Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number (1998-74-152F)

1998 Dodge Stratus

Nebraska

December/1998

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient Catalog No.
1998-74-152F		

4. Title and Subtitle	5. Report Date
	August 25, 1999
	6. Performing Organization Report No.

7. Author(s)	8. Performing Organization Report No.
Dynamic Science, Inc.	

9. Performing Organization name and Address	10. Work Unit No. (TRAIS)
Dynamic Science, Inc. 530 College Parkway, Ste. K Annapolis, MD 21401	11. Contract or Grant no. DTNH22-94-D-27058

12. Sponsoring Agency Name and Address	13. Type of report and period Covered
U.S. Dept. of Transportation (NRD-32) National Highway Traffic Safety Administration 400 7th Street, SW Washington, DC 20590	[Report Month, Year]
	14. Sponsoring Agency Code

15. Supplemental Notes

16. Abstract

This remote investigation focused on the deployment of the redesigned air bag system in a 1998 Dodge Stratus. This minor injury crash occurred in December, 1998 during the early afternoon. The weather was clear and the bituminous roadways were dry and free of defects. The investigating officer noted that there was considerable sun glare for the southbound vehicle. The azimuth for the sun was 191 degrees with an altitude of 25.1 degrees. This crash occurred at a four leg intersection. The southern leg of the intersection is comprised of one southbound and one northbound lane. The northern leg of the intersection is comprised of one northbound and one southbound lane. There is an uphill grade for this roadway. The speed limit is 56 km/h (35 mph) in both directions. There were no applicable traffic controls.

Vehicle 1, a 1998 Dodge Stratus driven by a 27-year-old male (173 cm/68 in., 79 kg/174 lbs.), was traveling northbound at a driver reported speed of 48 km/h (30 mph) approaching the four-leg intersection. The driver was restrained by the available manual lap and shoulder belt. There were no other occupants in Vehicle 1. Vehicle 2, a 1982 Cadillac Eldorado two-door coupe driven by a 20-year-old female (173 cm/68 in., 113 kg/249 lbs), was traveling southbound approaching the four-leg intersection. The driver was not using the available manual lap and shoulder belt. The rear right seat was occupied by a 3-year-old male (76 cm/30 in., 11 kg/24 lbs.). This occupant was not using the available manual lap and shoulder belt.

As the vehicles approached the intersection, the driver of Vehicle 2 initiated a left turn (to go east) in the path of Vehicle 1. The driver of Vehicle 1 swerved to the right and braked but was unable to avoid the impact. The front right of Vehicle 1 (11FLEW1) struck the front right of Vehicle 2 (01FZEW2). Vehicle 1 sustained a longitudinal delta V of -24 km/h (-14.9 mph). Both front air bags in Vehicle 1 deployed at this point. Both vehicles came to rest in the intersection.

The driver of Vehicle 1 was able to exit the vehicle under his own power. He sustained a scalp contusion and a contusion to the upper left arm from contact with the deploying driver's side air bag. He did not require any medical attention. The driver of Vehicle 2 was able to exit the vehicle under her own power. She sustained a contusion her chin from contact with the windshield and a contusion to her right knee from contact with the lower instrument panel. She was transported to a local hospital where she was treated and released. The rear right occupant of Vehicle 2 sustained contusion and laceration to the right jaw from contact with the seat back. He did require medical attention. Both vehicles became disabled due to damage sustained in the crash and were towed from the scene.

17. Key Words	18. Distribution Statement
Redesigned, air bag, minor injury	

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 focused on the deployment of the redesigned air bag system in a 1998 Dodge Stratus. This minor injury crash occurred in December, 1998 during the early afternoon. The weather was clear and the bituminous roadways were dry and free of defects. The investigating officer noted that there was considerable sun glare for the southbound vehicle. The azimuth for the sun was 191 degrees with an altitude of 25.1 degrees[1]. This crash occurred at a four leg intersection. The southern leg of the intersection is comprised of one southbound and one northbound lane. The northern leg of the intersection is comprised of one northbound and one southbound lane. There is an uphill grade for this roadway. The speed limit is 56 km/h (35 mph) in both directions. There were no applicable traffic controls.

