CRASH DATA RESEARCH CENTER

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**CALSPAN REMOTE CERTIFIED ADVANCED 208-COMPLIANT
VEHICLE CRASH INVESTIGATION**

NASS/SCI CASE NO: 2004-47-043C

VEHICLE: 2004 GMC SIERRA PICUP TRUCK

LOCATION: ALABAMA

CRASH DATE: APRIL 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

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This remote investigation focused on the Certified Advanced 208-Complaint (CAC) safety system that was present in a 2004 GMC Sierra pickup truck.

16. Abstract

This remote investigation focused on the Certified Advanced 208-Complaint (CAC) safety system that was present in a 2004 GMC Sierra pickup truck. The manufacturer of this vehicle certified that it meets the requirements of the Advanced 208 Motor Vehicle Safety Standard (FMVSS). The CAC system consisted of dual-stage frontal air bags for the driver and front right passenger positions, seat track position sensors, front safety belt buckle switches, a front right occupant detection sensor, and an Event Data Recorder (EDR). A restrained 40-year-old male driver was operating the Sierra in a westbound direction on a two-lane roadway on approach to a four-leg intersection. The Sierra passed an uninvolved vehicle which was stopped in a westbound direction at the intersection attempting to turn left. After passing this vehicle and traversing the intersection, a 1993 Chevrolet C1500 pickup truck traveling eastbound made a sharp left turn and impacted Sierra head-on. The vehicles impacted in an offset configuration approximately 10 m (33') west of the intersection. The impact resulted in severe frontal damage to both vehicles that was sufficient to deploy the driver's frontal air bag in the Sierra. The driver of the Sierra was transported to a regional trauma center by helicopter where he was treated for a soft-tissue injury and released. The driver of the Chevrolet was transported by ambulance to local hospital where he was treated for soft tissue injuries and released.

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TABLE OF CONTENTS

CALSPAN REMOTE CERTIFIED ADVANCED 208-COMPLIANT VEHICLE
CRASH INVESTIGATION
NASS/SCI CASE NO: 04-47-043C
LOCATION: ALABAMA
VEHICLE: 2004 GMC SIERRA PICKUP TRUCK
CRASH DATE: APRIL 2004

BACKGROUND
This remote investigation focused on the Certified Advanced 208-Complaint (CAC) safety system that was present in a 2004 GMC Sierra pickup truck **(Figure 1)**. The manufacturer of this vehicle certified that it meets the requirements of the Advanced 208 Federal Motor Vehicle Safety Standard (FMVSS). The CAC system consisted of dual-stage frontal air bags for the driver and front right passenger positions, seat track position sensors, front safety belt buckle switches, a front right occupant detection sensor, and an Event Data Recorder (EDR). A restrained 40-

Figure 1 - Damaged 2004 GMC Sierra.

year-old male driver was operating the Sierra in a westbound direction on a two-lane roadway on approach to a four-leg intersection. The Sierra passed an uninvolved vehicle which was stopped in a westbound direction at the intersection attempting to turn left. After passing this vehicle and traversing the intersection, a 1993 Chevrolet C1500 pickup truck traveling eastbound made a sharp left turn and impacted Sierra head-on. The vehicles impacted in an offset configuration approximately 10 m (33') west of the intersection. The impact resulted in severe frontal damage to both vehicles that was sufficient to deploy the driver's frontal air bag in the Sierra. The driver of the Sierra was transported to a regional trauma center by helicopter where he was treated for a soft-tissue injury and released. The driver of the 1993 Chevrolet C1500 was transported by ambulance to local hospital where he was treated for soft tissue injuries and released.

This crash was identified by the Crash Investigations Division of the National Highway Traffic Safety Administration (NHTSA). It was selected as CDS Case No: 04-47-043C. The NASS PSU performed the vehicle and scene inspections and downloaded the EDR. Due to the presence of the Certified Advanced 208-Compliant safety system in the 2004 Chevrolet Sierra, NHTSA assigned the tasks of case review and report preparation to the Calspan SCI team on May 14, 2004.

