

Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number (1999-79-801E)

1999 Mitsubishi Mirage

California

April 1999

Technical Report Documentation Page

1. Report No. 1999-79-801E	2. Government Accession No.		3. Recipient Catalog No.	
4. Title and Subtitle		5. Report Date August 23, 2000		
		6. Performing Organization Report No.		
7. Author(s) Dynamic Science, Inc.		8. Performing Organization Report No.		
9. Performing Organization name and Address Dynamic Science, Inc. 530 College Parkway, Ste. K Annapolis, MD 21401		10. Work Unit No. (TRAIS)		
		11. Contract or Grant no. DTNH22-94-D-27058		
12. Sponsoring Agency Name and Address U.S. Dept. of Transportation (NRD-32) National Highway Traffic Safety Administration 400 7th Street, SW Washington, DC 20590		13. Type of report and period Covered [Report Month, Year]		
		14. Sponsoring Agency Code		
15. Supplemental Notes				
16. Abstract This remote investigation was focused on the redesigned air bag system deployment of a 1999 Mitsubishi Mirage, four door sedan hardtop. This vehicle versus parked vehicle front to back crash occurred during the noon hour of April, 1999. This crash took place on a seven lane, two way, divided roadway. The three eastbound travel lanes are separated from the three westbound travel lanes by a center left turn lane. The center left turn lane is shared by the east and the westbound traffic. The traffic volume was light/moderate. The bituminous roadway surface was travel worn, but dry and free of defects and bordered by curbs. Parking is permitted adjacent to the curb on both sides of the roadway. There are no traffic controls present for this roadway. The posted speed limit is 56 km/h (35mph). Vehicle 1, a 1999 Mitsubishi Mirage driven by a restrained 18 year-old male (170 cm/67 in., 57 kg /126 lbs.), was traveling eastbound in the outside curbed through lane attempting to go straight. The posted speed limit is 56 km/h (35 mph). Vehicle 1 was traveling at an unknown rate of speed. The parked vehicle, a 1997 Chevrolet S-10/T-10 light conventional pickup truck, was legally parked along the curbed edge facing east and was unoccupied. Vehicle 1 was traveling in the curbed lane eastbound and drifted to the right striking the legally parked truck. The front right corner of Vehicle 1 (12FZEW1) impacted the back of the parked vehicle (06BYEW2). The front driver's and passenger's air bag systems in Vehicle 1 deployed. The Delta V was calculated using the WinSmash algorithm program and the crush profile obtained from both vehicles. The longitudinal speed change for Vehicle 1 was calculated at -38.4 km/h (-23.9 mph). The longitudinal Delta V for Vehicle 2 was calculated at 29.7 km/h (18.5 mph). Vehicle 1 continued forward rotating slightly clockwise post impact. The final rest position for Vehicle 1 was on the roadway facing east. The parked vehicle was pushed forward and remained eastbound on the roadway. The 18 year-old male driver of Vehicle 1 sustained a minor abrasion and laceration to his lower face (AIS-1) due to contacting the deploying air bag. The driver was wearing sunglasses at the time of the crash but no additional injuries were noted. The driver was able to exit his vehicle without assistance.				
17. Key Words Redesigned, air bag, minor injuries		18. Distribution Statement		
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No of pages	22. Price	

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Summary

This remote investigation was focused on the redesigned air bag system deployment of a 1999 Mitsubishi Mirage, four door sedan hardtop.

This vehicle versus parked vehicle front to back crash occurred during the noon hour of April, 1999. This crash took place on a seven lane, two way, divided roadway. The three eastbound travel lanes are separated from the three westbound travel lanes by a center left turn lane. The center left turn lane is shared by the east and the westbound traffic. The traffic volume was light/moderate. The bituminous roadway surface was travel worn, but dry and free of defects and bordered by curbs. Parking is permitted adjacent to the curb on both sides of the roadway. There are no traffic controls present for this roadway. The posted speed limit is 56 km/h (35mph).



Figure 1. Approach to area of impact with parked vehicle

Vehicle 1, a 1999 Mitsubishi Mirage driven by a restrained 18 year-old male (170 cm/67 in., 57 kg /126 lbs.), was traveling eastbound in the outside curbed through lane attempting to go straight. The posted speed limit is 56 km/h (35 mph). Vehicle 1 was traveling at an unknown rate of speed.

The parked vehicle, a 1997 Chevrolet S-10/T-10 light conventional pickup truck, was legally parked along the curbed edge facing east and was unoccupied.

