CRASH DATA RESEARCH CENTER
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CALSPAN ON-SITE CERTIFIED ADVANCED 208-COMPLIANT VEHICLE CRASH INVESTIGATION

SCI CASE NO: CA04-016

VEHICLE: 2004 CHEVROLET SILVERADO PICK-UP TRUCK
LOCATION: NORTH CAROLINA
CRASH DATE: MARCH 2004

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

1. Report No. CA04-016	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle On-Site Certified Advanced 208-Compliant Vehicle Crash Investigation Vehicle: 2004 Chevrolet Silverado Pick-up Truck Location: North Carolina		*5. Report Date*: June 2006	
		6. Performing Organization Code	
7. Author(s) Crash Data Research Center		*8. Performing Organization Report No.*	
9. Performing Organization Name and Address Calspan Corporation Crash Data Research Center P.O. Box 400 Buffalo, New York 14225		*10. Work Unit No.* C00410.0000.200	
		11. Contract or Grant No. DTNH22-01-C-17002	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		*13. Type of Report and Period Covered* Technical Report Crash Date: March 2004	
		14. Sponsoring Agency Code	
15. Supplementary Note An investigation of the head-on crash of a 2004 Chevrolet Silverado and a 1983 Ford F250.			

16. Abstract

This investigation focused on the performance of the Certified Advanced Compliant (CAC) occupant protection system in a 2004 Chevrolet C1500 Silverado pick-up truck. This advanced occupant protection system was comprised of dual-stage frontal air bags, seat track position sensors for both front seats, front safety belt buckle switches and a front right occupant detection sensor. The vehicle's Sensing and Diagnostic control Module (SDM) tailored the deployment of the frontal air bags based on the crash severity and input from these sensors. The SDM had Event Data Recorder (EDR) capabilities that captured pre-crash and crash data related to the event. The EDR recorded a deployment event that was downloaded during the inspection and was used as a supplement to the on-site investigation. The Chevrolet was involved in a head-on collision with a 1983 Ford F250 pick-up truck. The driver bag in the Chevrolet deployed as a result of the crash. The 50-year old restrained male driver of the Chevrolet sustained multiple injuries; and was transported to a medical center for treatment. The 31 year old unrestrained driver of the Ford was fatally injured in the crash.

This crash was identified from a list of claims provided by an insurance company to the National Highway Traffic Safety Administration (NHTSA). The list identified CAC vehicles that had been involved in traffic crashes. The NHTSA analyzed the list based on vehicle type and location, and then forwarded a list of selected crashes to the Calspan Special Crash Investigations (SCI) team for follow-up investigation. The subject Chevrolet Silverado was located and cooperation was established with the local insurance adjuster and salvage yard. An on-site investigation was assigned to the SCI team on April 19, 2004. The on-site investigation took place during the week of April 26, 2004. The 1983 Ford F250 could not be located and was not inspected.

17. Key Words Certified Advanced Frontal Air Bag FMVSS 208 Stage 2 deployment AIS 2 Injury Sensing and Diagnostic Control Module Crash Data Recorder		*18. Distribution Statement* General Public	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 17	*22. Price*

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BACKGROUND

This investigation focused on the performance of the Certified Advanced Compliant (CAC) occupant protection system in a 2004 Chevrolet C1500 Silverado pick-up truck, **Figure 1**. This advanced occupant protection system was comprised of dual-stage frontal air bags, seat track position sensors for both front seats, front safety belt buckle switches and a front right occupant detection sensor. The manufacturer certified that this advanced system met the requirements of the advanced Federal Motor Vehicle Safety Standard No. 208. The vehicle's Sensing and Diagnostic control Module (SDM) tailored the deployment of the frontal air bags based on the crash severity and input from these sensors. The SDM had Event Data Recorder (EDR) capabilities that captured pre-crash and crash data related to the event. The EDR recorded a deployment event that was downloaded during the inspection and was used as a supplement to the on-site investigation. The Chevrolet was involved in a head-on collision with a 1983 Ford F250 pick-up truck. The driver bag in the Chevrolet deployed as a result of the crash. The 50-year old restrained male driver of the Chevrolet sustained multiple injuries and was transported to a medical center for treatment. The 31 year old unrestrained driver of the Ford was fatally injured in the crash.

Figure 1: Front left oblique view of the subject vehicle.

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SUMMARY

VEHICLE DATA

2004 Chevrolet C1500 Silverado Pick-Up Truck

The 2004 Chevrolet C1500 Silverado was identified by the Vehicle Identification Number (VIN): 1GCEC14TX4Z (production sequence deleted). The two wheel drive, 454 kg (1/2 ton) short box, regular cab pick-up was configured with a 302 cm (119 in) wheelbase. The Gross Vehicle Weight Rating (GVWR) was 2,767 kg (6,100 lb). The power train consisted of a 5.3 liter/V8 engine linked to a four-speed automatic transmission with overdrive. The vehicle was equipped with power steering, power windows and door locks, power driver seat and power assist four-wheel disc brakes with ABS. The manual restraint system consisted of integrated 3-point lap and shoulder belts in the outboard positions. The center position was lap belt equipped. The Supplemental Restraint System consisted of dual stage driver and front right passenger air bags certified by the manufacturer to be compliant with the advanced FMVSS 208 occupant protection standard. The vehicle's date of manufacture was February 2004. The digital odometer reading was unknown. The pick-up was equipped with General Ameritrac P255/70R16 tires on alloy wheels. The recommended tire pressures were 190 kpa (29 PSI) front and 240 kpa (35 PSI) rear. The specific measured tire data was as follows:

Tire	Measured Pressure	Tread Depth	Restricted	Damage
LF	307 kPa (44.5 PSI)	9 mm (11/32)	Yes	None
LR	303 kPa (44.0 PSI)	9 mm (11/32)	No	None
RF	296 kPa (43.0 PSI)	9 mm (11/32)	No	None
RR	296 kPa (43.0 PSI)	9 mm (11/32)	No	None

1983 Ford F250 Pick-Up Truck

The 1983 Ford F250 pick-up truck was identified by the Vehicle Identification Number (VIN): 1FTHT25G6DN (production sequence deleted). The 4x2, 680 kg (3/4 ton) regular cab pick-up was manufactured with a 338 cm (133 in) wheelbase. The power plant consisted of a 5.8 liter V8 engine. The service brakes were front disc/rear drum without ABS. The manual restraint system consisted of 3-point lap and shoulder belts in the outboard positions. The vehicle was not equipped with a frontal air bag system. The Ford was not inspected for this investigation.

