

On-Scene / Vehicle to Vehicle / Front to Rear
Dynamic Science, Inc. / Case Number: DS97002
1996 Dodge Grand Caravan
California
February/1997

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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.

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16. Abstract This case was initiated in response to a report of airbag-related serious head injuries to a child in the right front passenger seat. Vehicle 1, a 1996 Dodge Grand Caravan LE driven by a 50-year-old female, was traveling northbound on a two-lane undivided roadway. The right front seat was occupied by a 6-year-old female. Both occupants were properly belted. There is blood and witness evidence which confirms the seatbelt usage for the right front occupant. Vehicle 2, a 1989 Ford Econoline 15 passenger bus driven by a 35-year old male, was in front of Vehicle 1 approaching a railroad crossing. The driver turned on his four-way flashers, came to a stop, and opened the doors of the bus as required by the state motor vehicle code. The driver of Vehicle 1 looked away from the roadway to pick up her cell phone and when she looked back the bus had stopped. She braked but could not stop in time. The front of Vehicle 1 struck the rear of Vehicle 2 at a relatively low speed. Both air bags in Vehicle 1 deployed at this point. The right front passenger had turned to the left to look at the car phone just prior to braking and impact. The deploying airbag struck the right front occupant primarily on the right side of her face. This occupant sustained facial abrasions and a closed head injury. She was semi-conscious immediately after the collision. She was transported by air ambulance to a local trauma center, treated for a concussion and possible spinal cord damage, and then released three days after the accident. Vehicle 1 was towed from the scene due to damage. Vehicle 2 was driven from the scene.					
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Dynamic Science, Inc.
Accident Investigation
Case Number: DS97002

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BACKGROUND:

Description:

This case was initiated in response to a report of airbag-related serious head injuries to a child in the right front passenger seat.

Vehicle 1 was a 1996 Dodge Grand Caravan LE driven by a 50-year-old female. The right front seat was occupied by a 6-year-old female. Vehicle 2 was a 1989 Ford Econoline 15 passenger bus driven by a 35-year old male.

Investigation Type:

On-Scene

Crash Location:

California

Crash Date:

February 1997

Notification Date:

February 28, 1997

Field Work Completed:

March 3, 1997

SUMMARY:

This collision occurred at 1830 hours in the state of California. The weather was clear and the bituminous roadway dry. Vehicle 1, a 1996 Dodge Grand Caravan LE driven by a 50-year-old female (132 cm / 75 kg), was traveling northbound on a two-lane undivided roadway. The right front seat was occupied by a 6-year-old female (114 cm / 22 kgs). Both occupants were properly belted. There is blood and witness evidence which confirms the seatbelt usage for the right front occupant. The driver of Vehicle 1 normally wears glasses and was wearing them at the time of the accident. Vehicle 2, a 1989 Ford Econoline 15 passenger bus driven by a 35-year old male, was in front of Vehicle 1 approaching a railroad crossing. The driver turned on his four-way flashers, came to a stop, and opened the doors of the bus as required by the state motor vehicle code. His right foot was on the brake. The driver of Vehicle 1 looked away from the roadway to pick up her cell phone and when she looked back the bus had stopped. The cell phone is a flip-phone type and was plugged into the cigarette lighter. The driver braked but could not stop in time. This vehicle is equipped with anti-lock brakes. The front of Vehicle 1 dove downward and struck the rear of Vehicle 2 at a relatively low speed. Both air bags in Vehicle 1 deployed at this point. The right front occupant was forward on the seat due to the backpack and seatbelt had an unknown amount of slack in it. During braking she went forward and was struck in the face by the deploying airbag, causing visible abrasions and knocking her unconscious. The driver of

Vehicle 2 exited his vehicle and came to the aid of the right front occupant. He found her wearing her seatbelt with the backpack still on her back. He cautioned the driver against moving the child. A 911 call was placed using the phone in Vehicle 1. Paramedics arrived by ground. She was transported by ground to a local landing area and was then transported by air ambulance to a local trauma center, treated for a concussion and possible spinal cord damage, and then released three days after the accident.

