

Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number ( 1998-081-802G)

1998 Honda CR-V

Washington

October/1998

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16. Abstract <p>This remote investigation was focused on the redesigned air bag system deployment of a 1998 Honda CR-V Sport Utility Vehicle. This two-vehicle front to rear axial crash occurred during the afternoon hours of a Fall day in October, 1998. This crash took place on a rural two-lane, undivided roadway and the bituminous roadway surface was dry. The impact occurred immediately prior to a four-leg intersection that was controlled by an overhead traffic signal. The roadway is straight and the northbound travel lane has a negative grade (&gt;2%) while the eastbound travel lane has a positive grade (&gt;2%). The east and westbound roadway consists of an undivided two-lane roadway. There were no adverse weather conditions and the posted speed limit is 56 km/h (35 mph). Paved shoulders border each of the connecting roadways. Vehicle 1, a 1998 Honda CR-V Sport Utility Vehicle, was driven by a 27 year-old-male (188 cm/ 74 in., 91 kg/201 lbs.) who was fully restrained by the available three-point manual lap and shoulder belt. The front, right seated position was occupied by a fully restrained 38 year-old-female (170 cm/67 in., 54 kg./120 lbs.). Driver 1 was traveling northbound and did not detect that the traffic in front of him had stopped. Vehicle 2, a 1984 Ford Mustang three-door hatchback was driven by an 18 year-old-male (168 cm/ 66 in., 64 kg/ 140 lbs.) who was reportedly wearing the available three-point manual lap and shoulder belt. Driver 2 was stopped in the northbound travel lane and waiting for the vehicle that was in front of him to complete a left turn at the intersection. The front, left two thirds of Vehicle 1's bumper (12FYEW2) impacted the rear plane of Vehicle 2 (Ford Mustang). The frontal impact was of sufficient force to deploy the 2<sup>nd</sup> generation air bags in Vehicle 1. The calculated Delta V for Vehicle 1 (Honda CR-V) was 26.6 km/h (16.5 mph) with a longitudinal Delta V of -26.6 km/h (-16.5 mph). The Delta V for Vehicle 2 (Mustang) was computed at 30.5 km/h (19 mph). Vehicle 1 continued in its forward trajectory before coming to rest in its respective travel lane and facing north. Vehicle 2 was thrust forward due to the rear impact force. Vehicle 2 came to rest in the northbound travel lane and facing north. The 27 year-old-male driver was uninjured while his front, right 38 year-old-female passenger reportedly sustained a 'bump' (contusion) to her head from an unknown source. Driver 2 sustained contusions to both shins (AIS-1), bruised ribs (AIS-1), a left elbow contusion and a laceration to the posterior of his scalp due to cargo movement located in the second seat. Driver 2 was transported to a local hospital where he was treated and released. A local towing agency responded to the crash location and subsequently removed the involved vehicles.</p>					
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***Summary***

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Honda CR-V Sport Utility Vehicle. This two-vehicle front to rear axial crash occurred during the afternoon hours of a Fall day in October, 1998. This crash took place on a rural two-lane, undivided roadway and the bituminous roadway surface was dry. The impact occurred immediately prior to a four-leg intersection that was controlled by an overhead traffic signal. The roadway is straight and the northbound travel lane has a negative grade (>2%) while the eastbound travel lane has a positive grade (>2%). The east and westbound roadway consists of an undivided two-lane roadway. There were no adverse weather conditions and the posted speed limit is 56 km/h (35 mph). Paved shoulders border each of the connecting roadways.

Vehicle 1, a 1998 Honda CR-V Sport Utility Vehicle, was driven by a 27 year-old-male (188 cm/ 74 in., 91 kg/201 lbs.) who was fully restrained by the available three-point manual lap and shoulder belt. The front, right seated position was occupied by a fully restrained 38 year-old-female (170 cm/67 in., 54 kg./120 lbs.). Driver 1 was traveling northbound and did not detect that the traffic in front of him had stopped.

Vehicle 2, a 1984 Ford Mustang three-door hatchback was driven by an 18 year-old-male (168 cm/ 66 in., 64 kg/ 140 lbs.) who was reportedly wearing the available three-point manual lap and shoulder belt. Driver 2 was stopped in the northbound travel lane and waiting for the vehicle that was in front of him to complete a left turn at the intersection.



**Figure 1.** Pre-impact trajectories of Vehicle 1 (Honda CR-V) and Vehicle 2 (Ford Mustang)



**Figure 2.** Frontal deformation to Vehicle 1

## Crash Events

The front, left two thirds of Vehicle 1's bumper (12FYEW2) impacted the rear plane of Vehicle 2 (Ford Mustang). The frontal impact was of sufficient force to deploy the 2<sup>nd</sup> generation air bags in Vehicle 1. The calculated Delta V for Vehicle 1 (Honda CR-V) was 26.6 km/h (16.5 mph) with a longitudinal Delta V of -26.6 km/h (-16.5 mph)<sup>1</sup>. The Delta V for Vehicle 2 (Mustang) was computed at 30.5 km/h (19 mph).