SUMMARY
Vehicle Data – 2004 GMC Sierra
The 2004 GMC Sierra was identified by the Vehicle Identification Number (VIN): 1GTEC19T24E (sequence number omitted). The vehicle's electric odometer was not read during the NASS inspection. The Sierra was a four-door extended cab pickup truck with a 5.3-liter, V8 engine linked to a 5-speed automatic transmission. The rear-

wheel drive vehicle was equipped with four-wheel disc brakes with ABS, power steering, daytime running lamps, and a tilt steering wheel. The Sierra was equipped with 41 cm (16") steel wheels and General Ameritrac P255/70R16 tires. The specific tire information at the time of the NASS inspection was as follows:

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	0 kPa	9 mm (11/32")	Yes	Tire cut/torn
LR	241 kPa (35 PSI)	9 mm (11/32")	No	None
RF	255 kPa (37 PSI)	9 mm (11/32")	No	None
RR	255 kPa (37 PSI)	9 mm (11/32")	No	None

The front row of the Sierra was configured with a split bench seat with separate cushions for the driver, center, and right seating positions. The driver and passenger seats were adjusted to the mid-position and the center seat was not adjustable. The second row was configured with a bench seat with foldable seat backs for all three positions. The four outboard positions contained adjustable head restraints all of which were in the full down position at the time of the NASS inspection.

Vehicle Data – 1993 Chevrolet C1500

The 1993 Chevrolet C1500 was identified by the VIN: 1GCDC14K6PZ (production number omitted). The vehicle's odometer read 410,709 km (255,202 miles). The vehicle was a two-door regular cab pick-up truck equipped with a 5.7-liter, 8 cylinder engine linked to a 5-speed manual transmission. The rear-wheel drive vehicle was equipped with 38 cm (15") steel wheels and Cooper Cobra Radial GT P275/60R15 tires. The specific tire information at the time of the NASS inspection was as follows:

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	214 kPa (31 PSI)	3 mm (4/32")	Yes	None
LR	234 kPa (34 PSI)	2 mm (3/32")	No	None
RF	76 kPa (11 PSI)	1 mm (2/32")	No	None
RR	228 kPa (33 PSI)	3 mm (4/32")	No	None

Crash Site

This two-vehicle crash occurred during the daylight hours of April 2004 in the state of Alabama. At the time of the crash there were no adverse weather conditions and the asphalt roadway was dry. The east/west roadway consisted of one lane in each direction and was separated by a double-yellow painted centerline. Asphalt shoulders delineated by white painted fog lines were present outboard of both travel lanes. The roadside environment consisted of natural growth and sporadic dwellings in a rural setting. The east/west roadway traversed a two-lane north/south roadway at an intersection controlled by a two-phase blinking traffic signal. The east/west roadway traffic signal illuminated yellow indicating right of way. In addition to the two-phase traffic signal, stop signs were positioned on the southeast and northwest corners to control north/south traffic. The east/west roadway was straight and level and the posted speed limit was 89 km/h (55

mph) The NASS scene schematic is included as **Figure 9** at the end of this narrative report.

Figure 2 - Westbound approach of 2004 GMC Sierra.

Figure 3 - Eastbound approach of 1993 Chevrolet C1500.

Crash Sequence
　　Pre-Crash
The 40-year-old male driver of the 2004 GMC Sierra was westbound and had just traversed the intersection through the illuminated yellow blinking signal **(Figure 2)**. A 19-year-old male, operating the 1993 Chevrolet 1500 pickup truck, was traveling eastbound on the same roadway and was intending to turn left **(Figure 3)**. An uninvolved vehicle was stopped the westbound lane at the intersection and was in the process of turning left. As the Sierra passed the turning vehicle and traversed the intersection, the operator of the 1993 Chevrolet 1500 pickup truck either failed to recognize the Sierra or misjudged the gap distance and entered the westbound travel lane in an attempt to execute a sharp left turn. The driver of the Sierra reported that he did not initiate any avoidance actions during the NASS interview.