CRASH SITE

This two-vehicle crash occurred during the nightlight hours of March, 2004. At the time of the crash, it was dark and the weather was not a factor. The road surface was dry. There was no artificial lighting at the crash site. The crash occurred on a two-lane east/west road in a rural residential setting. The east/west travel lanes measured 3.4 m (11 ft) in width and were separated by a solid double yellow centerline. The outboard edges of the travel lanes were bordered by white fog lines. The asphalt road surface was in good condition and had been newly paved. At the crash site, a two-lane north/south road intersected the primary roadway from the south forming a three-leg intersection. The impact occurred within the mouth of the intersection. The final rest positions of the vehicles were documented by the investigating police officers with

orange paint. The posted speed limit was 89 km/h (55 mph). **Figure 2** is an eastbound trajectory view at the crash site 61 m (200 ft) from the point of impact. **Figure 3** is an eastward view of the point of impact and the final rest positions of the vehicles.

Figure 2: Eastbound trajectory view 61 m (200 ft from the point of impact.

Figure 3: Point of impact and final rest of the vehicles in the mouth of the intersection.

CRASH SEQUENCE

Pre-Crash

The 2004 Chevrolet Silverado pick-up truck was eastbound driven by a 50 year old male. He was restrained at the time of the crash by the vehicle's integrated three-point lap and shoulder belt. He was in the process of his daily commute home from work and was approximately 3 km (2 miles) from his destination. The vehicle's Event Data Recorder indicated the speed of the Chevrolet was 89 km/h (55 mph) five seconds (T-5) prior to Algorithm Enable (AE). Algorithm Enable occurred at the time of the impact. The 1983 Ford F250 pick-up was westbound driven by a 31 year old male. This driver was unrestrained. For unknown reasons, the Ford's driver relinquished direction control and the Ford crossed the centerline into the eastbound traffic lane. The medical examiner's report indicated that this driver had a known seizure disorder that may have contributed to the loss of control.

The driver of the Chevrolet steered his vehicle to the right in an attempt to avoid the Ford as it encroached into his lane and began to brake. The EDR reported the Chevrolet's brakes were activated two seconds (T-2) prior to AE. There was a corresponding reduction in Engine RPM, and Percent Throttle. The speed of the Chevrolet reduced to 53 km/h (33 mph) one second (T-1) prior to AE. The right steer maneuver positioned the Ford in the mouth of the intersection. Coincident to this, the Ford continued its errant trajectory through the eastbound traffic lane and also entered the mouth of the intersection. Due to the speeds of the respective vehicles and the separation distance, the Chevrolet driver's avoidance maneuver directed his vehicle into the impact. A schematic of the crash is attached to the end of this report as **Figure 9**.

Crash

The frontal plane of the Ford struck the frontal plane of the Chevrolet in a head-on crash. The directions of force were in the 12 o'clock sectors for both vehicles. The force of the impact commanded a Stage 2 deployment of the advanced driver air bag in the Chevrolet 10 milliseconds after AE. Reconstruction analysis of the crash indicated the impact momentum of the respective vehicles was approximately balanced. The final rest position of each vehicle was within 2.4 m (8 ft) of the area of the impact. The kinetic energy of each vehicle was absorbed and transferred into deformation. The Chevrolet rebounded approximately 3 m (6 ft) from the impact and came to rest facing eastward. The Ford rebounded approximately 2.4 m (8 ft) from the impact and came to rest facing west-southwestward. The maximum longitudinal delta V recorded by the Chevrolet's Event Data Recorder (EDR) was -54 km/h (-33.6 mph) and occurred 97.5 milliseconds after AE. The Chevrolet's total delta V calculated by the Missing Vehicle Algorithm of the WINSMASH model was 60 km/h (37.3 mph). The longitudinal and lateral components of the delta V were -59 km/h (-35.2 mph) and 11 km/h (6.2 mph), respectively. There was a close match between the EDR recorded values and the WINSMASH reconstruction.

Post-Crash

The police and ambulance personnel responded to the crash. The 50-year old driver of the Chevrolet was assisted from his vehicle by the EMS responders and transported to a regional trauma center. The Chevrolet driver sustained fractures to each of his four extremities and required a twenty day hospitalization. The 31 year old unrestrained driver of the Ford was found lying across the front seat by the EMS personnel. He was pulseless and apneic. He sustained fatal blunt trauma to his chest and was pronounced deceased at the scene. Both vehicles sustained severe frontal damage and had to be towed.

