CRASH DATA RESEARCH CENTER
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OFFICE OF DEFECTS INVESTIGATION

2005 FORD CROWN VICTORIA POLICE INTERCEPTOR REAR IMPACT CRASH AND FIRE INVESTIGATION

CALSPAN CASE NO: CA07-037
LOCATION: OHIO
CRASH DATE: NOVEMBER, 2007

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

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

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16. Abstract

This on-site investigation focused on the crash severity and the source of the fuel leak that contributed to a post-crash fire that consumed a 2005 Ford Crown Victoria Police Interceptor (CVPI). This CVPI was not equipped with a Fire Panel or the Ford Fire Suppression System. The Ford was driven by a 48 year old on-duty police officer. The Ford was traveling at a driver estimated speed of 48 km/h (30 mph) when its back plane was impacted by a 1995 Cadillac Deville. The Cadillac was operated by an intoxicated 22 year old female driver at a reconstructed speed of approximately 145 to 161 km/h (90 to 100 mph). The crash resulted in severe rear impact damage to the Ford and a fuel-fed fire. The impact displaced the CVPI approximately 119 m (390 ft) forward of the point of impact to its final rest location. The police officer driver of the Ford was able to open the driver's door post-crash and exited the vehicle unassisted; however, he sustained thermal burns over approximately 40 percent of his body and was admitted to a burn unit for treatment.

The police department filed a Vehicle Owners Questionnaire (VOQ) through the Auto Safety Hotline of the National Highway Traffic Safety Administration (NHTSA). The NHTSA's Office of Defects Investigation (ODI) requested the VOQ be forwarded to the Special Crash Investigations (SCI) team at Calspan for follow-up investigation. The VOQ was forwarded on December 14, 2007. The Calspan SCI team contacted the involved police agency and secured cooperation to conduct an on-site investigation. In order to determine the root cause of the fuel leakage, a joint inspection of the Ford with members of the investigating police agency took place January 23 and 24, 2008. The inspection included a vehicle disassembly/tear down to facilitate the removal of the CVPI fuel tank.

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BACKGROUND

This on-site investigation focused on the crash severity and the source of the fuel leak that contributed to a post-crash fire that consumed a 2005 Ford Crown Victoria Police Interceptor (CVPI), **Figure 1**. This CVPI was not equipped with a Fire Panel or the Ford Fire Suppression System. The Ford was driven by a 48 year old on-duty police officer. The Ford was traveling at a driver estimated speed of 48 km/h (30 mph) when its back plane was impacted by a 1995 Cadillac DeVille. The Cadillac was operated by an intoxicated 22 year old female driver at a reconstructed speed of approximately 145 to 161 km/h (90 to 100 mph). The crash resulted in severe rear impact damage to the Ford and a fuel-fed fire. The impact displaced the CVPI approximately 119 m (390 ft) forward of the point of impact to its final rest location. The police officer driver of the Ford was able to open the driver's door post-crash and exited the vehicle unassisted; however, he sustained thermal burns over approximately 40 percent of his body and was admitted to a burn unit for treatment.

Figure 1: Left side view of the Ford.

The police department filed a Vehicle Owners Questionnaire (VOQ) through the Auto Safety Hotline of the National Highway Traffic Safety Administration (NHTSA). The NHTSA's Office of Defects Investigation (ODI) requested the VOQ be forwarded to the Special Crash Investigations (SCI) team at Calspan for follow-up investigation. The VOQ was forwarded on December 14, 2007. The Calspan SCI team contacted the involved police agency and secured cooperation to conduct an on-site investigation. In order to determine the root cause of the fuel leakage, a joint inspection of the Ford with members of the investigating police took place January 23 and 24, 2008. The inspection included a vehicle disassembly/tear down to facilitate the removal of the CVPI fuel tank.

SUMMARY

Vehicle Data

2005 Ford Crown Victoria

The 2005 Ford CVPI was identified by the Vehicle Identification Number (VIN): 2FAFP71W05X (production sequence deleted). The date of manufacturer and odometer reading were unknown due to fire damage. The four-door, rear-wheel drive, body-on-frame sedan was equipped with the Police Interceptor Package. Its power train consisted of a 4.6 liter/V8 engine linked to a four-speed automatic transmission. The service brakes were four-wheel disc with anti-lock (ABS). The manual restraint system consisted of 3-point lap and shoulder belts with

retractor pretensioners for the front occupant positions. The vehicle was equipped with Certified Advanced 208 Compliant (CAC) air bags for the driver and front right passenger positions. The vehicle manufacturer certified that the Ford Crown Victoria met the advanced air bag requirements of the Federal Motor Vehicle Safety Standard No. 208. The air bags did not deploy as a result of the crash or fire. The vehicle was equipped with the factory-installed OEM shields covering the sway bar brackets and the fuel tank straps, a molded rubber grommet that recessed the bolt heads on the lower aspect of the rear differential cover and a redesigned vapor canister mounted to the lower surface of the trunk. The left front, left rear, and right rear tires were consumed in the fire. The right front tire was a Goodyear Eagle RS-A, size P225/60R16. The specific measured tire data was as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	0 kPa (0 PSI)	Unknown	No	Consumed by fire
LR	0 kPa (0 PSI)	Unknown`	Unknown	Consumed by fire
RF	207 kPa (30 PSI)	8 mm (10/32)	No	None
RR	0 kPa (0 PSI)	Unknown	Unknown	Consumed by fire

This police agency did not use the Kevlar-shielded trunk pack in their vehicles that was developed by Ford. A 91 cm x 61 cm (36 in x 24 in) molded plastic organizer was used to arrange the trunk contents in a lateral direction. The trunk contents included: Measuring Wheel, First Aid Kit, Sharps Container, "Big Easy" Lock-out Tool, 91 cm (36 in) long Stop Sticks, 10 cm (4 in) diameter Fire Extinguisher, Box of Flares, 61 cm (24 in) Crow Bar, Lug Wrench, Slim Jim, Flexible Cuffs, Ammunition Belt and an Assault Rifle. A single radio unit was mounted to plywood backing on the forward shelf of the trunk. **Figure 2** is a view of the trunk contents in an exemplar police vehicle.

Figure 2: Exemplar trunk contents.

The police officer was approximately 3 hours into his shift at the time of the crash. Reportedly, the vehicle had been refueled at the start of the shift. It was estimated that the fuel tank was approximately ¾ full at the time of the crash. This fuel level amounted to 53.9 liters (14.3 gallons) based on a 72 liter (19 gallon) full tank.

1995 Cadillac DeVille

The 1995 Cadillac Deville was identified by the Vehicle Identification Number (VIN) 1G6KF52Y1SU (production sequence deleted). The date of manufacture was 3/95. The digital odometer could not be read due to damage to the electrical system. The four-door, front wheel drive sedan was equipped with a 4.9 liter V8 engine linked to a four speed automatic

transmission. The service brakes were a four-wheel disc system with ABS. The interior was configured for six passengers with bench style seating. The four outboard positions were equipped with manual lap and shoulder belts. The front and rear center positions were equipped with lap belts. The vehicle was also equipped with driver and front right passenger air bags that deployed as a result of the impact. The Cadillac was equipped with Cornell 1000 Radial A/S P225/60R16 tires. The specific measured tire data collected at the time of the SCI inspection was as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	Tire flat	5 mm (6/32)	Yes	None
LR	76 kPa (11 PSI)	6 mm (7/32)	No	None
RF	Tire flat	4 mm (5/32)	No	None
RR	Tire flat	5 mm (6/32)	No	None

Crash Site

This two-vehicle front-to-rear crash occurred during the nighttime hours of November 2007. At the time of the crash, it was dark with overhead street lighting. The weather was police reported as fog. There was no precipitation and the concrete road surface was dry. The crash occurred on a two-lane divided north/south road in a suburban commercial setting. The traffic flow in the respective directions was separated by a 15 cm (6 in) high curbed concrete median. There was an overpass in the area of the impact. North of the overpass, the road grade was a positive two percent. The speed limit in the area of the crash was 56 km/h (35 mph). **Figure 3** is a northward view along the roadway at the point of impact.

Figure 3: Northbound trajectory view at the POI.

Crash Sequence

Pre-Crash

The 2005 Ford CVPI was northbound on the inboard lane of the road traveling at a driver estimated speed of 48 km/h (30 mph). The police officer driver was restrained by the vehicle's manual safety belt and was the sole occupant in the vehicle. The 1995 Cadillac DeVille was also northbound on the inboard traffic lane. The Cadillac was driven by a 22 year old restrained female. This driver was intoxicated with a reported Blood Alcohol Content (BAC) above the legal limit. Approximately 400 m (1/4 mile) south of the area of the crash, another police officer was outside of his vehicle working a traffic stop. The stopped officer reportedly heard the

Cadillac approach and then observed it bypass his location at a high rate of speed. The officer reported that he heard the Cadillac accelerate away from his location.

Crash

The front plane of the Cadillac impacted the back plane of the Ford in an in-line 12/6 o'clock impact configuration. The point of impact and engagement were identified by a 0.6 m (2 ft) long gouge mark and 2 m (6 ft) long tire marks attributed to the rear undercarriage and rear tires of the Ford. The full frontal aspect of the Cadillac and full rear aspect of Ford were severely crushed. The fire started immediately after the impact. The police investigation documented burn marks on the inboard northbound lane 24 m (80 ft) north of the impact location. The northbound momentum of the Cadillac displaced the Ford forward in continuous engagement until the vehicles reached a common velocity. The Ford was deflected to the left and separated from the Cadillac with a counterclockwise (CCW) rotation. The Ford mounted the center median approximately 43 m (140 ft) north of the impact, crossed into the southbound traffic lanes and came to final rest on the west shoulder of the roadway. **Figure 4** is a post-impact trajectory view of the Ford. The vehicle came to rest facing eastward approximately 119 m (390 ft) north of the impact. The total rotation of the Ford measured 280 degrees.

