

On-scene Investigation / Vehicle to Vehicle
Dynamic Science, Inc. / Case Number: DS98005
1997 Toyota Camry
California
May 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 <p>This collision occurred in California in May 1997 at 1945 hours. The weather was clear and the roadway dry. It was dusk at the time of the crash. This was an intersection-related collision. The case vehicle, a 1997 Toyota Camry driven by a restrained 54-year-old female (163 cm/64 in., 68 kg/150 lbs.), was traveling northbound on a five-lane undivided roadway. The front right of the case vehicle was occupied an unrestrained 79-year-old female (157 cm/62 in., 49 kg/ 108 lbs.). The other vehicle, a 1978 Datsun B-210 driven by a 47-year-old male, was initially stopped at a stop sign in the westbound leg of the intersection. The driver pulled into the intersection, intending to turn left to the south. The driver of the case vehicle braked. The case vehicle was ABS-equipped and did not leave any residual skidmarks. The front of the case vehicle struck the left rear tire area of the other vehicle. The case vehicle sustained a longitudinal delta V of -14.5 km/h (-9 mph). Both air bags deployed at this time. The case vehicle was towed from the scene due to damage. The other vehicle fled from the scene. Witnesses to the crash followed the other vehicle. The driver lost control of his vehicle and after the vehicle came to rest the witnesses pulled him out of the car. Police arrested the driver and impounded the other vehicle.</p> <p>The front right passenger of the case vehicle was transported by ground ambulance to a local trauma center. She was hospitalized for seven days before passing away at 0500 hours on the seventh day. Her injuries included the following: cerebral contusion, subarachnoid hemorrhage (bilateral), subdural hemorrhage (bilateral), subluxation of the cervical vertebra, and bilateral lung contusions; she also sustained multiple contusions and abrasions to the chin, neck, and chest. The injuries were all as result of contact with the deploying air bag and contact with the upper portion of the windshield.</p> <p>The driver of the case vehicle was also transported. She was treated for pain in her right hand and stomach and then released. The driver of the other vehicle was transported to the hospital where he was treated for a laceration to his head.</p>		14. Sponsoring Agency Code	
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Dynamic Science, Inc.
Accident Investigation
Case Number: DS98005

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BACKGROUND:

Description: This case was initiated in response to a report of a passenger-side air bag related fatality. This case was conducted as an on-scene investigation. The NHTSA was notified by the Office of Defects Investigation (ODI). An Auto Safety Hotline Vehicle Owner's Questionnaire was submitted to ODI by attorneys representing the vehicle owner.

Investigation Type: On-scene

Crash Location: California

Crash Date: May 1997

Notification Date: February 5, 1998

Field Work Completed: February 11, 1998

SUMMARY:

This collision occurred in California in May 1997 at 1945 hours. The weather was clear and the roadway dry. It was dusk at the time of the crash. This was an intersection-related collision. The case vehicle, a 1997 Toyota Camry driven by a restrained 54-year-old female (163 cm/64 in., 68 kg/150 lbs.), was traveling northbound on a five-lane undivided roadway. The front right of the case vehicle was occupied by an unrestrained 79-year-old female (157 cm/62 in., 49 kg/ 108 lbs.).

The other vehicle, a 1978 Datsun B-210 driven by a 47-year-old male, was initially stopped at a stop sign in the westbound leg of the intersection. The driver pulled into the intersection, intending to turn left to the south.



Figure 1. Exterior, case vehicle.



Figure 2. Exterior windshield, case vehicle

The driver of the case vehicle braked. The case vehicle was ABS-equipped and did not leave any residual skidmarks. The front of the case vehicle struck the left rear tire area of the other vehicle. The case vehicle sustained a longitudinal delta V of -16.6 km/h (-10 mph)¹. Both air bags deployed at this time. The case vehicle was towed from the scene due to damage. The other vehicle fled from the scene. Witnesses to the crash followed the other vehicle. The driver lost control of his vehicle and after the vehicle came to rest the witnesses pulled him out of the car. Police arrested the driver and impounded the other vehicle.