2004 CHEVROLET C1500 SILVERADO

Exterior Damage

Figures 4 and 5 are the front and left lateral views of the Chevrolet. The front plane of the Chevrolet sustained a combined width of direct contact and induced damage that extended across the vehicle's 167.6 cm (66.0 in) front end width. The direct contact damage began 46 cm (18 in) right of center and extended 122 cm (48 in) to the left front corner. The direct contact began immediately outboard of the right frame rail. The damaged components included the front bumper, center grille, headlamp assemblies, hood and left front fender. The direct contact of the surface of the hood extended 61 cm (24 in) rearward of the hood face. The damage profile was biased to the left side. The residual crush was measured along the front bumper was as follows: C1 = 70 cm (27.6 in), C2 = 58 cm (22.8.in), C3 = 52 cm (20.5 in), C4 = 47 cm (18.5 in), C5 = 32 cm (12.6 in), C6 = 20 cm (7.9 in). The maximum crush was located at C1, the left front bumper corner. The left sill buckled 23 cm (9 in) rearward of the A-pillar. The left wheelbase was reduced 20 cm (8.0 in). The left front tire was displaced rearward to the aft aspect of the wheel opening and was restricted. The right wheelbase was reduced 4 cm (1.5 in). The lower left aspect of the windshield was fractured from the exterior impact force. The left door was jammed closed by the impact. It was opened by the emergency responders. There was evidence of extrication at the door latch. There was cab-to-bed contact on the left side due to the compressive force of impact. The Collision Deformation Classification (CDC) was 12-FYEW-3.

Figure 4: Front view of the Chevrolet.

Figure 5: Left lateral view.

Interior Damage

Figure 6 is a left interior view of the Chevrolet. The interior damage to the Chevrolet consisted of the deployment of the driver air bag, the driver interior contacts, and minor intrusion. The left corner of the instrument panel intruded rearward 4 cm (1.5 in). The intrusion of the outboard aspect of the toe pan measured 5 cm (2 in).

The driver seat was located in a rear track position that measured 6 cm (2.5 in) forward of full rear. The total seat track travel measured 22 cm (8.8 in). The seat back was upright (0 degrees) measured 29 cm (11.5 in) above the seat bight. An inspection of the seat back recline mechanism revealed it was damaged. The seat back angle could not be altered. During the driver's ride down of the crash, his loading of the integrated manual restraint resulted in damage to the recline adjustment. The horizontal distance from the center hub of the steering wheel rim to the seat bight measured 39 cm (15.5 in).

The 4-spoke steering wheel was rotated 80 degrees clockwise at inspection. The tilt adjustment was in the center position. There was no deformation of the steering wheel rim. There was complete shear capsule separation estimated at 5 cm (2 in). The compressed steering column was captured by the deformed metal backer located behind the driver knee bolster, **Figure 7**. The rigid plastic knee bolster exhibited a 5 cm (2 in) diameter contact scuff mark on the steering wheel centerline. The bolster panel compressed forward 9 cm (3.5 in) as evidenced by the deformation of the metal backer located behind the panel. This deformation resulted from contact with the driver's lower extremities. The upper left aspect of the instrument panel, immediately adjacent to HVAC vent, exhibited residual blood evidence from a left upper extremity contact. There were no other identified occupant contacts to the interior.

The front right seat was adjusted to a rear track position that measured 1 cm (0.5 in) forward of full rear. The seat back was reclined 7 degrees. This seat was equipped with Lower Anchors and Tethers for CHildren (LATCH). There were no contacts identified in the front right passenger interior space.

Figure 6: Left front interior view.

Figure 7: Deformation of the metal backer behind the knee bolster.

Manual Restraint Systems

The manual restraint systems in the Chevrolet consisted of three-point lap and shoulder safety belts in the two outboard positions. The center position was lap belt equipped. The respective manual restraints in the front row were each integrated into the cloth-upholstered bucket seats. The driver's restraint consisted of continuous loop webbing, a sliding latch plate, and an Emergency Locking Retractor (ELR) mounted in the seat back. The webbing spooled out through a belt guide located above the driver's left shoulder. Upon initial inspection, the driver's restraint was in the stowed position. The webbing was creased 89 cm (35.2 in) above the outboard anchor due to loading at the buckled latch plate. The friction surface of the latch plate was abraded. The shoulder portion of the webbing exhibited an intermittent abrasion pattern from loading by the belt guide. This abrasion pattern was within an 11 cm (4.5 in) webbing section located 170 cm to 181 cm (67 in to 71.5 in) above the anchor. The evidence identified during the SCI inspection of the driver's restraint indicated it was in use at the time of the crash.

Certified Advanced 208-Compliant (CAC) Air Bag System

The Certified Advanced 208-Compliant (CAC) frontal air bag consisted of advanced dual stage air bags for the driver and front right passenger, seat track position sensors, front safety belt buckle switch sensors, and a front right occupant detection sensor. The frontal air bag system was certified by the manufacturer to have met the requirements of the advanced Federal Motor Vehicle Safety Standard 208. The system was controlled and monitored by a Sensing and Diagnostic control Module (SDM) located under the driver's seat. The SDM was equipped with an Event Data Recorder (EDR) that recorded data related to the crash. This data was downloaded by the SCI investigator at the time of the vehicle inspection.

The driver air bag, **Figure 8**, deployed from an I-configuration module located in the center hub of the steering wheel rim. The symmetrical cover flaps measured 8 cm x 11 cm (3 in x 4.5 in), width by height, respectively. The flaps opened at the designed tear seams during the deployment sequence and were not damaged. There was no evidence of occupant contact. The deployed driver air bag measured 61 cm (24 in) in diameter. The bag was tethered by two 10 cm

(4 in) wide straps in the 3/9 o'clock sectors and was vented by two 3 cm (1.2 in) diameter ports located in the 11/1 o'clock sectors. The 8 through 9 o'clock sectors of the air bag revealed evidence of an expansion scuff. The face of the bag was abraded over a radial length of 17 cm (6.5 in) measured from the perimeter seam. The air bag was spattered with post-crash blood evidence.

Figure 8: Driver air bag.

