

Remote Investigation of a Crash Involving
a Non-available (removed) air bag
Dynamic Science, Inc. / Case Number:DS98023
1995 Honda Civic
Oregon
August 1998

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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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16. Abstract <p>This collision occurred approximately five miles outside of a small town in August 1998 at 1223 hours. This was a head-on type collision. The roadway at this location is a four-lane east/west highway divided by two solid double yellow lines. It has a long gradual hill sloping down in the eastward direction. The road gradually curves north approximately 0.4 km (0.25 mile) from the crash scene. The roadway surface is bituminous and was dry at the time of the crash. The posted speed limit is 89 km/h (55 mph) in both directions. The case vehicle, a 1995 Honda Civic driven by a restrained 17-year-old female (169 cm/66.5 in., 57 kg/125 lbs.), was traveling eastbound on a four-lane state highway at a police estimated speed of 89-97 km/h (55-60 mph). The front right seat position was occupied by a restrained 17-year-old female. The rear left seat position was occupied by an unrestrained 17-year-old female (175 cm/69 in., 108 kg/240 lbs.). The rear middle position was occupied a 20-year-old male. The rear right position was occupied by a 16-year-old male. The case vehicle had been previously crashed and repaired. The air bag had been cut out and not replaced. The other vehicle, a 1992 Honda Accord driven by a 23-year-old male, was traveling westbound at a police estimated speed of 89-97 km/h (55-60 mph). The driver of the other vehicle was wearing his seatbelt at the time of the crash. Approximately 8 hours earlier, the driver had climbed to the summit of a local mountain. He had returned at around 1120 hours. He stopped for food along the way and was in the process of returning to his residence when the crash took place. At some point prior to the crash he had adjusted the speed control to 89 km/h (55 mph). Shortly after that time, he had slowed from some construction activity but did not recall if he had reset the speed control.</p> <p>Just prior to the crash, the other vehicle crossed the painted centerline and entered the path of the case vehicle. The vehicles struck head-on, with the left front of the other vehicle engaging the entire left front and then the left side of the case vehicle. The driver's side air bag in the other vehicle deployed at this point. The front of the other vehicle continued in contact with the case vehicle, engaging both the driver's door and the left passenger door. After impact, Vehicle 2 rotated counterclockwise and came to rest facing east. After impact, the case vehicle rotated counterclockwise and traveled in a southeasterly direction and struck a metal guardrail. The driver and the 17-year-old female rear left occupant of Vehicle 1 were both fatally injured.</p>					
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Dynamic Science, Inc.
Accident Investigation
Case Number:DS98023

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BACKGROUND:

Description:	This case was initiated in response to a report of a removed air bag-related driver fatality. This case is being conducted as a remote investigation. The NHTSA was made aware of the case via a newspaper article.
Investigation Type:	Remote
Crash Location:	Oregon
Crash Date:	August 1998
Notification Date:	August 27, 1998
Field Work Completed:	NA

SUMMARY:

This collision occurred approximately five miles outside of a small town in Oregon on August 1998 at 1223 hours. This was a head-on type collision. The roadway at this location is a four-lane east/west highway divided by two solid double yellow lines. It has a long gradual hill sloping down in the eastward direction. The road gradually curves north approximately 0.4 km (0.25 mile) from the crash scene. The roadway surface is bituminous and was dry at the time of the crash. The posted speed limit is 89 km/h (55 mph) in both directions.

The case vehicle, a 1995 Honda Civic driven by a restrained 17-year-old female (169 cm/66.5 in., 57 kg/125 lbs.), was traveling eastbound on a four-lane state highway at a police estimated speed of 89-97 km/h (55-60 mph). The front right seat position was occupied by a restrained 17-year-old female. The rear left seat position was occupied by an unrestrained¹ 17-year-old female (175 cm/69 in., 108 kg/240 lbs.). The rear middle position was occupied by an unrestrained 20-year-old male. The rear right position was occupied by an unrestrained 16-year-old male.

The case vehicle had been previously crashed and repaired. The vehicle was examined at the scene by the investigating officer who determined that the bag had been cut out of the vehicle. The air bag had not been replaced. The officer later learned that the vehicle had been purchased at a salvage yard or an auto auction and had been rebuilt.

