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REMOTE AIR BAG DEPLOYMENT REPORT

CASE NUMBER - IN99-019

LOCATION - Florida

VEHICLE - 1998 FORD ESCORT LX

CRASH DATE - May 1998

Submitted:

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National Center for Statistics and Analysis
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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 Documentation Page

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15. <i>Supplementary Notes</i> Remote air bag deployment investigation involving a 1998 Ford Escort LX, four-door sedan, with manual safety belts and dual front redesigned air bags, a 1987 Ford F350 pickup truck, and a 1998 Peterbilt tractor semi-trailer					
16. <i>Abstract</i> This report covers a remote investigation of an air bag deployment crash that involved a 1998 Ford Escort (case vehicle), a 1987 Ford F350 pickup truck (vehicle #2) and a 1998 Peterbilt truck-tractor towing a semi-trailer (vehicle #3). This case is of special interest because the case vehicle was equipped with redesigned air bags that deployed as a result of the collision events and the case vehicle's front right passenger (67-year-old female) died due to complications associated with internal head injuries. The case vehicle (vehicle #1) was traveling east in the eastbound lane of a two-lane undivided county road, approaching a four-leg intersection. Vehicle #2 was traveling south in the southbound lane of a two-lane undivided county road, approaching the same intersection. Vehicle #3 was stopped, headed north in the northbound lane of the same roadway as vehicle #2. The case vehicle entered the intersection. There is no evidence that the driver of the case vehicle attempted any avoidance action. The front right area of vehicle #2 impacted the left front area of the case vehicle, causing the case vehicle's driver and front right air bags to deploy. The case vehicle came to rest off of the roadway, having rotated approximately 230 degrees clockwise from its pre-impact heading. Vehicle #2 rotated a few degrees counterclockwise, traveled south-southwest across the intersection and the front of V#2 impacted the front of V#3. V#2 came to rest lodged against vehicle #3. The crash severity for the case vehicle was high [greater than 40 km.p.h. (25 m.p.h.)]. The case vehicle's front right passenger was restrained by her available manual three-point lap-and-shoulder safety belt but her right shoulder slipped out from under the shoulder belt. She flexed over the lap belt and struck her head and face on the center instrument panel. According to the non-invasive death examination, she sustained a contusion to the liver, a major laceration to the left side of her head and unspecified internal head injuries. She subsequently developed a cerebral infarct. She suffered gradual clinical deterioration leading to death on the ninth day post-crash.					
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Additional photographs are available in SCI EDCS case IN99-019

This case was brought to the NHTSA’s attention by a review of the 1998 Fatality Analysis Reporting System (FARS) in February 1999. The crash involved a 1998 Ford Escort (case vehicle), a 1987 Ford F350 pickup truck (vehicle #2) and a 1998 Peterbilt truck-tractor towing a semi-trailer (vehicle #3). The crash occurred in May, 1998 at 8:10 a.m. in Florida and was investigated by the applicable state police. This case is of special interest because the case vehicle was equipped with redesigned air bags that deployed as a result of the collision events and the case vehicle’s front right passenger [67-year-old, White (unknown if Hispanic) female) died due to complications resulting from the injuries she sustained. The Police Crash Report was received in March 1999 and police photographs and the medical examiner’s report of a noninvasive death examination were received in April 1999. This report is based on the Police Crash Report, the death examination report, police on-scene photographs, occupant kinematic principles, and this contractor’s evaluation of the evidence.

CRASH CIRCUMSTANCES

The case vehicle (vehicle #1) was traveling east in the eastbound lane of a two-lane undivided county road, approaching a four-leg intersection and intending to pass through the intersection and continue east. Vehicle #2 was traveling south in the southbound lane of a two-lane undivided county road, approaching the same intersection and intending to pass through the intersection and continue south (Figure 1). Vehicle #3 was headed north in the northbound lane of the same roadway as vehicle #2 and was stopped in the roadway approximately 20 meters (65 feet) south of the intersection, waiting for traffic to clear to make a U-turn. The intersection was controlled by stop signs for east-west traffic with a flashing beacon over the center of the intersection. The speed limit was 89 km.p.h. (55 m.p.h.) for both roadways. It was daylight, the weather was clear, the traffic control devices were functioning correctly and there were no roadway defects. The case vehicle entered the intersection without coming to a complete stop. The driver of vehicle #2 observed the case vehicle pulling into his path and braked with full lockup, leaving 10 meters (33 feet) of skid marks. There is no evidence that the driver of the case vehicle attempted any avoidance action.

