On-scene Investigation / Vehicle to Vehicle
Dynamic Science, Inc. / Case Number: DS00005
2000 Mercury Sable LS
Texas
March, 2000

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

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

1. Report No.	2. Government Accession No.	3. Recipient Catalog No.
DS00005		

4. Title and Subtitle	5. Report Date
In-Depth Accident Investigation	January 17, 2001
	6. Performing Organization Report No.

7. Author(s)	8. Performing Organization Report No.
Dynamic Science, Inc.	

9. Performing Organization name and Address	10. Work Unit No. (TRAIS)
Dynamic Science, Inc. 530 College Parkway, Ste. K Annapolis, MD 21401	11. Contract or Grant no. DTNH22-94-D-27058

12. Sponsoring Agency Name and Address	13. Type of report and period Covered
U.S. Dept. of Transportation (NRD-32) National Highway Traffic Safety Administration 400 7th Street, SW Washington, DC 20590	[Report Month, Year] 14. Sponsoring Agency Code

15. Supplemental Notes

16. Abstract

The crash occurred in Texas in March, 2000 at 1720 hours. The crash took place at a four-leg intersection. The southbound leg of the intersection is comprised of two, unmarked one-way travel lanes. There is a 2% positive grade at this location. Traffic is controlled by a stop sign. The speed limit is 48 km/h (30 mph). The westbound leg of the intersection is comprised of three one way travel lanes. The roadway is level at this location. The northernmost two lanes continue through the intersection and continue as an access to a freeway. The southern lane is for left turning traffic only and is separated from the other lanes by a raised grass-covered median. The speed limit is 56 km/h (35 mph).

The case vehicle, a 2000 Mercury Sable LS 4-door sedan driven by a restrained 40-year-old male, was traveling southbound. The front right seat was occupied by a 20-year-old female. The other vehicle, a 1986 Honda Accord driven by an 18-year-old male, was traveling westbound.

The driver of the case vehicle stopped at the intersection and did not yield the right of way to the other vehicle. As the case vehicle entered the intersection at a speed estimated to be 16 km/h (10 mph), the front of the case vehicle (10FYEW1) struck the right side of the other vehicle.

The impact was of insufficient magnitude to deploy the driver's air bag and the front right passenger's air bag. The driver's side seat belt pretensioners also did not fire at this time. The pretensioner tube measurement for the driver was 11 cm; for the passenger the measurement was 11.2 cm. There was no movement of the steering column shear capsules.

The case vehicle sustained a longitudinal delta v of -3.1 km/h (-1.9 mph) and a lateral delta v of 8.5 km/h (5.3 mph).

The center console of the case vehicle was displaced somewhat–possibly by the left leg of the front right seat occupant. There were, however, no injuries reported by any of the parties involved. Both vehicles were towed from the scene due to the damage.

17. Key Words	18. Distribution Statement
Air bag, non deployment, advanced, no injury	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No of pages	22. Price

Dynamic Science, Inc.
Accident Investigation
Case Number: DS00005

TABLE OF CONTENTS

Background 1
- Description 1
- Investigation Type 1
- Crash Location 1
- Crash Date 1
- Notification Date 1
- Field Work Completed 1

Summary 1

Scene Diagram 4

Detailed Information 5
- Vehicles 5
- Occupants 7
- Injuries and Injury Mechanisms 9
- Occupant Kinematics 9

Attachment 1. Speed calculations

BACKGROUND:

Description:	This Advanced Occupant Protection Systems case was generated by DSI through existing insurance contacts. NHTSA was notified of the case on July 06, 2000. DSI was assigned the case on July 06, 2000 and an on-site investigation was conducted.
Investigation Type:	On-scene
Crash Location:	Texas
Crash Date:	March, 2000
Notification Date:	July 6, 2000
Field Work Completed:	July 7, 2000

SUMMARY:

The crash occurred in Texas in March, 2000 at 1720 hours. The crash took place at a four-leg intersection.

The southbound leg of the intersection is comprised of two, unmarked one-way travel lanes. There is a 2% positive grade at this location. Traffic is controlled by a stop sign. The speed limit is 48 km/h (30 mph).

The westbound leg of the intersection is comprised of three one way travel lanes. The roadway is level at this location. The northernmost two lanes continue through the intersection and continue as an access to a freeway. The southern lane is for left turning traffic only and is separated from the other lanes by a raised grass-covered median. The speed limit is 56 km/h (35 mph).

The weather was clear and the asphalt roadways were dry and free of defects.

Figure 1. Path of case vehicle (Mercury Sable) to area of impact

Figure 2. Path of other vehicle (Honda Accord) to area of impact

The case vehicle, a 2000 Mercury Sable LS 4-door sedan driven by a restrained 40-year-old male, was traveling southbound. The front right seat was occupied by a restrained 20-year-old female.

The other vehicle, a 1986 Honda Accord driven by an 18-year-old male, was traveling westbound.