The other vehicle, a 1992 Honda Accord driven by a 23-year-old male, was traveling westbound at a police estimated speed of 89-97 km/h (55-60 mph). The driver of the Accord was wearing his lap and shoulder belt at the time of the crash. Approximately 8 hours earlier, the driver had climbed to the summit of a local mountain. He had returned at around 1120 hours. He stopped for food along the

¹According to witnesses on scene, this occupant was not restrained. On-scene photographs made available to this contractor confirm the witness statements.

way and was in the process of returning to his residence when the crash took place. At some point prior to the crash he had adjusted the speed control to 89 km/h (55 mph). Shortly after that time, he had slowed for some construction activity but did not recall if he had reset the speed control.

Just prior to the crash, the other vehicle crossed the painted centerline and entered the path of the case vehicle. The vehicles struck head-on, with the left front of the other vehicle engaging the left front and then the left side of the case vehicle. The driver's side air bag in the other vehicle deployed at this point. The front of the other vehicle continued in contact with the case vehicle, engaging both the driver's door and the left passenger door. After impact, the other vehicle rotated counterclockwise and came to rest approximately 17.9 m (59 ft) west of the impact area facing east. After impact, the case vehicle rotated counterclockwise and traveled in a southeasterly direction and struck a metal guardrail. The guardrail was 17.6 m (58 ft) from the impact area. The guardrail redirected the case vehicle, and it began traveling in a northeast direction and came to rest in the second westbound lane, facing south, approximately 27.1 m (89 ft) from the guardrail impact.

The driver and the 17-year-old female rear left occupant of the case vehicle were both fatally injured.

The driver sustained a broad-based impact injury to the left side of the face, with a gaping, chop-like diagonal laceration measuring 5 cm (2 in.), extending from the chin through the left cheek, and a nearly-contiguous, 2.5 cm (1 in.) deep puncture laceration extending from the cheek to the left preauricular region. There was a chop-like fracture of the left mandibular ramus, a crush fracture of the left maxilla, and a chop-like fracture of the left zygoma. There is a Le Fort-type fracture, with bilateral fracture of the inferior orbits, and a free-floating maxilla, fractured in roughly the midline. The mandible was fractured in multiple places. There was a compound fracture of the mid-shaft of the left humerus. In addition, there were numerous abrasions, contusions, and lacerations.

The front right occupant sustained an arm fracture and lacerations to her face. The middle rear occupant sustained what were described as "extensive injuries to his pelvis and hip bone." The rear right occupant was knocked unconscious; he had no memory of the crash, recalling only that he had awakened after being taken from the vehicle. The front right and rear right occupants were taken to a local hospital by ground ambulance. The middle rear occupant was transported by air ambulance. The hospital reported that his injuries were serious but not life threatening.

The rear left occupant sustained a high cervical/basilar skull fracture, a bilateral fracture of the mandible at the base of the condyles, a fracture/separation of the symphysis pubis, a through-and-through compound fracture of the mid-shaft of the left humerus, a fracture of the distal third of the left femur; and a gaping 30 cm (12 in.) long, 15 cm (6 in.) wide, deep laceration of the left anterolateral thigh, extending deep into the muscle and face. There were also numerous contusions, lacerations, and abrasions. The cause of death was attributed to the head and neck injuries.

The driver of the other vehicle sustained multiple, unspecified contusions. He was taken by ambulance to a local hospital where he was treated and released.