DETAILED INFORMATION

Vehicles

Vehicle 1

Description:	1996 Dodge Grand Caravan LE	
VIN:	1B4GP54L6TBXXXXXX	
Odometer:	Unknown. Digital style, battery dead.	
Engine:	3.8 L V6	
Reported Defects:	None	
Cargo:	None	
Damage Description:	Minor contact across top of bumper, minor rearward crush to grille.	
CDC:	12FDEW1	
Delta V: ¹	Total	13.8 km/h
	Longitudinal	-13.8 km/h
	Latitudinal	0.0 km/h
	Energy	15118 joules

This vehicle is equipped with three rows of seats. The front seats are both bucket seats. The seat tracks were in the mid position and the seatbacks were slightly reclined. The driver's side airbag had a single tether and no vents. The passenger side airbag was enclosed in a mid-mount module. The airbag had no tethers and no vents. It had a maximum deployed excursion of 69 cm. Neither airbag sustained any damage. There is some indication of passenger side airbag contact to the windshield near the right A-pillar. There was a single, post-deployment blood drop on the passenger side airbag, but no other indications of contact. There was no intrusion nor any integrity loss.



Figure 1. Vehicle 1, 1996 Dodge Grand Caravan

¹WINSMASH barrier run

Vehicle 2

Description: 1989 Ford Econoline 4 x 2 RV cutaway
VIN: 1FDKE30M6KHCXXXXX
Odometer: Unknown
Engine: 7.3 L V8
Reported Defects: None
Cargo: None
Damage Description: Minor crush to rear crush. Maximum crush = 8 cm (3.1 in.)
CDC: 06BDLW1
Delta V:



Figure 2. Vehicle 2, 1989 Ford bus



Figure 3. Vehicle 2, 1989 Ford bus

Occupants

<u>Vehicle 1</u>	Occupant 1	Occupant 2
Age/Sex:	50/Female	6/Female
Seated Position:	Left front	Right front
Seat Type:	Bucket	Bucket
Height:	132 cm (52 in.)	114 cm (45 in.)
Weight:	74.8 kg. (165 lbs.)	22.2 kg (49 lbs.)
Occupation:	Unknown	None
Pre-existing Medical Condition:	None	None
Alcohol/Drug Involvement:	None	NA
Driving Experience:	. 25 years	NA
Body Posture:	Normal, upright. Initially facing down and to the right, but returns to forward position prior to impact.	Seated forward on seat due to backpack and turned toward the left.
Hand Position:	Both hands back on wheel, unknown positions.	Unknown
Foot Position:	Right foot on brake, left on floorboard.	Unknown
Restraint Usage:	Lap and shoulder used properly	Lap and shoulder used properly--some extra slack due to backpack

Injuries and Injury Mechanisms

Vehicle 1

	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
Driver:	No reported injuries			
Occupant 2:	Brain swelling	140660.3	850.5	Airbag
	Forehead abrasion	290202.1	910.0	Airbag
	Abrasions to cheek	290202.1	910.0	Airbag
	Abrasion to nose	290202.1	910.0	Airbag
	Abrasions to lips	290202.1	910.0	Airbag
	Closed head injury	160608.3		Airbag

Occupant Kinematics

The right front occupant was wearing her lap and shoulder belt. The driver indicated that she had not cinched the seatbelt down in any fashion, assuming that the retractor would take care of that. The right front occupant was wearing a backpack. The backpack contained a lunchbox which was (10-13 cm) 4-5 in. thick. This would have moved her further forward on the seat. Prior to impact, she had turned to the left to help the driver look for the car phone just prior to braking and impact--which likely caused the belt to have additional slack. As the driver braked she went forward to some degree but remained facing to the left. The deploying airbag struck the right front occupant primarily on the right side of her face. This occupant sustained facial abrasions and a concussive head injury.