Vehicle 1 continued in its forward trajectory before coming to rest in its respective travel lane and facing north. Vehicle 2 was thrust forward due to the rear impact force. Vehicle 2 came to rest in the northbound travel lane and facing north.



**Figure 3.** Rear deformation to Vehicle 2

The 27 year-old-male driver was uninjured while his front, right 38 year-old-female passenger reportedly sustained a ‘bump’ (contusion) to her head from an unknown source. Driver 2 sustained contusions to both shins (AIS-1), bruised ribs (AIS-1), a left elbow contusion and a laceration to the posterior of his scalp due to cargo movement located in the second seat. Driver 2 was transported to a local hospital where he was treated and released. A local towing agency responded to the crash location and subsequently removed the involved vehicles.

**Table 1. Delta V**

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	26.6	16.5	30.5	19
Longitudinal	-26.6	-16.5	30.5	19
Lateral	0.0	0	0.0	0

<sup>1</sup> Calculated utilizing the Damage Only Routine of the WinSmash 1.2.1 program

**Exterior of Case Vehicle**

**Table 2. Vehicle Information**

Model year, make and model	1998 Honda CR-V
VIN	JHLRD284XWC
CDC	12FYEW2



**Figure 4.** Perpendicular view of Vehicle 1 showing level of crush



**Figure 5.** Three-quarter view showing rear damage to Vehicle 2

**Table 3. 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.
Front Bumper	143	25	19	20	16	9	0
	56.3	9.8	7.5	7.9	6.3	3.5	0

## *Interior of Case Vehicle*

The interior of the 1998 Honda CR-V was undamaged as a result of the moderate frontal crash. The case vehicle maintained its integrity and there were no intruding components. The interior was void of any occupant contact damage and there was no damage to any of the glazing. This vehicle was equipped with front bucket seats and adjustable head restraints. It is unknown the exact seat track position for both front seats. The second row was equipped with a split bench seat with folding backs. There were adjustable head restraints at the outboard positions.

## *Case Vehicle Occupant Protection Systems*

The 1998 Honda CR-V Sport Utility Vehicle was equipped with redesigned air bag systems. This system consists of a SRS unit (diagnostic module) which is centrally located in the center console, forward of the transmission selector lever. The SRS unit houses the safing sensor and the impact sensor<sup>2</sup>. The SRS ready lamp indicator is located in the lower left instrument 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 and two exhaust vent port holes. The vent ports are located at the 11 and 1 o'clock positions. The rigid plastic knee bolster was undamaged and maintained its original form.

The front, right passenger air bag is located on the instrument panel (top mounted). 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 deployed and was undamaged and void of any occupant contact evidence. The passenger air bag is equipped with two vent port hole which are at the 10 and 2 o'clock positions respectively.



**Figure 6.** View showing deployed driver's air bag



**Figure 7.** View showing opened passenger air bag module cover flaps

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<sup>2</sup> Refer to the 1998-1999 Honda CR-V Supplemental Restraint Systems and Wiring Mapping Views

## Case Vehicle Occupant Demographics

	Occupant 1	Occupant 2
Age/Sex:	27/Male	38/Female
Seated Position:	Front, Left	Front, Right
Seat Type:	Bucket, cloth covered	Bucket, cloth covered
Height (cm/in):	188 74.02	170 66.93
Weight (kg/lbs):	91 200.6	54 119.1
Pre-existing Medical Condition:	None Reported	None Reported
Body Posture:	Upright, facing forward	Upright, facing forward
Hand Position:	Both hands on steering wheel rim at the 10 and 2 o'clock positions	Both hands on lap
Foot Position:	Right foot on accelerator pedal and left foot on floor	Both feet on floor panel
Restraint Usage:	Manual, three-point lap and shoulder belt reportedly worn snug and in a proper fashion	Manual, three-point lap and shoulder belt reportedly worn snug and in a proper fashion.
Air bag:	Driver's air bag deployed as a result of the frontal impact.	Passenger Frontal air bag deployed as a result of the frontal impact.

## Occupant Injuries

**Table 4. Injuries**

Injury	Injury Severity (AIS)	Injury Mechanism
(Passenger) Right Side Scalp Contusion	1	Unknown Source



## ***Occupant Kinematics***

The 27 year-old-male driver of the 1998 Honda CR-V was fully restrained and was wearing the available three-point lap and shoulder belt in a normal and proper fashion. He reportedly was in an upright seated position with both hands on the steering wheel rim (10 and 2 o'clock) and his right foot was depressing the accelerator pedal.

