TRANSPORTATION RESEARCH CENTER

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DEPOWERED AIR BAG REPORT

CASE NUMBER - IN97-062
LOCATION - TEXAS
VEHICLE - 1998 NISSAN ALTIMA
CRASH DATE - December, 1997

Submitted:

April 29, 1998

Contract Number: DTNH22-94-D-17058

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

TECHNICAL REPORT STANDARD TITLE PAGE

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15. *Supplementary Notes* On-site depowered/second generation air bag deployment investigation involving a 1998 Nissan Altima and a 1997 Ford Mustang.			
16. *Abstract* This report covers an on-site investigation of an air bag deployment crash. This case is of special interest because the case vehicle (1998 Nissan Altima) was equipped with depowered/second generation air bags that deployed as a result of the crash events. The case vehicle was stopped headed southbound in the southbound left-turn lane of a divided local road, waiting to turn left to travel east on the intersecting local road. Vehicle #2 (1996 Ford Mustang) was northbound in the outside northbound lane, approaching the intersection. Vehicle #3 (1989 Mitsubishi Galant) was headed westbound on the intersecting roadway and was stopped for the automatic signal. Starting from a stop, the case vehicle turned left across the path of V#2 and the center-front of V#2 impacted the right front corner of the case vehicle within the intersection, causing the case vehicle's driver and front right air bags to deploy. The driver and front right air bags in V#2 also deployed. The case vehicle's driver did not attempt any avoidance action. It is not known if V#2's driver performed any avoidance actions. V#2 traveled obliquely across the intersection and the center-front of V#2 impacted the left front corner of V#3, with V#2 coming to rest against V#3. The case vehicle and vehicle #2 were towed away from the scene due to disabling damage, but vehicle #3 was driven away. The case vehicle's driver and V#2's right front passenger were transported via ambulance to a local hospital. The drivers of vehicles #2 and #3 declined treatment at the scene.			
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TABLE OF CONTENTS

Background

This investigation was brought to the NHTSA's attention on December 23, 1997 by NASS/CDS sampling activities. This case is of special interest because the case vehicle (1998 Nissan Altima) was equipped with a depowered/second generation air bag system. The investigating agency was contacted on December 23, with inspections of the case vehicle, vehicle #2 and the scene performed on December 30, January 7, and January 22, respectively. Medical treatment records for the case vehicle's driver were received on April 3, 1998.

Crash Circumstances

The crash occurred in Texas, in December 1997 at 3:35 p.m. and was investigated by the applicable city police agency. The case vehicle (1998 Nissan Altima) was stopped headed southbound in the southbound left-turn lane of a divided local road (three lanes southbound and two lanes northbound, separated by a grass median), waiting to turn left to travel east on the intersecting local road. Vehicle #2 (1996 Ford Mustang) was northbound in the outside northbound lane, approaching the intersection. Vehicle #3 (1989 Mitsubishi Galant) was headed westbound on the intersecting roadway and was stopped for the automatic signal. The speed limit for all three vehicles was 64 km.p.h. (40 m.p.h.). Starting from a stop, the case vehicle turned left (see Figure 1) across the path of vehicle #2 and the center-front of vehicle #2 impacted the right front corner of the case vehicle within the intersection, causing the case vehicle's driver and front right air bags to deploy. The driver and front right air bags in vehicle #2 also deployed. The case vehicle's driver did not attempt any avoidance action. It is not known if vehicle #2's driver performed any avoidance actions. The case vehicle rotated approximately 90 degrees counterclockwise, skidded a short distance and came to rest in the intersection. Vehicle #2 rotated approximately 45 degrees clockwise, traveled obliquely across the intersection and the center-front of vehicle #2 impacted the left front corner of vehicle #3, with vehicle #2 coming to rest against vehicle #3. The case vehicle and vehicle #2 were towed away from the scene due to disabling damage, but vehicle #3 was driven away. There was one occupant in the case vehicle, two in vehicle #2, and one in vehicle #3. The case vehicle's driver and vehicle #2's passenger were transported via ambulance to a local hospital. The drivers of vehicles #2 and #3 declined treatment at the scene.

