect improper system performance, contact Ford Motor Company and request their assistance to read the module with a proper vehicle simulator attached. If you choose to read via the module connector, Ford recommends that you do so in the vehicle and that you leave the second large connector plugged into the vehicle wiring harness to minimize the number of new diagnostic trouble codes created.

While data stored in RCM's is accurate, accident reconstructionists must be aware of the limitations of the data recorded in Ford's control modules and should compare the recorded data with the physical evidence at the accident scene using professional accident reconstruction techniques (i.e. vehicle crush characteristics, skid marks, etc) before making any assumptions about the import and validity of the data recorded in the module with respect to the crash event being analyzed. The following describes specific limitations that must be considered when analyzing recorded data. Investigators should obtain permission of the vehicle owner prior to reading any data.

1. There may be no deceleration data recorded in the module.
Loss of power (cut wires, damaged battery, crushed fuse box) to the module during or immediately after the crash may prevent the crash data from being recorded. A backup power supply within the module has sufficient power to continue to analyze the deceleration data and deploy restraint devices if needed, but there is no backup power for recording.

If the deceleration input does not create a vehicle longitudinal Delta-V above 4 mph within 100 milliseconds, there may not be any data recorded.

2. In unusual circumstances, deceleration data stored in the module may be from a crash other than the one you are currently analyzing.
The module will record data from some non-deploy events. If, after the module has recorded data from a non-deploy event, and there is a subsequent event in which there is a loss of power and no new recording is made for that subsequent event, the deceleration data in the module's memory may be from the prior event. If the new, subsequent event is a deploy event and recording has occurred, the deployment times should be recorded. If there are no deployment times recorded, but airbags or other restraint devices are observed to have deployed, the recorded data that you read are most likely from a prior event.

Once an airbag or other restraint device has been commanded to deploy, the data recorded in connection with that deployment are "locked", and subsequent crashes cannot be recorded.

If a vehicle is being repaired, the RCM should be replaced after any crash in which restraint devices deploy. Early printed shop manuals refer to re-using modules by clearing the "crash data memory full" code, but this is no longer true and the latest on-line electronic shop manual directs that modules be replaced.

Crashes that involve multiple impacts will record only one of the impacts. If there is a deployment, the deployment event will be recorded and locked. If no restraint device is commanded to deploy, the recorded data are not "locked", and subsequent impacts may record over any previous recorded data. Further analysis will be required to determine which of the events was actually recorded.

3. The computed longitudinal Delta-V may understate the total Delta-V

Many real-world crashes can last longer than the memory has the capacity to record. Therefore, the actual Delta-V of the event may be higher than the Delta-V calculated and displayed by the Vetronix CDR System output. Review the end of the longitudinal acceleration/deceleration pulse - if it has not settled to zero G's by the end of the recording, the vehicle longitudinal Delta-V is most likely understated. If there is a clear decaying trend line you may choose, at your own risk, to estimate the total Delta-V by extrapolating the decay trend to zero and to calculate the additional Delta-V not captured.

Under some circumstances where power is interrupted, during the recording of data, or the module re-sets during the recording of data, a partial recording may occur. This will be shown as "no data" in the data table and will not be plotted on the graph of acceleration. The "no data" sections may be at the beginning, in the middle, or at the end(s) - it will not be consistent from one occurrence to another. When some portion of the acceleration data is not recorded, the Delta-V during that time cannot be calculated. A Delta-V will be calculated for the points that are valid, but the user must be aware that the partial Delta-V calculated will further underestimate the actual event total Delta-V. Restraint device deployment times are recorded first in to memory, and the acceleration data is recorded last. Thus, even with partial acceleration traces, deployment times are valid.

4. This module records only longitudinal acceleration/deceleration of the vehicle. You must compute lateral or resultant total acceleration based on your estimated Principal Direction of Force (PDOF).

5. Vertical acceleration/decelerations are not recorded. Vehicle spin about a point not centered on the Restraints Control Module sensor may add or subtract from bulk vehicle motion.

6. This module is not intended to record acceleration/deceleration in a side-impact event. If the side impact generates a longitudinal deceleration component sufficient to wake up the frontal deployment algorithm, there may be a recording of longitudinal deceleration in a side impact event.

Any Longitudinal Delta-V determined by using data read from the air bag module should be verified with physical evidence from the crash (such as vehicle crush, skid marks) and assumed accident sequence. Multiple impacts, angular collisions, side impacts, vehicle spin, etc should be considered in addition to the data read from the air bag module.

