TRANSPORTATION SCIENCES
CRASH RESEARCH SECTION

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CALSPAN REMOTE DEPOWERED AIR BAG DEPLOYMENT INVESTIGATION

CALSPAN CASE NO. CA97-50

VEHICLE - 1998 SATURN SL1

LOCATION - MICHIGAN

CRASH DATE - DECEMBER, 1997

Contract No. DTNH22-94-07058

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, DC 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 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.

TECHNICAL REPORT STANDARD TITLE PAGE

1. *Report No.* CA97-50	2. *Government Accession No.*	3. *Recipient's Catalog No.*	
		4. Weights	
5. *Title and Subtitle* Calspan Remote Depowered Air Bag Deployment Investigation Vehicle - 1998 Saturn SL1 Location - Michigan		6. *Report Date*: March, 1998	
		7. *Performing Organization Code*	
8. *Author(s)* Crash Research Section		9. *Performing Organization Report No.*	
10. *Performing Organization Name and Address* Transportation Sciences Crash Research Section Calspan Corporation P.O. Box 400 Buffalo, New York 14225		11. *Work Unit No.* 1115 (8190-8199)	
		12. *Contract or Grant No.* DTNH22-94-D-07058	
13. *Sponsoring Agency Name and Address* U.S. Department of Transportation National Highway Traffic Safety Administration Washington, DC 20590		14. *Type of Report and Period Covered* Technical Report Crash Date: December, 1997	
		15. *Sponsoring Agency Code*	
16. *Supplementary Notes:* Remote depowered air bag investigation of a 1998 Saturn SL1.			

17. *Abstract*

This remote investigation focused on the two vehicle crash that involved a 1998 Saturn SL1 and a 1997 Oldsmobile Silhouette minivan. The Saturn was equipped with a Supplemental Restraint System (SRS) that consisted of depowered driver and front passenger air bags that had deployed as a result of the crash. The driver of the Saturn was a 34 year old male, restrained in the vehicle by the 3-point lap and shoulder belt system. The driver was not injured in the crash.

Immediately preceding the crash, the Saturn was eastbound on an inter-state entrance ramp and the driver was looking to his left checking for traffic, in order to merge with the traffic flow. The crash occurred when he failed to see the 1997 Oldsmobile Silhouette stopped on the ramp in front of him. In his interview, the driver indicated that the impact occurred immediately as he turned his view back to his right (straight ahead). The left front of the Saturn struck the right rear of the Oldsmobile in a 12 o'clock/6 o'clock impact configuration. The estimated Collision Deformation Classification's (CDC) were 12-FYEW-01 and 06-BZEW-01 for the Saturn and Oldsmobile respectively. The estimated delta V of the Saturn was 19 to 24 km/h (12 to 15 mph).

The 12 o'clock direction of the impact force caused the driver to be displaced forward. The driver loaded the 3-point restraint and deployed air bag. He was not injured in the crash and did not seek any medical attention.

18. *Key Words* Remote investigation Supplemental Restraint System Air bag deployment Depowered air bag		19. *Distribution Statement* General Public	
20. *Security Classif. (of this report)* Unclassified	21. *Security Classif. (of this page)* Unclassified	22. *No. of Pages* 2	23. *Price*

CALSPAN REMOTE DEPOWERED AIR BAG DEPLOYMENT INVESTIGATION
VEHICLE: 1998 SATURN SL1

CALSPAN CASE NO. CA97-50
LOCATION: MICHIGAN
CRASH DATE: DECEMBER, 1997

BACKGROUND

This investigation focused on a two-vehicle crash that involved a 1998 Saturn SL1, 4 door sedan and a 1997 Oldsmobile Silhouette 4x2 APV. The 1998 Saturn Sedan was equipped with a Supplemental Restraint System (SRS) that consisted of de-powered driver and front passenger air bags. The Saturn's air bags deployed as a result of an impact into the rear of the Oldsmobile. The 34 year old male driver of the Saturn was not injured in the crash. NHTSA was informed of the crash by NASS PSU 11 on December 15, 1997. NHTSA assigned an on-site investigation effort of this task to the Special Crash Investigation Team at Calspan on the same day. Initial SCI investigation revealed that the Saturn was repaired prior to NHTSA's notification of the crash. Therefore, a remote investigation was conducted.