Figure 1. Approach of Vehicle 1 to area of impact.

Vehicle 1, a 1998 Dodge Stratus driven by a 27-year-old male (173 cm/68 in., 79 kg/174 lbs.), was traveling northbound at a driver reported speed of 48 km/h (30 mph) approaching the four-leg intersection. The driver was restrained by the available manual lap and shoulder belt. There were no other occupants in Vehicle 1.

Vehicle 2, a 1982 Cadillac Eldorado two-door coupe driven by a 20-year-old female (173 cm/68 in., 113 kg/249 lbs), was traveling southbound approaching the four-leg intersection. The driver was not using the available manual lap and shoulder belt. The rear right seat was occupied by a 3-year-old male (76 cm/30 in., 11 kg/24 lbs.). This occupant was not using the available manual lap and shoulder belt.

Figure 2. Exterior, Vehicle 1 (case vehicle)

Crash Events

As the vehicles approached the intersection, the driver of Vehicle 2 initiated a left turn (to go east) in the path of Vehicle 1. The driver of Vehicle 1 swerved to the right and braked but was unable to avoid the impact. The front right of Vehicle 1 (11FLEW1) struck the front right of Vehicle 2 (01FZEW2). Vehicle 1 sustained a longitudinal delta V of -24 km/h (-14.9 mph). Both front air bags in Vehicle 1 deployed at this point.

Both vehicles came to rest in the intersection.

Figure 3. Exterior, Vehicle 2.

The driver of Vehicle 1 was able to exit the vehicle under his own power. He sustained a scalp contusion and a contusion to the upper left arm from contact with the deploying driver's side air bag. He did not require any medical attention. The driver of Vehicle 2 was able to exit the vehicle under her own power. She sustained a contusion her chin from contact with the windshield and a contusion to her right knee from contact with the lower instrument panel. She was transported to a local hospital where she was treated and released. The rear right occupant of Vehicle 2 sustained contusion and laceration to the right jaw from contact with the seat back. He did require medical attention.

Vehicle 1 was not towed. Vehicle 2 became disabled due to damage sustained in the crash and was towed from the scene.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	26	16.2	20	12.4
Longitudinal	-24	-14.9	-19	-11.8
Lateral	9	5.6	-7	-4.3

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Dodge Stratus
VIN	1B3EJ46X2WNxxxxxx
CDC	11FLEW1

Figure 4. Exterior, Vehicle 1

Figure 5. Exterior, Vehicle 1

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	160	15	2	0	0	0	0
	63	5.9	0.8	0	0	0	0

Interior of Case Vehicle

The case vehicle was equipped with bucket seats in the front left and front right seating positions. Both seats were adjusted to the between middle and rear most track position and were slightly reclined. Both seats were equipped with adjustable head restraints, which were not damaged.

There were no interior occupant contacts detected, nor was there any intrusion or integrity loss. All four door operated properly after the crash.

Case Vehicle Occupant Protection Systems

The vehicle occupant protection systems for this 1998 vehicle included next-generation driver and front-passenger air bags, side-guard door beams, and front seat height adjustable shoulder belts.

The front left air bag was housed in the steering wheel hub and was concealed by an "H" pattern cover flap that was not damaged. The circular air bag was equipped with two tether straps and a single vent port. The bag was not damaged in the crash, nor were there any occupant contacts.

The front right air bag was housed in the top of the instrument panel position. There was a single rectangular cover flap that was not damaged. The rectangular air bag was equipped with two tethers and no vent ports. The air bag was not damaged in the crash.

Figure 6. Front left air bag

Figure 7. Front left air bag

Case Vehicle Occupant Demographics

	Occupant 1	
Age/Sex:	27/Male	
Seated Position:	Front left	
Seat Type:	Bucket	
Height (cm/in:):	173	68.11
Weight (kg/lbs).:	79	174.16
Pre-existing Medical Condition:	None noted	
Body Posture:	Normal, upright, facing forward	
Hand Position:	Both on steering wheel	
Foot Position:	On floor or foot controls	
Restraint Usage:	Manual lap and shoulder belt in use	
Air bag:	Deployed redesigned air bag system	