The driver of the case vehicle stopped at the intersection and did not yield the right of way to the other vehicle. As the case vehicle entered the intersection at a speed estimated to be 16 km/h (10 mph)[1], the front of the case vehicle (10FYEW1) struck the right side of the other vehicle.

Figure 3. Case vehicle, front view

The impact was of insufficient magnitude to deploy the driver's air bag and the front right passenger's air bag. The driver's side seat belt pretensioners also did not fire at this time. The pretensioner tube measurement for the driver was 11 cm; for the passenger the measurement was 11.2 cm. There was no movement of the steering column shear capsules.

Figure 4. Vehicle 1, front right view

The case vehicle sustained a longitudinal delta v of -3.1 km/h (-1.9 mph)[2] and a lateral delta v of 8.5 km/h (5.3 mph) as computed by WinSmash. The RCM data was downloaded and forwarded to Ford. On August 29, 2000, Ford indicated that: "The crash events for the SCI investigation of case DS00-005 were not recorded by the Restraints Control Module. Therefore, no information about the crash pulse, or other conditions is available."

The center console of the case vehicle was displaced somewhat–possibly by the left leg of the front right seat occupant. There were, however, no injuries reported by any of the parties involved.

[1]Calculated using a travel distance of 27 ft and an acceleration rate of 4 ft/sec/sec

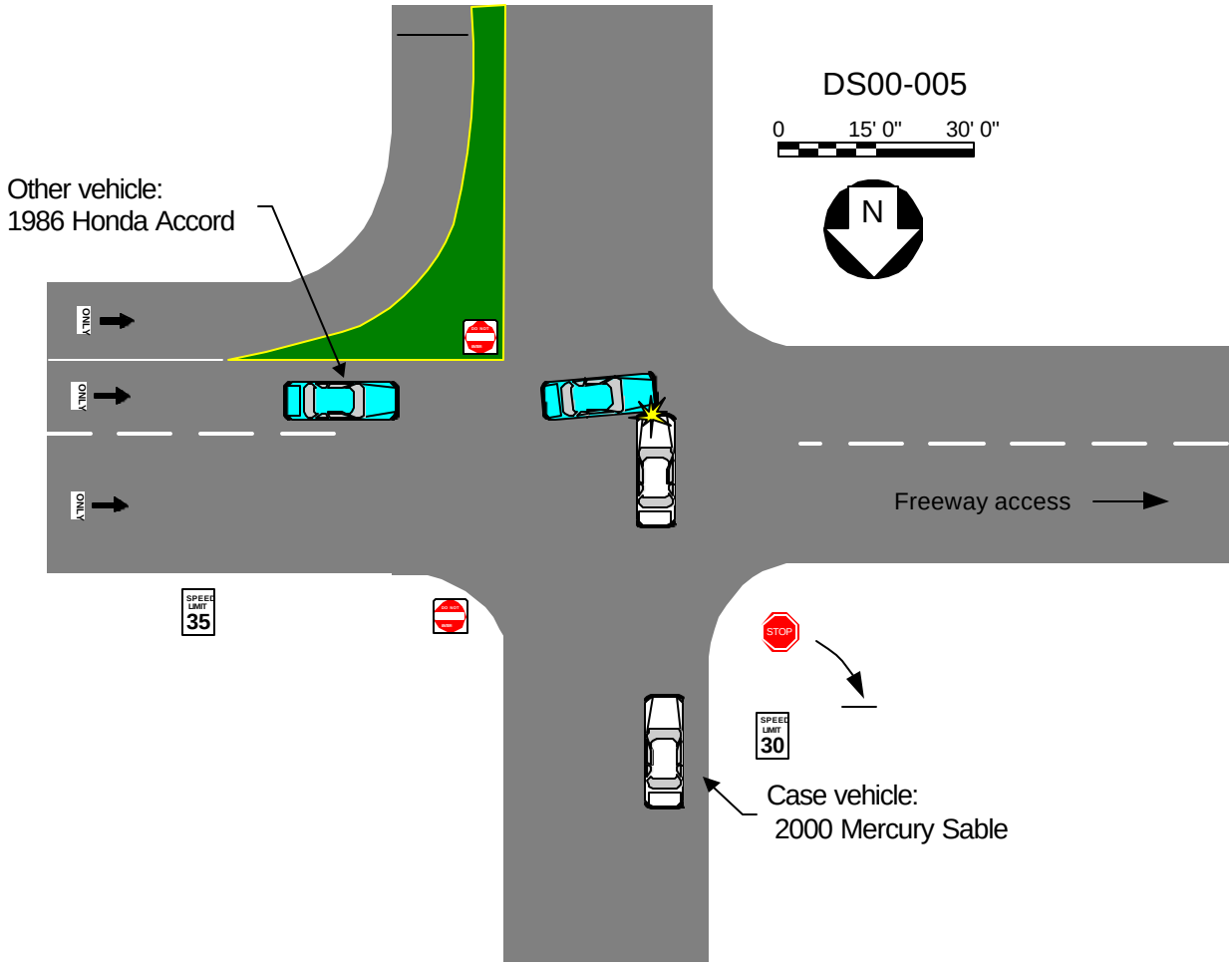
[2]Calculated using stiffness values from NCAP tests