Figure 4: Post-impact trajectory of the Ford.

The Cadillac continued northward after the separation of the Ford. The left front tire of the Cadillac became restricted due to the impact damage and induced a left steer to the vehicle. The police documented the post-impact trajectory of the Cadillac as it contacted the center median several times but did not mount it. The center median terminated at the intersection of the roadway with an interstate on-ramp. The Cadillac traversed through the intersection with a northwest trajectory as a result of the induced steer and began to rotate CCW. Refer to **Figure 5**. A fluid trail evidenced the vehicle's trajectory across the intersection. The Cadillac traveled into the northwest intersection quadrant and came to rest in the grass facing southward. The Cadillac came to rest approximately 204 m (670 ft) from the point of impact. A schematic of the crash developed by the police during their investigation is included at the end of this report as **Figure 23**.

Figure 5: Post-impact trajectory view of the Cadillac.

Post-Crash

Multiple police officers working traffic detail in the area of the crash witnessed the sound of the impact and observed the developing fire. These officers were reportedly on-scene within one to two minutes of the impact and summoned fire and ambulance personnel. Upon their arrival, the Ford CVPI was fully engulfed in flames.

Reportedly, the driver of the Ford CVPI recalled the force of the impact and the heat from the developing fire. He reported that he had released his seat belt and exited the vehicle through the front left door. The arriving police personnel found the subject driver approximately 46 m (150 ft) north of the burning CVPI with burns to his face, head, arms and legs. The driver was transported by ground ambulance to a local hospital and then transferred to a trauma center burn unit. The responding fire personnel extinguished the fire of the burning CVPI. The vehicle was burned approximately 80 percent. The Cadillac sustained disabling damage and was impounded by the investigating police department. The driver of the Cadillac exited the vehicle under her own power and was found wandering around the vehicle. She complained of neck and back pain as a result of the crash. She was transported to a local hospital, treated and released.

Exterior Damage

2005 Ford Crown Victoria

Figure 6 is the rear view of the damaged CVPI. **Figures 7 and 8** are the right lateral and left rear oblique views, respectively. The back plane of the Ford CVPI sustained severe direct and induced damage as a result of the impact. The direct contact began at the left rear bumper corner and extended 152 cm (62 in) to the right rear bumper corner. The dynamics and force of the impact fully compressed the volume of the trunk space forward and through the second row of the interior.

Figure 6: View of the Ford's damaged back plane.

The residual crush profile of the CVPI was documented along the rear bumper reinforcement bar and was as follows: C1 = 106 cm (41.7 in), C2 = 137 cm (53.9 in), C3 = 148 cm (58.3 in), C4 = 151 cm (59.4 in), C5 = 155 cm (61.0 in), C6 = 149 cm (58.7 in). The maximum crush measured 155 cm (61.0 in) and was located 46 cm (18 in) right of the centerline at C5. The trunk latch released during the impact and the lid was displaced forward through the backlight and into contact with the roof. The rear aspect of the roof buckled. The longitudinal deformation of the upper left and upper right corners of the roof measured 13 cm (5.3 in) and 25 cm (10.0 in), respectively. The right quarterpanel was completely buckled into the right C-pillar. The left wheelbase was reduced 30.4 cm (4.8 in). The right wheelbase was reduced 38 cm (15.1 in). The deformation and compression of the impact jammed the left rear, right front and right rear doors of the vehicle in the closed position. The front left door was opened by the driver post-crash. The left front door could not be relatched at the time of the SCI inspection due to body distortion. The fuel neck disengaged from the crushed left rear quarterpanel during the crash

sequence. There was no fuel leakage along the neck. The filler neck remained intact and was relatively undeformed.

The Collision Deformation Classification (CDC) of the Ford was 06-BDEW-6. The total delta V of the CVPI calculated by the Damage Algorithm of the WINSMASH model was 68.0 km/h (42.2 mph). The longitudinal and lateral components were 68 km/h (42.2 mph) and 0 km/h (0 mph), respectively. This calculation utilized the model's default stiffness coefficients. This calculation overestimated the severity of the crash based on SCI field experience. The overestimation resulted from the use of the default stiffness values relative to the extreme magnitude of the deformation (i.e. depth of crush).

Figure 7: Right lateral view of the deformation.

Figure 8: Left rear oblique view of the Ford.

The Ford Crown Victoria was equipped with a Restraints Control Module (RCM) located on the center tunnel within the occupant compartment. The RCM had Event Data Recording (EDR) capabilities. The module was removed from the Ford CVPI by the investigating police agency, reinstalled in an exemplar vehicle and download through the exemplar vehicle's Diagnostic Link Connector (DLC) with the Bosch Crash Data Retrieval (CDR) tool. The removal and download of the RCM took place prior to SCI involvement in this crash investigation.

The downloaded data is included at the end of this report as Attachment A. Although the RCM was designed to record frontal impact events, the severity of this rear impact signaled the module's crash algorithm. The recorded data indicated the driver's belt was buckled at the time of the recording. The recorded longitudinal velocity change was 60.3 km/h (37.5 mph) at 368 milliseconds after Algorithm Enable. The recorded velocity change was consistent with the dynamics of the impact.

1995 Cadillac DeVille

Figures 8 and 9 are the front and front right oblique views of the Cadillac. The vehicle's front plane sustained 157 cm (62 in) of direct contact damage that spanned the entire end width of the vehicle. The nature of the direct damage was indicative of an in-line front-to-rear impact configuration. The front fascia and reinforcement bar separated from the vehicle during the impact. The bumper reinforcement bar was attached to Energy Absorbing Devices (EAD's) fastened to the forward sub-frame of the vehicle. The residual crush of the Cadillac was documented at the EAD's and along the upper radiator support. The residual crush at the left and

right EAD's measured 69 cm (27.2 in) and 61 cm (24.0 in), respectively. Each EAD stroked its full 6 cm (2.5 in) depth and returned to its original length. The residual crush along the upper radiator support was as follows: C1 = 64 cm (25.2 in), C2 = 62 cm (24.4 in), C3 = 57 cm (22.4 in), C4 = 56 cm (22.0 in), C5 = 54 cm (21.3 in), C6 = 46 cm (18.1 in). All the doors remained closed during the impact and were operational post-crash. The windshield fractured during the impact. All side glazing and the backlight remained intact. The left front suspension deformed rearward and jammed the left front tire into the rear aspect of the wheel opening. The left wheelbase was reduced 18 cm (6.9 in). The right wheelbase was reduced 6 cm (2.4 in). There was no occupant compartment intrusion.

The CDC of the impact was 12-FDEW-3. The total delta V of the Cadillac calculated by the Damage Algorithm of the WINSMASH model was 69.0 km/h (42.9 mph). The longitudinal and lateral components were -69.0 km/h (-42.9 mph) and 0 km/h (0 mph), respectively. This calculated value was also overestimated due to the limitations of using the model's default stiffness values for the Ford Crown Victoria.

The Cadillac's driver and front right passenger air bags deployed as a result of the impact. The deployment of the air bags was commanded and controlled by a Sensing and Diagnostic Module (SDM) that was located under the driver's seat. The SDM had Event Data Recorder (EDR) capabilities. The data was downloaded by the investigating police with the Bosch CDR tool directly from the module. The vehicle's EDR recorded data that was related to this deployment event. The EDR data reported that the driver's safety belt was buckled at the time of the event and that the air bag deployment criteria was met 8.75 milliseconds after Algorithm Enable (AE). The EDR recorded a maximum delta V of -45 km/h (-28 mph), value rounded. This delta V was the maximum value that could be recorded by this module. Therefore, this reported value underestimated the Cadillac's actual velocity change in the impact. Refer to the Data Limitations Section of the EDR report. The downloaded data is attached to the end of this report as Attachment B. A crash reconstruction utilizing Conservation of Momentum Principles and velocity change data from the Ford RCM calculated a 56 to 63 km/h (35 to 39 mph) delta V for the Cadillac DeVille.

Figure 9: Front view of the Cadillac.

Figure 10: Front right oblique view.

Vehicle Interior – CVPI

The interior of the 2005 CVPI sustained extensive damage as a result of crash induced intrusion of the rear seat area and the resulting fire. The back of the vehicle was crushed to a depth of 155 cm (61 in) which collapsed the trunk and rear wall of the passenger compartment into the back seat. The frame of the rear seat back intruded forward, nearly consuming the entire rear seating positions, **Figure 11**. The longitudinal distance between the aft edge of the safety cage and the right seat back frame was 10 cm (4 in), and 18 cm (7 in) on the left side.

Figure 11: Intrusion of the right rear seat position.

The driver loaded the front seat back as he responded to the rearward direction of force. The driver's seat back frame appeared to have deflected in a slight clockwise direction with the left aspect of the seat back protruding forward. The driver's head loaded the head restraint which deflected the head restraint rearward. The fabric and padding of the head restraints were consumed by the fire; however, the angle of the upper frame was straightened and the right stalk was bowed, indicative of loading in the rearward direction.