SUMMARY

This two vehicle crash occurred in the late afternoon hours of December 1997. The crash occurred on an entrance ramp to an urban section of the interstate. The entrance ramp was a single lane that merged into the two lane eastbound interstate traffic. At the time of the crash, it was dark (unlighted) and the weather was not a factor. The roads were dry. The rush hour traffic at the time of the crash was heavy. The speed limit of the interstate in the area of the crash was 113 km/h (70 mph).

The driver was the sole occupant of the 1998 Saturn SL1. The driver's plan was to enter the interstate from his downtown place of employment for the trip home. The Saturn was eastbound on the entrance ramp and the driver was looking to his left checking for traffic, in order to merge with the traffic flow. The crash occurred when he failed to see the 1997 Oldsmobile Silhouette stopped on the ramp in front of him. In his interview, the driver indicated that the impact occurred immediately as he turned his view to his right (straight ahead). He did not believe he had any time to make an avoidance maneuver. He estimated his speed was 32-40 km/h (20-25 mph). The left front of the Saturn struck the right rear of the Oldsmobile in a 12 o'clock/6 o'clock impact configuration. The estimated Collision Deformation Classification's (CDC) were 12-FYEW-01 and 06-BZEW-01 for the Saturn and Oldsmobile respectively. The estimated delta V of the Saturn was 19 to 24 km/h (12 to 15 mph).

1998 SATURN SL1

The 1998 Saturn SL1 4 door sedan was identified by a VIN of 1G8ZH5283WZ (Production sequence deleted). The vehicle was equipped with a Supplemental Restraint System that consisted of driver and front passenger depowered air bags. The manual restraint system was 3-point lap and shoulder belts for

the four outboard seat positions. The power train consisted of a 1.9 liter L4 engine linked to an automatic transmission.

The Saturn reportedly sustained damages totaling approximately $8200. The body shop repair manager indicated the damaged components include the front bumper, hood, left head lamp, left front fender, radiator core and support, and air conditioner. The left unitized frame rail was also damaged requiring repair. The steering column was replaced in addition to both driver and front passenger air bags. A copy of the insurance adjusters Polaroid photograph of the vehicle was obtained and can be seen at the right.

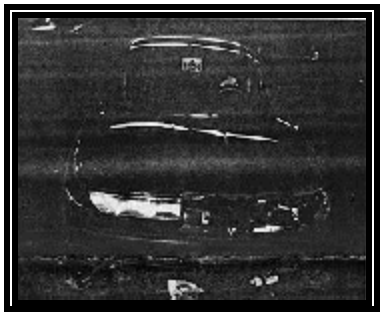

Figure 1: Saturn front view

1997 OLDSMOBILE SILHOUETTE

The 1997 Oldsmobile Silhouette Minivan was identified by the VIN of 1GHDX03E4VD(Production sequence deleted). The damage to the vehicle consisted of exterior damage to the rear bumper. There was no structural damage. The total cost of the vehicle's repairs was approximately $630, presumably to repair and refinish the rear bumper. The vehicle was driven away from the crash scene by the driver. None of the three occupants in the vehicle were injured.

Figure 2: Oldsmobile rear view

SATURN DRIVER ISSUES

The driver of the Saturn was a 34 year old male, with a reported height/ weight of 175 cm (69 in) and 66 kg (145 lb). He indicated that the left front seat was positioned between the middle and rear track position and that he was wearing the manual lap and shoulder restraint. The tilt steering column was adjusted between the center and full up position. He was not wearing any type of glasses.

Immediately prior to the crash, the Saturn's driver was seated in a presumed normal posture checking traffic. The driver returned his view to the forward direction and the front-to-rear impact with the stopped Oldsmobile Silhouette occurred. The driver recalled recognizing there was a stopped vehicle but did not recall having time to take any avoidance action. Upon impact, the collision force caused the Saturn's SRS to deploy. The driver responded to the 12 o'clock direction of the collision force by moving forward, loading the 3-point restraint, driver air bag and steering column. The steering column may have been compressed necessitating its replacement. The driver then rebounded back into the seat. He had no recollection of the actual impact or air bag deployment. He was not injured in the crash and has not sought medical attention.