Event Data Recorder

The Event Data Recorder (EDR) was downloaded at the time of the SCI inspection utilizing the Vetronix Crash Data Retrieval (CDR) tool and software version 2.24. The data was retrieved by connecting the CDR tool directly to the SDM. The downloaded data is attached to the end of this report as *Attachment A.* The EDR recorded a Deployment and a Non-Deployment event on ignition cycle 171. The data download occurred on ignition cycle 172. Analysis of the data indicated the Deployment event was related to the impact event and occurred first. Data flags within the record indicated the Non-Deployment was not related to the Deployment event.

The Deployment event data indicated the driver's safety belt was buckled consistent with the SCI reconstruction. The Chevrolet's frontal impact commanded a Stage 1 deployment of the driver's air bag 7.5 milliseconds after Algorithm Enable (AE). Stage 2 deployment of the driver air bag was commanded 10 milliseconds after AE. The front right air bag deployment was suppressed by the occupant presence detection system. The maximum EDR recorded longitudinal delta V was -54 km/h (-33.6 mph) 97.5 milliseconds after AE.

DRIVER DEMOGRAPHICS

2004 Chevrolet C1500 Silverado

Age / Sex:	50 year old / Male
Height:	Not Reported
Weight:	Not Reported
Seat Position:	Rear Track, 6 cm (2.5 in) forward of full rear
Manual Restraint Use:	Integrated three-point lap and shoulder belt
Restraint Usage Source:	SCI Inspection, EDR, Occupant Kinematics
Medical Treatment:	Transported via ground ambulance and hospitalized 20 days

DRIVER INJURY

Injury	***Injury Severity (AIS 98 Update)***	***Injury Source***
Closed head injury, No loss of consciousness, vomitous, GCS=15	Minor (160402.1,0)	Crash force
Transverse and minimally comminuted fracture through the mid to distal diaphysis of the left ulna	Serious (753204.3,2)	Left instrument panel
Abrasion left hand, dorsal aspect	Minor (790202.1,2)	Left instrument panel
Contusion left forearm, dorsal aspect	Minor (790402.1,2)	Left instrument panel
Mildly comminuted fractures through the distal right lateral radius into the radial carpal joint; the ulnar styloid process, the lunate, and the medial triquetral bone	Serious (752804.3,1) Serious (753204.3,1) Moderate (752002.2,1)	Left instrument panel
Abrasion right hand	Minor (790202.1.1)	Left instrument panel
Abrasion right forearm	Minor (790202.1,1)	Left instrument panel
Highly comminuted intra-articular fracture of the right proximal tibia plateau and fibula	Serious (853408.3,1) Moderate (851606.2,1)	Knee bolster
Comminuted fracture of the left calcaneus extending through both the posterior and inferior cortex	Moderate (851400.2,2)	Floor pan

Note: the above injury information was obtained from the driver's emergency room records, radiology reports and discharge summary from the treating hospital.

DRIVER KINEMATICS

The 50 year old driver was seated in a rear track position in a presumed upright posture. He was restrained by the vehicle's integrated three-point lap and shoulder belt system. Upon impact with the Ford, the manual restraint's ELR retractor locked and the CAC advanced driver air bag deployed. The driver initiated a forward trajectory in response to the 12 o'clock direction of the impact force and loaded the locked belt system. The driver's hands were displaced from the steering wheel rim by the force of the crash and impacted the instrument panel forward of his seated position. The contact of his upper extremities with the instrument panel resulted in the identified fractures. The driver loaded the belt system with his torso and pelvis and as the driver rode down the force of the impact, this load was transferred into the seat back through the integrated belt system. The driver's seat back deflected forward damaging the recline mechanism. The driver's right lower extremity impacted and deformed the knee bolster and its metal backer forward. This contact resulted in the right tibia plateau fracture and fibula fracture.

The driver's chest and head contacted and loaded the deployed driver air bag. The driver's chest loaded the steering column through the inflated bag and separated the column from the shear capsules. The driver fractured his left calcaneus through the combination of its loading of the floor pan and the floor pan intrusion. The medical records indicated there was a concern that the driver sustained a possible closed head injury manifested by his vomiting in the emergency room. This injury was related to the acceleration/deceleration of the head due to the force of the impact. After the impact, the driver rebounded back into his seat where he was found by the first responders.

