Remote, Redesigned Air Bag Special Study **FOR NHTSA'S INTERNAL USE ONLY**

Dynamic Science, Inc., Case Number (1999-079-802E) 1998 Toyota Camry 4-door sedan California August/1999

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18. Distribution Statement

17. Key Words

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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Toyota Camry 4door sedan. This serious injury crash occurred in August, 1999 in the afternoon. The weather was clear and the bituminous roadway was dry. The crash occurred in a four-leg intersection. The southbound leg of the intersection is a two-way undivided roadway and is comprised of five travel lanes; two southbound thrulanes, one southbound left-turn lane, and two northbound lanes. The speed limit for this road is 56 km/h (35 mph). It is controlled by overhead traffic signals. The road was level at this location. The northbound leg of the intersection is a two-way undivided roadway and is comprised of five travel lanes; two northbound thru-lanes, one northbound left-turn lane, and two southbound lanes. The speed limit for this road is 56 km/h (35 mph). It is controlled by overhead traffic signals. The road was level at this location.

Vehicle 1, a 1998 Toyota Camry 4-door sedan (case vehicle) driven by a 52 year old female (170 cm/67 in, 57 kg/125 lbs), was traveling south in the southbound left-turn lane approaching the intersection at an unknown speed. The driver was preparing to make a left turn at the intersection. The overhead traffic signal was in the green phase at this time. The driver was restrained by the available manual lap & shoulder restraint. There were no other occupants in Vehicle 1.



Figure 1. Exterior, Vehicle 1 (Toyota Camry)



Figure 2. Exterior, Vehicle 2 (Mazda 929)

Vehicle 2, a 1992 Mazda 929 4-door sedan driven by a 21 year old female, was traveling north in the right northbound lane approaching the intersection at an unknown speed. The driver was preparing to travel straight through the intersection. The overhead traffic signal was in the green phase at this time. The front right seat was occupied by a 43 year old female. It is unknown if either occupant was restrained.

Crash Events

The driver of Vehicle 1 initiated the left turn in the path of Vehicle 2 and was struck. The front plane of Vehicle 1 (01FYEW1) struck the left plane of Vehicle 2 (11LYEW2) in the intersection.

A Delta V was calculated for the case vehicle, utilizing the Damage Only Algorithm of WinSMASH, as 21 km/h (13 mph).

As a result of the frontal impact, the supplemental restraint system (driver's and passenger's frontal redesigned air bags) of the case vehicle deployed.

Vehicle 1 came to rest in the northeast corner of the intersection facing east. Vehicle 2 came to rest in the northeast corner of the intersection facing north.

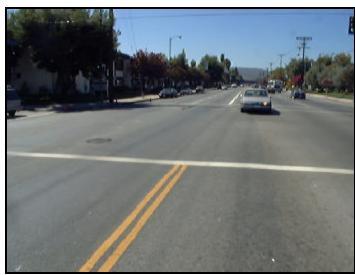


Figure 3. Crash scene. Vehicle 1 approach path.

All three occupants were transported from the scene to a hospital where they were treated and released.

Both vehicles were disabled due to damage sustained in the crash and were towed form the scene.

Table 1. Delta V

	Case Vehicle		Other Vehicle		
	km/h	mph	km/h	mph	
Total	21	13	17	10.6	
Longitudinal	-18	-11.2	-16	-9.9	
Lateral	-10	-6.2	6	3.7	
Barrier speed	15	9.3	23	14.3	

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Toyota Camry 4-door sedan
VIN	JT2BG22K1W0
CDC	01FYEW1

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.
Bumper	138	9	18	13	7	4	3
	54.3	3.5	7.1	5.1	2.8	1.6	1.2

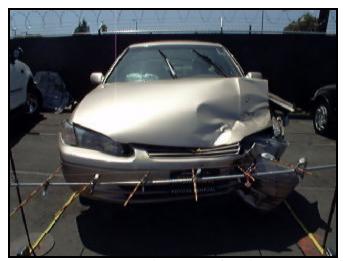


Figure 4. Exterior, Vehicle 1 (1998 Toyota Camry)



Figure 5. Exterior, Vehicle 1 (1998 Toyota Camry)

Interior of Case Vehicle

The interior of the Toyota Camry sustained minor damage from occupant contact. There were no areas of intrusion into the passenger compartment. There was occupant contact evidence present to the driver's air bag, mirror, windshield, and front header.

The case vehicle was equipped with bucket seats with adjustable head restraints in the front left and front right seating

positions. The front left seat was adjusted between the middle and rear most track positions. The front right seat was adjusted to the rear most track position. The rear of the vehicle was equipped with bench seats in all three seating positions which were not adjustable. The outboard rear seats were equipped with adjustable head restraints while the center rear seat was not equipped with a head restraint system.

Case Vehicle Occupant Protection Systems

The Toyota Camry 4-door sedan was equipped with a redesigned air bag system which consisted of front left and front right air bag modules which housed air bags and depowered inflator units.



Figure 6. Interior, case vehicle. Driver's frontal air bag.

The front left air bag was housed in the steering wheel hub and was concealed by asymmetrical H-configuration cover flaps which were not damaged in the crash. The circular air bag was equipped with four tether straps and two vent ports. Contact evidence consisting of a "very light gray scuff" was found on the upper left quadrant of the front of the bag. The air bag was not damaged.

The front right air bag was housed in the top-instrument panel position and was concealed by symmetrical Hconfiguration cover flaps which were not damaged in the crash. The rectangular air bag was not equipped with tether straps or vent ports. No contact evidence was found on the bag and the air bag was not damaged.

Case Vehicle Occupant Demographics

Table 4. Case Vehicle Occupant(s) Demographics

Occupant 1

Age/Sex: 52/Female Seated Position: Front left

Seat Type: Bucket - leather covered

Height (cm/in:): 170 Weight (kg/lbs).: 57 125

Pre-existing None noted

Medical Condition:

Body Posture: Normal upright posture - not

bracing

Hand Position: On steering wheel - unknown

positions

Foot Position: On floor or foot controls Restraint Usage:

Manual lap and shoulder

restraint

Deployed redesigned air bag Air bag:

system

Occupant Injuries

Table 5. Case Vehicle Occupant(s) Injuries

Injury	Injury Severity (AIS)	Injury Mechanism	
Fractured sternum	2	Driver's air bag	
Chest skin contusion	1	Driver's air bag	
Right forearm skin contusion	1	Driver's air bag	

Occupant Kinematics

The driver (case occupant) of the Toyota Camry was seated in a normal upright posture in the front left position of the vehicle. She was wearing the manual lap and shoulder restraint. Seat belt usage was determined through visual inspection by the researcher and the lack of prominent frontal contact evidence in the vehicle's interior. The driver reported that no pre-impact avoidance maneuvers were performed, so the case occupant should not have been out of position prior to impact.

At impact, the driver responded to the 1 o'clock direction of force by moving forward and to the right, loading the manual lap and shoulder restraint. As the restraints locked, further forward movement of the case occupant was prevented. It appears that the driver came into contact with the deploying driver's frontal



Figure 7. Interior, case vehicle. Air bag contact.

air bag-causing the fractured sternum, chest contusion, and forearm contusion. A small grayish scuff was found on the front of the bag (see Figure 7). It is believed that loading of the shoulder belt contributed to the sternum fracture. The case occupant was transported from the scene to a hospital where she was treated and released.