The fire spread rapidly to the passenger compartment and consumed the majority of the flammable materials. Refer to **Figure 12.** The foam padding surrounding the perimeter of the safety cage was charred but remained in place. The rear seat fabric and padding was totally consumed. The upper third of the foam padding on the front seat backs was melted with approximately 50 percent of the fabric covering burned from the foam. The head restraint padding and fabric covering was completely consumed. The leading edge of the fabric on the seat cushions was burned. The soft-edged steering wheel rim was charred but intact. The instrument panel was severely melted and consumed by the fire. The driver and front right air bag modules did not deploy. Both cover flaps were distorted by the heat, but remained intact.

Figure 12: Burned/charred interior surfaces.

Air Bag Systems - CVPI

The 2005 Ford CVPI was equipped with Certified Advanced 208 Compliant (CAC) driver and front right passenger air bags. The air bag system in the Ford Crown Victoria was certified by the manufacturer to have met the requirements of the Federal Motor Vehicle Safety Standard 208. The system was controlled by a Restraints Control Module (RCM) that provided system diagnostics, crash sensing, and Event Data Recording (EDR) capabilities. The air bags did not deploy in this rear crash event, **Figure 13**. The EDR was mounted on the forward aspect of the center tunnel and was downloaded by the

Figure 13: Non-deployed front right air bag.

investigating police agency prior to this SCI investigation. The output was discussed in the Exterior Damage Section above. The downloaded EDR data is included at the end of this report as Attachment A. This CVPI was not equipped with the optional seat back mounted side impact air bag system.

Manual Safety Belt Systems – CVPI

The CVPI was equipped with manual 3-point lap and shoulder belt systems for the five designated seating positions. All of the belt systems were consumed by the fire. Based on an exemplar vehicle, the safety belt systems consisted of continuous loop webbings with sliding latch plates. The front belt systems were equipped with retractor pretensioners and adjustable D-rings. The driver's side was equipped with an Emergency Locking Retractor (ELR) while the remaining belt systems had switchable ELR/Automatic Locking Retractors (ALR). The driver stated to his Chief that he was restrained during the crash. The EDR recorded the buckled status of the driver's safety belt.

Fuel System – CVPI

The fuel system of the 2005 CVPI consisted of a 72 liters (19 gallon) steel tank that was positioned vertically between the forward wall of the trunk and the rear axle. The tank was a clam-shell design consisting of two halves that were welded around the perimeter seam. The overall dimensions of the tank were approximately 53 cm (21 in) in height and 114 cm (45 in) in width with a depth of approximately 20 cm (8 in). The tank was retained in the vehicle by two conventional steel tank straps. The filler tube was mounted on the left rear quarter panel aft of the rear axle and extended through the rear edge of the inner wheel opening and into the left side of the tank. The tube was secured to the tank with a rubber grommet. Fuel was pumped from the tank by an internally mounted electric pump/sending unit that was affixed to the forward wall of the tank at the mid upper third area. The tank opening for the pump was 11 cm (4.5 in) in diameter. A 17 cm (6.5 in) diameter retainer ring was crimped into the perimeter of the tank opening and six bolts secured the pump flange to the tank flange. Two plastic valves were mounted via rubber grommets to the top aspect of the tank.

The tank was shielded from undercarriage components by a factory installed shield kit. The shields consisted of rubberized protectors over the lower aft mounting point of the tank straps. Fiberglass shields were positioned over the axle mounted sway bar brackets and fastened with two band clamps. A rubberized shield was positioned over the lower differential cover bolts. There were no additional aftermarket shielding or fire suppression systems on the vehicle.

Fuel Tank Inspection and Removal

The CVPI was stored in a repair facility of the municipality in a bay without a hydraulic floor lift. The vehicle was in its unaltered post-crash condition and it was not feasible to move the vehicle to another bay with a lift. The SCI team and mechanical staff decided to roll the vehicle onto its right side to safely inspect and remove the fuel tank from the vehicle. This was accomplished by using the hydraulic bucket of an articulated front-end loader. Chains were connected to the axle positions and the loader was used to lift and roll the vehicle onto the right side, **Figure 14.** The CVPI was stabilized with a floor jack and small tow motor. A municipal mechanic was available to cut the necessary components using a reciprocating saw and a cutting torch.

The initial inspection of the undercarriage revealed that the back wall of the fuel tank was crushed by the forward wall of the trunk and against the differential housing. The tank was intact, held in place by the tank straps. The filler tube remained intact and positioned in the tank and at the filler-door location. A positioning bracket attached to the inner fender held the tube in place. No visible punctures of the tank were visible. The fuel pump sending unit was dislodged from the tank and rotated 180 degrees. Refer to **Figure 15**. The unit was held in place by the external braided stainless steel fuel lines. The retainer ring was secured to the pump/sending unit flange by the six bolts.

Figure 14: CVPI positioned on its right side.

Figure 15: Separated fuel pump/sending unit.

Numerous damaged and displaced undercarriage components required removal to fully view and remove the fuel tank. The tank was secured in position by the tank straps and the deformation of the vehicle. The dual exhaust mufflers and tail pipes were cut from the vehicle to access the tank. The aluminum driveshaft fractured at the rear yoke and was jammed into the tailstock of the transmission. The shaft was cut at the mid point of the vehicle. The rear coil springs were displaced from the mounting points and were removed by hand. The rear upper shock mounts separated from the frame mount. Next, the rear sway bar was cut from the vehicle along with the emergency brake cables. The axle was secured to the frame of the CVPI with a chain as the rear suspension arms were cut. The chain was removed and the rear axle was manually lowered to the floor of the facility.

Figure 16: Fuel tank with surrounding components removed.

With the axle removed, the forward wall of the fuel tank was in full view, **Figure 16**. The forward wall and bottom aspect of the tank did not exhibit perforations or penetration of the tank. The sending unit mounting point was deformed to a slight oval shape.

The fuel tank straps were cut at the bottom mounts and removed. The braided fuel lines were cut and the pump/sending unit removed. The tank was captured by the displacement of the left frame rail. The mechanic used a cutting torch to cut the rail at the axle arch and the rail was pushed outward to free the tank. The tank was removed and less than 1 liter (1 qt) of gasoline remained in the tank.

Fuel Tank Damage

The deformed sending unit opening measured 13x11 cm (5.25x4.25in). The crimp edge was deformed with an outward bowing at the upper right aspect of the opening, **Figures 17 and 18**. As the tank deformed and as the internal pressure increased (hydraulic pressure), the sending unit separated from the tank. The sending unit deformed during the separation, **Figure 19.** The bottom aspect of the tank was crushed to near full-thickness. The mid area of the tank at the sending unit opening was 18 cm (7 in) in depth while the left side remained near original at 20 cm (8 in) in depth. A 2.5 cm (1 in) cut from the left tank strap was noted to the top aspect of the tank and was 17 cm (6. 5 in) inboard of the left edge.

Two additional holes were noted to the upper rear wall of the tank, **Figure 20**. The first hole was slightly elongated with a maximum diameter of approximately 0.6 cm (0.25 in) and was located 2 cm (0.75 in) left of the centerline and 10 cm (3.75 in) below the top aspect of the tank. The second hole was approximately 5 mm (3/16 in) in diameter and was located 29 cm (11.25 in) right of center and 13 cm (5.25 in) below the top surface. A close inspection of the forward wall of the trunk revealed eight puncture holes. These punctures originated in the trunk with two of the holes matching the tank penetrations. The spacing of the trunk punctures measured approximately 8 cm (3.25 in). It was determined that the source of these punctures was the Stop Stick tire puncture system that was positioned laterally in the trunk and crushed against the forward wall of the trunk. There was no other damage or punctures of the tank.

The rubber grommet for the filler tube was charred but intact. The left valve of the top of the tank was melted but intact with no evidence of fuel leakage. The right valve was completely burned; however, the grommet remained in place within the 2 cm (13/16 in) opening.

Figure 17: Deformed sending unit port.

Figure 18: View across the deformation of the sending unit port.

Figure 19: Deformation to the sending unit.

Figure 20: View of the rear wall of the fuel tank.

Driver Data/Demographics

Driver – CVPI

Age/Sex:	48-year old/Male
Height:	180 cm (71 in)
Weight:	75 kg (165 lb)
Seat Track Position:	Rearward
Safety Belt Use:	3-point lap and shoulder belt system
Usage Source:	Driver statements, EDR
Egress from Vehicle:	Exited the left front door unassisted
Type of Medical Treatment:	Transported to a regional trauma center where he was admitted for treatment of his burns

Driver Injuries

Injury	Injury Severity (AIS 98 Update)	Injury Source
Thermal burns over both lower extremities into subcutaneous tissue, burns of both forearms, face, corneas, and scalp.	Severe (992024.4,0)	Crash-induced fire

Police reported

Driver Kinematics

The driver was seated in an unknown posture with the seat track adjusted to a rear track position and the head restraint adjusted above the top of the seat back. He was restrained by the 3-point lap and shoulder belt system. The source of restraint use was statements made by the driver to the Police Chief. The driver was dressed in his police uniform and was wearing a bullet-proof vest and his utility belt.

The driver responded to the 6 o'clock direction of force impact by initiating a rearward trajectory with respect to the accelerated vehicle. His back loaded the seat back that was reinforced by the placement of the passenger safety cage, **Figure 21**. His loading force was distributed over a

wide body area which mitigated potential injury. The driver's head loaded the adjustable head restraint. Although the fabric and padding was burned from the head restraint, the frame and inboard stalk of the head restraint was deformed rearward. The angle of the upper frame was altered by the loading and the inboard stalk was bowed, indicative of rearward movement, **Figure 22**. The head restraint was backed by the safety cage and protected the driver's head and neck from possible injury.