The front right passenger of the case vehicle was transported by ground ambulance to a local trauma center. She was hospitalized for seven days before passing away at 0500 hours on the seventh day. Her injuries included the following: cerebral contusion, subarachnoid hemorrhage (bilateral), subdural hemorrhage (bilateral), subluxation of the cervical vertebra, and bilateral lung contusions; she

also sustained multiple contusions and abrasions to the chin, neck, and chest. The injuries were all as a result of contact with the deploying air bag and contact with the upper portion of the windshield.

The driver of the case vehicle was also transported. She was treated for pain in her right hand and stomach and then released. The driver of the other vehicle was transported to the hospital where he was treated for a laceration to his head.



Figure 3. Exterior, Vehicle 2

¹As calculated by the WinSmash program using CDC only for Vehicle 2

Scene Diagram

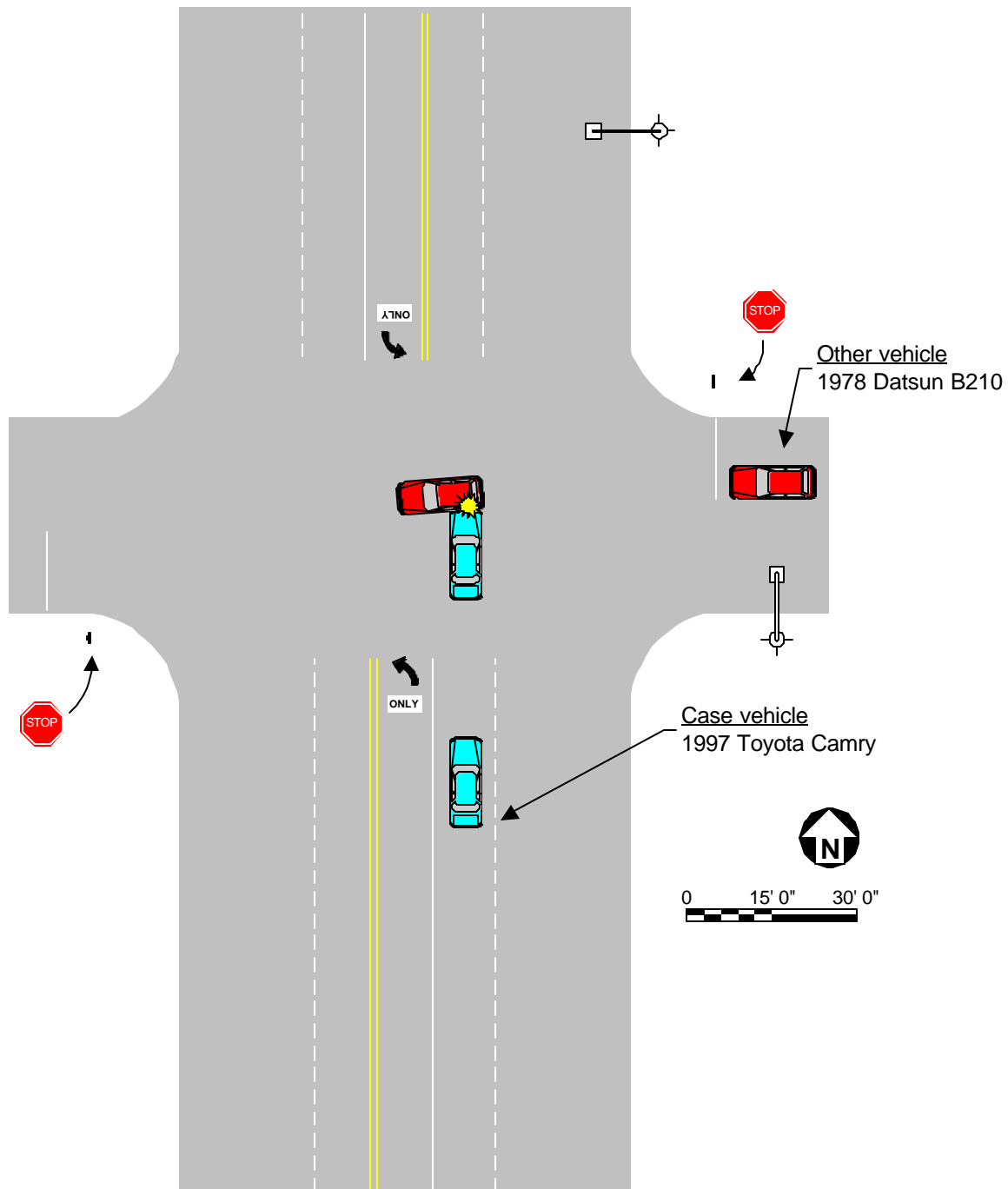


Figure 4.