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

Figure 5. Driver's seated area

Figure 6. Front right occupant seated area

Scene Diagram



DETAILED INFORMATION

Vehicles

Case vehicle

Description:	2000 Mercury Sable LS four-door	
VIN:	1MEFM55S1YGxxxxxx	
Odometer:	11,329 km (7,040 miles)	
Engine:	V6 / 3.0 L	
Reported Defects:	None	
Cargo:	None	
Damage Description:	Minor bumper contact, minor contact damage to left fender. Towed from the scene.	
CDC:	10FYEW1	
Delta V:	Total	9.0 km/h (5.6 mph)
	Longitudinal	-3.1 km/h (-1.9 mph)
	Latitudinal	8.5 km/h (5.3 mph)
	Energy	4,668 joules (3,444 ft-lbs)

Figure 8. Exterior, case vehicle

Figure 9. Exterior, left side, case vehicle

Other vehicle

Description:	1986 Honda Accord four door	
VIN:	JHMBA7435GCxxxxxx	
Odometer:	Unknown	
Engine:	Unknown	
Reported Defects:	None noted	
Cargo:	Unknown	
Damage Description:	Moderate damage to front right fender. Towed from the scene.	
CDC:	Unknown	
Delta V:	Total	12.4 km/h (7.7 mph)
	Longitudinal	-11.2 km/h (-7.0 mph)
	Latitudinal	-5.2 km/h (-3.2 mph)
	Energy	19,519 joules (14,397 ft-lbs)

Occupants

Vehicle 1	Occupant 1	Occupant 2
Age/Sex:	40/Male	20/Female
Seated Position:	Front left	Front right
Seat Type:	Bucket	Bucket
Height:	Unknown	Unknown
Weight:	Unknown	Unknown
Occupation:	Business owner	Unknown
Pre-existing Medical Condition:	None noted	None noted
Alcohol/Drug Involvement:	None	NA
Driving Experience:	Unknown	NA
Body Posture:	Presumed to be normal, upright	Presumed to be normal, upright
Hand Position:	Unknown	Unknown
Foot Position:	Left on floorboard, right on accelerator	Unknown
Restraint Usage:	Lap and shoulder belt used	Lap and shoulder belt used
Air bag:	Available, not deployed	Available, not deployed

Occupants

Vehicle 2

Age/Sex:	18/Male
Seated Position:	Front left
Seat Type:	Bucket
Height:	Unknown
Weight:	Unknown
Occupation:	Unknown
Pre-existing Medical Condition:	None noted
Alcohol/Drug Involvement:	None
Driving Experience:	Unknown
Body Posture:	Unknown
Hand Position:	Unknown
Foot Position:	Unknown
Restraint Usage:	Lap and shoulder belt used

Injuries and Injury Mechanisms

Case vehicle (2000 Mercury Sable)

	INJURY	OIC CODE	ICD-9	SOURCE
Driver:	Not injured			
RF Occupant:	Not injured			

Vehicle 2

	INJURY	OIC CODE	ICD-9	SOURCE
Driver:	Not injured			

Occupant Kinematics

The 40-year-old male driver of the case vehicle was seated in a normal, upright position. The seat was adjusted to between the middle and rear most track position. He was wearing the available lap and shoulder belt. The shoulder belt upper anchorage was adjusted to the full down position. The tilt steering wheel was in the middle position. The driver responded to the -70 degree direction of force by moving laterally to the left. He likely engaged the driver's door, but there were no resulting contacts nor any reported injuries.

Figure 10. Contact to center console

The 20-year-old female front right occupant of the case vehicle was seated in what was presumed to be a normal, upright position. The seat was adjusted to the rear most track position. She was wearing the available lap and shoulder belt. The shoulder belt upper anchorage was adjusted to the full up position.
This occupant responded to the -70 degree direction of force by moving laterally to the left. She likely engaged the center console with her leg–causing it to be displaced to the left. There were, however, no reported injuries to this occupant.

Attachment 1.

CASE NUMBER: None

Comments: starting from stop

*** * END VEL W/ A RATE, I VEL, DISTANCE * ***

$Ve = \sqrt{Vi^2 + 2 \times a \times D}$

$Ve = \sqrt{0.00^2 + 2 \times 4.00 \times 27.00}$

$Ve = \sqrt{0.00 + 216.00}$

$Ve = \sqrt{216.00}$

$Ve = 14.69$

Ve = Ending Velocity in FPS.
Vi = Initial Velocity in FPS.
a = Acceleration in FPS².
D = The Distance in Feet.
2 = A Constant.

INPUTS:	
The Initial Vel in FPS is:	0.00
The Acceleration Rate is:	4.00
The Distance in Feet is:	27.00

RESULTS:	
The Ending Vel in FPS is:	14.69

Printed: 08/30/00