Remote, Redesigned Air Bag Special Study
Dynamic Science, Inc., Case Number (1999-079-044)
1998 Honda Accord
California
April /1999

Technical Report Documentation Page

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16. Abstract

This remote investigation focused on the redesigned air bag system deployment of a 1998 Honda Accord four-door sedan. This two vehicle crash took place during the afternoon hours in April of 1999. The weather was clear and the level bituminous roadway surface was dry and free of defects. This crash occurred on a divided eight lane urban roadway. This roadway consisted of three westbound travel lanes and five east bound travel lanes (three through lanes and two left turn lanes). A raised, curbed concrete median separates the east and westbound travel lanes. The posted speed limit for this roadway is 56 km/h (35 mph). Vehicle 1, a 1995 Dodge Caravan minivan was driven by a 26 year-old-male who reportedly was wearing the available three-point manual lap and shoulder belt. A 43 year-old-female passenger occupied the second seat, middle position. It is unknown wether she was wearing the three-point lap and shoulder belt. Vehicle 1 was traveling eastbound in lane four, approaching an intersection. The driver of Vehicle 1 attempted a U-turn at the area where the center median ends. Driver 1 was attempting this U-turn maneuver with the intention of proceeding westbound. Vehicle 2, a 1998 Honda Accord four-door sedan was driven by a fully restrained 22 year-old-female (163 cm/ 64 in., 68 kg/ 150 lbs.) Driver 2 was traveling westbound in lane two at a police reported travel speed of > 72 km/h (45 mph). Vehicle 1 (Dodge Caravan) turned left directly in front of Vehicle 2's (Honda Accord) path of travel. Driver 2 detected Vehicle 1 encroaching her lane of travel and applied the brakes. Vehicle 2 skidded approximately 29.5 m (97 ft.) to the point of impact. The front bumper of Vehicle 2 (12FDEW2) impacted the right, rear corner of Vehicle 1 (Dodge Caravan). Vehicle 1 was under repair and a CDC could not be assigned. The total delta V and the longitudinal delta V for the 1998 Honda Accord could not be ascertained due to unreliable field measurements. Vehicle 2 continued in a forward trajectory coming to rest facing west. Vehicle 1 (Dodge Caravan) rotated clockwise and its left front tire impacted the north curb edge (Crash Event 2). Vehicle 1 came to rest facing northeast. The 26 year-old-male driver of Vehicle 1 was reportedly uninjured. The 43 year-old-female passenger that was positioned in the second seat, middle position was transported to a local hospital with complaints of pain to her right hip and lower right back. The 22 year-old-female driver of Vehicle 2 (Honda) was transported to a local hospital where she was treated and released. She sustained a right hand contusion (AIS-1) due to contacting the sun visor and a left forearm abrasion (AIS-1) was attributed to the deploying air bag. Her left knee contacted the knee bolster which resulted in an area of contusion (AIS-1).

17. Key Words	18. Distribution Statement
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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Honda Accord four-door sedan. This two vehicle crash took place during the afternoon hours in April of 1999. The weather was clear and the level bituminous roadway surface was dry and free of defects. This crash occurred on a divided eight lane urban roadway. This roadway consisted of three westbound travel lanes and five east bound travel lanes (three through lanes and two left turn lanes). A raised, curbed concrete median separates the east and westbound travel lanes. The posted speed limit for this roadway is 56 km/h (35 mph).

Figure 1. Pre-impact trajectory for Vehicle 1 (Dodge Caravan)

Figure 2. Vehicle 1 initiates a U-turn (point of impact)

Figure 3. View showing frontal damage to Vehicle 2 (Honda)

Vehicle 1, a 1995 Dodge Caravan minivan was driven by a 26 year-old-male who reportedly was wearing the available three-point manual lap and shoulder belt. A 43 year-old-female passenger occupied the second seat, middle position. It is unknown whether or not she was wearing the three-point lap and shoulder belt. Vehicle 1 was traveling eastbound in lane four, approaching an intersection. The driver of Vehicle 1 attempted a U-turn at the area where the center median ends. Driver 1 was attempting this U-turn maneuver with the intention of proceeding westbound.

Vehicle 2, a 1998 Honda Accord four-door sedan was driven by a fully restrained 22 year-old-female (163 cm/ 64 in., 68 kg/ 150 lbs.) Driver 2 was traveling westbound in lane two at a police reported travel speed of > 72 km/h (45 mph).

Crash Events

Vehicle 1 (Dodge Caravan) turned left directly in front of Vehicle 2's (Honda Accord) path of travel. Driver 2 detected Vehicle 1 encroaching her lane of travel and applied the brakes. Vehicle 2 skidded approximately 29.5 m (97 ft.) to the point of impact. Based on the skid distance, Vehicle 2's minimum pre-braking travel speed was in excess of 72 km/h (45 mph). The front bumper of Vehicle 2 (12FDEW2) impacted the right, rear corner of Vehicle 1 (Dodge Caravan). Vehicle 1 was under repair and a CDC could not be assigned. The total delta V and the longitudinal delta V for the 1998 Honda Accord could not be ascertained due to unreliable crush measurements.