　　Crash
The off-set frontal crash occurred in the westbound lane approximately 10 m (33') west of the intersection. The directions of force for the 2004 Sierra and 1993 Chevrolet were in the 12 o'clock and 1 o'clock sectors, respectively. The impact resulted in severe damage to both vehicles and was sufficient to deploy the driver's frontal air bag. The EDR-reported the maximum velocity change of -31 km/h (-19.5 mph) for the Sierra that occurred 97.5 milliseconds from Algorithm Enable (AE). The damage-only routine of the WinSMASH program calculated a total delta-V of 43 km/h (26.7 mph), based on the frontal crush profiles of the two vehicles. Following the initial impact, the Sierra was deflected laterally to the right and came to final rest in a ditch approximately 5 m (16') north of the right roadside. The front of the Sierra contacted the ditch resulting in minor damage and no residual crush. The 1993 Chevrolet rotated counterclockwise (CCW) approximately 90 degrees and came to rest facing a northwesterly direction in the westbound lane.

The EDR also recorded a Non-Deployment event unrelated to this crash, based on the event counter and ignition cycles. The EDR-reported maximum delta-V for the Non-Deployment event was -0.53 km/h (-0.33 mph) and occurred 2.5 milliseconds from AE.

Post-Crash

The 40-year-old driver of the 2004 Sierra was removed from the vehicle by emergency personnel and was transported by helicopter to a regional trauma center where he was treated and released. The driver sustained a contused left shoulder. The 19-year-old male driver of the 1993 Chevrolet was removed from his vehicle by emergency personnel and transported by ambulance to a local hospital where he was treated for soft-tissue injuries and then released.

Vehicle Damage

Exterior Damage – 2004 GMC Sierra

The 2004 GMC Sierra pickup truck sustained severe frontal damage as a result of the impact with the 1993 Chevrolet C1500 (**Figure 4**). The NASS vehicle inspection revealed that the direct contact damage began at the front left bumper corner and extended 124 cm (48.8") to the right. The maximum crush was located at the front left bumper corner and measured 70 cm (27.6") in depth. The combined direct and induced damage extended the entire width of

Figure 4 - 2004 GMC Sierra crush profile.

the bumper and measured 151 cm (59.4") in width. The Collision Deformation Classification (CDC) for this frontal impact was 12-FDEW-3. Six equidistant crush measurements were documented across the full width of the chrome bumper and were as follows: C1 = 70 cm (27.6"), C2 = 48 cm (18.9"), C3 = 43 cm (16.9"), C4 = 18 cm (7.1"), C5 = 7 cm (2.8"), C6 = 0 cm.

After the initial impact, the Sierra exited the roadway off the right side and impacted a ditch with its front end. This impact caused no residual damage and the NASS investigation did not include a crush profile for this event. The CDC for this secondary impact was 12-FDEU-1.

Energy from the impact translated down the left side causing induced buckling extending the full length of the crew cab. The left front door was jammed shut and extrication measures were employed to free the driver from the vehicle. The left front wheel was compressed rearward reducing the left side wheelbase 35 cm (13.8") and the tire aired out due to a tear in the tread. The left A-pillar pitched upward slightly and the roof sustained minor buckling. The hood deformed rearward contacting and holing the windshield. The hole in the windshield begins at the lower left aspect near the base of the A-pillar and is approximately 10 cm (4") in diameter. The front left tempered glazing shattered during the impact.

4

Interior Damage – 2004 GMC Sierra

The NASS investigation revealed minor interior damage associated with occupant contact and minor intrusion. Minor scuffing was present on the lower aspect of the rigid left knee bolster probably from loading of the lower extremities. The top aspect of the steering wheel rim was loaded and deformed 5 cm (2") from its original position. Longitudinal intrusions into the driver's seating position included the toe pan, left instrument panel, and the left aspect of the windshield.

