

Remote, Redesigned Air Bag Special Study  
Dynamic Science, Inc., Case Number ( 1999-79-501F)  
1998 Nissan Pathfinder  
California  
April/1999

**Technical Report Documentation Page**

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<p>16. Abstract</p> <p>This remote investigation was focused on the redesigned air bag system deployment of a 1998 Nissan Pathfinder. This two-vehicle front to side crash took place during the early evening hours of a spring day in April, 1999. The street lights were on. The crash took place in a three leg intersection.</p> <p>The case vehicle (Vehicle 2) is a 1998 Nissan Pathfinder being driven by a properly restrained 45-year-old male (180 cm/71 in., 91 kg/201 lbs.). Vehicle 2 was traveling northbound in the lane adjacent to the median at an unknown speed approaching the intersection. Vehicle 1, a 1998 Chrysler New Yorker driven by a properly restrained 20-year-old female, was traveling westbound approaching the intersection. The driver of Vehicle 2 indicated that she had a green light. The driver of Vehicle 1 did not recall even seeing the light. As the vehicles reached the intersection, Vehicle 1 entered the intersection and crossed in front of Vehicle 2. The front of Vehicle 2 (92FDEW2) struck the left rear side of Vehicle 1 (10LZAW3). The calculated delta V for Vehicle 2 was 23 km/h (14.3 mph) with a longitudinal delta v of -22 km/h (-13.7 mph) which was of sufficient force to deploy both the frontal air bags. The delta V for Vehicle 1 was calculated at 27 km/h (16.7 mph) with a longitudinal delta V of -18 km/h (11.1 mph).</p> <p>Vehicle 1 was redirected into a counterclockwise rotation and came to rest in the western part of the intersection facing south. Vehicle 2 was redirected in a counterclockwise direction and came to rest on the raised median on the northern leg of the intersection. Immediately after the crash, the driver of Vehicle 2 noticed "sparking" under the hood near the battery. A minute or two later, flames appeared. Approximately 3-4 minutes after the fire began, the fire department arrive and extinguished the flames.</p> <p>The driver of Vehicle 2 (case vehicle) sustained a contusions to his right lower leg and his left knee. He also complained of pain to his right hip from contact with the seat belt, minor pain to his nose from contact with the air bag, and pain to his lower back. He was not transported. He later sought treatment from a private physician. The driver of Vehicle 1 had no visible injuries. She was transported by ground ambulance to a local hospital. During transport she was crying and inconsolable. She was examined and it was determined that she was having some type of hysterical reaction.</p>			
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**Summary**

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Nissan Pathfinder. This two-vehicle front to side crash took place during the early evening hours of a spring day in April, 1999. The street lights were on. The crash took place in a three leg intersection. The southern leg of the intersection is comprised of two northbound travel lanes, a right hand turn lane, and two southbound travel lanes. The northbound and southbound travel lanes are separated by a raised island median. The eastern leg of the intersection has a downhill grade and a right hand curved; it is comprised of two westbound lanes and one eastbound lane. The intersection is controlled by tri-color traffic signals. The speed limit is 56 km/h (35 mph) in both directions. The bituminous roadways were dry and free of any defects.



**Figure 1.** Path of Vehicle 1 (Chrysler New Yorker) to area of impact

**Crash Events**

The case vehicle (Vehicle 2) is a 1998 Nissan Pathfinder being driven by a properly restrained 45-year-old male (180 cm/71 in., 91 kg/201 lbs.). Vehicle 2 was traveling northbound in the lane adjacent to the median at an unknown speed approaching the intersection. Vehicle 1, a 1998 Chrysler New Yorker driven by a properly restrained 20-year-old female, was traveling westbound approaching the intersection. The driver of Vehicle 2 indicated that she had a green light. The driver of Vehicle 1 did not recall even seeing the light.



**Figure 2.** Path of Vehicle 2 (Nissan Pathfinder) to area of impact

As the vehicles reached the intersection, Vehicle 1 entered the intersection and crossed in front of Vehicle 2. The front of Vehicle 2 (92FDEW2) struck the left rear side of Vehicle 1 (10LZAW3). The calculated delta V for Vehicle 2 was 23 km/h (14.3 mph) with a longitudinal delta v of -22 km/h (-13.7 mph) which was of sufficient force to deploy both the frontal air bags. The delta V for Vehicle 1 was calculated at 27 km/h (16.7 mph) with a longitudinal delta V of -18 km/h (11.1 mph).

Vehicle 1 was redirected into a counterclockwise rotation and came to rest in the western part of the intersection facing south. Vehicle 2 was redirected in a counterclockwise direction and came to rest on the raised median on the northern leg of the intersection. Immediately after the crash, the driver of Vehicle 2 noticed “sparking” under the hood near the battery. A minute or two later, flames appeared. Approximately 3-4 minutes after the fire began, the fire department arrive and extinguished the flames.



Figure 3. Left side, Vehicle 1

The driver of Vehicle 2 (case vehicle) sustained a contusions to his right lower leg and his left knee. He also complained of pain to his right hip from contact with the seat belt, minor pain to his nose from contact with the air bag, and pain to his lower back. He was not transported. He later sought treatment from a private physician.