Vehicle 2 continued in a forward trajectory coming to rest facing west. Vehicle 1 (Dodge Caravan) rotated clockwise and its left front tire impacted the north curb edge (Crash Event 2). Vehicle 1 came to rest facing northeast.

The 26 year-old-male driver of Vehicle 1 was reportedly uninjured. The 43 year-old-female passenger that was positioned in the second seat, middle position was transported to a local hospital with complaints of pain to her right hip and lower right back. The 22 year-old-female driver of Vehicle 2 (Honda) was transported to a local hospital where she was treated and released. She sustained a right hand contusion (AIS-1) due to contacting the sun visor and a left forearm abrasion (AIS-1) was attributed to the deploying air bag. Her left knee contacted the knee bolster which resulted in an area of contusion (AIS-1).

Exterior of Case Vehicle

Table 1. Vehicle Information

Model year, make and model	1998 Honda Accord
VIN	1HGCG5649WA
CDC	12FDEW2

Figure 4. Front view, Vehicle 2

Figure 5. Three-quarter view of frontal damage to Vehicle 2

Interior of Case Vehicle

The interior of the 1998 Honda Accord sustained minor interior damage due to occupant contact and passenger air bag deployment. The driver's right knee impacted the lower steering wheel column cover as evidenced by a residual scuff mark. The driver's right hand flailed upward breaking the underlying vanity mirror of the front, left sunvisor. The laminated windshield was broken due to the front, right passenger air bag deployment. There were no intruding components and the passenger compartment integrity was not compromised. The case vehicle is equipped with front bucket seats with adjustable head restraints. The second seat consists of a bench seat with integral head restraints located at the outboard positions. The front, left seat track was adjusted between the middle and rearmost seat track position.

Case Vehicle Occupant Protection Systems

The 1998 Honda Accord four-door sedan was equipped with redesigned air bag systems. This system consists of a SRS unit (diagnostic module) which is located centrally in the center console, forward of the transmission selector lever. The frontal air bag sensor is incorporated within the centrally located SRS unit. The SRS ready lamp indicator is located in the upper right instrumentation cluster, adjacent to the speedometer.

The driver's air bag is housed in the steering wheel hub and encases the nylon air bag unit. The double, horizontal, module cover flaps are asymmetric in design and opened at their designated tear points. The circular air bag is 62 cm (24.4 in.) in diameter and is equipped with two tether straps[1] and two exhaust vent port holes. The vent ports are located at the 11 and 1 o'clock positions respectively. The rigid plastic knee bolster was undamaged and did not reveal any detectable occupant contacts.

The front, right passenger air bag is located on the instrument panel (top mount). The module deployment door is rectangular in shape and is equipped with double horizontal cover flaps that are symmetrical in design (23 cm wide x 4.7 cm in height). The non-tethered air bag was undamaged and was equipped with two vent port holes which are at the 10 and 2 o'clock positions.

Figure 6. View showing deployed driver's air bag

Figure 7. View showing deployed passenger air bag

Case Vehicle Occupant Demographics

	Occupant 1
Age/Sex:	22/Female
Seated Position:	Front, Left
Seat Type:	Bucket, Fabric Covered
Height (cm/in:):	163 64.17
Weight (kg/lbs).:	68 149.9
Pre-existing Medical Condition:	None Reported
Body Posture:	Normal, upright facing forward
Hand Position:	Both hands on steering wheel rim, position unknown
Foot Position:	Right foot on brake pedal and left foot on floor panel
Restraint Usage:	Active, three-point lap and shoulder belt worn in a normal and proper fashion with the lap belt extending across her lap and the shoulder belt extended across her chest
Air bag:	Driver air bag deployed as a result of the initial frontal impact

[1]SCI corrected

Occupant Injuries

Table 2. Injuries

Injury	Injury Severity (AIS)	Injury Mechanism
Right hand contusion	1	Sunvisor
Left knee contusion	1	Knee bolster
Left forearm abrasion	1	Air bag

Occupant Kinematics

The restrained 22 year-old-female responded to the 12 o'clock principle direction of force by moving directly forward. She loaded the lap belt webbing as her left knee impacted the knee bolster resulting in a contusion (AIS-1). Her right knee contacted the lower steering column cover which did not result in injury but did leave a residual scuff mark to the cover. Her chest loaded the applied shoulder belt webbing which prohibited extended forward motion of her upper torso. As the air bag deployed, her right hand was thrust off of the steering wheel rim and flailed upward impacting the sun visor. This contact was evidenced by the broken underlying vanity mirror. She sustained a left forearm abrasion (AIS-1) which occurred during the air bag deployment and a contused right hand (AIS-1) due to the sunvisor contact. Driver 1 rebounded rearward into her respective seat back.