The intrusions identified during the NASS inspection are listed by their magnitude in the following table:

Position	Component	Magnitude	Direction
Front left	Toe pan	30 cm (11.8")	Longitudinal
Front left	Windshield	9 cm (3.5")	Longitudinal
Front left	Side panel – forward of A-pillar	8 – 15 cm (3 – 6")	Longitudinal
Front middle	Toe pan	6 cm (2.4")	Lateral
Front middle	Instrument panel	6 cm (2.4")	Longitudinal

Exterior Damage – 1993 Chevrolet C1500 Pickup Truck

The 1993 Chevrolet C1500 sustained severe frontal damage as a result of the impact with the 2004 GMC Sierra **(Figure 5)**. The direct contact damage involved the entire frontal width of the pickup and measured 141 cm (55.5"). The combined direct and induced damage was also 141 cm (55.5"). The maximum crush was located at the front left bumper corner and measured 50 cm (19.7") in depth. The front of the vehicle was canted slightly to the left; however, it did not exceed the 10 cm (4") threshold and therefore was not incremented as end-shift. The hood was deformed rearward

Figure 5 - Damaged 1993 Chevrolet C1500.

and the front left fender buckled outward. The left front wheel was compressed rearward and reduced the wheelbase by 21 cm (8.3"). The front left door was deformed but remained operational. The CDC for this frontal impact was 01-FDEW-2. Six equidistant crush measurements were documented along the front bumper and were as follows: C1 = 50 cm (19.7"), C2 = 47 cm (18.5"), C3 = 44 cm (17.3"), C4 = 42 cm (16.5"), C5 = 13 cm (5.1"), C6 = 0 cm.

Manual Restraints – 2004 GMC Sierra

The 2004 GMC Sierra was configured with integrated manual 3-point lap and shoulder belts for the front outboard seats. The front middle seat was equipped with a manual lap belt. The driver's safety belt was configured with a sliding latch plate and an Emergency Locking Retractor (ELR). The driver's safety belt sustained minor deformation in the form of stretch marks. The NASS case contained limited details of evidentiary belt

usage; measurements of the safety belt's components were not taken; however, many close-up images of the belt components were included. **Figures 6 and 7** below illustrate the stretched belt webbing and slight abrasions on the latch plate, indicative of belt usage. The front right restraint was equipped with a sliding latch plate and a switchable ELR/Automatic Locking Retractor (ALR). No additional occupants were present in the vehicle; close examinations of remaining restraints were limited in scope.

The second row bench seats with folding backs were equipped with manual 3-point lap and shoulder belts in both outboard position and a manual lap belt in the rear middle position. The outboard restraints were equipped with sliding latch plates and switchable ELR/ALR retractors.

Figure 6 - Loaded front left seat belt and deformed steering wheel rim.

Figure 7 - Front left safety belt latch plate.

Certified Advanced 208-Comliant Safety System
  Frontal Air Bag System – 2004 GMC Sierra
The 2004 GMC Sierra was equipped with a Certified Advanced 208-Complaint (CAC) safety system. The manufacturer of this vehicle certified that it meets the requirements of the Advanced 208 Federal Motor Vehicle Safety Standard (FMVSS). The CAC system consisted of dual-stage frontal air bags for the driver and front right passenger positions, seat track position sensors, front safety belt buckle switches, a front right occupant detection sensor, and an Event Data Recorder (EDR).

The driver's air bag deployed from the steering wheel hub through symmetrical H-configuration module cover flaps. Each cover flap measured 8 cm (3.1") in width and 12 cm (4.7") in height. The deployed driver's air bag measured 65 cm (25.6") in diameter in its deflated state. There was no contact evidence on the driver's air bag. The air bag was reportedly tethered by one internal strap and was vented by two ports located in the 10 and 2 o'clock positions on the rear of the bag.

The mid-mount front right passenger's air bag was suppressed and did not deploy during the crash.

