

Remote, Redesigned Air Bag Special Study  
Dynamic Science, Inc., Case Number ( 1998-49-136C)  
1998 Nissan Altima  
Texas  
August/1998

**Technical Report Documentation Page**

1. Report No. 1998-49-136C	2. Government Accession No.	3. Recipient Catalog No.	
4. Title and Subtitle		5. Report Date May 24, 1999	6. Performing Organization Report No.
		8. Performing Organization Report No.	
7. Author(s) Dynamic Science, Inc.		10. Work Unit No. (TRAIS)	
9. Performing Organization name and Address Dynamic Science, Inc. 530 College Parkway, Ste. K Annapolis, MD 21401		11. Contract or Grant no. DTNH22-94-D-27058	
		13. Type of report and period Covered [Report Month, Year]	
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		14. Sponsoring Agency Code	
		15. Supplemental Notes	
16. Abstract <p>This remote investigation focused on the redesigned air bag system deployment of a 1998 Nissan Altima 4-door sedan. This crash occurred in August, 1998 at 0150 hours. The weather was clear and the bituminous roadway was dry. The crash occurred in a four-leg intersection. The eastbound divided roadway was comprised of three eastbound travel lanes, a left turn lane, and three westbound lanes. The westbound divided roadway was comprised of three westbound travel lanes, a left turn lane, and three eastbound lanes. The speed limit was 56 km/h (35 mph) in both directions. It was dark at the time of the crash and the street lights were functioning. Tri-color traffic signals controlled intersection traffic. Vehicle 1 (the case vehicle), a 1998 Nissan Altima driven by a properly restrained 24-year-old male, was initially traveling eastbound approaching the four-leg intersection and had entered the left turn lane. The front right seat was occupied by a properly restrained 23-year-old female. Vehicle 2, a 1996 Jeep Cherokee driven by a 27-year-old female, was traveling westbound in the #3 lane approaching the intersection. As Vehicle 2 entered the intersection, Vehicle 1 failed to yield and began to make a left hand turn to go north. The front of Vehicle 2 (01FDEW3) struck the right side of Vehicle 1 (01RYAW3). Both front air bags in Vehicle 1 deployed at this time; as did the driver's air bag in Vehicle 2. Vehicle 1 was pushed into a counterclockwise rotation and came to rest in the intersection facing north. Vehicle 2 was redirected in a clockwise direction and came to rest in the intersection facing northwest. According the police accident report, the driver of Vehicle 1 did not sustain any injuries and the front right occupant sustained "B"-type, non incapacitating injuries. She was transported from the scene by ground ambulance. The driver of Vehicle 2 sustained a fractured right tibia, a fractured right fibula, a right ankle fracture, and a variety of contusions. She was transported from the scene by ground ambulance and hospitalized for 14 days.</p>			
17. Key Words Redesigned, air bag, no reported injuries		18. Distribution Statement	
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No of pages	22. Price

Remote, Redesigned Air Bag Special Study  
Dynamic Science, Inc., Case Number (1998-49-136C)  
1998 Nissan Altima  
Texas  
August/1998

**Summary**

This remote investigation focused on the redesigned air bag system deployment of a 1998 Nissan Altima 4-door sedan. This crash occurred in August, 1998 at 0150 hours. The weather was clear and the bituminous roadway was dry. The crash occurred in a four-leg intersection. The eastbound divided roadway was comprised of three eastbound travel lanes, a left turn lane, and three westbound lanes. The westbound divided roadway was comprised of three westbound travel lanes, a left turn lane, and three eastbound lanes. The speed limit was 56 km/h (35 mph) in both directions. It was dark at the time of the crash and the street lights were functioning. Tri-color traffic signals controlled intersection traffic.

Vehicle 1 (the case vehicle), a 1998 Nissan Altima driven by a properly restrained 24-year-old male, was initially traveling eastbound approaching the four-leg intersection and had entered the left turn lane. The front right seat was occupied by a properly restrained 23-year-old female.

Vehicle 2, a 1996 Jeep Cherokee driven by a 27-year-old female, was traveling westbound in the #3 lane approaching the intersection.

**Crash Events**

As Vehicle 2 entered the intersection, Vehicle 1 failed to yield and began to make a left hand turn to go north. The front of Vehicle 2 (01FDEW3) struck the right side of Vehicle 1 (01RYAW3). Both front air bags in Vehicle 1 deployed at this time; as did the driver's air bag in Vehicle 2.



**Figure 1.** Exterior, Vehicle 1



**Figure 2.** Exterior, Vehicle 2 (front)

Vehicle 1 was pushed into a counterclockwise rotation and came to rest in the intersection facing north. Vehicle 2 was redirected in a clockwise direction and came to rest in the intersection facing northwest.