Figure 21: Interior view and driver's rearward trajectory.

Figure 22: Driver loading deformation of the head restraint frame.

The Cadillac crushed the rear of the CVPI and the fuel tank which compressed the fuel in the tank that contributed to the separation of the fuel pump sending unit from the tank. The crash-induced fire ensued which engulfed the CVPI as it was displaced forward by the Cadillac. As the CVPI came to rest, the driver unbuckled his safety belt, opened the driver's door and exited the vehicle unassisted. He was able to move away from the vehicle as he remained conscious on the roadside. During the post-crash trajectory of the CVPI, the driver sustained thermal burns of both thighs that extended into the subcutaneous tissue, burns over the forearms, face and scalp. In addition to the facial burns, the driver sustained burns of the corneas.

He was transported by ground ambulance to a local hospital and then transferred to a regional trauma center where he was admitted for treatment of his burns. He was released from the hospital 48 days after the crash.

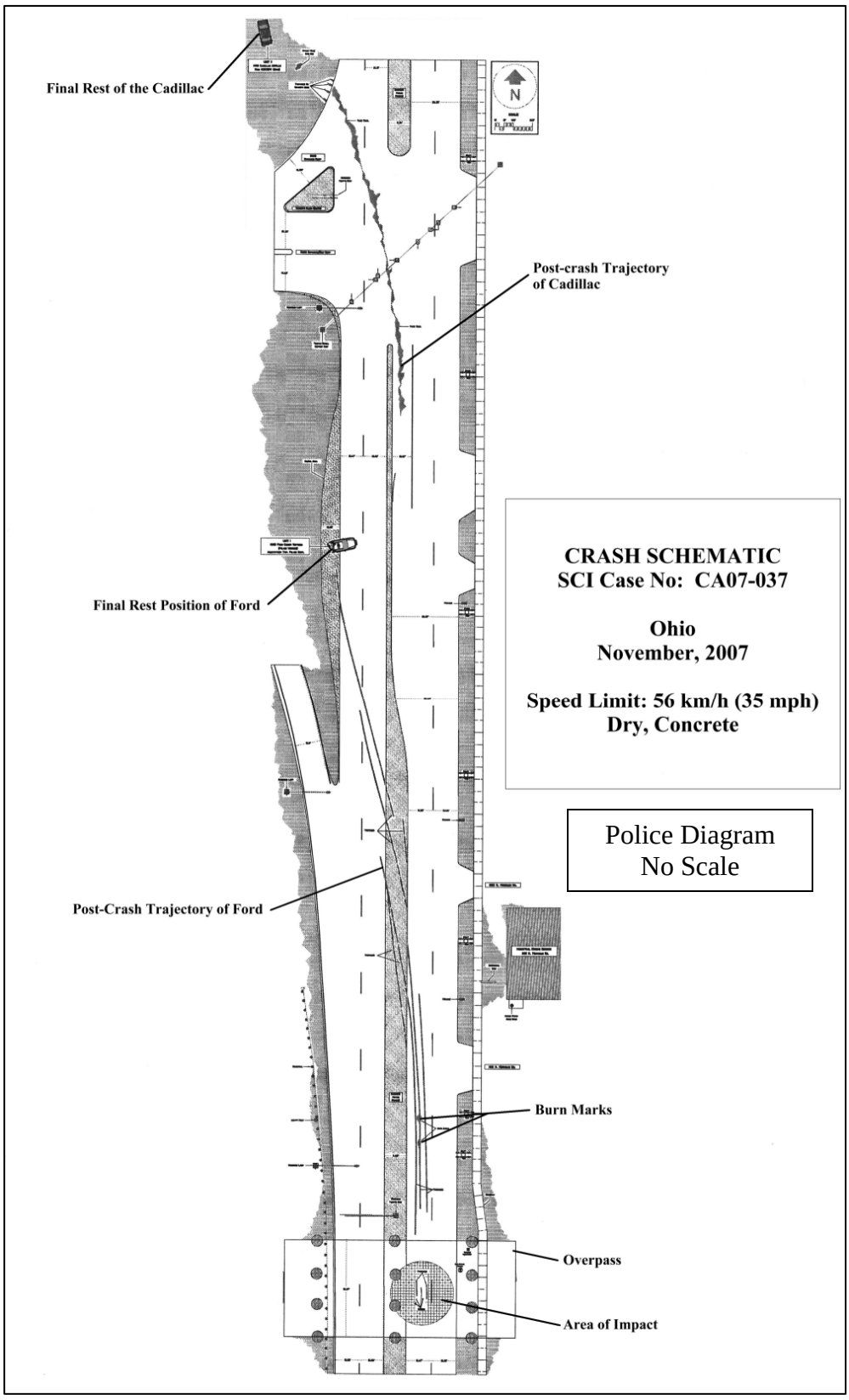


Figure 23: Crash schematic.

ATTACHMENT A

Ford EDR Data

CDR File Information

Vehicle Identification Number	2FAFP71W05X******
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	FORD CDR DATA.CDR
Saved on	Wednesday, November 28 2007 at 04:19:18 PM
Collected with CDR version	Crash Data Retrieval Tool 2.900
Reported with CDR version	Crash Data Retrieval Tool 2.900
Event(s) recovered	Frontal trigger event Side trigger event

Module Information

"Limitations that are important for users of the Vetronix Crash Data Retrieval (CDR) tool on this Ford product to know"

Disclaimer: Ford Motor Company Restraint Control Modules (RCM's) were designed to record deceleration data for the purpose of understanding the approximate input data the Restraint Control Module used to determine whether or not to deploy restraint devices. Ford Motor Company RCM's were not designed for the purpose of assisting accident reconstructionists. Ford RCM modules do not record vehicle speed, throttle position, brake on-off, and other data desired by accident reconstructionists, which may be recorded in some 1999 model year and later General Motors modules. There is a second module in the vehicle, the Powertrain Control Module (PCM) which may record vehicle speed, brake, and throttle information. Proper precautions must be taken when reading the RCM not to spoliate the data in the PCM. Those precautions are discussed later in this document.

The time series deceleration data recorded by Ford's module during a crash is mathematically integrated into a partial Delta V by the Vetronix tool. Delta_V is the change in velocity during the recording time and is NOT the speed the vehicle was traveling before the accident.

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, momentum analysis. 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

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 written to NVM (non-volatile memory). 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 limited backup power for recording.

2. If there are no deployment times recorded, but airbags or other restraint devices are observed to have deployed, the recorded data that you read after that event are most likely from a prior event. This module family does utilize backup power left over after any deployment to attempt to record information from the crash, and is much more likely to get a recording than prior modules, but it is still theoretically possible that there may not be any recording from a new event in which power is lost.

3. The recorded Delta V may understate the total Delta_V

* This module has two different displays with Delta V information. The cumulative longitudinal Delta V shown in the system status section of the report reflects the change in forward velocity that the sensing system experienced from the point of algorithm entry to algorithm exit. The cumulative longitudinal Delta V may understate the Delta V slightly because the algorithm does not begin until the deceleration reaches a pre-specified level of approximately 2 G's, so the first one or two milliseconds of actual Delta V may not be included in the total.
* If the acceleration levels measured exceed the sensor range of +/- 40G's, the data may be clipped and the area under the curve beyond +/-40G's will not be integrated in to the cumulative Delta V.
* In addition to the cumulative Delta V, this module records and displays a time series up to 192 data points of longitudinal vehicle acceleration at 0.8 millisecond intervals from which a partial Delta V is calculated and displayed. The 192 data points consist of 64 data points post deployment, 1 at deployment, and 127 prior to deployment. Depending upon the time from algorithm wake up to deployment, the duration of the data in the graph may not be sufficient to reach the maximum or final Delta V of the collision.
* The cumulative longitudinal Delta V is more likely to represent the Delta V of the complete crash because it will typically be over a longer duration. The purpose of looking at the graph is to determine if the G level exceeded the sensor range of +/- 40G's which would lead to under or over reporting Delta V.

* The cumulative longitudinal Delta V is not the total resultant Delta V in anything other than a pure frontal collision. If the collision is angular, you must determine the Principal Direction of force and divide by the cosine of the PDOF angle from frontal to get the total resultant Delta V. If there was a pitch angle, the pitch angle cosine must similarly be used to get the resultant.

4. Event Recording Complete will indicate if data from the recorded event has been fully written to the RCM memory or if it has been interrupted and not fully written. Even if the event Recording Complete is “no”, the data may still be valid. In general, fields with nonzero data written in them have been written successfully. The exception is passenger airbag occupant classification, which when unwritten displays “empty”.

5. The module may not record any lateral or longitudinal 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 both longitudinal and lateral deceleration.

6. 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 a connector to plug directly into the restraint control module. The Vetronix CDR RCM Interface Cable connects only power, ground, and memory readout pins to the relevant vehicle restraint control module. The other pins normally connected to inputs, like sensors, and outputs, such as airbags, are not connected to anything when you use the RCM Interface Cable connector to plug directly into the module. Since the vehicle restraint control module is constantly monitoring airbag system readiness, it will detect that the connection to the input sensors and output airbags has been lost. The restraint control module will write a new diagnostic trouble code into memory for each device that is not connected. These new diagnostic trouble codes could potentially overwrite 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 be charged with evidence spoliation in any litigation that may arise out of the accident. If you cannot read the module out through the diagnostic link connector, and if you suspect improper system performance, contact Ford Motor Company and request their assistance to read the module out with a proper vehicle simulator attached. If you choose to read out through the module small 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.