6

Occupant Sensing System – 2004 GMC Sierra
The CAC safety system was configured with a weight sensor in the front right seat cushion. The system was designed to detect the occupant presence and automatically suppress the front right passenger's air bag if it detected a weight consistent with a child seat, or a child sitting in the front seat, or if it determined that the front right seat was not occupied. A light on the mirror confirmed the on/off status. The air bag could also be manually disabled by inserting a

Figure 8 - Air bag cutoff switch.

key in the cutoff switch on the center instrument panel and placing in the 'off' position. The air bag was manually suppressed at the time of the NASS vehicle inspection and did not deploy (**Figure 8**). Both front seat positions were also equipped with seat track position sensors, which adjusted the air bag deployment level if the seat was in the forward position.

Event Data Recorder – 2004 GMC Sierra
The Sierra's EDR was downloaded by the NASS investigator and the summary report is attached as **Attachment A** at the end of this narrative report. The system recorded a Deployment event as a result of the frontal impact with the Chevrolet. The EDR reported the driver's belt switch circuit status as 'buckled,' which was supported by the vehicle inspection. The EDR commanded a stage-1 deployment of the driver's air bag system at 97.5 milliseconds from the AE. A Non-Deployment event was also recorded, but based on the event counter and ignition cycles it was determined not to be associated with this crash.

Occupant Demographics
   Driver – 2004 GMC Sierra
Age/Sex: 40-year-old/Male
Height: 175 cm (69")
Weight: 102 kg (225 lb)
Seat Track Position: Middle track position
Manual Restraint Use: Integrated 3-point lap and shoulder belt
Usage Source: Vehicle inspection, EDR
Eyewear: Eyeglasses/Sunglasses
Type of Medical Treatment: Transported by air to regional trauma center