According to the police accident report, the driver of Vehicle 1 did not sustain any injuries and the front right occupant sustained “B”-type, non-incapacitating injuries. She was transported from the scene by ground ambulance. The driver of Vehicle 2 sustained a fractured right tibia, a fractured right fibula, a right ankle fracture, and a variety of contusions. She was transported from the scene by ground ambulance and hospitalized for 14 days. A brief chronology of emergency medical efforts is shown in the following table:

<u>Event</u>	<u>Time</u>
Accident	0150
Police notified	0157
Ambulance notified (V2, Occupant 1)	0157
Police arrived	0204
Ambulance departed (V2, Occupant 1)	0204
Ambulance notified (V1, Occupant 2)	0230
Ambulance departed (V1, Occupant 2)	0235

**Table 1. Delta V**

	<b>Case Vehicle</b>		<b>Other Vehicle</b>	
	km/h	mph	km/h	mph
Total	38	23.6	31	19.3
Longitudinal	-33	-20.5	-31	-19.3
Lateral	-19	-11.8	18	11.2

**Exterior of Case Vehicle**

**Table 2. Vehicle Information**

Model year, make and model	1998 Nissan Altima
VIN	1N4DL01D2WCxxxxxx
CDC	01RYAW3

**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.
Mid-door	322	0	4	23	33	24	0
	126.8	0	1.6	9.1	13	9.4	0



**Figure 3.** Exterior, Vehicle 1 (front)



**Figure 4.** Exterior, Vehicle 1 (right side)

## Interior of Case Vehicle

This vehicle was equipped with bucket seats with adjustable head restraints (not damaged) in the left-front and right-front seating positions. The front left seat belt adjuster was adjusted to the full down position. The front rear seat belt adjuster was adjusted to the full up position. The rear seat was a bench with folding back(s) for all three seating positions. The left-rear and right-rear seats were equipped with integral head restraints (not damaged) while the center-rear seat had no head restraint system. The left-front seat was adjusted to the rear most position. The right-front seat was adjusted to the rear most track position. The rear seats were not adjustable. All seats were fabric covered. This vehicle sustained substantial intrusion through the right side as shown in Table 4. There were indications of occupant contact to the floor shifter mount and the right door.



**Figure 5.** Right side intrusion

**Table 4. Intrusions**

Intruded Component	Location of Intrusion	Intruded Value cm/in.		Dominant Crush Direction
		cm	in.	
Side panel	Front right	34	13.4	Lateral
A pillar	Front right	28	11	Lateral
IP right	Front right	17	6.7	Lateral
B pillar	Front right	14	5.5	Lateral
Door panel	Rear right	14	5.5	Lateral
Windshield	Front right	6	2.4	Vertical
Floor pan	Rear right	4	1.6	Lateral
Side panel	Front right	4	1.6	Lateral
Roof side rail	Front right	3	1.1	Vertical



**Figure 6.** Contact to door panel

### *Case Vehicle Occupant Protection Systems*

The Nissan Altima was equipped with Nissan redesigned “Second Generation” air bags 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 asymmetrical H-configuration cover flaps. The circular air bag was equipped with two tethers and two vent ports. The front-right air bag was located in the top-instrument panel position and was concealed by symmetrical H-configuration flaps. The rectangular air bag was not equipped with tethers but contained one vent port. There were no indications of damage or contact to either the air bag or the module cover.



**Figure 7.** Vehicle interior, driver side



**Figure 8.** Vehicle interior, passenger side



**Figure 9.** Driver's side air bag

## Case Vehicle Occupant Demographics

	Occupant 1	Occupant 2
Age/Sex:	24/Male	23/Female
Seated Position:	Front left	Front right
Seat Type:	Bucket	Bucket
Height (cm/in):	170    66.9	Unknown    0 n
Weight (kg/lbs):	64    141	Unknown    0 n
Pre-existing Medical Condition:	None noted	None noted
Body Posture:	Normal, upright	Normal, upright
Hand Position:	Unknown	Unknown
Foot Position:	Right presumed to be on accelerator, left on floorboard	Unknown
Restraint Usage:	Lap and shoulder used	Lap and shoulder used
Air bag:	Deployed as a result of impact	Deployed as a result of impact

## Occupant Injuries

**Table 5. Injuries**

Injury	Injury Severity (AIS)	Injury Mechanism
No reported injuries		

## Occupant Kinematics

While there were no injuries reported in this case, it seems likely that the front right occupant sustained injuries of sufficient magnitude to warrant transport to a local hospital. Without specific injuries, discussion of kinematics will be limited to information gleaned from the interior inspection and the vehicle dynamics.

Vehicle 1 was in a left-hand turn at the time of impact. Both front occupants were wearing the available lap and shoulder belts. During the turn, this vehicle was struck in the right side. The occupants of Vehicle 1 responded to the 030 degree principal direction of force by moving forward and to the right. Both occupants loaded the seat belts. The front right occupant contacted the center console with his right hip. The front left occupant contacted the right side door panel both as a result of the impact and the subsequent intrusion.