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CDR CRASH DATA RETRIEVAL SYSTEM

System Status At Deployment

Ford Part Number Prefix	3W7A
Number Of Active Faults	0
Driver Seat Belt Buckle	Unbuckled
Passenger Seat Belt Buckle	Unbuckled
Driver Seat Track In Forward Position	No
Occupant Classification Status Value	Off
Unbelted Stage 1	Fire
Unbelted Stage 2	No Fire
Belted Stage 1	Fire
Belted Stage 2	No Fire
Driver Pretensioner	Fire
Passenger Pretensioner	Fire

Parameter	Driver	Passenger
Pretensioner Time (milliseconds)	NONE	NONE
First Stage Time (milliseconds)	26.4	NONE
Second Stage Time (milliseconds)	126.4	NONE

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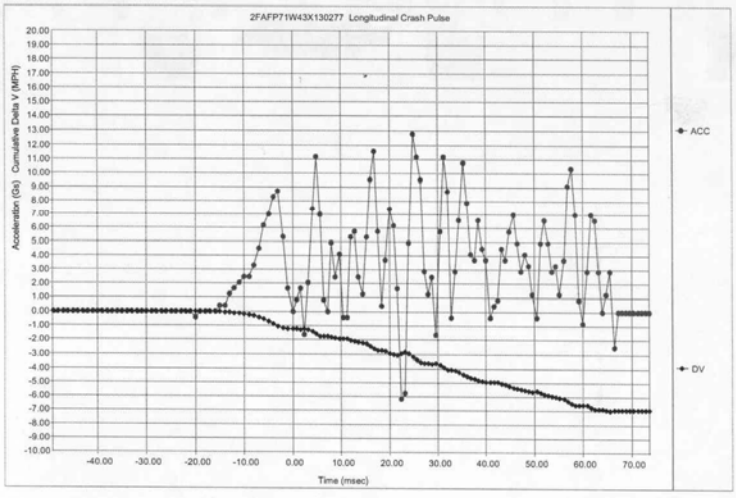
CDR CRASH DATA RETRIEVAL SYSTEM



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CDR CRASH DATA RETRIEVAL SYSTEM

Crash Pulse Data

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
-49.0	0.00	0.00
-48.0	0.00	0.00
-47.0	0.00	0.00
-46.0	0.00	0.00
-45.0	0.00	0.00
-44.0	0.00	0.00
-43.0	0.00	0.00
-42.0	0.00	0.00
-41.0	0.00	0.00
-40.0	0.00	0.00
-39.0	0.00	0.00
-38.0	0.00	0.00
-37.0	0.00	0.00
-36.0	0.00	0.00
-35.0	0.00	0.00
-34.0	0.00	0.00
-33.0	0.00	0.00
-32.0	0.00	0.00
-31.0	0.00	0.00
-30.0	0.00	0.00
-29.0	0.00	0.00
-28.0	0.00	0.00
-27.0	0.00	0.00
-26.0	0.00	0.00
-25.0	0.00	0.00
-24.0	0.00	0.00
-23.0	0.00	0.00
-22.0	0.00	0.00
-21.0	0.00	0.00
-20.0	-0.41	0.01
-19.0	0.00	0.01
-18.0	0.00	0.01
-17.0	0.00	0.01
-16.0	0.00	0.01
-15.0	0.41	0.00
-14.0	0.41	-0.01
-13.0	1.24	-0.04
-12.0	1.65	-0.07
-11.0	2.06	-0.12
-10.0	2.48	-0.17
-9.0	2.48	-0.23
-8.0	3.30	-0.30
-7.0	4.54	-0.40
-6.0	6.19	-0.53
-5.0	7.02	-0.69
-4.0	8.26	-0.87
-3.0	8.67	-1.06
-2.0	5.37	-1.18
-1.0	1.65	-1.21
0.0	0.00	-1.21
0.8	0.83	-1.23

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CDR CRASH DATA RETRIEVAL SYSTEM

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
1.6	1.65	-1.26
2.4	-1.65	-1.23
3.2	2.06	-1.26
4.0	7.43	-1.39
4.8	11.15	-1.59
5.6	7.02	-1.71
6.4	0.83	-1.73
7.2	0.00	-1.73
8.0	4.95	-1.82
8.8	2.48	-1.86
9.6	4.13	-1.93
10.4	-0.41	-1.92
11.2	-0.41	-1.92
12.0	5.37	-2.01
12.8	5.78	-2.11
13.6	2.48	-2.16
14.4	1.24	-2.18
15.2	5.37	-2.27
16.0	9.50	-2.44
16.8	11.56	-2.64
17.6	5.78	-2.74
18.4	0.41	-2.75
19.2	3.72	-2.82
20.0	7.43	-2.95
20.8	6.19	-3.05
21.6	1.65	-3.08
22.4	-6.19	-2.97
23.2	-5.78	-2.87
24.0	4.95	-2.96
24.8	12.80	-3.18
25.6	11.15	-3.38
26.4	9.50	-3.55
27.2	2.89	-3.60
28.0	1.24	-3.62
28.8	2.48	-3.66
29.6	-1.65	-3.63
30.4	5.78	-3.74
31.2	11.15	-3.93
32.0	8.67	-4.08
32.8	-0.41	-4.08
33.6	2.89	-4.13
34.4	6.61	-4.24
35.2	10.74	-4.43
36.0	7.85	-4.57
36.8	4.13	-4.64
37.6	3.72	-4.71
38.4	6.61	-4.82
39.2	4.54	-4.90
40.0	3.72	-4.97
40.8	-0.41	-4.96
41.6	0.41	-4.97
42.4	0.83	-4.98
43.2	4.54	-5.06