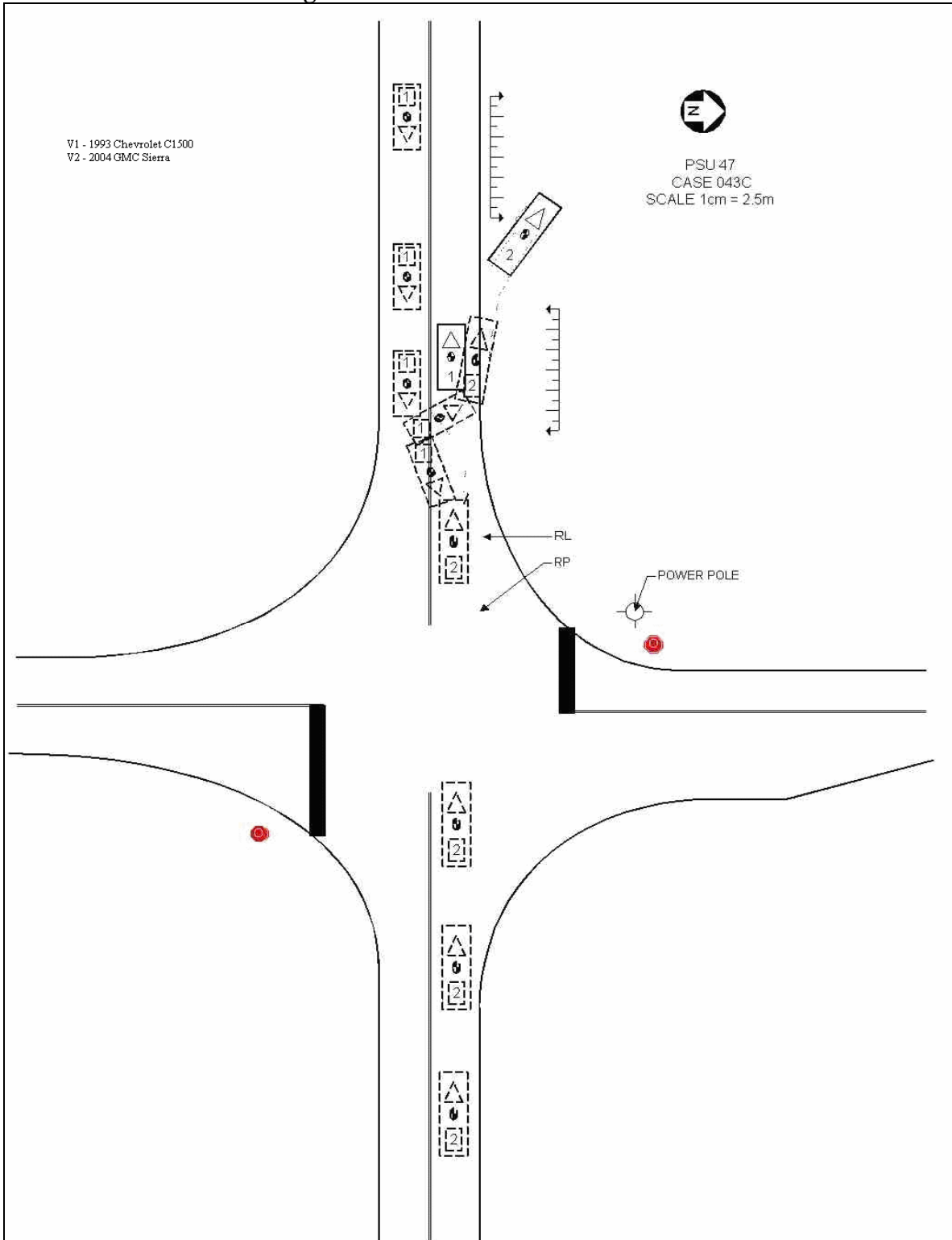   *Driver Injuries*

Injury	Injury Severity (AIS 90/Update 98)	Injury Source
Left shoulder contusion	Minor (790402.1,2)	Integrated restraint webbing

NASS driver interview.

Driver Kinematics

The 40-year-old driver was seated in an upright attitude and was restrained by the integrated 3-point lap and shoulder belt. Based on the EDR data, which provided information on driver inputs for five seconds prior to algorithm enable, his foot was positioned on the throttle until one second before the crash. At impact with the Chevrolet 1500, the driver's air bag deployed, and the driver initiated a forward trajectory responding to the 12 o'clock direction of force. The driver loaded the integrated restraint and sustained a contusion to this left shoulder. He continued forward and loaded through the air bag and contacted the top aspect of the steering wheel rim with his chest, resulting in no injuries. Prior to rebounding, the driver's lower extremities loaded and faintly scuffed the rigid plastic knee bolster. Emergency personnel arrived on the scene and extricated the driver from his vehicle through the jammed left front door. He was transported by air to a regional trauma center, evaluated, and released.

Figure 9 – NASS Scene Schematic

V1 - 1993 Chevrolet C1500
V2 - 2004 GMC Sierra

PSU 47
CASE 043C
SCALE 1cm = 2.5m

RL
RP
POWER POLE

9

Attachment A: 2004 GMC Sierra EDR Report

CDR File Information

Vehicle Identification Number	1GTEC19T24E******
Investigator	
Case Number	043G
Investigation Date	Thursday, April 29 2004
Crash Date	Monday, April 5 2004
Filename	47-043C.CDR
Saved on	Thursday, April 29 2004 at 02:49:02 PM
Collected with CDR version	Crash Data Retrieval Tool 2.24
Reported with CDR version	Crash Data Retrieval Tool 2.900
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	522
Ignition Cycles At Investigation	525
Maximum SDM Recorded Velocity Change (MPH)	-19.50
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	97.5
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	7.5
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Suppressed
Passenger 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
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
-5	55	1472	18
-4	55	1472	18
-3	55	1472	18
-2	55	1472	18
-1	55	1472	0