Figure 4. Front view, Vehicle 2

The driver of Vehicle 1 had no visible injuries. She was transported by ground ambulance to a local hospital. During transport she was crying and inconsolable. She was examined and it was determined that she was having some type of hysterical reaction.

Both vehicles were towed from the scene due to disabling damage.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	23	14.3	27	16.8
Longitudinal	-22	-13.7	-18	-11.2
Lateral	-4	-2.5	21	13

**Exterior of Case Vehicle**

**Table 2. Vehicle Information**

Model year, make and model	1998 Nissan Pathfinder
VIN	JN8AR05s4WWxxxxxx
CDC	92FDEW2



**Figure 5.** Fire damage



**Figure 6.** Exterior, Vehicle 2

**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	157	32	23	23	28	21	20
	61.8	12.6	9.1	9.1	11	8.3	7.9

**Interior of Case Vehicle**

The interior of the 1998 Nissan Pathfinder did not sustain any integrity loss nor any intrusion. There was some minor scuffing to the right side of the left lower instrument panel from a probably knee contact.

This vehicle was equipped with front bucket seats and adjustable head restraints. The front, left seat was adjusted to a position between the middle and rear most track position. The front, right seat was also adjusted to a position between the middle and rear most track position. The second row was equipped with a split bench seat with folding backs.

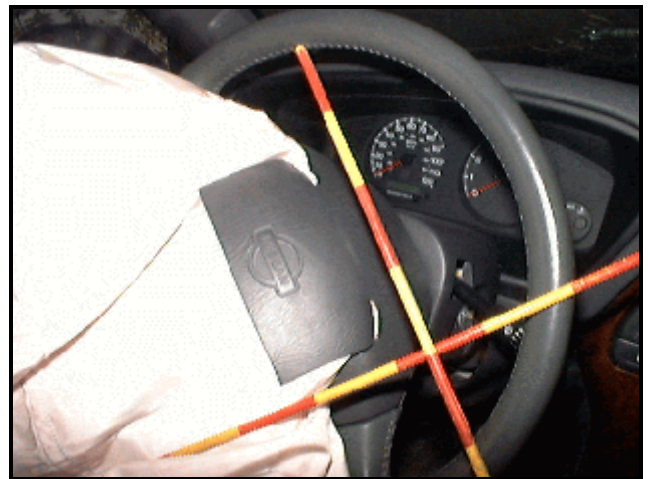
## *Case Vehicle Occupant Protection Systems*

The 1998 Nissan Pathfinder was equipped with redesigned air bag systems. The driver's air bag was housed in the steering wheel hub. The module cover was essentially symmetrical and opened in an "H" pattern. The circular air bag was equipped with four tethers and two vent ports. Neither the module cover nor the air bag itself was damaged. This air bag had been replaced after being stolen.

The front, right passenger's air bag was located on the instrument panel (top mounted). The module cover was rectangular. The air bag was equipped with two vent ports and does not have any tethers. This air bag had been replaced after being stolen.



**Figure 7.** Driver position



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



**Figure 8.** Front right seating position

## *Case Vehicle Occupant Demographics*

Occupant 1

Age/Sex: 45/Male

Seated Position: Front left

Seat Type: Bucket

Height (cm/in.): 180 70.9

Weight (kg/lbs): 91 201

Pre-existing Medical Condition: None noted

Body Posture: Normal, upright

Hand Position: Both hands were on the steering wheel, but their positions are not known

Foot Position: Right foot was on the accelerator, left on floor. There were no avoidance maneuvers.

Restraint Usage: Lap and shoulder used properly

Air bag: Deployed

## *Occupant Injuries*

**Table 4. Injuries**

<b>Injury</b>	<b>Injury Severity (AIS)</b>	<b>Injury Mechanism</b>
Contusion (3 in.), right lower leg	1	Left lower instrument panel
Contusion (3 in.), left knee	1	Left lower instrument panel

Driver also complained of pain to right side hip area from contact with the seat belt, pain to lower back, and minor pain to his nose from contact with the air bag.

### *Occupant Kinematics*

The driver of the case vehicle was seated in a normal, upright fashion. He was wearing the available lap and shoulder belt. The seat was adjusted to a position between the middle and rear most track position. The seat back was adjusted slightly rearward. He was preparing to change lanes to the right so his left hand may have been slightly higher than his right.

The driver responded to the 10E direction of force by moving forward and to the right. He was restrained by the lap and shoulder belt, but did move forward enough to engage the lower instrument panel/knee bolster with his left knee and with his right lower leg causing minor contusions (AIS1). As he moved forward he engaged and loaded the lap portion of the seat belt which resulted in causing some pain to his right hip area. As the driver's air bag deployed, he engaged it with his face. There were no resultant injuries from the air bag contact, but the driver did report some minor pain. The driver was maintained in his respective seated position and did not sustain any fractures or internal injuries.



**Figure 10.** Lower instrument panel-right leg contact



Scene Diagram