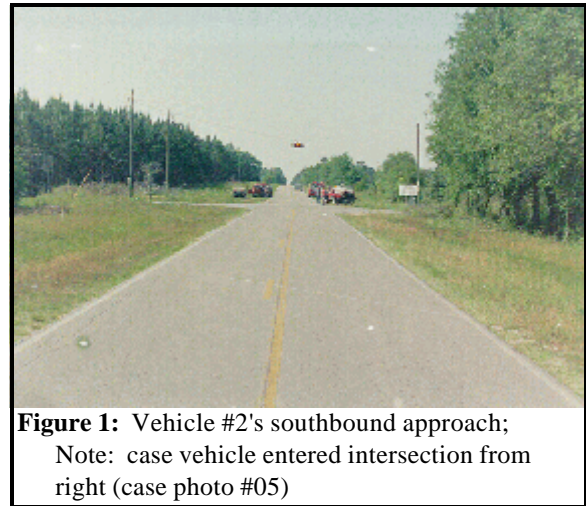


Figure 1: Vehicle #2's southbound approach; Note: case vehicle entered intersection from right (case photo #05)



Figure 2: Area of impact and case vehicle at final rest (case photo #09)

The crash occurred within the intersection. The front right area of vehicle #2 impacted the left front area of the case vehicle, causing the case vehicle’s driver and front right air bags to deploy. The case vehicle rotated clockwise and sustained a side-slap impact between the left side of the case vehicle and the

right side of vehicle #2. The case vehicle slid in a south-westerly direction and came to rest off of the roadway at the south-west corner of the intersection headed northwest (**Figure 2**), having rotated approximately 230 degrees clockwise from its pre-impact heading. Vehicle #2 rotated a few degrees counterclockwise, traveled approximately 24.7 meters (81 feet) in a south-southeasterly direction and the front of vehicle #2 impacted the front of vehicle #3. Vehicle #2 came to rest heading south on the east shoulder of the north-south roadway, lodged against vehicle #3. The crash severity for the case vehicle was high (greater than 40 km.p.h [25 m.p.h.]).

CASE VEHICLE

The case vehicle was a front wheel drive 1998 Ford Escort LX five-passenger, four-door sedan (VIN: 1FAFP10P6WW-----) equipped with a 2.0 liter I-4 engine and a four-speed automatic transmission with floor-mounted selector lever. Four wheel anti-lock brakes were an option for this vehicle, but it is not known if the case vehicle was so equipped. The case vehicle's wheelbase was 250 centimeters (98.4 inches). The odometer reading is not known. The case vehicle was towed due to disabling damage.

The case vehicle sustained heavy impact damage on the left side, from the front corner to the leading edge of front door (**Figures 3 and 4**). The left front wheel and tire were tilted inward at the top and it appeared that the axle/suspension was broken. The headlight and grille assembly shattered and the bumper cover was torn loose on the left. The front bumper's left corner was bent inward and rearward, the fender was crushed laterally into the engine compartment and the left edge of the hood was crushed and folded. There was direct contact to the left "A"-pillar above the belt line, with lateral movement of the upper "A"-pillar and buckling of the windshield header. The windshield glazing was fractured across the entire width and the left front door window glazing was shattered (kernalized). There was additional minor damage in the area of the left rear wheel and at the left rear corner, due to the second (side-slap) impact. The right side of the case vehicle was essentially undamaged (**Figure 5**). The CDC for the first impact, estimated from police on-scene photographs, is **10-LYAW-3**, with principal direction of force (PDOF)



Figure 3: Front of case vehicle (case photo #10)



Figure 4: Left side of case vehicle (case photo #12)



Figure 5: Right side and front of case vehicle (case photo #18)

290 (-70) degrees. The WinSMASH reconstruction program was used to calculate delta v based on the case vehicle and vehicle #2 CDCs. These CDC-only calculations provide a borderline reconstruction but the results appear reasonable. The total, longitudinal and lateral delta Vs are, respectively: 38 km.p.h (24 m.p.h.), -13 km.p.h (-8 m.p.h.) and 36 km.p.h (22 m.p.h.).

CASE VEHICLE DRIVER

The case vehicle’s driver [71-year-old male, race/ethnicity unknown, height and weight unknown] was restrained by the available manual three-point lap-and-shoulder safety belt system. He sustained police-reported incapacitating injuries.

CASE VEHICLE FRONT RIGHT PASSENGER

The case vehicle’s front right passenger [67-year-old, White (unknown if Hispanic) female, 155 centimeters, approximately 75 kilograms (61 inches, 165 pounds)] was restrained by the available manual three-point lap-and-shoulder safety belt system. Her seat adjustments and seated posture are not known. She was hospitalized and died nine days later due to complications associated with injuries sustained in the crash. The following discussion of the front right passenger’s injuries is based on a non-invasive coroner’s examination that includes a brief review of the course of hospitalization (hospital records were not acquired).