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CDR CRASH DATA RETRIEVAL SYSTEM

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
44.0	3.72	-5.13
44.8	-5.78	-5.23
45.6	7.02	-5.35
46.4	4.95	-5.44
47.2	2.89	-5.49
48.0	4.13	-5.56
48.8	3.30	-5.62
49.6	1.24	-5.64
50.4	-0.41	-5.63
51.2	4.95	-5.72
52.0	6.61	-5.84
52.8	4.95	-5.92
53.6	2.89	-5.97
54.4	3.30	-6.03
55.2	1.24	-6.05
56.0	3.72	-6.12
56.8	9.08	-6.28
57.6	10.32	-6.46
58.4	7.02	-6.58
59.2	0.83	-6.60
60.0	-0.83	-6.58
60.8	2.89	-6.63
61.6	7.02	-6.76
62.4	6.61	-6.87
63.2	2.89	-6.92
64.0	0.00	-6.92
64.8	1.24	-6.95
65.6	2.89	-7.00
66.4	-2.48	-6.95
67.2	0.00	-6.95
68.0	0.00	-6.95
68.8	0.00	-6.95
69.6	0.00	-6.95
70.4	0.00	-6.95
71.2	0.00	-6.95
72.0	0.00	-6.95
72.8	0.00	-6.95
73.6	0.00	-6.95

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.

```
0000:  14 BB F6 03 A5 00 20 73 0E 22 0E 2B 38 55 18 1E
0010:  00 7D 0C 19 0C 19 05 CC 33 57 37 41 00 03 71 7D
0020:  07 03 CC 73 39 32 35 37 38 32 31 42 00 00 00 00
0030:  00 00 00 00 00 00 00 00 00 00 00 00 33 32 35 35
0040:  30 34 36 32 51 74 80 77 03 60 21 52 17 00 08 00
0050:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0060:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0070:  00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00
0080:  33 01 92 8F 84 71 72 8C 9F 9B 97 87 83 86 7C 8E
0090:  9B 95 7F 87 90 9A 93 8A 89 90 8B 89 7F 81 82 8B
00A0:  89 8E 91 8C 87 8A 88 83 7F 8C 90 8C 87 88 83 89
00B0:  96 99 91 82 7E 87 91 90 87 80 83 87 7A 80 80 80
00C0:  80 80 80 80 80 80 80 80 80 80 80 80 80 80 80 80
00D0:  80 80 80 80 80 80 80 80 80 80 80 7F 80 80 80 80
00E0:  81 81 83 84 85 86 86 88 8B 8F 91 94 95 8D 84 80
00F0:  82 84 7C 85 92 9B 91 82 80 8C 86 8A 7F 7F 8D 8E
0100:  86 83 8D 97 9C 8E 81 89 00 00 00 00 00 00 00 21
0110:  00 9E 00 00 00 00 00 00 00 00 00 00 09 19 1B 00 00
0120:  00 00 00 04 00 21 00 21 00 5C 00 5C 3C 3B 80 39
0130:  00 CC AF 03 02 6C 05 0F 05 05 02 6C 07 43 09 AE
0140:  01 02 01 01 05 07 05 05 03 05 05 0B 00 00 00 3D
0150:  00 00 01 2F 00 79 00 00 00 C2 04 D7 00 B3 01 A8
0160:  01 E4 00 C4 00 A0 01 C0 00 44 01 DF 00 F9 00 63
0170:  FF FE 03 D2 2F 44 2F 44 2F 44 02 25 01 F3 01 6D
0180:  01 DF 02 25 FF FE 00 BF FF FE 05 63 00 85 00 85
0190:  FF FE 00 6D FF FE FF FE 00 94 00 30 00 BD 00 BD
01A0:  00 00 07 02 0A 02 02 6C 04 D7 13 5C 09 AE 3D 00
01B0:  00 01 03 04 03 06 04 06 05 04 00 63 00 C2 00 79
01C0:  01 83 00 C2 00 3D 00 49 00 91 09 AE 01 F0 00 2C
01D0:  00 63 00 C6 00 63 00 F7 00 63 00 A2 00 50 01 3F
01E0:  FF FE 02 2F 01 0D 00 94 01 0D 01 E9 01 8F 00 C6
01F0:  02 A6 01 0D 01 3F 07 06 01 DF 00 C6 1F 00 2F A5
```