Scene Diagram

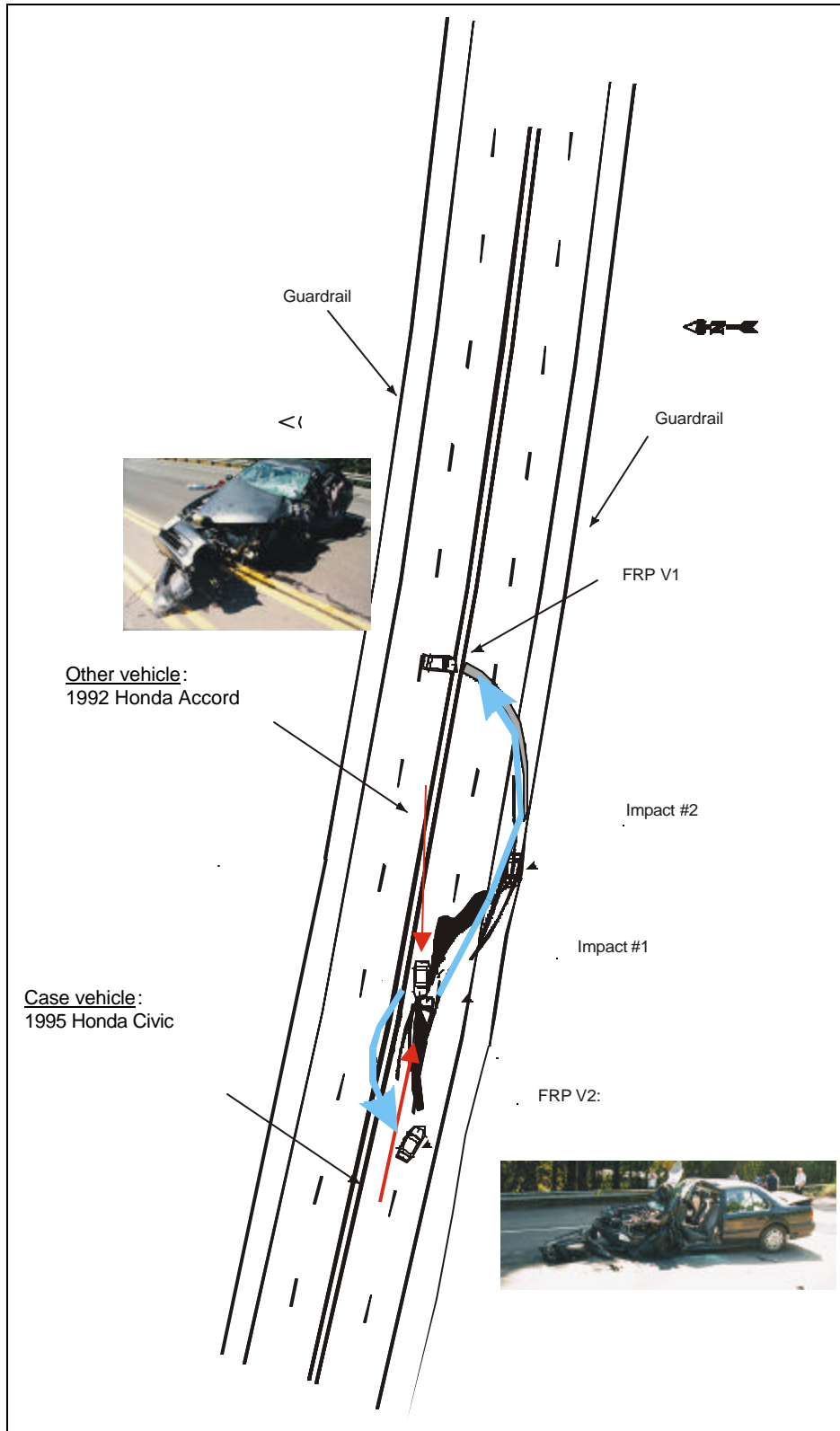


Figure 1. Modified police diagram

DETAILED INFORMATION**Vehicles**Case vehicle

Description:	1995 Honda Civic four-door	
VIN:	JHMEG8640SSxxxxxx	
Odometer:	Unknown	
Engine:	Unknown	
Reported Defects:	None noted	
Cargo:	None noted	
Damage Description:	<p>This vehicle had extensive damage to the driver's side fender and doors. Contact damage appears to have initiated from the left front corner of the vehicle, with additional contact damage to the driver's side doors of the vehicle. The vehicle had induced damage / buckling rear and upward at the A pillar area of the roof. It had induced damage to the passenger side doors, displacing them / "springing" them. The front cowling was torn free and there was extensive intrusion into the engine and the passenger compartment. The dash area was displaced rearward and towards the center of the compartment. The driver's seat appeared to be broken from its mount and twisted outwardly at approximately 20-30 degrees.</p>	
CDC:	12FLEE9	
Delta V:	Total	55.6 km/h (34.6 mph) ²
	Longitudinal	-55.4 km/h (-34.4 mph)
	Latitudinal	4.8 km/h (3.0 mph)
	Energy	246,365 joules (181,819 ft-lbs)

²Calculated using WinSMASH, CDC to CDC run



Figure 2. Exterior, case vehicle



Figure 3. Exterior, case vehicle

Other vehicle

Description:	1992 Honda Accord four-door, 5-speed manual transmission	
VIN:	1HGCB755XNAxxxxxxx	
Odometer:	Unknown	
Engine:	Unknown	
Reported Defects:	None noted	
Cargo:	Hiking gear, backpack, golf clubs	
Damage Description:	Extensive damage to front driver's side fender area. Contact damage appears to have begun to the left of the center-line at the front end and intruded into the engine compartment and seating area at a slight angle. Induced damage was present in the roof, trunk, and both sides of the vehicle. The left rear door was displaced rearward and showed signs of buckling. The roof was buckled back and upward from the left A pillar. The engine and firewall had intruded into the passenger compartment.	
CDC:	12FYEW3	
Delta V:	Total	58.7 km/h (36.5 mph)
	Longitudinal	-58.5 km/h (36.4 mph)
	Latitudinal	5.1 km/h (3.2 mph)
	Energy	119,105 joules (87,900 ft-lbs)



