

Remote, Redesigned Air Bag Special Study  
Dynamic Science, Inc., Case Number (1998-082-804G)  
1998 Chevrolet Cavalier  
Washington  
August/1998

**Technical Report Documentation Page**

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16. Abstract <p>This remote investigation focused on the redesigned air bag system deployment of a 1998 Chevrolet Cavalier 4-door sedan. This crash occurred in August, 1998 in the early morning. The weather was clear and the bituminous roadway was dry. The crash occurred on a two-way, undivided roadway. The road contains two travel lanes; one northbound lane and one southbound lane, and has a sharp northbound left curve at the area of impact. There is legal street parking on both curbed edges of the roadway. The speed limit for this road is 48 kmph (30 mph). There are no traffic controls at the area of impact. There is a &gt;2% uphill grade at this location. Vehicle 1, a 1998 Chevrolet Cavalier 4-door sedan (case vehicle) driven by a 24 year old female (163 cm/64 in, 52 kg/115 lbs), was traveling north in the northbound travel lane at an unknown speed. The driver was negotiating the left curve in the roadway. The driver was restrained by the available manual lap/shoulder restraint. There were no other occupants in the vehicle. The driver of Vehicle 1 failed to properly negotiate the left curve in the roadway and entered the right/east parking lane. The front plane of Vehicle 1 (12FREE7) impacted the back plane of a legally parked vehicle. A Delta V was calculated for Vehicle 1, utilizing the Missing Vehicle Algorithm of WinSMASH, as 12 kmph (7.5 mph). As a result of the frontal impact, the supplemental restraint system (driver's and passenger's frontal redesigned air bags) of the case vehicle deployed. After impact, Vehicle 1 rotated clockwise approximately 100 degrees and came to rest in the northbound travel lane facing southeast. The driver of Vehicle 1 was not injured in the crash and was not transported from the scene for medical attention. Vehicle 1 became disabled due to damage sustained in the crash and was towed from the scene.</p>					
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**Summary**

This remote investigation focused on the redesigned air bag system deployment of a 1998 Chevrolet Cavalier 4-door sedan. This crash occurred in August, 1998 in the early morning. The weather was clear and the bituminous roadway was dry. The crash occurred on a two-way, undivided roadway. The road contains two travel lanes; one northbound lane and one southbound lane, and has a sharp northbound left curve at the area of impact. There is legal street parking on both curbed edges of the roadway. The speed limit for this road is 48 kmph (30 mph). There are no traffic controls at the area of impact. There is a >2% uphill grade at this location.



**Figure 1.** Exterior, Vehicle 1 (Chevrolet Cavalier)

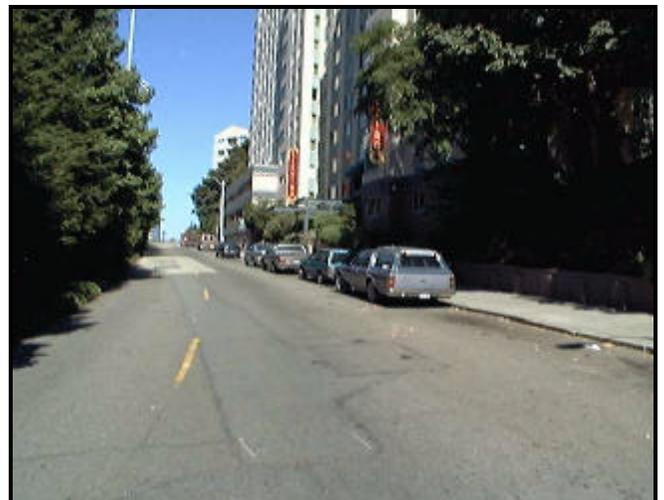
Vehicle 1, a 1998 Chevrolet Cavalier 4-door sedan (case vehicle) driven by a 24 year old female (unknown ht/wt), was traveling north in the northbound travel lane at an unknown speed. The driver was negotiating the left curve in the roadway. The driver was restrained by the available manual lap/shoulder restraint. There were no other occupants in the vehicle.

**Crash Events**

The driver of Vehicle 1 failed to properly negotiate the left curve in the roadway and entered the right/east parking lane. The front plane of Vehicle 1 (12FREE7) impacted the back plane of a legally parked vehicle.

A Delta V was calculated for Vehicle 1, utilizing the Missing Vehicle Algorithm of WinSMASH, as 12 kmph (7.5 mph). As a result of the frontal impact, the supplemental restraint system (driver's and passenger's frontal redesigned air bags) of the case vehicle deployed.