The front right passenger was probably seated in a normal driving posture, facing forward with her back against the seat back and her feet on the floor. The driver did not attempt any avoidance actions. At the moment of impact, the front right passenger moved forward and to the left, toward the 290 degree direction of principal force (PDOF). She encountered the deploying front right air bag, causing contusions to her upper chest and breasts. Her right shoulder slipped out from under the shoulder portion of her lap-and-shoulder safety belt system as the case vehicle rotated counterclockwise, allowing her torso and head to move further forward and leftward. Her waist loaded the lap portion of her safety belt causing contusions to her left abdomen and a contusion to her liver as she flexed over the lap belt. Her left hip and thigh impacted the center console, resulting in contusions and abrasions. The left side of her face and head impacted the center of the instrument panel, causing lacerations of the external ear, contusions on the left side of her face, a major laceration on the left side of her scalp and unspecified “internal head injuries”. She subsequently developed a cerebral infarct. She suffered gradual clinical deterioration leading to death on the ninth day post-crash.

CASE VEHICLE FRONT RIGHT PASSENGER INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Internal head injuries, not further specified	115099.7 unknown	Center instrument panel	Probable	Coroner’s Report

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
2	Major laceration over left parietal region	190604.2 moderate	Center instrument panel	Probable	Coroner's Report
3	Lacerations to left external ear	290602.1 minor	Center instrument panel	Probable	Coroner's Report
4	Contusions, left side of face	290402.1 minor	Center instrument panel	Probable	Coroner's Report
5	Contusions, upper chest	490402.1 minor	Air bag, front right passenger's	Probable	Coroner's Report
6	Contusions, left abdomen	590402.1 minor	Safety belt webbing	Probable	Coroner's Report
7	Contusion to the liver, not further specified	541810.2 moderate	Safety belt webbing	Probable	Coroner's Report
8	Contusions, left hip and thigh	890402.1 minor	Center console	Probable	Coroner's Report
9	Abrasions, left hip and thigh	890202.1 minor	Center console	Probable	Coroner's Report

VEHICLE NUMBER 2

Vehicle #2 (**Figures 6 and 7**) is a rear wheel drive 1987 Ford F350 Crew Cab (four-door) pickup truck (VIN: 2FTJW3510HC-----) equipped with a 6.9 liter V-8 Diesel engine. Vehicle #2 had tandem rear wheels and a wheelbase of 428 centimeters (168.4 inches). The odometer reading is not known. Vehicle #2 was towed from the scene due to disabling damage. There were four adult male occupants in vehicle #2. The driver sustained police-reported possible injuries and the three passengers all sustained police-reported incapacitating injuries. The CDC for vehicle #2's first impact, estimated from police on-scene and tow yard photographs, is **01-FZEW-3**, with principal direction of force (PDOF) 20 degrees. The WinSMASH reconstruction program was used to calculate Delta V based on the vehicle #2 and case vehicle CDCs. These CDC-only calculations provide a borderline reconstruction but the results appear reasonable. The Total, Longitudinal, and Lateral Delta Vs are, respectively: 17 km.p.h (11 m.p.h.), -16 km.p.h (-10 m.p.h.) and -6 km.p.h (-4 m.p.h.).



Figure 6: Front and right side of vehicle #2 (case photo #26)

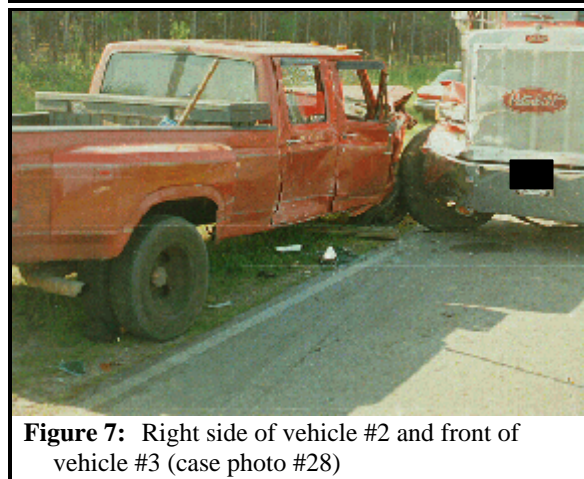


Figure 7: Right side of vehicle #2 and front of vehicle #3 (case photo #28)

VEHICLE NUMBER 3

Vehicle #3 (**Figure 7** above) was a 1998 Peterbilt model 379 cab-behind-engine 6 x 4 truck-tractor (VIN: 1XP5DB9X8WD-----) that was towing a livestock semi-trailer. Vehicle #3 was towed from the scene due to disabling damage. The driver (sole occupant) was not injured.