Powertrain Control Module Data Spoliation Cautions:

When reading the RCM users must use caution to not spoil data in the PCM. This Restraint Control Module does NOT record vehicle speed, braking, or throttle inputs prior to or during a collision event. There is a Powertrain Control Module (PCM) in this vehicle which records vehicle speed, brake, throttle angle and other parameters in a Data Recording Device (DRD), an EEPROM chip, whenever the key is in the run position. The PCM is intended to lock the recording if an airbag or safety belt pre-tensioner has deployed, and the vehicle data bus stays up long enough for the deploy signal from the RCM to reach the PCM. If the deploy signal has not reached the PCM and the PCM is powered, the DRD data can be overwritten by new data. If there is any doubt as to the PCM deployment lock status, the user must proceed with the understanding that the data may not be locked and could be overwritten if key power is turned on. It is recommended that the PCM not be key powered until it the EEPROM memory can be properly read out by a special procedure that prevents data from being overwritten. Vetronix is currently developing the ability to read the PCM. If a PCM must be read before the public Vetronix tool is available, contact the Ford Motor Company in writing to Office of the General Counsel, 1400 Parklane Towers West, Dearborn, MI 48126 Attention: third party request attorney.

The PCM also has a diagnostic trouble code history is kept in Keep Alive Memory (KAM). KAM is a form of RAM memory powered directly from the battery and is preserved as long as there is battery power to the PCM (the ignition key does not have to be on). If all power is removed from the PCM or the PCM exits flash mode after reading the Data Recording Device, KAM is cleared. The reader must make a judgment as to which data, DRD or KAM, is more likely to provide useful data for the situation at hand.

It has been Ford’s experience that the DRD data is more useful than the KAM data when:
1. The airbag has deployed and it is likely that the DRD is locked and has data
2. Power was lost in the crash and KAM is already cleared due to power loss
3. Power has been depleted subsequent to the crash and KAM is already lost.
4. Crash damage makes it likely there are multiple codes in KAM due to accident damage which were not likely to be present before the crash, where it is difficult to isolate codes present before the crash that may have contributed to the cause of the crash.
The KAM data may be more valuable when:
1. There has been no airbag deployment and it is likely the key has been left on after the event such that no useful data is likely to remain in the DRD.

If there is insufficient information to make a judgment per the above, Ford’s experience is that the DRD data is more likely to have significance, and that it is better to prioritize reading the DRD data first. To preserve the DRD data, unplug the PCM connectors while the RCM is being read.

Airbag Module Data Sources:

* All RCM recorded data is measured, calculated, and stored internally, sensors external to the RCM include the following:
o The Driver and Passenger Belt Switch Circuits are wired directly to the RCM.
o The Driver's Seat Track Position Switch Circuit is wired directly to the RCM.
o The Side Impact Sensors (if equipped) are located at the base of the B-pillars and are wired directly to the RCM.
o The Occupant Classification Sensor is located in the front passenger seat and transmits data directly to the RCM on a dedicated high-speed CAN bus.
o Front Impact Sensors (right and left) are located on top of radiator support bracket.

System Status at Time of Data Retrieval

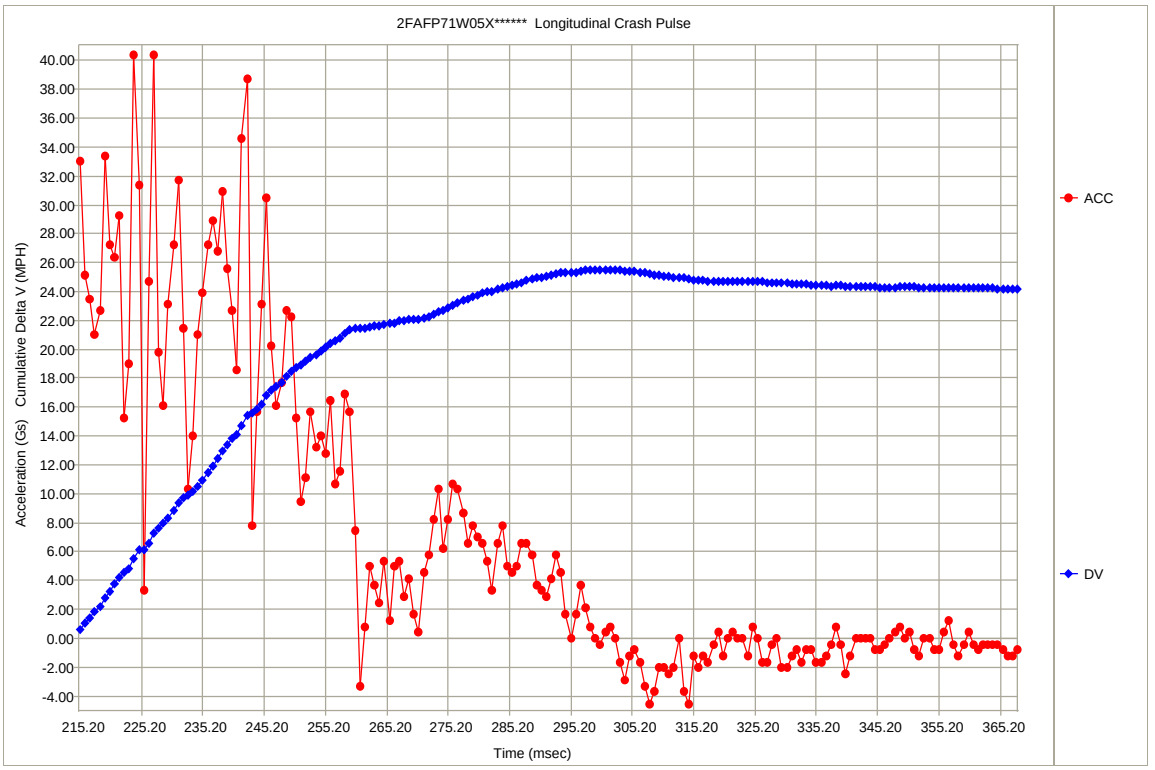
Vehicle Identification Number	2FAFP71W05X******
Module Serial Number	050150L5
Restraints Control Module Part Number	5W73-14B321-EB
Restraints Control Module Software Version Number	0
Restraints Control Module Software Date	July 12, 2004
Longitudinal Velocity Change (MPH)	37.49
Longitudinal Velocity Change (msec)	368
Deployment Counter	0
Restraints System Faults Present at time of read out.	Yes

System Status At Frontal Trigger Event

Ignition Cycle Key On Timer at Start of Frontal Event	8008
Driver's Belt Switch Circuit Status	Buckled
Passenger's Belt Switch Circuit Status	Unbuckled
Driver seat forward of switch point	Rearward
Passenger occupant classification status	Occupied Disable
Frontal Event Record Locked	No
Frontal Event Recording Complete	Yes

System Status At Side Trigger Event

Ignition Cycle Key On Timer at Start of Side Event	1994
Driver's Belt Switch Circuit Status	Buckled
Passenger's Belt Switch Circuit Status	Unbuckled
Driver seat forward of switch point	Rearward
Passenger occupant classification status	Occupied Disable
Side Event Record Locked	No
Side Event Recording Complete	No


2FAFP71W05X****** Longitudinal Crash Pulse
Acceleration (Gs) Cumulative Delta V (MPH)
40.00
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
215.20
225.20
235.20
245.20
255.20
265.20
275.20
285.20
295.20
305.20
315.20
325.20
335.20
345.20
355.20
365.20
Time (msec)
ACC
DV

Crash Pulse Data

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
215.2	32.99	0.58
216.0	25.15	1.02
216.8	23.50	1.43
217.6	21.03	1.80
218.4	22.68	2.20
219.2	33.40	2.79
220.0	27.22	3.26
220.8	26.39	3.73
221.6	29.28	4.24
222.4	15.26	4.51
223.2	18.97	4.84
224.0	40.41	5.55
224.8	31.34	6.10
225.6	3.30	6.16
226.4	24.74	6.59
227.2	40.41	7.30
228.0	19.79	7.65
228.8	16.08	7.93
229.6	23.09	8.34
230.4	27.22	8.81
231.2	31.75	9.37
232.0	21.44	9.75
232.8	10.31	9.93
233.6	14.02	10.17
234.4	21.03	10.54
235.2	23.92	10.96
236.0	27.22	11.44
236.8	28.87	11.95
237.6	26.80	12.42
238.4	30.93	12.96
239.2	25.57	13.41
240.0	22.68	13.81
240.8	18.56	14.13
241.6	34.64	14.74
242.4	38.76	15.42
243.2	7.83	15.56
244.0	15.67	15.83
244.8	23.09	16.24
245.6	30.51	16.77
246.4	20.21	17.13
247.2	16.08	17.41
248.0	17.73	17.72
248.8	22.68	18.12
249.6	22.27	18.51
250.4	15.26	18.78
251.2	9.48	18.95
252.0	11.13	19.14
252.8	15.67	19.42
253.6	13.20	19.65
254.4	14.02	19.89
255.2	12.78	20.12
256.0	16.49	20.41