Occupant Injuries

Table 4. Injuries

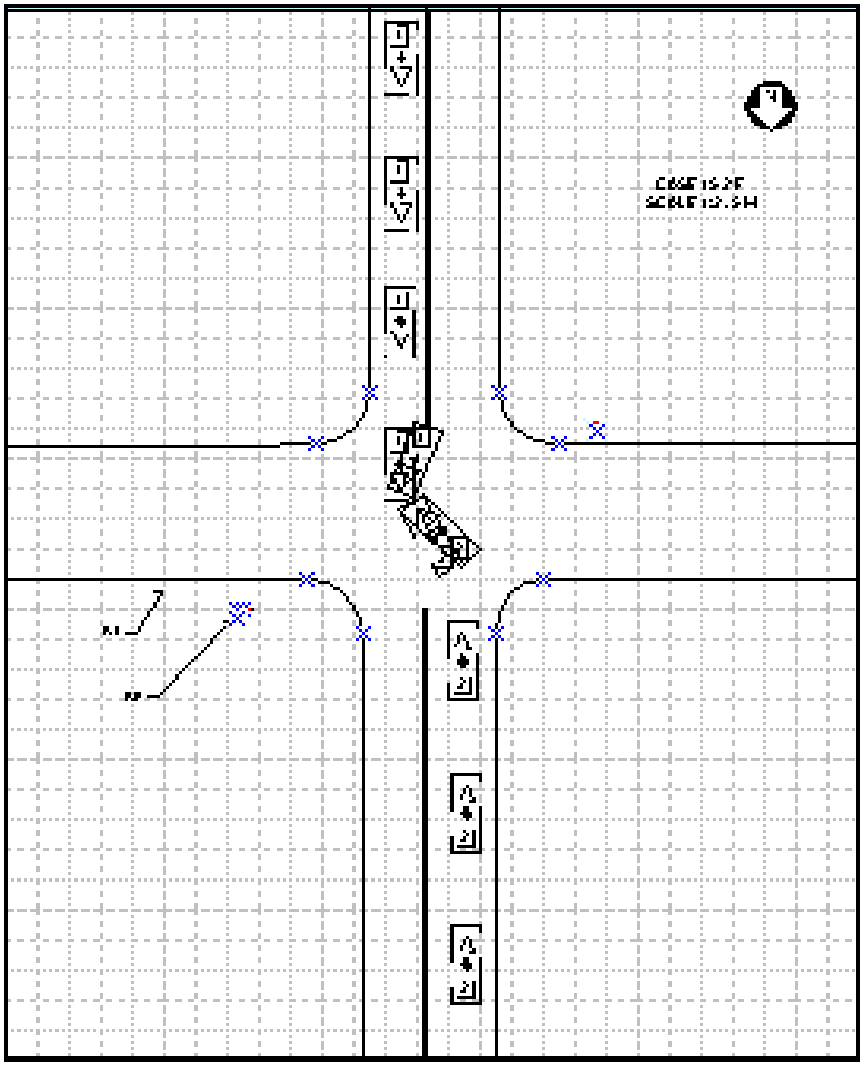
Injury	Injury Severity (AIS)	Injury Mechanism
Scalp contusion	1	Air bag
Left upper arm contusion	1	Air bag

Occupant Kinematics

The driver (case occupant) of the Dodge Stratus was seated in a normal upright posture in the front left seat position. He was wearing the manual lap and shoulder restraints. Prior to impact, the driver indicates that he steered to the right and braked, loading the shoulder harness to some degree.

At impact, the case occupant reacted to the 340 degree principal direction of force by moving forward and to the left. As the air bag inflated, the outer edge contacted the inner part of the upper left arm, causing a minor contusion. The face of the air bag then contacted this occupant's scalp, causing a minor contusion.

Scene Diagram



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U.S. Naval Observatory
Washington, DC 20392-5420

OMAHA, NEBRASKA
o , o ,
W 95 59, N41 16

Altitude and Azimuth of the Sun
Dec 10, 1998
Central Standard Time

	Altitude	Azimuth (E of N)
h m	o	o
12:50	25.4	188.5
13:00	25.1	191.0
13:10	24.7	193.5