Case Vehicle

The case vehicle was a front wheel drive 1998 Nissan Altima 4-door sedan (VIN: 1N4DL01D9WC------) and was not equipped with anti-lock brakes. Direct contact damage was on the right side, primarily forward of the front axle but also including the right front wheel and tire with induced damage causing the entire right front fender to be deformed. In addition, the right front corner of the engine hood and the right front headlight area sustained direct contact,

but the headlight was not broken. There was no glazing damage and all doors remained closed and operational (see Figures 2 and 3). The CDC for the case vehicle is **02-RFEW-3**. The case vehicle was traveling 13 - 16 km.p.h. (8 - 10 m.p.h.) immediately prior to the impact. The SMASH reconstruction program, damage-only algorithm, indicates that the Total, Longitudinal, and Lateral Delta Vs for the case vehicle were, respectively: 28 km.p.h. (17 m.p.h.), -18 km.p.h. (-11 m.p.h.) and -21 km.p.h. (-13 m.p.h.). The Delta V calculations incorporate vehicle #2's final crush profile, which includes the minor impact to vehicle #3 as discussed below.

The case vehicle was fitted with bucket seats in the front row. The driver reported that her seat track was adjusted in the forward-most position, but upon inspection it was found at the middle position. It is assumed that the driver's seat track adjustment was changed during post-crash handling of the case vehicle. There was no evidence of seat or track failure. The seat back was slightly reclined and retained its pre-crash adjustment. There were three-point lap-and-shoulder safety belt systems at the four outboard positions, with the front seat positions the only ones showing signs of use. The tilt steering wheel was adjusted in the middle position. The driver's air bag was located in the steering wheel hub with cover flaps in the H-configuration (see Figure 4). The flaps opened along the seams, with no evidence of damage to the flaps or the air bag. The deployed driver's air bag was round with diameter 60 centimeters (24 inches), with two tether straps and two vent ports at the 11 and 1 o'clock positions. The steering wheel rim was not deformed and there was no evidence that the steering column had moved. Inspection of the driver's air bag revealed makeup smudges on the front, near the center (see Figure 5). There were no other points of occupant contact noted anywhere in the vehicle. In addition, there were two areas of dark plastic transfers on the front of the driver's air bag, near the lower-left edge and to the right and above the center. The front right air bag was located in the top of the instrument panel (see Figure 5). The two flaps opened along the seams with no evidence of damage to the flaps or the air bag, except the lower flap was slightly bent from the force of the deployment. There was no damage to the windshield. The deployed front right air bag was a rectangle 40 centimeters (16 inches) wide and 52 centimeters (20 inches) high, with no tether straps and two vent ports in the 10 and 2 o'clock positions. There was a dark plastic transfer mark in the center area of the top of the passenger air bag.

Case Vehicle Occupant

The case vehicle's driver [42-year-old female--not pregnant, 152 centimeters, 86 kilograms, (60 inches, 190 pounds)] was restrained by the available, manual, three-point lap-and-shoulder safety belt system, with the upper anchorage adjustment in the full up position. There was no other occupant in the case vehicle. She was seated in a slightly reclined posture, with her back against the seat back, the seat track adjusted to the full forward position, both hands on the steering wheel, her left foot on the floor, and her right foot on the accelerator pedal.

CASE VEHICLE DRIVER INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Contusion right shoulder[1]	790402.1 minor	Air bag, driver's side	Probable	Emergency room visit
2	Contusion left knee	890402.1 minor	Left instrument panel	Probable	Emergency room visit

The driver was executing a left turn maneuver, leaning slightly to the left. She did not attempt any avoidance actions. The driver was a heavy, short statured woman seated close to the steering wheel. The impact caused the driver and front right air bags to deploy and caused the driver to be thrust forward and to the right, toward the two o'clock direction of principal force. Her left shoulder loaded the shoulder portion of her safety belt, restricting her forward motion and causing her to rotate slightly counterclockwise and lean forward such that the right side of her torso was leading. The deploying driver's air bag impacted the right side of her chest and right shoulder, causing an area of diffuse, minor bruising on her right shoulder. The air bag billowed up as it encountered her torso, contacting her face such that her make-up smudged the air bag. Her left knee impacted the rigid plastic cover of the knee bolster on the lower edge of the left instrument panel, in the area where the knee bolster is molded to accommodate the steering column, causing a minor contusion. She exited her vehicle with the assistance of the emergency medical technicians and was transported to a hospital via ambulance, where she was treated and released.