Crash Events

Vehicle 1 was traveling in the curbed lane eastbound and drifted to the right striking the legally parked truck. The front right corner of Vehicle 1 (12FZEW1) impacted the back of the parked vehicle (06BYEW2). The front driver's and passenger's air bag systems in Vehicle 1 deployed. The Delta V was calculated using the WinSmash algorithm program and the crush profile obtained from both vehicles. The longitudinal speed change for Vehicle 1 was calculated at -38.4 km/h (-23.9 mph). The longitudinal Delta V for Vehicle 2 was calculated at 29.7 km/h (18.5 mph). Vehicle 1 continued forward rotating slightly clockwise post impact. The final rest position for Vehicle 1 was on the roadway facing east. The parked vehicle was pushed forward and remained eastbound on the roadway.

The 18 year-old male driver of Vehicle 1 sustained a minor abrasion and laceration to his lower face (AIS-1) due to contacting the deploying air bag. The driver was wearing sunglasses at the time of the crash but no additional injuries were noted. The driver was able to exit his vehicle without assistance.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	38.4	23.9	29.8	18.5
Longitudinal	-38.4	-23.9	29.7	18.5
Lateral	0	0	2.6	1.6

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1999 Mitsubishi Mirage, 4 door hard top sedan
VIN	JA3AY26A0XU
CDC	12FZEW1



Figure 2. Exterior, Vehicle 1. Front view.



Figure 3. Exterior, Vehicle 1. Left quarter view

Table 3. Crush Measurements / Vehicle 1 (1999 Mitsubishi Mirage)

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.
Front bumper	132	0	0	10	11	3	1
	52	0	0	3.9	4.3	1.2	0.4

Interior of Case Vehicle 1 (1999 Mitsubishi Mirage)

The interior of the 1999 Mitsubishi Mirage was undamaged as a result of the minor/moderate frontal impact. The Mitsubishi Mirage maintained its integrity and there were no intruding components. The left instrument panel and the driver's belt restraint webbing/buckle showed signs of occupant contact but no occupant injuries were reported that can be attributed to the contacts. The deployed driver's frontal air bag showed signs of smudging and occupant contact is evident due to the driver's facial injuries. This vehicle is equipped with front row bucket seats with adjustable head restraints and the second row has a bench seat with integral head restraints located at the outboard positions. The left front seat was positioned at the middle track position with the seat back in a normal, slightly reclined position as also was the right front seat. The second row bench seats are non-adjustable. No seat performance failures are noted. No vehicle glazing damage is reported.

Case Vehicle Occupant Protection Systems (1999 Mitsubishi Mirage)

The original manufacturer installed driver's frontal air bag module is housed in the steering wheel hub and encases the nylon air bag unit. The single flap air bag deployed during the crash sequence and no damage to the bag was noted. The circular air bag is tethered by two straps and equipped with two exhaust vent port holes.

The front, right passenger air bag is located on the right hand side of the instrument panel and is top mount. The single module deployment door is rectangular in shape and opened at its designated tear point. Upon deployment, the enclosed air bag fully deployed. The non-tethered air bag was undamaged and was equipped with two exhaust vent port holes.



Figure 4. Driver's air bag



Figure 5. Driver's seated position

Case Vehicle Occupant Demographics

Occupant 1

Age/Sex: 18 / Male

Seated Position: Left front

Seat Type: Bucket

Height (cm/in.): 170 66.93

Weight (kg/lbs.): 57 125.66

Pre-existing Medical Condition: None reported

Body Posture: Normal, upright

Hand Position: Both hands on steering wheel

Foot Position: Right foot on brake, left foot on floor

Restraint Usage: Lap and shoulder belt

Air bag: Frontal driver's air bag

Occupant Injuries

Table 4. Injuries

Injury	Injury Severity (AIS)	Injury Mechanism
2906021 - Facial laceration	1	Air bag
2902021 - Facial abrasion	1	Air bag

Occupant Kinematics

The driver of Vehicle 1 was seated in a normal, upright position. He was wearing the available lap and shoulder belts. The front left bucket seat was adjusted to the middle track position. The driver recognized the impending crash and began braking. As the vehicle decelerated, the driver moved forward to some degree. At impact, the driver fully loaded the lap and shoulder belt and engaged the deploying air bag with his face. The contact with the air bag caused a minor facial laceration and abrasion.

Scene Diagram

