

**TRANSPORTATION SCIENCES
CRASH RESEARCH SECTION**

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CALSPAN REMOTE DEPOWERED AIR BAG DEPLOYMENT INVESTIGATION

CALSPAN CASE NO. CA98-21

VEHICLE - 1998 SATURN SC2

LOCATION - ILLINOIS

CRASH DATE - JANUARY, 1998

Contract No. DTNH22-94-07058

Prepared for:

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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 be 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 of the involved vehicle(s) or their safety systems.

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<p>17. <i>Abstract</i></p> <p>This remote investigation focused on an intersection collision that involved a 1998 Saturn SC2 and a 1978 Peterbilt tractor semi-trailer. The Saturn SC2 was equipped with a Supplemental Restraint System that consisted of depowered driver and front passenger air bags. The Saturn's SRS deployed as a result of the crash. The sole occupant in the Saturn was the 56 year old male driver who suffered a minor contusions as a result of the crash.</p> <p>This two-vehicle crash occurred in the morning hours of January, 1998. At the time of the crash, the roads were dry and the weather was not a factor. The crash occurred at the suburban intersection of a two lane north/south road and a two lane east/west road. Standard red/amber/green traffic signals controlled the traffic flow through the intersection. The speed limit in the area of the crash was 72 km/h (45 mph).</p> <p>The 1978 Peterbilt tractor semi-trailer was traveling eastbound. The 1998 Saturn SC2 was traveling northbound, driven by a 56 year old male at a, driver estimated, speed of 64 km/h (40 mph). The crash occurred when the tractor semi-trailer reportedly entered the intersection against the red traffic signal. The Saturn driver indicated he was aware of the impending crash and braked his vehicle. He stated that the Saturn pitched down (due to the dynamics of the braking), struck and slid partially under the right side of the semi-trailer. He estimated his impact sped was approximately 24 - 32 km/h (15 - 20 mph). The tractor semi-trailer continued eastbound, driving across the front of the Saturn. The force of the impact deployed the depowered Supplemental Restraint System in the Saturn. The Saturn sustained disabling damage and was towed from the scene.</p>			
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CALSPAN REMOTE DEPOWERED AIR BAG DEPLOYMENT INVESTIGATION

VEHICLE: 1998 SATURN SC2

CALSPAN CASE NO. CA98-21

LOCATION: ILLINOIS

CRASH DATE: JANUARY, 1998

BACKGROUND

This remote investigation focused on an intersection collision that involved a 1998 Saturn SC2 and a 1978 Peterbilt tractor semi-trailer. The Saturn SC2 was equipped with a Supplemental Restraint System that consisted of depowered driver and front passenger air bags. The Saturn's SRS deployed as a result of the crash. The sole occupant in the Saturn was the 56 year old male driver who suffered a police reported incapacitating injury as a result of the crash. The National Highway Traffic Safety Administration (NHTSA) was informed of the crash by a NASS research team and assigned a remote investigation to the Special Crash Investigations Team at Calspan on March 24, 1998.

SUMMARY

This two-vehicle crash occurred in the morning hours of January, 1998. At the time of the crash, the roads were dry and the weather was not a factor. The crash occurred at the suburban intersection of a two lane north/south road and a two lane east/west road. Standard red/amber/green traffic signals controlled the traffic flow through the intersection. The speed limit in the area of the crash was 72 km/h (45 mph).

The 1978 Peterbilt tractor semi-trailer was traveling eastbound. The 1998 Saturn SC2 was traveling northbound, driven by a 56 year old male. The driver estimated his speed was approximately 64 km/h (40 mph). The driver had just left his residence and was on his way to a business seminar. He was approximately 1.6 km (1.0 mile) from his home. The driver reported the traffic light was green as he approached and entered the intersection. The crash occurred when the tractor semi-trailer reportedly entered the intersection against the red traffic signal.

The Saturn driver indicated he was aware of the impending crash and braked his vehicle. He stated that the Saturn pitched down (due to the dynamics of the braking), struck and slid partially under the right side of the semi-trailer. He estimated his impact speed to be approximately 24 - 32 km/h (15 - 20 mph). The tractor semi-trailer continued eastbound, driving across the front of the Saturn. The force of the impact deployed the depowered Supplemental Restraint System in the Saturn. The Saturn sustained disabling damage and was towed from the scene. The uninjured driver of the Peterbilt drove the undamaged tractor semi-trailer from the scene.

The 56 year old male driver of the Saturn reportedly had a height/weight of 183 cm (72 in) and 100 kg (220 lb). He was restrained by the vehicle's manual 3-point lap and shoulder restraint. He indicated his seat was adjusted to the full rear position. The police report indicated he suffered an incapacitating injury. However in his interview, the driver stated that he was only disoriented after the crash. He did not loose

consciousness and remained in the vehicle until EMS arrived. He further indicated that the only sustained injuries were contusions to the right wrist and left shoulder (AIS 1). He was taken to a community hospital for examination and released 3 to 4 hours post-crash. He has not sought any follow-up treatment. The driver was reluctant to sign any type of medical release.

AIR BAG VEHICLE

The 1998 Saturn SC2, 2 door coupe, was identified by a Vehicle Identification Number (VIN) of: 1G8ZH1276WZ (production sequence deleted). The vehicle was equipped with a Supplemental Restraint System that consisted of depowered driver and front passenger air bags. The manual restraint system consisted of continuous loop lap and shoulder belts in the 4 outboard seated positions. The vehicle's power train consisted of a 1.9 liter, I-4 engine linked to a 5-speed manual transmission. The driver indicated he had purchased the vehicle approximately 2 months prior to the crash.

VEHICLE DAMAGE

Insurance company photographs of the vehicle were not available. The repair estimate of the vehicle, forwarded by the repair facility, indicated the total cost of the repair (parts and labor) was approximately \$5460. The damaged components included: the front bumper fascia, bumper reinforcement bar, hood, right and left headlamps and marker lights, radiator assembly and supports, right and left exterior fenders and the left inner fender reinforcement. The front unibody required realignment. The extent of damage included those components and structures forward of the radiator support plane. The front suspension and drive train were not damaged. The damage description suggests the Saturn was struck on the left frontal area with a PDOF in the 10 o'clock sector.

The only interior components replaced appeared to be those associated with the Supplemental Restraint System. Those components included the air bag control module, clock spring, driver air bag module and the front passenger air bag module. There was no indication of any steering column repair.

DRIVER INJURIES

Injury	Severity (AIS 90)	Injury Mechanism
Contusion - right wrist	Minor (790402.1,1)	Left center instrument panel
Contusion - left shoulder	Minor (790402.1,2)	Inertial contact w/ 3-point restraint

NOTE: the above injuries were identified during an interview with the driver

DRIVER KINEMATICS

The 56 year old male driver of the Saturn had a reported height/weight of 183 cm (72 in) and 100 kg (220 lb). He was restrained in the vehicle with his seat adjusted to a full rear position. He recalled that his hands were positioned at the 3 and 9 o'clock sectors of the steering wheel. At impact, the driver was braking and had probably braced himself for impact. The driver initiated a forward and left trajectory in response to the 10 o'clock direction of the impact and loaded the 3-point restraint. The force of the impact

deployed the depowered driver and front passenger air bags. The expanding driver air bag displaced his hands from the steering wheel and his forward trajectory displaced his right wrist into the instrument panel. The driver contacted the expanded air bag and then rebounded back into the seat.