

Remote, Redesigned Air Bag Special Study

FOR NHTSA'S INTERNAL USE ONLY

Dynamic Science, Inc., Case Number (1999-081-046K)

1998 Dodge Neon

Washington

April/1999

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| 16. Abstract <p>This remote investigation focused on the redesigned air bag system deployment of a 1998 Dodge Neon 4-door sedan. This crash occurred in April, 1999 in the afternoon. It was raining at the time and the bituminous roadway was wet. The crash occurred on a two-way, divided roadway. The road contains four travel lanes; two northbound lanes, and two southbound lanes. Northbound traffic is separated from southbound traffic by a grassy median. The speed limit for this road is 97 kmph (60 mph). There are no traffic controls and the road is level at the area of impact. Vehicle 1, a 1986 Mitsubishi Pickup compact pickup truck driven by a 78 year old male (175 cm/69 in, 77 kg/170 lbs), was reportedly initially traveling south in the right southbound travel lane but had pulled into the right shoulder prior to impact. The driver was not restrained. There were no other occupants in the vehicle. Vehicle 2, a 1998 Dodge Neon 4-door sedan (case vehicle) driven by a 25 year old male (180 cm/71 in, 68 kg/150 lbs), was traveling south in the southbound left lane at an unknown speed. The driver was restrained by the available manual lap and shoulder restraint. There were no other occupants in the vehicle. According to the police accident report, the driver of vehicle 1 initiated a u-turn from the right shoulder and began traveling north in the left southbound travel lane. The front plane of Vehicle 2 (12FZAW7) struck the front plane of Vehicle 1 (12FZEW6) in the left southbound travel lane. Vehicle 1 came to rest in the right southbound travel lane facing northeast. Vehicle 2 exited the roadway after impact and came to rest on the east grassy road side facing northwest. A Delta V was calculated for Vehicle 2, utilizing the Damage Only Algorithm of WinSMASH, as 76 kmph (47 mph). As a result of the frontal impact, the supplemental restraint system (driver's and passenger's redesigned air bags) of the case vehicle deployed. Both vehicles were disabled due to damage sustained in the crash and were towed from the scene. The driver of Vehicle 1 sustained incapacitating injuries in the crash and was transported to a trauma center where he was hospitalized for 15 days. The driver of Vehicle 2 was reported by police as having sustained non-incapacitating injuries. The extent of his injuries and his treatment status are not known.</p> | | | |
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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Dodge Neon 4-door sedan. This crash occurred in April, 1999 in the afternoon. It was raining at the time and the bituminous roadway was wet. The crash occurred on a two-way, divided roadway. The road contains four travel lanes; two northbound lanes, and two southbound lanes. Northbound traffic is separated from southbound traffic by a grassy median. The speed limit for this road is 97 kmph (60 mph). There are no traffic controls and the road is level at the area of impact.

Vehicle 1, a 1986 Mitsubishi Pickup compact pickup truck driven by a 78 year old male (175 cm/69 in, 77 kg/170 lbs), was reportedly initially traveling south in the right southbound travel lane but had pulled into the right shoulder prior to impact. The driver was not restrained. There were no other occupants in the vehicle.

Vehicle 2, a 1998 Dodge Neon 4-door sedan (case vehicle) driven by a 25 year old male (180 cm/71 in, 68 kg/150 lbs), was traveling south in the southbound left lane at an unknown speed. The driver was restrained by the available manual lap and shoulder restraint. There were no other occupants in the vehicle.

Crash Events

According to the police accident report, the driver of Vehicle 1 initiated a u-turn from the right shoulder and began traveling north in the left southbound travel lane. The front plane of Vehicle 2 (12FZAW7) struck the front plane of Vehicle 1 (12FZEW6) in the left southbound travel lane.

Vehicle 1 came to rest in the right southbound travel lane facing northeast. Vehicle 2 exited the roadway after impact and came to rest on the east grassy road side facing northwest.



Figure 1. Exterior, Vehicle 1 (1986 Mitsubishi Pickup)



Figure 2. Exterior, Vehicle 2 (1998 Dodge Neon)

A Delta V was calculated for Vehicle 2, utilizing the Damage Only Algorithm of WinSMASH, as 76 kmph (47 mph).

As a result of the frontal impact, the supplemental restraint system (driver’s and passenger’s redesigned air bags) of the case vehicle deployed.

Both vehicles were disabled due to damage sustained in the crash and were towed from the scene.

The driver of Vehicle 1 sustained incapacitating injuries in the crash and was transported to a trauma center where he was hospitalized for 15 days. The driver of Vehicle 2 was reported by police as having sustained non-incapacitating injuries. The extent of his injuries and his treatment status are not known.



Figure 3. Crash scene, area of impact.