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
256.8	10.72	20.60
257.6	11.55	20.80
258.4	16.91	21.10
259.2	15.67	21.37
260.0	7.42	21.50
260.8	-3.30	21.44
261.6	0.82	21.46
262.4	4.95	21.54
263.2	3.71	21.61
264.0	2.47	21.65
264.8	5.36	21.75
265.6	1.24	21.77
266.4	4.95	21.85
267.2	5.36	21.95
268.0	2.89	22.00
268.8	4.12	22.07
269.6	1.65	22.10
270.4	0.41	22.11
271.2	4.54	22.19
272.0	5.77	22.29
272.8	8.25	22.43
273.6	10.31	22.61
274.4	6.19	22.72
275.2	8.25	22.87
276.0	10.72	23.06
276.8	10.31	23.24
277.6	8.66	23.39
278.4	6.60	23.50
279.2	7.83	23.64
280.0	7.01	23.77
280.8	6.60	23.88
281.6	5.36	23.98
282.4	3.30	24.03
283.2	6.60	24.15
284.0	7.83	24.29
284.8	4.95	24.37
285.6	4.54	24.45
286.4	4.95	24.54
287.2	6.60	24.66
288.0	6.60	24.77
288.8	5.77	24.87
289.6	3.71	24.94
290.4	3.30	25.00
291.2	2.89	25.05
292.0	4.12	25.12
292.8	5.77	25.22
293.6	4.54	25.30
294.4	1.65	25.33
295.2	0.00	25.33
296.0	1.65	25.36
296.8	3.71	25.42
297.6	2.06	25.46
298.4	0.82	25.47
299.2	0.00	25.47
300.0	-0.41	25.47

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
300.8	0.41	25.47
301.6	0.82	25.49
302.4	0.00	25.49
303.2	-1.65	25.46
304.0	-2.89	25.41
304.8	-1.24	25.39
305.6	-0.82	25.37
306.4	-1.65	25.34
307.2	-3.30	25.29
308.0	-4.54	25.21
308.8	-3.71	25.14
309.6	-2.06	25.10
310.4	-2.06	25.07
311.2	-2.47	25.02
312.0	-2.06	24.99
312.8	0.00	24.99
313.6	-3.71	24.92
314.4	-4.54	24.84
315.2	-1.24	24.82
316.0	-2.06	24.79
316.8	-1.24	24.76
317.6	-1.65	24.74
318.4	-0.41	24.73
319.2	0.41	24.74
320.0	-1.24	24.71
320.8	0.00	24.71
321.6	0.41	24.72
322.4	0.00	24.72
323.2	0.00	24.72
324.0	-1.24	24.70
324.8	0.82	24.71
325.6	0.00	24.71
326.4	-1.65	24.68
327.2	-1.65	24.66
328.0	-0.41	24.65
328.8	0.00	24.65
329.6	-2.06	24.61
330.4	-2.06	24.58
331.2	-1.24	24.55
332.0	-0.82	24.54
332.8	-1.65	24.51
333.6	-0.82	24.50
334.4	-0.82	24.48
335.2	-1.65	24.45
336.0	-1.65	24.42
336.8	-1.24	24.40
337.6	-0.41	24.40
338.4	0.82	24.41
339.2	-0.41	24.40
340.0	-2.47	24.36
340.8	-1.24	24.34
341.6	0.00	24.34
342.4	0.00	24.34
343.2	0.00	24.34
344.0	0.00	24.34

Milliseconds	Long. Acceleration (Gs)	Long. Cumulative Delta V (MPH)
344.8	-0.82	24.32
345.6	-0.82	24.31
346.4	-0.41	24.30
347.2	0.00	24.30
348.0	0.41	24.31
348.8	0.82	24.32
349.6	0.00	24.32
350.4	0.41	24.33
351.2	-0.82	24.32
352.0	-1.24	24.29
352.8	0.00	24.29
353.6	0.00	24.29
354.4	-0.82	24.28
355.2	-0.82	24.26
356.0	0.41	24.27
356.8	1.24	24.29
357.6	-0.41	24.29
358.4	-1.24	24.26
359.2	-0.41	24.26
360.0	0.41	24.26
360.8	-0.41	24.26
361.6	-0.82	24.24
362.4	-0.41	24.24
363.2	-0.41	24.23
364.0	-0.41	24.22
364.8	-0.41	24.21
365.6	-0.82	24.20
366.4	-1.24	24.18
367.2	-1.24	24.16
368.0	-0.82	24.14

Hexadecimal Data

```
0000:  30 30 30 32 46 41 46 50 37 31 57 30 35 58 31 36
0010:  31 35 31 34 03 BB F5 00 60 C0 00 00 F8 29 05 7A
0020:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0030:  0E 22 0E 2B 39 56 0A 12 03 CC 30 B0 07 0D 26 BC
0040:  BC BC BC 0D 20 20 BC BC BC BC BC BC BC BC BC 00
0050:  00 00 BC BC BC 05 80 35 57 37 33 08 01 CE 1C C4
0060:  09 32 00 BA FF DB FD 7C 01 EF 61 56 1D EF 61 56
0070:  1D 41 43 31 33 38 35 42 20 20 20 20 20 AD A8 94
0080:  8F 55 50 42 3E 62 41 00 00 00 E8 FF 87 ED 4F FC
0090:  0F C0 02 20 10 08 04 00 00 00 00 00 C0 FF 0F C0
00A0:  00 00 00 06 00 00 00 00 30 01 88 8B 73 29 19 02
00B0:  30 01 88 8B 73 29 19 02 20 01 88 8B 73 29 19 02
00C0:  20 01 88 8B 73 29 19 02 BC AF 00 00 00 00 00 00
00D0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00E0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00F0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0100:  00 00 30 35 30 31 35 30 4C 35 30 30 34 39 45 39
0110:  41 36 30 30 34 39 46 30 35 39 00 00 00 00 00 00
0120:  00 00 00 00 00 00 00 00 00 00 48 76 66 69 07 62
0130:  61 74 22 19 1F 01 A6 02 00 00 80 6B 21 00 00 00
0140:  21 00 25 00 00 00 03 00 97 02 00 00 00 00 02 81
0150:  84 6C 21 00 00 00 21 00 25 00 00 00 03 00 97 02
0160:  00 00 00 00 02 81 4F FF 24 19 1F 01 02 00 24 19
0170:  1F 01 02 00 00 00 00 00 00 00 01 00 C3 8F 28 19
0180:  1F 01 06 00 28 19 1F 01 06 00 00 00 00 00 00 00
0190:  01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01A0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01B0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01C0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01D0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01E0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01F0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0200:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0210:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0220:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0230:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0240:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0250:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0260:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0270:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0280:  00 00 00 00 00 00 00 00 00 00 00 00 00 80 00 00
0290:  00 00 00 00 00 00 00 00 00 00 00 00 08 00 00 00
02A0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 11
02B0:  00 00 00 00 00 00 00 00 00 00 00 00 CC CC 00 00
02C0:  AA F0 7F 03 33 41 42 39 38 39 38 44 20 00 00 00
02D0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02E0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02F0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0300:  00 01 0A 02 02 01 00 01 00 02 00 06 00 14 01 00
0310:  00 00 00 05 06 04 01 02 05 05 04 06 23 00 00 00
0320:  CC 01 F2 00 00 00 00 00 55 00 00 00 E8 03 00 05
0330:  25 02 C0 01 C2 33 C4 00 C0 01 44 00 A0 00 1F 03
0340:  13 01 C8 00 7F 03 19 00 9A 01 FE FF 82 00 B9 00
0350:  EA 01 20 03 8F 01 84 03 D0 07 20 03 FE FF E8 03
0360:  F4 01 85 00 64 00 1E 00 BD 00 BD 00 00 00 07 07
0370:  08 00 00 04 03 03 00 00 A5 00 79 00 00 07 00 05
0380:  DF 00 8F 01 17 02 F9 00 BB 02 F0 00 8F 01 96 00
0390:  54 01 E8 03 62 0E 26 E2 00 00 00 00 00 00 00 00
03A0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03B0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03C0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03D0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
03E0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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03F0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0400:  00 01 07 08 02 00 00 00 00 00 00 04 04 05 05 05
0410:  05 06 03 05 06 01 01 01 70 01 02 02 6D 00 00 01
0420:  00 01 00 02 00 01 00 01 00 01 00 01 64 00 31 00
0430:  A0 00 00 00 64 00 00 00 00 00 31 00 00 00 64 00
0440:  C8 00 FA 00 3F 01 82 00 82 00 C7 00 4A 01 64 00
0450:  A5 00 93 00 93 00 64 00 2C 01 2C 01 5E 01 20 03
0460:  90 01 C8 00 04 01 14 05 DC 00 4A 01 2C 01 96 00
0470:  00 00 AF 00 D0 02 90 01 DC 00 2C 01 58 02 4F 01
0480:  B0 04 EE 02 58 02 90 01 C8 00 90 01 4B 00 6E 00
0490:  C8 00 90 01 F4 01 C2 01 90 01 E0 15 00 00 84 03
04A0:  8A 02 E8 03 02 BE 00 00 00 00 00 00 00 00 00 00
04B0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
04C0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
04D0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
04E0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
04F0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0500:  00 01 08 01 01 01 05 04 04 07 06 04 05 01 1D 00
0510:  00 01 00 18 00 01 00 00 00 00 00 00 00 00 03 00
0520:  34 03 ED 01 20 03 A4 01 57 01 4A 04 02 02 BC 02
0530:  F4 01 DB 00 F0 00 82 00 F4 01 FA 00 44 00 FA 00
0540:  FA 00 17 C8 03 70 86 00 00 00 00 00 00 00 00 00
0550:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0560:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0570:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0580:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0590:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
05A0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
05B0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
05C0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
05D0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
05E0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
05F0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0600:  C2 5C 60 57 65 63 56 59 6D 87 7D 73 76 79 72 7C
0610:  73 72 78 75 7B 7E 74 71 6B 66 70 6B 65 66 6A 6F
0620:  6C 6E 6F 72 77 6F 6C 73 74 73 6F 6F 71 76 77 78
0630:  75 71 74 7B 7F 7B 76 7A 7D 7F 80 7E 7D 7F 83 86
0640:  82 81 83 87 8A 88 84 84 85 84 7F 88 8A 82 84 82
0650:  83 80 7E 82 7F 7E 7F 7F 82 7D 7F 83 83 80 7F 84
0660:  84 82 81 83 81 81 83 83 82 80 7D 80 85 82 7F 7F
0670:  7F 7F 81 81 80 7F 7E 7D 7F 7E 81 82 7F 7F 81 81
0680:  7E 7C 80 82 80 7E 80 81 80 80 80 80 81 82 82 81
0690:  2F 42 46 4C 48 2E 3D 3F 38 5A 51 1D 33 77 43 1D
06A0:  4F 58 47 3D 32 4B 66 5D 4C 45 3D 39 3E 34 41 48
06B0:  52 2B 21 6C 59 47 35 4E 58 54 48 49 5A 68 64 59
06C0:  5F 5D 7E 7F 7F 7F 7F 7F 7F 7E 7E 7E 7E 7E 7E 7E
06D0:  7E 7E 7E 7E 7E 7E 7E 7F 80 80 80 7F 7E 6C 69 68
06E0:  6B 6F 73 7A 7E 7E 7E 7B 76 72 70 6D 6E 75 78 7D
06F0:  80 82 80 77 71 6F 6F 71 73 78 7D 80 83 80 7B 79
0700:  75 6C 65 67 6C 6D 6F 73 7F 83 80 80 81 80 79 76
0710:  71 71 71 72 76 7C 81 80 7F 7E 7B 78 76 74 74 77
0720:  7A 7C 7B 77 76 74 71 6F 6E 6E 72 79 7B 7C 7E 82
0730:  83 81 7D 7B 77 75 71 74 79 7C 80 84 85 85 80 7B
0740:  76 74 72 73 76 78 7D 81 84 85 84 80 7B 76 75 74
0750:  74 76 77 7C 81 82 81 7E 7B 77 75 74 75 79 7B 7E
0760:  82 82 81 7E 7C 78 76 76 77 7B 7E 80 82 83 82 81
0770:  7D 7A 79 7A 7B 7C 7E 80 82 82 81 80 7E 7D 7C 7C
0780:  7E 80 80 80 81 80 7E 7D 7D 7E 7F 7F 7E 7F 81 80
0790:  7F 7E 80 81 81 80 80 81 80 7D 7D 7F 80 80 82 84
07A0:  85 83 80 7E 7D 7D 7C 7D 80 81 82 82 81 80 7E 7C
07B0:  7B 7B 7C 7E 80 82 84 83 81 80 7C 7A 79 7A 7B 7E
07C0:  81 83 84 83 80 7E 7C 7B 7A 7B 7C 7E 81 82 82 81
07D0:  7F 7D 7C 7B 7C 7D 7E 80 81 82 81 80 7E 7C 7C 7C
07E0:  7D 7E 80 80 81 80 7E 7E 7D 7C 7C 7C 7D 7D 7E 7F
07F0:  7F 7F 7F 7F 7F 7F 7E 7E 7E 7F 7F 7F 7F 7F 7F 7E
0800:  7E 7E 7E 7E 7E 7E 7F 7F 7F 80 80 7F 7F 7E 7E 7E
0810:  7E 7E 80 7F 7F 7F 7E 7E 7E 7E 7E 7E 7E 7F 7F 7F
```