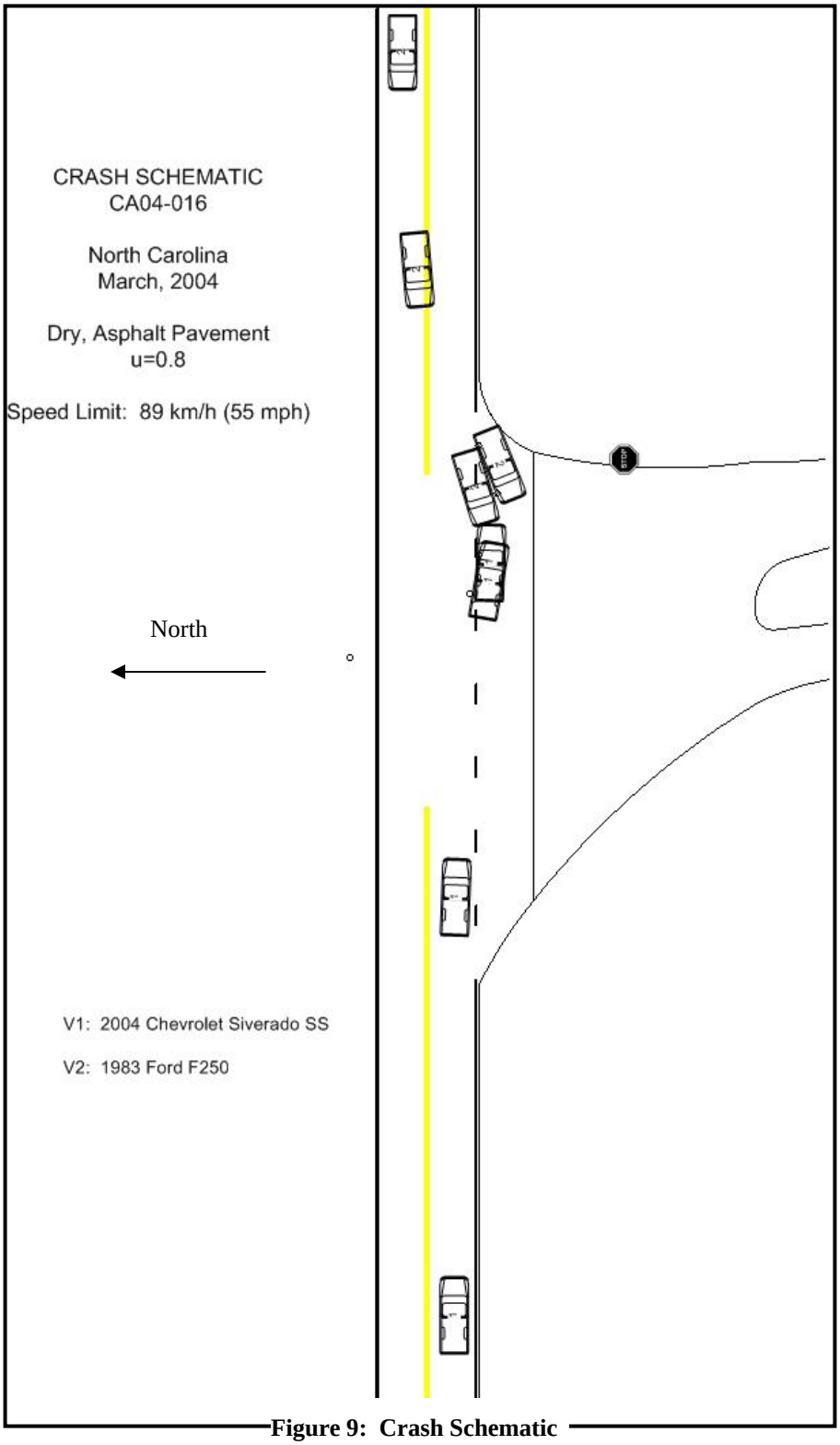


Figure 9: Crash Schematic

ATTACHMENT A

EDR DATA

CDR File Information

Vehicle Identification Number	1GCEC14TX4Z******
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	CA04-016 CDR.CDR
Saved on	Wednesday, April 28 2004 at 01:23:00 PM
Collected with CDR version	Crash Data Retrieval Tool 2.24
Collecting program verification number	70CD83DD
Reported with CDR version	Crash Data Retrieval Tool 2.800
Reporting program verification number	9238B95E
Interface used to collected data	Block number: 00 Interface version: 39 Date: 10-09-03 Checksum: 0300
Event(s) recovered	Deployment Non-Deployment

SDM Data Limitations

SDM Recorded Crash Events:
There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to "wake up" the sensing algorithm but not severe enough to deploy the air bag(s). It contains Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded vehicle forward velocity change. This event will be cleared by the SDM after the ignition has been cycled 250 times.
The second type of SDM recorded crash event is the Deployment Event. It also contains Pre-Crash and Crash data. The SDM can store up to two different Deployment Events, if they occur within 25.4 seconds of one another. Deployment Events cannot be overwritten or cleared from the SDM. Once the SDM has deployed the air bag, the SDM must be replaced.
The data in the Non-Deployment Event file will be locked after a Deployment Event, if the Non-Deployment Event occurred within 5 seconds before the Deployment Event. If multiple Non-Deployment Events occur within 5 seconds prior to a Deployment Event, then the most severe Non-Deployment Event will be recorded and locked. If multiple Non-Deployment Events precede a Deployment Event, and multiple Non-Deployment Events occur within 5 seconds of each other (but not necessarily all within 5 seconds of the Deployment Event), and subsequent Non-Deployment Events are less severe than prior Non-Deployment Events, and the last of the multiple Non-Deployment Events occurs within 5 seconds of a Deployment Event, then the most severe of the Non-Deployment Events (which may have occurred more than 5 seconds prior to the Deployment Event) will be recorded and locked.