Table 1. Delta V

| | Case Vehicle | | Other Vehicle | |
|---------------|--------------|-------|---------------|-------|
| | km/h | mph | km/h | mph |
| Total | 76 | 47.2 | 70 | 43.5 |
| Longitudinal | -76 | -47.2 | -69 | -42.9 |
| Lateral | -10 | -6.2 | -12 | -7.5 |
| Barrier speed | 45 | 28 | 93 | 57.8 |

Exterior of Case Vehicle

Table 2. Vehicle Information

| | |
|----------------------------|-----------------|
| Model year, make and model | 1998 Dodge Neon |
| VIN | 1B3ES47C9WD |
| CDC | 12FZAW7 |

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 | 103 | 0 | 12 | 29 | 46 | 63 | 92 |
| | 40.6 | 0 | 4.7 | 11.4 | 18.1 | 24.8 | 36.2 |



Figure 4. Exterior, Vehicle 2 (1998 Dodge Neon 4-door)



Figure 5. Direct damage, Vehicle 2 (1998 Dodge Neon 4-door)

Interior of Case Vehicle

The interior of the Dodge Neon sustained minor damage from occupant contact. There were several areas of intrusion into the passenger compartment including the instrument panel, A-pillar, toe pan, and windshield. For a detailed list of intrusions, see Table 4. There was occupant contact evidence present to the driver’s frontal air bag and center instrument panel.

The case vehicle was equipped with bucket seats with adjustable head restraints which were not damaged in the front left and front right seating positions. Both front seats were adjusted to the rear most track position. The rear of the vehicle was equipped with non-adjustable bench seats in all three seating positions.

Table 4. Intrusions

| Intruded Component | Location of Intrusion | Intruded Value cm/in. | | Dominant Crush Direction |
|-------------------------|-----------------------|--------------------------|------|--------------------------|
| A-pillar | Front right | 49 | 19.3 | Longitudinal |
| Right instrument panel | Front right | 43 | 16.9 | Longitudinal |
| Toe pan | Front right | 37 | 14.6 | Longitudinal |
| Windshield | Front right | 24 | 9.4 | Longitudinal |
| Center instrument panel | Front center | 22 | 8.7 | Longitudinal |
| Windshield | Front left | 2 | 0.8 | Longitudinal |

Case Vehicle Occupant Protection Systems

The Dodge Neon 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 a single inverted D-shaped cover flap which was not damaged in the crash. The circular air bag was equipped with two vent ports and two tether straps. Contact evidence consisting of several blood spots was found on the upper left quadrant of the front of the bag. The air bag was not damaged.

The front right air bag was housed in the top-instrument panel position and was concealed by a single rectangular-shaped cover flap which was not damaged in the crash. The rectangular air bag was equipped with one vent port and two tether straps. No contact evidence was found on the bag and the air bag was not damaged.

Case Vehicle Occupant Demographics

Table 5. Case Vehicle Occupant(s) Demographics

| | Occupant 1 | |
|---------------------------------|------------------------------------|-----|
| Age/Sex: | 25/Male | |
| Seated Position: | Front left | |
| Seat Type: | Bucket - cloth covered | |
| Height (cm/in.): | 180 | 71 |
| Weight (kg/lbs): | 68 | 150 |
| Pre-existing Medical Condition: | None noted | |
| Body Posture: | Unknown | |
| Hand Position: | Unknown | |
| Foot Position: | Unknown | |
| Restraint Usage: | Manual lap and shoulder restraint | |
| Air bag: | Deployed redesigned air bag system | |



Figure 6. Driver's frontal redesigned air bag.

Occupant Injuries

Table 6. Case Vehicle Occupant(s) Injuries

| Injury | Injury Severity (AIS) | Injury Mechanism |
|---|-----------------------|------------------|
| Non-incapacitating injuries - details unknown | | |

Occupant Kinematics

The driver (case occupant) of the Dodge Neon was seated in an unknown posture in the front left position of the vehicle. He was wearing the manual lap and shoulder restraint. Seat belt usage was determined through visual inspection by the researcher, the lack of prominent frontal contact evidence in the vehicle, and observations by the investigating police officer at the scene of the crash. Pre-crash avoidance maneuvers are not known.

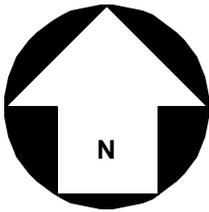
At impact, the driver reacted to the 0 degree principle direction of force by moving sharply forward. As the restraints locked, further frontal movement of the driver was prevented. The driver appears to have engaged the deploying frontal air bag with his face, leaving several blood spots on the front of the bag (see Figure 7).

Examination of the vehicle's interior also showed a likelihood that the driver impacted the intruding center instrument panel with his right knee. Unfortunately, the injury status of the driver is not known. He was reported by police as having sustained non-incapacitating injuries, but the level and course of treatment is unknown.



Figure 7. Driver's frontal air bag contact evidence.

PAR STATES VEH'S TRAVELING W/B. ACTUAL TRAVEL DIRECTION WAS S/B. V1'S PRECRASH TRAVEL COULD NOT BE SUBSTANTIATED, BUT AT IMPACT WAS FACING OPPOSITE THE ORIGINAL DIRECTION OF TRAVEL.



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