

**TRANSPORTATION SCIENCES CENTER
ACCIDENT RESEARCH GROUP**

Calspan SRL Corporation
Buffalo, New York 14225

**CALSPAN REMOTE INADVERTENT SIDE AIR BAG DEPLOYMENT
INVESTIGATION**

CALSPAN CASE NO. CA97-27

SUBJECT VEHICLE - 1995 VOLVO 850

LOCATION - STATE OF MASSACHUSETTS

INCIDENT DATE - MAY, 1997

Contract No. DTNH22-94-D-07058

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

DISCLAIMER

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

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. <i>Report No.</i> CA 97-27	2. <i>Government Accession No.</i>	3. <i>Recipient's Catalog No.</i>	
4. <i>Title and Subtitle</i> Calspan Remote Inadvertent Side Air Bag Deployment Investigation Subject Vehicle - 1995 Volvo 850 Location - State of Massachusetts		5. <i>Report Date:</i> October, 1997	
		6. <i>Performing Organization Code</i>	
7. <i>Author(s)</i> Accident Research Group		8. <i>Performing Organization Report No.</i>	
9. <i>Performing Organization Name and Address</i> Transportation Sciences Center Accident Research Group Calspan SRL Corporation P.O. Box 400 Buffalo, New York 14225		10. <i>Work Unit No.</i> 1115 (7500-7509)	
		11. <i>Contract or Grant No.</i> DTNH22-94-D-07058	
12. <i>Sponsoring Agency Name and Address</i> U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		13. <i>Type of Report and Period Covered</i> Technical Report Incident Date: May, 1997	
		14. <i>Sponsoring Agency Code</i>	
15. <i>Supplementary Notes</i> Remote investigation of a 1995 Volvo 850's passenger Supplemental Impact Protection System (SIPS) air bag which deployment resulted from the compression of a hockey stick between the right front door and the passenger's right side air bag triggering mechanism.			
16. <i>Abstract</i> The incident involved the inadvertent deployment of the right side air bag (Sipsbag) of a 1995 Volvo 850, 4-door sedan. The Volvo was occupied by a 15 year old male in the right front seated position at the time that the passenger side Sipsbag deployed. In addition, the Volvo was also occupied by an adult male seated in the driver's position and three teenaged males seated in the rear seat of the vehicle. The Volvo's ignition was turned to the on-position with the engine running and the transmission in park when a hockey stick was compressed between the right front door and the passenger's Sipsbag triggering mechanism. The right front occupant sustained a contusion (AIS-1) approximately 2.5cm (1.0 in) in diameter on his lateral right forearm. No other occupants of the Volvo were injured.			
17. <i>Key Words</i> Side Impact Protection System (SIPS), Sipsbag, Side air bag, Side air bag deployment, 1995 Volvo 850, Inadvertent deployment.		18. <i>Distribution Statement</i> General Public	
19. <i>Security Classif. (of this report)</i> Unclassified	20. <i>Security Classif. (of this page)</i> Unclassified	21. <i>No. of Pages</i> 3	22. <i>Price</i>

CALSPAN REMOTE INADVERTENT AIR BAG DEPLOYMENT

CALSPAN CASE NO. CA97-27

VEHICLE: 1995 VOLVO 850

LOCATION: STATE OF MASSACHUSETTS

INCIDENT DATE: MAY, 1997

TECHNICAL SUMMARY

This incident involved the inadvertent deployment of the passenger Side Impact Protection System air bag (Sipsbag) in a 1995 Volvo 850, 4-door sedan. The Volvo was occupied by a 15 year old male in the right front seated position at the time the right side Sipsbag deployed. The Volvo was also occupied by an adult male seated in the driver's position and three teenaged males seated in the rear seat of the vehicle. The Volvo's ignition was turned to the on-position with the engine running and the transmission in park when a hockey stick which was positioned along the right sill of the vehicle was compressed between the right side air bag triggering mechanism and the closing right front door, causing the passenger Sipsbag to deploy. The right front occupant sustained a contusion (AIS-1) approximately 2.5 cm (1.0 in) in diameter on his lateral right forearm resulting from contact with the deploying Sipsbag. No other occupants of the Volvo were injured.

Initial notification of this incident was received by Public Affairs at NHTSA from a consumer reporter for a newspaper local to the area in which the incident occurred. Calspan's Special Crash Investigation Team was subsequently alerted of the incident on August 11, 1997 and initiated a remote investigation.