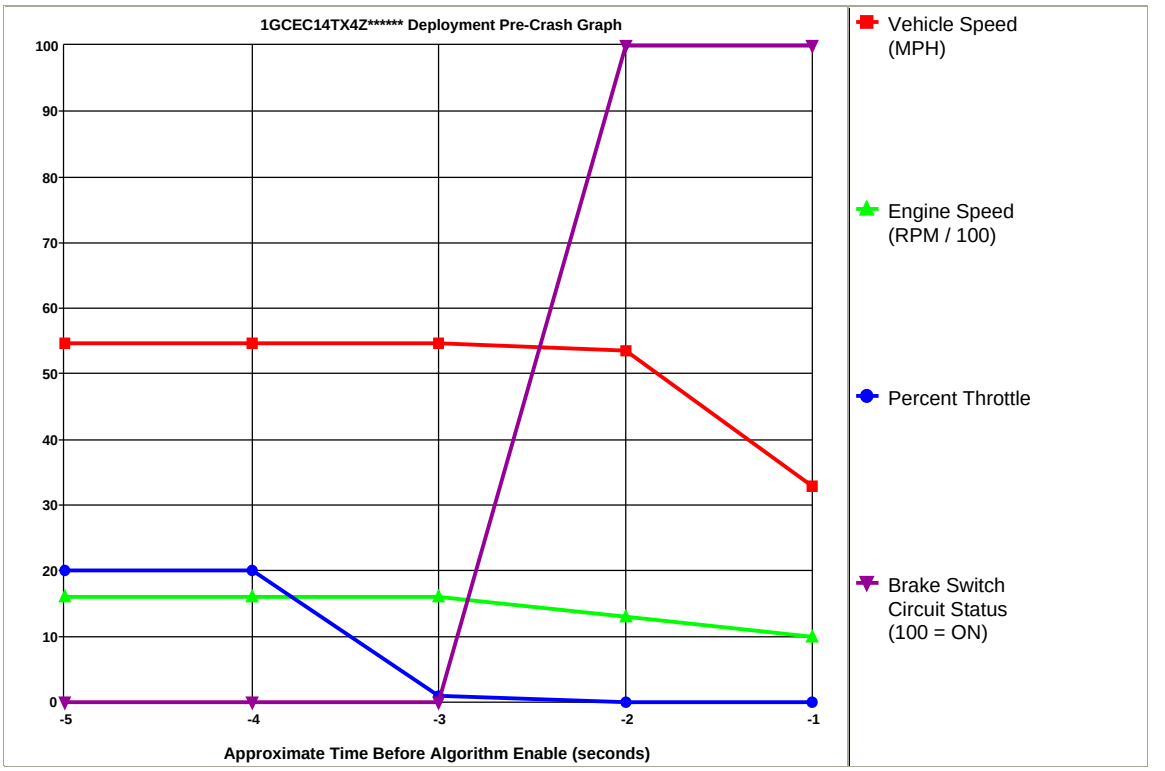
SDM Data Limitations:
-SDM Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Forward Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change. For Deployment Events and Deployment Level Events, the SDM will record 100 milliseconds of data after deployment criteria is met and up to 50 milliseconds before deployment criteria is met. For Non-Deployment Events, the SDM will record the first 150 milliseconds of data after algorithm enable.
-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.
-SDM Recorded Vehicle Speed accuracy can be affected if the vehicle has had the tire size or the final drive axle ratio changed from the factory build specifications.
-Brake Switch Circuit Status indicates the status of the brake switch circuit.
-Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if the SDM receive an invalid message from the module sending the pre-crash data.
-Driver's and Passenger's Belt Switch Circuit Status indicates the status of the seat belt switch circuit. If the vehicle's electrical system is compromised during a crash, the state of the Belt Switch Circuit may be reported other than the actual state.
-The Time Between Non-Deployment and Deployment Events is displayed in seconds. If the time between the two events is greater than 25.4 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.
-Multiple Events Associated with this Record: This parameter will indicate whether one or more associated events preceded the recorded event.
-One or More Associated Events Not Recorded: If a single event is recorded, this parameter will indicate whether one or more associated events, prior to the recorded event, was not recorded.
If two associated events are recorded, this parameter for the first event will indicate whether one or more associated events, prior to the first event, was not recorded.

If two associated events are recorded, this parameter, for the second event, will indicate whether one or more associated events, between the first and second events, was not recorded.

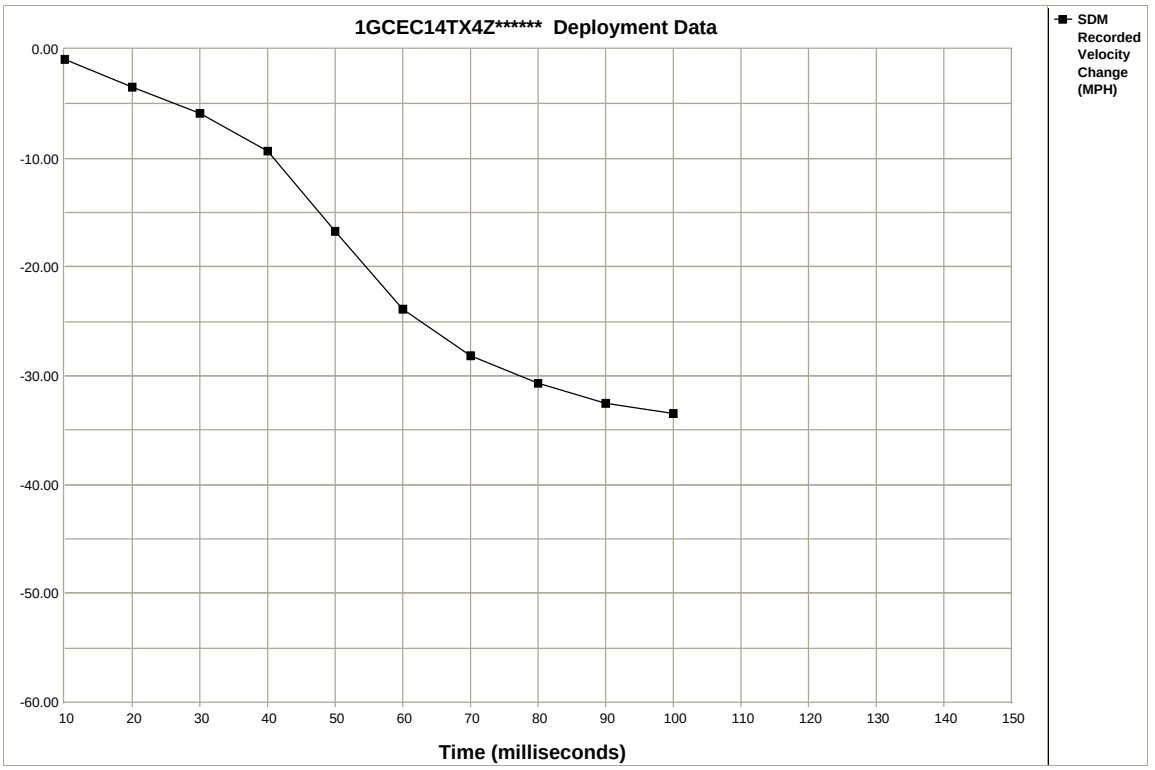
SDM Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Speed, Engine Speed, and Percent Throttle data are transmitted once a second by the Powertrain Control Module (PCM), via the vehicle's communication network, to the SDM.
-Brake Switch Circuit Status data is transmitted once a second by either the ABS module or the PCM, via the vehicle's communication network, to the SDM.
-The SDM may obtain Belt Switch Circuit Status data a number of different ways, depending on the vehicle architecture. Some switches are wired directly to the SDM, while others may obtain the data from various vehicle control modules, via the vehicle's communication network.