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0820:  7E 7E 7D 7D 7E 7E 7E 7F 80 80 80 7E 7E 7C 71 6D
0830:  69 68 69 6C 78 84 8C 8E 8D 80 75 6F 67 67 6D 71
0840:  7C 8A 91 8F 84 75 68 64 61 63 6E 74 7E 82 82 7B
0850:  75 69 62 67 6C 7C 82 83 7E 73 63 61 67 76 84 86
0860:  84 7F 79 6E 6A 6D 75 7D 7F 84 86 84 7C 78 73 6F
0870:  70 73 79 7C 7C 7C 7C 78 75 74 73 71 70 70 76 80
0880:  84 84 7F 7D 7A 78 76 76 78 7A 7B 7E 82 81 7F 7A
0890:  75 74 75 77 7A 7C 7D 7F 7D 7B 7A 78 75 74 75 7B
08A0:  7F 80 7E 7C 79 77 76 76 75 76 79 7A 7C 7E 7E 7E
08B0:  7C 7B 7A 7A 7B 7C 7E 7F 80 80 7F 7F 7C 7A 7A 7A
08C0:  7B 7D 80 80 80 81 81 80 80 7E 7D 7D 7D 7D 7D 7E
08D0:  7F 80 80 80 80 80 7E 7E 7E 7F 7F 7E 7E 80 82 81
08E0:  7F 80 83 83 81 7E 7D 7D 7D 7D 7D 7E 80 81 80 80
08F0:  82 83 82 81 81 80 80 80 80 80 7F 7F 80 7F 7F 80
0900:  81 80 80 80 80 7F 7E 7D 7D 7D 7D 7E 7E 7E 7E 7E
0910:  7E 7D 7D 7E 7F 7F 7F 80 80 7F 7F 7E 7D 7D 7D 7E
0920:  7E 7F 7F 80 7F 7E 7D 7D 7D 7E 7E 7E 7F 80 7F 7F
0930:  7E 7E 7D 7D 7E 7E 7F 7E 7E 7D 7D 7D 7D 7D 7E 7E
0940:  7F 80 7F 7F 7F 7E 7E 7E 7F 80 81 81 81 80 7F 7D
0950:  7D 7D 7D 7E 7E 7F 80 80 80 7F 7E 7E 7D 7D 7E 7E
0960:  7F 80 93 01 6A 38 1F 01 48 1F CC 00 B3 B3 00 00
0970:  00 00 00 00 00 00 00 00 00 00 00 00 00 B3 B3 00
0980:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0990:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
09A0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
09B0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
09C0:  00 00 00 00 00 00 00 00 00 00 00 00 0D 01 0D 01
09D0:  19 02 00 00 1B 00 1A 00 0C 01 1B 00 1A 00 0C 01
09E0:  8F 8E 7F 00 00 7E 7D 87 04 CC 00 33 C4 EB FF FF
09F0:  CC 01 00 00 7B D0 C9 00 1B 1D 00 00 01 00 00 00
0A00:  00 00 00 00 30 00 01 0A 05 00 00 30 00 01 0A 05
0A10:  00 00 30 00 01 0A 05 00 00 30 00 01 0A 05 00 00
0A20:  30 00 01 0A 05 00 00 01 00 01 00 00 00 00 00 00
0A30:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0A40:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0A50:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0A60:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0A70:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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0B10:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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0B70:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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0B90:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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0BC0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0BD0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0BE0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0BF0:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0C00:  13 31 89 8A 8A 89 88 87 83 81 84 84 86 84 81 7D
0C10:  82 82 85 83 81 81 84 86 86 87 87 87 87 85 86 84
0C20:  86 87 87 83 82 80 7C 7C 78 78 77 76 00 00 00 00
0C30:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0C40:  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