Seconds Before AE	Brake Switch Circuit Status
-8	OFF
-7	OFF
-6	OFF
-5	OFF
-4	OFF
-3	OFF
-2	OFF
-1	OFF
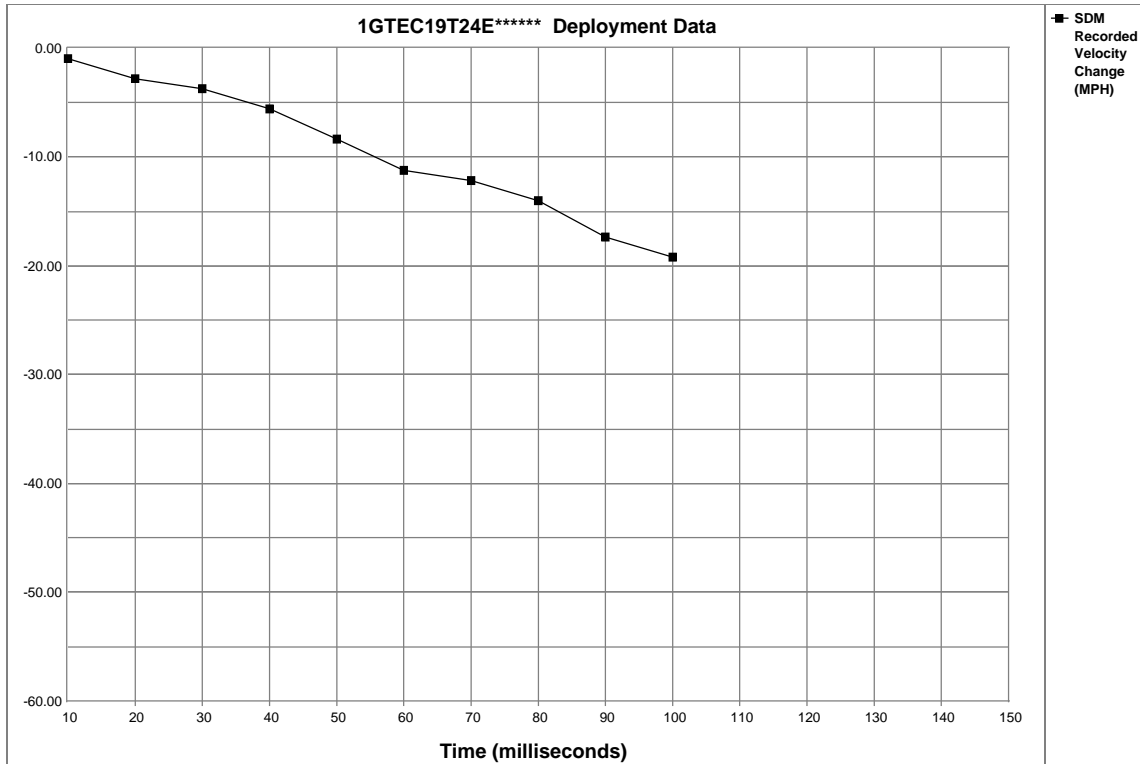
1GTEC19T24E**** Deployment Data**

SDM Recorded Velocity Change (MPH)

Time (milliseconds)

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.93	-2.79	-3.72	-5.58	-8.37	-11.16	-12.09	-13.95	-17.36	-19.22	N/A	N/A	N/A	N/A	N/A

System Status At Non-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 Non-Deployment	416
Ignition Cycles At Investigation	525
Maximum SDM Recorded Velocity Change (MPH)	-0.33
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	2.5
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
-5	24	1792	29
-4	26	1920	29
-3	30	2048	29
-2	32	2240	29
-1	36	2432	29