System Status At Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Passenger's Belt Switch Circuit Status	UNBUCKLED
Passenger Seat Position Switch Circuit Status	Rearward
Ignition Cycles At Deployment	171
Ignition Cycles At Investigation	172
Maximum SDM Recorded Velocity Change (MPH)	-33.58
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	97.5
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	7.5
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	10
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	Suppressed
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	Suppressed
Time Between Non-Deployment And Deployment Events (sec)	N/A
Frontal Deployment Level Event Counter	1
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No



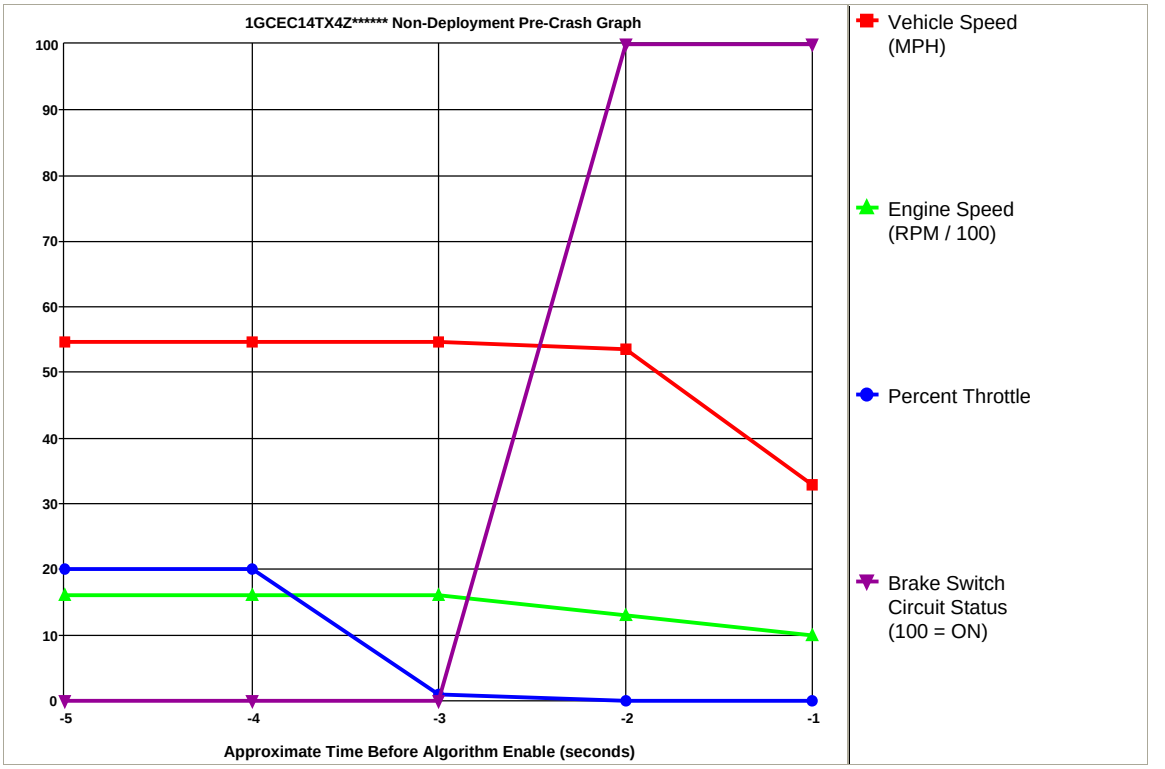
Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	55	1600	20	OFF
-4	55	1600	20	OFF
-3	55	1600	1	OFF
-2	53	1344	0	ON
-1	33	960	0	ON