After impact, Vehicle 1 rotated clockwise approximately 100 degrees and came to rest in the northbound travel lane facing southeast.



**Figure 2.** Crash scene, approach to impact.

The driver of Vehicle 1 was not injured in the crash and was not transported from the scene for medical attention.

Vehicle 1 became disabled due to damage sustained in the crash and was towed from the scene.

**Table 1. Delta V**

	Case Vehicle	
	km/h	mph
Total	12	7.5
Longitudinal	-12	-7.5
Lateral	0	0
Barrier speed	12	7.5

**Exterior of Case Vehicle**

**Table 2. Vehicle Information**

Model year, make and model	1998 Chevrolet Cavalier
VIN	1G1JC5249W7
CDC	12FREE7



**Figure 3.** Exterior, Vehicle 1 (1998 Chevrolet Cavalier)



**Figure 4.** Direct damage, Vehicle 1 (1998 Chevrolet Cavalier)

**Table 3. Crush Measurements**

Plane of Impact	Field L cm/in.	C1 cm/in.	C2 cm/in.	C3 cm/in.	C4 cm/in.	C5 cm/in.	C6 cm/in.
Bumper	134	1	0	0	0	1	3
	52.8	0.4	0	0	0	0.4	1.2

## *Interior of Case Vehicle*

The interior of the Chevrolet Cavalier sustained no damage from occupant contact. There was a minor amount of intrusion of the right side panel, forward of the A-pillar. The intruded value is reported in Table 4. There was occupant contact evidence to the driver's frontal air bag only.

The case vehicle was equipped with bucket seats in the front left and front right seating positions. Both front seats were adjusted to the rear most track positions and both were equipped with adjustable head restraints which were not damaged in the crash. The rear of the vehicle was equipped with bench seats with folding backs, and no head restraints in all three seating positions.

**Table 4. Intrusions**

Intruded Component	Location of Intrusion	Intruded Value cm/in.		Dominant Crush Direction
Side panel - forward of the A-pillar	Front right	2	0.8	Lateral

## *Case Vehicle Occupant Protection Systems*

The Chevrolet Cavalier 4-door sedan was equipped with a redesigned air bag system which consisted of front left and front right air bag modules which housed air bags and depowered inflator units.

The front left air bag was housed in the steering wheel hub and was concealed by symmetrical I-configuration cover flaps which were not damaged in the crash. The circular air bag was equipped with two vent ports and no tether straps. Contact evidence consisting of a small "brown transfer" was found on the upper left quadrant of the front of the bag. The air bag was not damaged.



**Figure 5.** Driver's frontal air bag.

The front right air bag was housed in the top-instrument panel position. The single air bag module cover flap was a rectangular configuration and was not damaged in the crash. The rectangular air bag was not equipped with vent ports or tether straps. No contact evidence was found on the air bag and the bag was not damaged.

## *Case Vehicle Occupant Demographics*

**Table 5. Case Vehicle Occupant Demographics**

	Occupant 1	
Age/Sex:	24/Female	
Seated Position:	Front left	
Seat Type:	Bucket - cloth covered	
Height (cm/in):	163	64
Weight (kg/lbs):	52	115
Pre-existing Medical Condition:	Unknown	
Body Posture:	Unknown	
Hand Position:	Unknown	
Foot Position:	Unknown	
Restraint Usage:	Manual lap & shoulder restraint	
Air bag:	Deployed redesigned air bag system	

## *Occupant Injuries*

**Table 6. Injuries**

Injury	Injury Severity (AIS)	Injury Mechanism
Not injured		

## *Occupant Kinematics*

The driver (case occupant) of the Chevrolet Cavalier was seated in an unknown posture in the front left position of the vehicle. She was wearing the manual lap/shoulder restraint. Seat belt usage was determined through visual inspection by the researcher and the lack of frontal contact evidence in the vehicle. It appears that the driver attempted to avoid the impact by applying the brakes (with lock-up).

At impact, the driver reacted to the 0 degree principle direction of force by moving forward and loading the manual lap/shoulder restraint. As the restraints locked, further frontal movement of the driver was prevented. The driver had moved far enough forward to engage the deploying driver's frontal air bag with her chest/face. A small transfer was found on the front of the bag, but no injury was caused by this contact. No other contact evidence was found in the vehicle. The driver was not injured in the crash and did not seek medical attention.



**Figure 6.** Driver's frontal air bag contact evidence.