Figure 4. Exterior, other vehicle

Occupants

<u>Case vehicle</u>	Occupant 1	Occupant 2
Age/Sex:	17/Female	17/Female
Seated Position:	Front Left	Front Right
Seat Type:	Bucket	Bucket
Height:	169 cm (66.5 in.)	Unknown
Weight:	57-59 kg(125-130 lbs.)	Unknown
Occupation:	Unknown	Unknown
Pre-existing Medical Condition:	None noted	Unknown
Alcohol/Drug Involvement:	None	NA
Driving Experience:	Approx. one year, based on age	NA
Body Posture:	Presumed normal, upright	Presumed normal, upright
Hand Position:	Unknown	Unknown
Foot Position:	Right presumed to be on accelerator, left on floor	Unknown
Restraint Usage:	Lap and shoulder used	Lap and shoulder used
Air bag:	Not available (removed)	None

	Occupant 3	Occupant 4
Age/Sex:	17/Female	20/Male
Seated Position:	Rear Left	Rear Middle
Seat Type:	Bench w/ folding back	Bench w/ folding back
Height:	175 cm (69 in.)	Unknown
Weight:	109 kg (240 lbs.)	Unknown
Occupation:	Unknown	Unknown
Pre-existing Medical Condition:	None noted	Unknown
Alcohol/Drug Involvement:	NA	NA
Driving Experience:	NA	NA
Body Posture:	Presumed normal, upright	Presumed normal, upright
Hand Position:	Unknown	Unknown
Foot Position:	Unknown	Unknown
Restraint Usage:	Lap and shoulder belts available, not used	Lap belt available, not used

	Occupant 5
Age/Sex:	16/Male
Seated Position:	Rear Right
Seat Type:	Bench w/ folding back
Height:	Unknown
Weight:	Unknown
Occupation:	Unknown
Pre-existing Medical Condition:	Unknown
Alcohol/Drug Involvement:	NA
Driving Experience:	NA
Body Posture:	Presumed normal, upright
Hand Position:	Unknown
Foot Position:	Unknown
Restraint Usage:	Lap and shoulder belts available, not used

Other vehicle

Age/Sex:	23/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:	Approximately 5 years
Body Posture:	Unknown, but driver may have been asleep and out of position
Hand Position:	Unknown
Foot Position:	Unknown
Restraint Usage:	Lap and shoulder belt used
Air bag:	Air bag deployed as result of crash

Injuries and Injury Mechanisms

Case vehicle

	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
Driver	Transverse basilar skull fracture	150200.3,8	801.0	A-pillar
	Compound/open humerus fracture	765604.3,2	812.3	Door
	Fe Fort fracture with bilateral fracture of the inferior orbits and free floating maxilla	250806.2,4	802.4	A-pillar
	Chop-like fracture, left zygoma	251800.2,2	802.4	A-pillar
	Chop-like fracture, left mandibular ramus / multiple mandible fractures	250606.1,2	802.29	A-pillar
	Abrasion, forehead	290202.1,7	910.0	A-pillar
	Gaping, diagonal laceration, 2 in., extends from chin through left cheek	290602.1,2	873.51	A-pillar
	Puncture laceration, 1 in., extends from cheek to pre-auricular region	290602.1,2	873.51	A-pillar
	Contusion, right upper arm	790401.1,1	923.00	Unknown
	Abrasion, elbow	790202.1,2	912.0	Door
	Multiple minor abrasions to left breast	490202.1,2	911.0	Door
	Laceration, right hand	790600.1,1	882.0	Unknown
	Contusion, right thigh	890402.1,1	891.0	Steering wheel
	Abrasions/lacerations right leg	890202.1,1 890602.1,1	891.0 916.0	IP
	Extensive abrasions, left upper arm	790202.1,2	912.0	Door
	Multiple abrasions/lacerations, left lower arm	790600.1,2 790202.1,2	881.0 912.0	Door
	3/4 in. punctate laceration, left thigh	890602.1,2	891.0	Door
	Abrasions, left thigh and knee	890202.1,2	916.0	IP
	3 in. laceration, left knee	890602.1,2	891.0	IP

