

Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number ( 1998-81-801E)

1998 Ford Ranger pickup

Washington

July/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 Ford Ranger pickup truck. This single vehicle crash occurred during the mid-afternoon hours in July, 1999. The crash occurred on a curved, two-lane country road. The bituminous roadway was dry and free of defects. The east and westbound traffic lanes were separated by double yellow lines; the shoulders were bituminous and separated from the travel lanes by white lines. The limit is 80 km/h (50 mph). Vehicle 1, a 1998 Ford Ranger pickup driven by a 39-year-old male (173 cm/68 in., 68 kg/150 lbs), was traveling eastbound through the left-hand curve at a driver estimated speed of 80 km/h (50 mph). The front right seat was occupied by a 10-year-old female (142 cm/56 in., 39 kg/86 lbs.). Both occupants were wearing the available lap and shoulder belts.</p> <p>A deer approached the roadway from the north, crossed the westbound lane, and then went into the eastbound lane. The driver did not see the deer until it was in front of him. There was insufficient time to brake and Vehicle 1 struck the deer with its front end (12FYMW1). A longitudinal delta v was calculated using the WinSmash barrier option as -12.2 km/h (7.6 mph). The impact was of sufficient magnitude and both front air bags deployed. Vehicle 1 came to rest on the right hand shoulder. The driver noted that the cab was filling with smoke and both occupants exited the vehicle on their own.</p> <p>The driver of Vehicle 1 sustained abrasions and contusions to both forearms as a result of contact with the deploying air bag. He was treated at the scene and released. The 10-year-old front right occupant sustained minor contusions to both her face and to her lower lip as a result of contact with the deploying air bag.</p> <p>Vehicle 1 was towed away due to damage (radiator). At some point after the crash, the deer was able to run away.</p>			
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***Summary***

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Ford Ranger pickup truck. This single vehicle crash occurred during the mid-afternoon hours in July, 1999. The crash occurred on a curved, two-lane country road. The bituminous roadway was dry and free of defects. The east and westbound traffic lanes were separated by double yellow lines; the shoulders were bituminous and separated from the travel lanes by white lines. The limit is 80 km/h (50 mph).

Vehicle 1, a 1998 Ford Ranger pickup driven by a 39-year-old male (173 cm/68 in., 68 kg/150 lbs), was traveling eastbound through the left-hand curve at a driver estimated speed of 80 km/h (50 mph). The front right seat was occupied by a 10-year-old female (142 cm/56 in., 39 kg/86 lbs.). Both occupants were wearing the available lap and shoulder belts.

A deer approached the roadway from the north, crossed the westbound lane, and then went into the eastbound lane. The driver did not see the deer until it was in front of him. There was insufficient time to brake and Vehicle 1 struck the deer with its front end (12FYMW1). A longitudinal delta v was calculated using the WinSmash barrier option as -12.2 km/h (7.6 mph). The impact was of sufficient magnitude and both front air bags deployed.



**Figure 1.** Overview of impact area and final rest (east)



**Figure 2.** Exterior, Vehicle 1

Vehicle 1 came to rest on the right hand shoulder. The driver noted that the cab was filling with smoke and both occupants exited the vehicle on their own.

The driver of Vehicle 1 sustained abrasions and contusions to both forearms as a result of contact with the deploying air bag. He was treated at the scene and released.

The 10-year-old front right occupant sustained minor contusions to both her face and to her lower lip as a result of contact with the deploying air bag.

Vehicle 1 was towed away due to damage (radiator).

At some point after the crash, the deer was able to run away.

*Exterior of Case Vehicle*

**Table 1. Vehicle Information**

Model year, make and model	1998 Ford Ranger pickup
VIN	1FTYR14U9WPxxxxx
CDC	12FYMW1



**Figure 3.** Exterior, Vehicle 1



**Figure 4.** Close up view of frontal damage

**Table 2. 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	150	2	2	1	0	0	0
	59.1	0.8	0.8	0.4	0	0	0

## *Interior of Case Vehicle*

The interior of the 1998 Ford Ranger pickup truck was basically undamaged due to this minor frontal impact. The vehicle maintained its integrity and there were no intruding components. The interior was void of any detectable occupant contact evidence. This vehicle is equipped with a cloth covered split bench seat with folding backs. The front seat outboard positions are equipped with integral head restraints. The front left seat track was adjusted to the middle track position and the shoulder belt manual adjuster was in the mid position. The front right seat track was adjusted to the forward most track position and the shoulder belt manual adjuster was in the down position.



**Figure 5.** Driver's seated area

## *Case Vehicle Occupant Protection Systems*

The 1998 Ford Ranger was equipped with the redesigned air bag systems. The driver's air bag is housed in the steering wheel hub and encases the nylon air bag unit. The module cover consists of dual rectangular flaps that opened at their designated tear points. The circular air bag is tethered by one strap and is equipped with two vent ports. The rigid plastic knee bolster was undamaged and did not reveal any detectable occupant contacts.



**Figure 6.** Front right passenger seated area

The front, right passenger air bag is located in the right hand side of the instrument panel (mid-mount). There is an ON/OFF key switch for this air bag; the switch was in the ON position. The single, rectangular module deployment door opened at its designated tear points. Upon deployment, the encased air bag fully deployed. The non-tethered air bag was undamaged and was not equipped with exhaust vent ports.



**Figure 8.** Driver's air bag



**Figure 7.** Passenger air bag



**Figure 9.** Passenger front air bag ON/OFF switch

## Case Vehicle Occupant Demographics

	Occupant 1	Occupant 2
Age/Sex:	39/Male	10/Female
Seated Position:	Front left	Front right
Seat Type:	Split bench with separate backs	Split bench with separate backs
Height (cm/in.):	173 68.1	142 55.9
Weight (kg/lbs):	68 150	39 86
Pre-existing Medical Condition:	None noted	None noted
Body Posture:	Normal, upright	Normal, upright
Hand Position:	Both hands on steering wheel-o'clock position not known	Unknown
Foot Position:	Right on accelerator, left on floor	Interview indicated that feet were on floor, but given the age of the child this is probably not likely
Restraint Usage:	Lap and shoulder belt used properly	Lap and shoulder belt used properly
Air bag:	Deployed at impact	Deployed at impact

## Occupant Injuries

**Table 3. Injuries (01)**

Injury	Injury Severity (AIS)	Injury Mechanism
Bilateral forearm contusions	1	Air bag
Bilateral forearm abrasions	1	Air bag

**Table 4. Injuries (02)**

Injury	Injury Severity (AIS)	Injury Mechanism
Contusion, face and lips	1	Air bag



### *Occupant Kinematics*

The 39-year-old female driver of the 1998 Ford Ranger pickup truck was fully restrained. At impact, she responded to the 12 o'clock direction of force by moving directly forward. She engaged the lap and shoulder belt which prohibited further forward movement. Both forearms were contacted by the deploying air bag which resulted in contusions and abrasions (AIS-1).

The 10-year-old front right occupant was fully restrained. The front right seat was apparently positioned in the forward most track position. At impact, this occupant responded to the 12-o'clock direction of force by moving directly forward. She engaged the lap and shoulder belt which prohibited further forward movement. Her face came into contact with the deploying air bag—causing the lip and facial contusions.

Scene Diagram