The subject vehicle was a 1995 Volvo 850, 4-door sedan which was identified by vehicle identification number YV11S5508S1 (production number deleted). It was equipped with a Supplemental Restraint System (SRS) that consisted of driver and passenger frontal air bags, and a Side Impact Protection System (SIPS). The SIPS consisted of the reinforcement of many systems of the vehicle including the doors, B-pillar, the floor, the floor tunnel, the roof, and the seats in addition to the Sipsbag. The Volvo was also equipped with 3-point lap and shoulder belt systems for the front and rear outboard seated positions as well as the center rear seated position.. Pyrotechnic pretensioners were available at the front positions.

On the date of the incident, the adult male driver of the Volvo drove to pickup the four teenage occupants from playing street hockey. Three of the males took positions in the rear seat of the Volvo while the remaining male was seated in the right front position of the vehicle. This occupant did not have adequate room to place his hockey stick in front of him and, therefore he positioned the stick between the right front sill area and the right front seat at the location of the Sipsbag's sensor unit. The right front door was still open at this time. This occupant then closed the door which compressed the hockey stick against the seat frame and the triggering mechanism subsequently initiated the Sipsbag's deployment sequence. The deployment of the passenger side Sipsbag caused the stitching of the leather seat back on the outboard and superior aspects to separate. A safety report from Volvo Car Corporation (Paper No. 94 S6 O 13) indicates that this is normal on the outboard side of the seat back. The cost incurred to replace the Sipsbag and repair the seat back was \$1300.00.

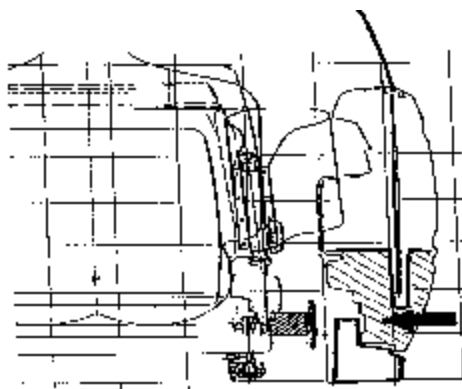
The right front seated occupant was a 15 year old male with a height of 178 cm (70 in) and weight of 64 kg (140 lbs) . At the time of the incident, he was wearing blue jeans and a short sleeved cotton T-shirt which remained intact. This occupant sustained a contusion approximately 2.5 cm (1.0 in) in diameter on his lateral right forearm (AIS-1) from contact with the deploying Sipsbag.

The hockey stick consisted of a wooden handle and a plastic blade. It was placed with the plastic blade forward of the right front seat cushion with the handle extended along the right sill area and into the right rear area. The handle and blade were not fractured as a result of being compressed between the right front door and the triggering mechanism.

The Sipsbag's sensor was located on the outboard aspect of the lower seat frame and the module was contained in the outboard seat back. The ventilated Sipsbag was made of polyamide with an internal coating of silicone rubber. It was designed to deploy when an impact triggers a mechanical sensor and drives a firing pin into a percussion cap. Speed, force, and deformation equivalent to a side impact at a minimum of approximately 18 km/h (11 mph) is required to initiate the deployment of the side air bag system. The conditions required to trigger the Sipsbag are:

- Speed > 2 m/s
- Force > 500 N
- Stroke > 2 mm

Volvo's Sipsbag Seat Installation



The left and right side air bags deploy independently of one another, therefore the driver's side Sipsbag did not deploy. The vehicle was also equipped with frontal air bags in the left and right seated positions. These air bags did not deploy in this non-crash event.

HUMAN DEMOGRAPHICS/ OCCUPANT DATA

Right Front Passenger: 15 year old male

Height: 178 cm (70 in)

Weight: 64 kg (140 lbs.)

Clothing: Jeans and a short sleeved white cotton t-shirt.
No protective hockey equipment was used.

Medical Treatment: None

RIGHT FRONT PASSENGER INJURIES

Injury	Injury Severity (AIS-90)	Injury Mechanism
Lateral right arm contusion 2.5 cm (1.0 in) in diameter	Minor (790402.1,1)	Passenger right side air bag

Appendix A
Selected Images

SELECTED IMAGES
CALSPAN CASE NO. 97-27



1. Identification of the subject vehicle



2. View of the deployed passenger side Sipsbag and the separated stitching on the outboard and superior aspects of the right front seat back.



3. Posterior view of the separated stitching on the right front seat back.