Seconds Before AE	Brake Switch Circuit Status
-8	OFF
-7	OFF
-6	OFF
-5	OFF
-4	OFF
-3	OFF
-2	OFF
-1	OFF
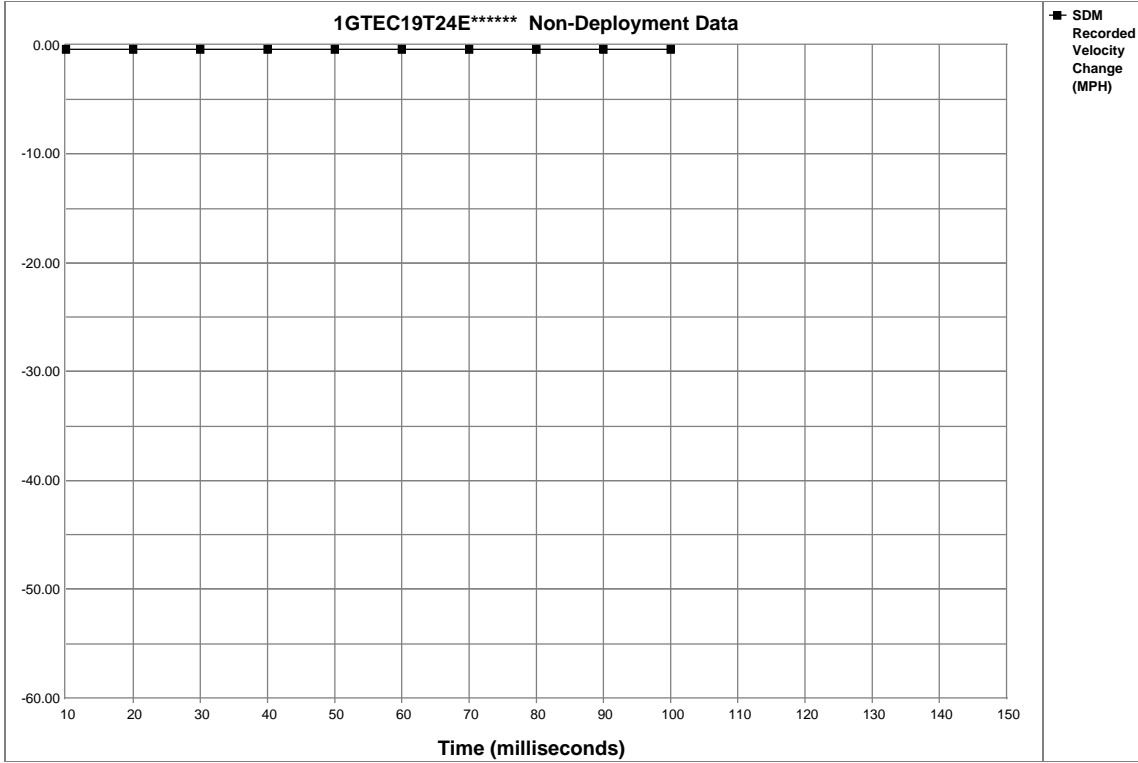
1GTEC19T24E**** Non-Deployment Data**

SDM Recorded Velocity Change (MPH)

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	-0.31	N/A	N/A	N/A	N/A	N/A

Time (milliseconds)

Hexadecimal Data

```
$01   F0 39 33 A9 AE C6
$02   F1 F1 00 00 B8 00
$03   41 53 34 30 31 33
$04   4B 54 56 4A 48 32
$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 BE E0 00 00 00
$11   82 81 82 7C 7C 7D
$12   9A 89 89 21 20 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   12 FE 00 00 FF FF
$21   FF FF FF FF FF FF
$22   FF FF FF FF FF FF
$23   FF FF FF FF FF FF
$24   00 00 11 02 01 04
$25   02 00 00 03 FF FF
$26   01 01 01 01 01 01
$27   01 01 01 01 00 00
$28   00 00 00 0A FF CB
$29   FF 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 FD 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   00 00 33 07 03 03
$35   00 00 00 00 00 00
$36   00 00 00 00 00 00
$37   00 00 00 03 ED 49
$38   27 03 49 27 00 00
$39   01 00 00 03 FF FF
$3A   03 09 0C 12 1B 24
$3B   27 2D 38 3E 00 00
$3C   00 00 00 0A FF BE
$3D   FC A5 00 00 00 00
$40   3A 34 30 2A 26 00
$41   00 00 4A 4A 4A 4A
$42   4A 00 26 23 20 1E
$43   1C 00 33 C0 00 00
$44   58 58 58 58 58 00
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$45   00 00 00 2E 2E 2E
$46   2E 00 17 17 17 17
$47   17 00 41 FF 00 00
$48   47 58 58 58 58 00
$49   80 00 00 00 2E 2E
$4A   2E 00 10 17 17 17
$4B   17 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
```