Figure 8. View showing driver's seated position

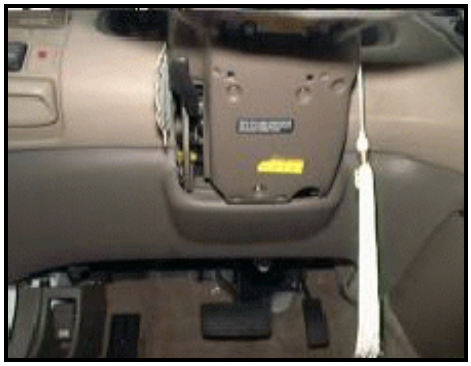
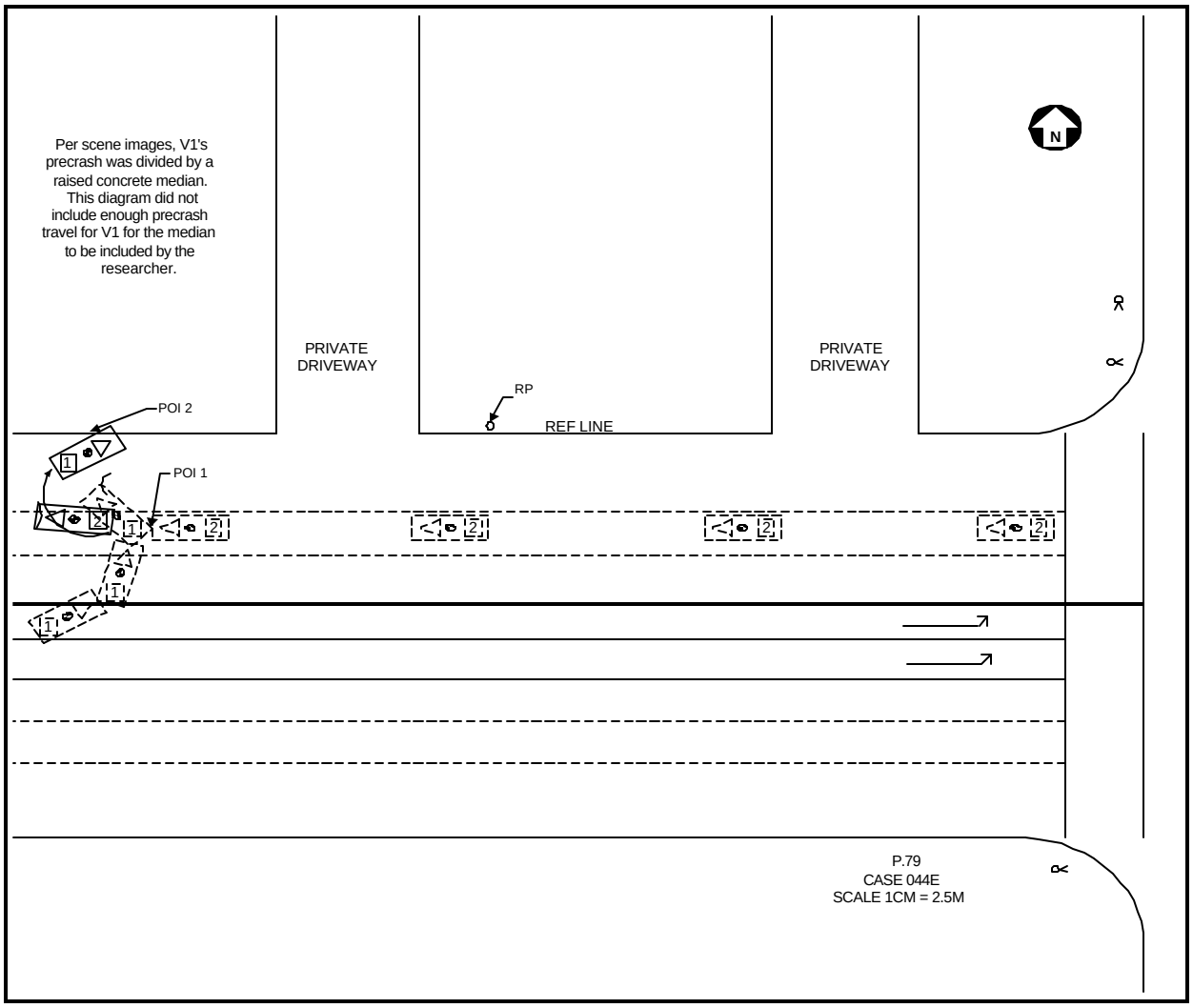


Figure 9. Close up showing knee contact to lower steering column cover

Figure 10. Damaged vanity mirror due to right hand contact

Scene Diagram



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* * MINIMUM SPEED W/ KNOWN DRAG FACTOR * *

$S = \sqrt{30 \times D \times .}$

$S = \sqrt{30 \times 97.00 \times 0.70}$

$S = \sqrt{2037.00}$

$S = 45.13$

S = The Speed in M PH.
30 = A Constant.
D = The Distance in Feet.
. = The Adjusted Accel/Drag Factor.

INPUTS:	
The Acceleration/Drag Factor is:	0.70
The Distance in Feet is:	97.00

RESULTS:	
The Speed in M PH is:	45.13
The Velocity in FPS is:	66.16

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