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0C50:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0C60:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0C70:   00 00 00 00 00 00 00 00 00 00 FF FF FF FF FF FF
0C80:   FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0C90:   FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0CA0:   FF FF FF FF 00 00 00 00 00 00 00 00 00 00 00 00
0CB0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0CC0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0CD0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF FF
0CE0:   FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0CF0:   FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
0D00:   FF FF FF FF FF FF FF FF 00 00 00 00 00 00 00 00
0D10:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0D20:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0D30:   00 00 01 00 03 89 1E 01 CA 07 16 00 16 00 2A 00
0D40:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 15 00
0D50:   15 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0D60:   00 00 00 00 00 00 00 00 00 00 00 00 2A 00 00 00
0D70:   00 00 00 2A 25 24 25 24 02 87 04 CC 7B D0 C9 00
0D80:   1B 1D 00 00 01 00 00 00 00 00 00 00 30 00 01 0A
0D90:   05 00 00 30 00 01 0A 05 00 00 30 00 01 0A 05 00
0DA0:   00 30 00 01 0A 05 00 00 30 00 01 0A 05 00 00 01
0DB0:   00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0DC0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0DD0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0DE0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0DF0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E00:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E10:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E20:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E30:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E40:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E50:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E60:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E70:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E80:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0E90:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0EA0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0EB0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0EC0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0ED0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0EE0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0EF0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F00:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F10:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F20:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F30:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F40:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
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0F60:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F70:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F80:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0F90:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0FA0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0FB0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0FC0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0FD0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0FE0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0FF0:   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 A5
C943    00 06 01 09
E200    07 0C 68
E217    14 0B 03 21
E219    08 01
E21A    35 57 37 33
E221    30 35 30 31
E222    35 30 4C 35
E300    30 30 30 32
```

E301	46	41	46	50
E302	37	31	57	30
E303	35	58	31	36
E304	31	35	31	34

Comments

ATTACHMENT B

Cadillac EDR Data

CDR File Information

Vehicle Identification Number	1G6KF52Y1SU******
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	
Saved on	Friday, January 25 2008 at 05:02:31 PM
Collected with CDR version	Crash Data Retrieval Tool 3.00
Reported with CDR version	Crash Data Retrieval Tool 2.900
Event(s) recovered	Crash 1 Deployment

SDM Data Limitations

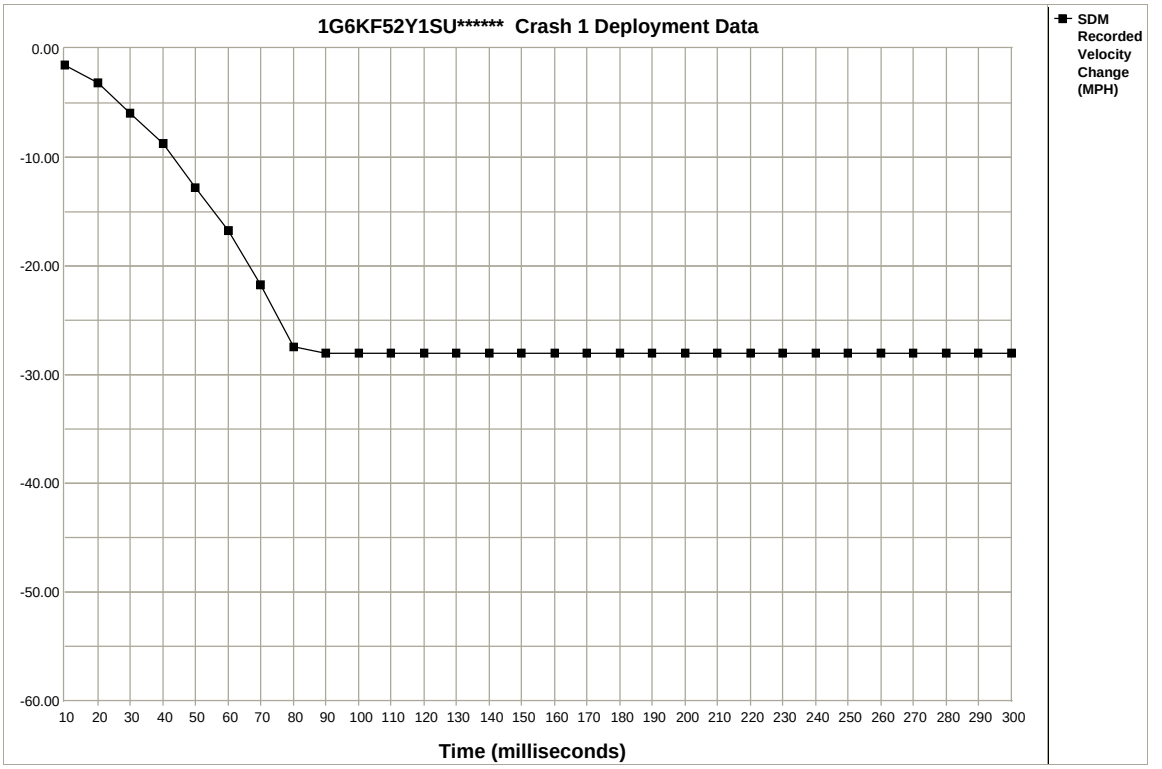
SDM Recorded Crash Events:
There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to "wake up" the sensing algorithm but not severe enough to deploy the air bag(s). The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded forward velocity change. This event will be cleared by the SDM after the ignition has been cycled 125 times.
The second type of SDM recorded crash event is the Deployment Event. The SDM can store up to two different Deployment Events. The first Deployment Event will be stored in the #1 Deployment Event file (this would have been the event that deployed the air bag) and the second Deployment Event will be stored in the #2 Deployment Event file. Deployment Events cannot be overwritten or cleared from the SDM. Once the SDM has two Deployment Events recorded, 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 7.65 seconds before the Deployment Event unless a Deployment Level Event occurs within 5 seconds after the Deployment Event, and 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. The SDM records the first 300 milliseconds of Vehicle Forward Velocity Change after Algorithm Enable. The maximum value that can be recorded for Vehicle Forward Velocity Change is 28 MPH.
-Driver's Belt Switch Circuit Status indicates the status of the driver's seat belt 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. An indication of a loss of power would be if the ignition cycles at the event is recorded as zero. Data recorded after that may not be reliable, such as Time Between Non-Deployment and Deployment Events and Driver Belt Switch Circuit Status.

SDM Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-The Driver's Belt Switch Circuit is wired directly to the SDM.

System Status At Crash 1

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Deployment	20650
Ignition Cycles At Investigation	20652
Time From Algorithm Enable to Deployment Command Criteria Met (msec)	8.75
Time Between Non-Deployment And Deployment Events (sec)	N/A



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-1.54	-3.18	-5.92	-8.78	-12.83	-16.78	-21.72	-27.43	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97
Time (milliseconds)	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
Recorded Velocity Change (MPH)	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97	-27.97

Hexadecimal Data

```
0D80:  AA AA 00 00 00 00 7D 00
0D88:  08 00 00 07 00 0E 1D 36
0D90:  50 75 99 C6 FA FF FF FF
0D98:  FF FF FF FF FF FF FF FF
0DA0:  FF FF FF FF FF FF FF FF
0DA8:  FF FF FF 50 AA 55 07 07
0DB0:  FA 55 07 01 FF 00 00 00
0DB8:  00 00 00 00 00 00 00 00
0DC0:  00 00 00 00 00 00 00 00
0DC8:  00 00 00 00 00 00 00 00
0DD0:  00 00 00 00 00 00 00 00
0DD8:  00 00 00 00 00 00 00 00
0DE0:  00 00 00 00 00 00 00 00
0DE8:  00 00 00 00 00 00 00 00
0DF0:  00 00 00 00 00 00 00 00
0DF8:  00 00 00 00 00 00 00 00
0E00:  00 00 00 00 00 00 00 00
0E08:  00 00 00 00 00 00 00 00
0E10:  00 00 00 00 00 00 00 21
0E18:  89 80 00 01 09 08 00 00
0E20:  00 00 00 00 00 00 00 52 F9
0E28:  F9 98 F9 F9 F9 F9 F9 00
0E30:  00 7D 00 00 7D 00 00 00
0E38:  00 06 81 00 00 00 00 00
0E40:  7D 00 00 7D 00 00 7D 00
0E48:  00 00 00 00 00 31 60 43
0E50:  85 07 44 17 70 93 69 6C
0E58:  96 02 64 00 00 00 00 00
0E60:  36 45 05 55 55 50 00 00
0E68:  00 00 00 1C 30 F0 FF 20
0E70:  00 08 40 80 F0 05 45 34
0E78:  50 77 77 77 77 77 77 77
0E80:  77 77 77 77 77 77 77 77
0E88:  77 77 77 77 77 77 77 77
0E90:  77 77 77 77 77 77 77 77
0E98:  79 7B 7F 82 85 88 8C 90
0EA0:  94 98 A2 A8 B0 BA C6 D2
0EA8:  D6 DB E8 F8 41 42 42 44
0EB0:  48 4E 4F 4F 50 54 55 57
0EB8:  59 5B 5D 60 61 63 65 67
0EC0:  69 6A 6C 6D 6E 6F 70 70
0EC8:  71 72 72 72 73 73 74 74
0ED0:  74 75 75 75 75 75 75 75
0ED8:  76 76 76 76 76 14 28 39
0EE0:  00 00 00 00 00 00 00 00
0EE8:  00 00 00 00 00 00 00 00
0EF0:  00 00 00 10 11 12 16 16
0EF8:  16 16 16 19 19 19 19 1C
0F00:  1F 20 20 23 24 26 28 29
0F08:  00 00 00 00 00 00 00 00
0F10:  00 00 00 00 00 00 00 00
0F18:  24 50 AA 00 50 00 F0 09
0F20:  0E 2C 22 0A 10 01 07 02
0F28:  40 41 37 37 37 37 37 37
0F30:  37 37 37 37 37 37 37 37
0F38:  37 37 37 37 37 37 37 37
0F40:  37 37 37 37 37 37 37 37
0F48:  37 37 37 37 37 37 37 37
0F50:  37 37 37 37 37 37 37 37
0F58:  37 37 37 37 37 37 37 37
0F60:  37 37 37 37 37 37 37 37
0F68:  37 37 FF FF FF FF FF FF
0F70:  FF FF FF FF FF FF FF FF
```

```
0F78:  FF FF AA 00 50 00 F0 09
0F80:  0E 2C 22 0A 10 01 07 02
0F88:  40 41 37 37 37 37 37 37
0F90:  37 37 37 37 37 37 37 37
0F98:  37 37 37 37 37 37 37 37
0FA0:  37 37 37 37 37 37 37 37
0FA8:  37 37 37 37 37 37 37 37
0FB0:  37 37 37 37 37 37 37 37
0FB8:  37 37 37 37 37 37 37 37
0FC0:  37 37 37 37 37 37 37 37
0FC8:  37 37 FF FF FF FF FF FF
0FD0:  FF FF FF FF FF FF FF FF
0FD8:  FF FF CF 30 41 53 33 16
0FE0:  4B 85 07 44 17 70 00 00
0FE8:  00 00 00 00 00 00 00 00
0FF0:  00 00 00 00 00 00 00 00
0FF8:  00 00 00 00 00 00 75 FD
```