	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
RF Occupant	Fractured left arm	751800.2,2	813.20	IP
	Facial lacerations	290600.1,0	873.40	Unknown
LR Occupant	High cervical/basilar skull fracture	150200.3,8	801.0	B-pillar
	Through-and through compound fracture, left humerus, mid shaft	752604.3,2	812.31	Door panel, possibly some component from V2
	Fracture, left femur	851800.3,2	820.8	Door
	Contusion, right chest	490402.1,1	922.1	Seat back
	Contusion, left chest	490402.1,2	922.0	Seat back
	Contusion, 3 in., right lateral hip	590402.1,1	924.00	Unknown ³
	Contusion, 1 in. wide band, across suprapubic area	590402.1,4	922.0	Unknown ⁴
	Contusion, dorsum of right hand	790402.1,1	923.20	Unknown
	Abrasion, left upper arm	790202.1,2	912.0	Door panel
	Multiple lacerations, left forearm	790600.1,2	881.0	Door panel
	Gaping, 12 in. long x 6 in. wide, deep laceration of left anterolateral thigh, extending deep in muscle and fat	890604.2,1	890.1	Door
	Contusions/abrasions left lateral hip and thigh	890202.1,2 890402.1,2	916.0 924.0	Door
	Abrasion, bridge of nose	290202.1,4	910.0	Unknown
	"Spectacle" hemorrhage (eyelid)	297099.1,2	921.1	Unknown
	Linear abrasion, left side of face	290202.1,2	910.0	Unknown
	Bilateral fracture of mandible at base of the condyles	250600.1,3	802.21	B-pillar
Multiple lacerations to left side of face	290600.1,2	873.41	B-pillar	

³The autopsy report indicated that this injury may be related to seat belt usage. It is this investigator's opinion that this occupant was not restrained. This is based on witness information and on-scene phonographs made available to this contractor.

⁴See above

	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
	1" laceration above right medial malleolus	890600.1,1	892.0	Unknown
	Contusion of right medial gastroc region with some underlying palpable soft tissue crush injury	Unknown	Unknown	Unknown
MR Occupant	Extensive injuries to his pelvis and hip bone	Not codeable	Unknown	Seat back (LF)
RR Occupant	Knocked unconscious - no memory of accident - LOC several minutes	160414.2,0	850.1	Unknown
Other vehicle				
	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
Driver:	Multiple contusions	990400.1,9	924.8	Unknown

Occupant Kinematics (case vehicle)

The 17-year-old female driver of this vehicle was seated in a normal upright position in a bucket seat. She was wearing her lap and shoulder belt. This seat position was initially equipped with an air bag, but the air bag had been removed. Based on the evidence at the scene, there is no indication of any braking or other evasive maneuvers. The driver likely had her right foot on the accelerator and her left on the floor. At impact, the driver was projected forward and to the left. The lower portion of the driver engaged the left lower instrument panel and the left door. The left A-pillar was forced rearward and to the right and it appears that the driver engaged it with her face and head. There was significant instrument panel and left side intrusion. The driver's legs were pinned by the instrument panel and the steering wheel.

The front right occupant was wearing her lap and shoulder belt. She was also projected forward and to the left. Her arms were flung forward and it appears that her left arm struck the instrument panel and was fractured.

The 17-year-old female rear left occupant was not wearing her lap and shoulder belt. She was seated in a forward facing position on a bench seat. She was projected forward and to the left. She engaged both the B-pillar and the rear of the driver's seat. There was significant intrusion on the left side causing the left side leg and thigh injuries. There may have been some contact between this occupant and the exterior of Vehicle 2.

The 20-year-old male middle rear occupant was not wearing the available lap belt at the time of the crash. He was seated in a forward facing position on a bench seat. At impact, he was projected forward and to the left. It appears likely that he engaged the right edge of the left front seat, causing a forward deformation. He sustained what were described as "extensive injuries to his pelvis and hip bone." It is not clear what may have caused these injuries, but there very well may have been some intra-occupant contact between this occupant and the rear left occupant.

The 16-year-old male rear right occupant was not wearing the available lap and shoulder belt. He was seated in a forward facing position on a bench seat. At impact he was projected forward and to the left. He was knocked unconscious during the crash but there are no indications as to what he may have struck.

Subsequent to the initial impact, the case vehicle rotated violently in a counterclockwise direction. This movement would have caused the occupants to move towards the right side of the vehicle. The two front seat occupants were restrained so their movements would have been limited. The three rear seat occupants would have shifted to the right more robustly but this movement was likely limited by the limited amount of room available in the rear seat of this small vehicle.

While still in rotation, the case vehicle came into contact with a guardrail. This appears to have been a glancing, sideswipe type impact so there was little additional occupant movement.