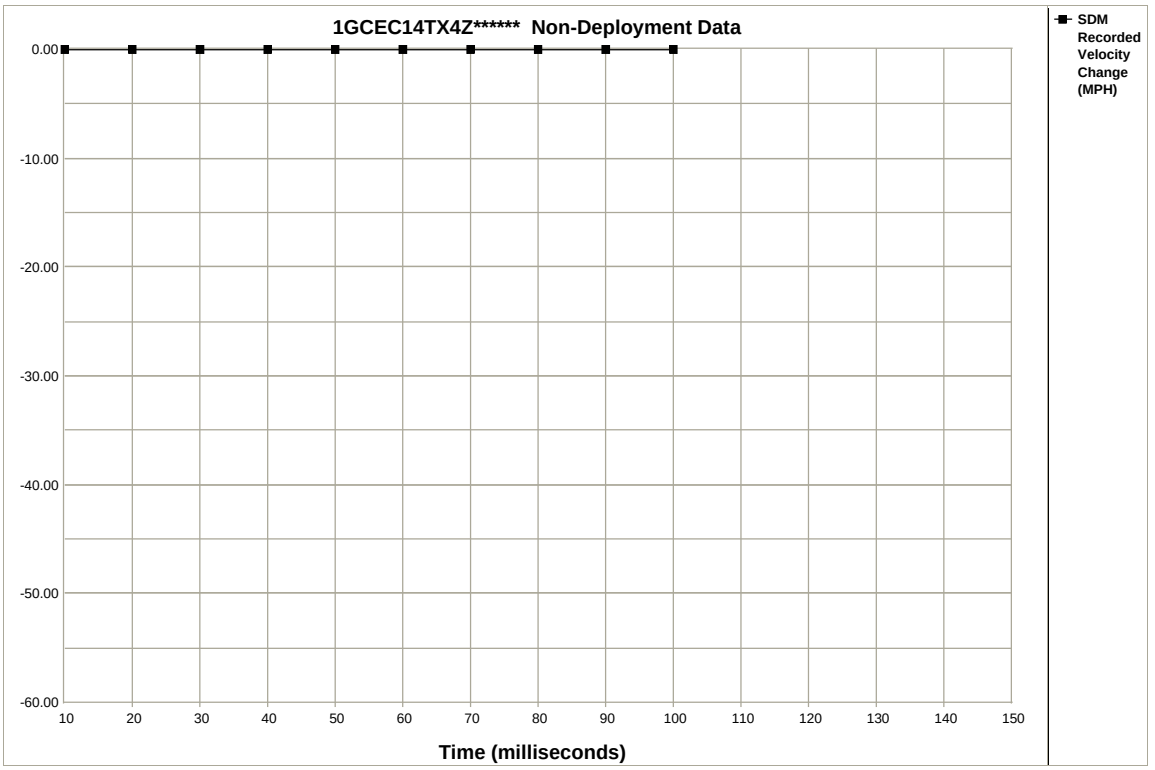
Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.93	-3.41	-5.89	-9.30	-16.74	-23.87	-28.21	-30.69	-32.55	-33.48	N/A	N/A	N/A	N/A	N/A

System Status At Non-Deployment

SIR Warning Lamp Status	ON
Driver's Belt Switch Circuit Status	BUCKLED
Passenger's Belt Switch Circuit Status	UNBUCKLED
Passenger Seat Position Switch Circuit Status	Rearward
Ignition Cycles At Non-Deployment	171
Ignition Cycles At Investigation	172
Maximum SDM Recorded Velocity Change (MPH)	-0.02
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	0
Crash Record Locked	No
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No



Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	55	1600	20	OFF
-4	55	1600	20	OFF
-3	55	1600	1	OFF
-2	53	1344	0	ON
-1	33	960	0	ON



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	N/A	N/A

Hexadecimal Data

This page displays all the data retrieved from the air bag module.
It contains data that is not converted by this program.

```
$01  F0 39 33 A9 AE C6
$02  F1 F1 00 00 B8 00
$03  41 53 34 30 32 37
$04  4B 55 30 4A 55 31
$05  00 00 00 00 00 00
$06  15 13 06 08 00 00
$07  00 00 00 00 00 00
$08  00 00 00 00 00 00
$09  00 00 00 00 00 00
$0A  00 00 00 00 00 00
$0B  00 00 00 00 00 00
$0C  00 00 00 00 00 00
$0D  00 00 00 00 00 00
$0E  00 00 00 00 00 00
$0F  00 00 00 00 00 00
$10  FF EA F0 00 00 00
$11  80 7F 80 81 80 81
$12  A1 8E 8E 22 22 11
$13  FF 02 00 00 00 00
$14  03 03 00 00 6C 00
$15  FA FA FA FA FA FA
$16  FA FA FA FA FA FA
$17  FA FA 00 00 00 00
$18  00 0F 05 EC F5 00
$19  09 00 0A 00 00 64
$1A  00 00 00 00 00 00
$1B  00 00 00 00 00 00
$1C  00 0C 00 00 00 00
$1D  00 00 00 00 00 00
$1F  FE 00 00 00 00 00
$20  52 FD 00 00 FF FF
$21  FF F7 FF FF FF FF
$22  FF FF FF FF FF FF
$23  FF FF FF FF FF F7
$24  55 00 01 00 00 4D
$25  27 00 00 01 FF FF
$26  00 00 00 00 00 00
$27  00 00 00 00 00 00
$28  00 00 00 0A FF EA
$29  F8 A5 FF FF FF FF
$2A  FF FF FF FF FF FF
$2B  FF FF FF FF FF FF
$2C  FF FF FF FF FF FF
$2D  FF FF 00 00 00 00
$30  B2 FE 00 00 FF FF
$31  FF FF FF FF FF FF
$32  FF FF FF FF FF FF
$33  FF FF FF FF FF FF
$34  55 00 53 07 03 03
$35  00 00 00 00 00 00
$36  53 08 04 03 00 00
$37  00 00 00 06 C3 4D
$38  27 03 4D 27 00 00
$39  05 00 00 01 FF FF
$3A  03 0B 13 1E 36 4D
$3B  5B 63 69 6C 00 00
$3C  00 00 00 0A FF EA
$3D  F8 A5 00 00 00 00
$40  35 56 58 58 58 00
$41  C0 00 00 00 02 34
$42  34 00 0F 15 19 19
$43  19 00 15 FC 00 00
```

```
$44  35 56 58 58 58 00
$45  C0 00 00 00 02 34
$46  34 00 0F 15 19 19
$47  19 00 80 FE 00 00
$48  35 56 58 58 58 00
$49  C0 00 00 00 02 34
$4A  34 00 0F 15 19 19
$4B  19 00 80 FE 00 00
$4C  FF FF FF FF FF FF
$4D  FF FF FF FF FF FF
$4E  FF FF FF FF FF FF
$4F  FF FF FF FF 00 00
$50  FF FF FF FF FF FF
$51  FF FF FF FF FF FF
$52  FF FF FF FF FF FF
$53  FF FF FF FF FF FF
$54  FF FF FF FF FF FF
```