He responded to the 360 degree impact force by moving directly forward. He loaded the lap and shoulder belt webbing which prohibited extended forward movement of his upper and lower torso. His face and chest probably contacted the driver's air bag, however, the nylon bag material was void of any occupant contact evidence. He rebounded backwards into the seatback support. He was maintained within his respective seated position and was uninjured.

The 38 year-old-female front, right passenger was also fully restrained. She responded to the 12 o'clock direction of force by moving directly forward loading the lap belt webbing with her lower torso. Her upper torso was prohibited from extended forward motion as she loaded the shoulder belt webbing. Her chest and head likely contacted the deploying passenger air bag, however, the nylon air bag surface did not reveal any signs of occupant contact evidence. She rebounded into the seatback coming to rest in her respective seated position. She reportedly sustained a contusion to the right side of her scalp(AIS-1) from an unknown injury source.



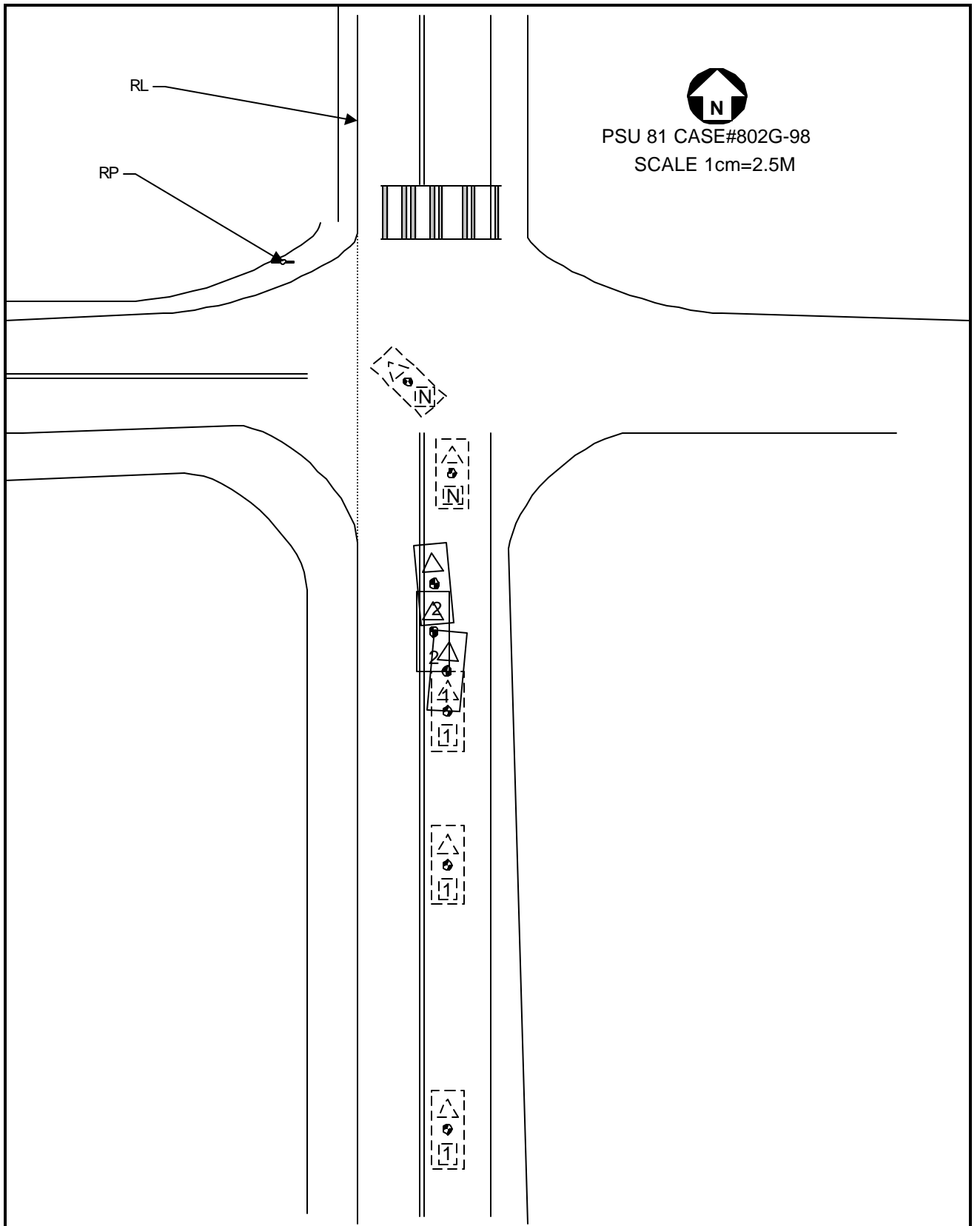
**Figure 8.** Interior view showing driver's seated position



**Figure 9.** Interior view of Vehicle 1 showing the left and front right seated positions



Scene Diagram



NOTE: All SRS electrical wiring harnesses are covered with yellow insulation.