Vehicle #2

Vehicle #2 was a rear wheel drive 1996 Ford Mustang 2-door coupe (VIN: 1FALP4045TF------). Vehicle #2 sustained two impacts on its front plane. It is assumed that vehicle #2 was traveling at or near the speed limit, approximately 56 - 64 km.p.h. (35 - 40 m.p.h.), prior to the first impact. It is not known if the driver of vehicle #2 attempted any avoidance actions. In the first event, the center of vehicle #2's front plane impacted the right front corner of the case vehicle. Vehicle #2 rotated approximately 45 degrees clockwise, traveled obliquely across the intersection and struck vehicle #3, which was stopped. In the second event, the center of vehicle #2's front plane impacted the left front corner of vehicle #3. Because vehicle #3 was driven away from the scene, it is assumed that the second impact for vehicle #2 was minor. The final crush profile for vehicle #2 indicates a CDC of **11-FDEW-2** (see Figures 7 and 8). The

[1] According to the driver, she indicated that she sustained an acute strain to both her cervical and lower back areas; however, both areas were examined during her emergency room visit and found to be nontender. Therefore, following NASS CDS injury coding protocol, neither strain is listed.

SMASH reconstruction program, damage-only algorithm based on the final crush profile for vehicle #2, indicate that the Total, Longitudinal, and Lateral Delta Vs were, respectively: 26 km.p.h. (16 m.p.h.), -24 km.p.h. (-15 m.p.h.), and +9 km.p.h. (+5 m.p.h.). The crush measurements used for this reconstruction include the overlapping damage from two impacts. The computed results provide an approximation for the severity of vehicle #2's impact with the case vehicle, under the assumption that vehicle #2's second impact was minor.

Vehicle #3

Vehicle #3 was a front wheel drive 1989 Mitsubishi Galant 4-door sedan (VIN: JA3BR56V9KZ------). Vehicle #3 did not contact the case vehicle, was driven away from the scene of the crash and was not inspected.

Selected Photographs

Figure 1: Case vehicle's approach to left turn (case photo #2)

Selected Photographs (continued)

Figure 2: Case vehicle's front and right side (case photo #22)

Figure 3: Case vehicle's front and left side (case photo #14)

Selected Photographs (continued)

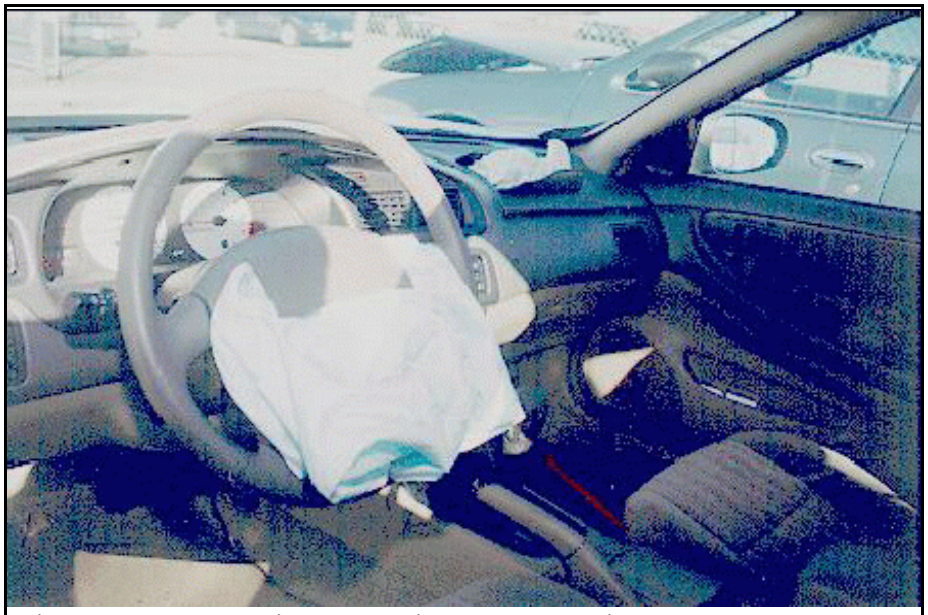

Figure 4: Case vehicle's steering wheel and instrument panel (case photo #26)

Figure 5: Case vehicle's driver side air bag, with makeup smudges (case photo #26)

Selected Photographs (continued)

Figure 6: Vehicle #2, front and left side (case photo #38)

Figure 7: Vehicle #2, front and right side (case photo #43)