DETAILED INFORMATION**Vehicles**Case vehicle

Description:	1997 Toyota Camry LE 4-door	
VIN:	JT2BF22K2V0XXXXXX	
Odometer:	Unknown / digital	
Engine:	Unknown	
Reported Defects:	None noted	
Cargo:	Unknown	
Damage Description:	Slight rearward crushing of front bumper, imprint of V2 tire rim in bumper fascia, windshield fractured.	
CDC:	12FDEW1	
Delta V:	Total	17.2 km/h (10.7 mph)
	Longitudinal	-16.6 km/h (-10.3 mph)
	Latitudinal	-4.4 km/h (-2.8 mph)
	Energy	13,433 joules (9,906 ft-lbs)



Figure 5. Exterior, case vehicle

DETAILED INFORMATION**Vehicles**Other vehicle

Description:	1978 Datsun B210	
VIN:	Unknown	
Odometer:	Unknown	
Engine:	Unknown	
Reported Defects:	None noted	
Cargo:	Unknown	
Damage Description:	Light crush damage to left rear quarter panel; vehicle was able to be driven.	
CDC:	09LZEW2	
Delta V:	Total	25.3 km/h (15.7 mph)
	Longitudinal	-8.6 km/h (-5.4 mph)
	Latitudinal	23.7 km/h (14.7 mph)
	Energy	31,730 joules (23,400 ft-lbs.)



Figure 6. Exterior, other vehicle

Occupants

<u>Case vehicle</u>	Occupant 1	Occupant 2
Age/Sex:	54/Female	79/Female
Seated Position:	Left front	Right front
Seat Type:	Bucket	Bucket
Height:	163 cm (64 in.)	157 cm (62 in.)
Weight:	68 kg (150 lbs)	49 kg (108 lbs)
Occupation:	Unknown	Retired
Pre-existing Medical Condition:	None noted	Moderate coronary atherosclerosis
Alcohol/Drug Involvement:	None	None
Driving Experience:	> 20 years	NA
Body Posture:	Normal, upright	Normal, upright
Hand Position:	Unknown	Unknown
Foot Position:	Right foot presumed to be on brake.	Unknown
Restraint Usage:	Lap and shoulder belt used properly	Restraint not used
Air bag:	Deployed properly	Deployed properly

Occupants

<u>Other vehicle</u>	Occupant 1
Age/Sex:	47/Male
Seated Position:	Left front
Seat Type:	Bucket with folding back
Height:	173 cm (68 in.)
Weight:	79 kg (175 lbs)
Occupation:	Unknown
Pre-existing Medical Condition:	None noted
Alcohol/Drug Involvement:	None
Driving Experience:	Unknown
Body Posture:	Unknown
Hand Position:	Unknown
Foot Position:	Unknown
Restraint Usage:	Lap and shoulder belt used - per PAR

Injuries and Injury Mechanisms

Case vehicle

	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
Driver:	Reported pain to right hand and stomach			
RF Occupant:	Subarachnoid hematoma	140684.3,1	852.00	Windshield
	Cerebral contusion, right	140604.3,1	851.06	Windshield
	Subarachnoid hematoma	140684.3,2	852.00	Windshield
	Subdural hemorrhage, parieto-occipital, right	140650.4,1	852.00	Windshield
	C1/C2 subluxation cervical vertebra	650204.3,6	839.01	Air bag
	Abrasion, 3 x 1 in., chin	290202.1,8	910.0	Air bag
	Contusion with ecchymosis, anterior neck	390402.1,5	920.0	Air bag
	Contusion with ecchymosis, upper back below neck	690402.1,7	922.3	Windshield
	Chest abrasion, 1 x ½ in.	490202.1,1	911.0	Air bag
	Chest abrasion, 1 x 1/4 in.	490202.1,1	911.0	Air bag
	Chest contusion	490402.1,0	922.1	Air bag
	Chest abrasion, 1-1/2 x ½ in.	490202.1,4	911.0	Air bag
	Bilateral lung contusions	441410.4,3	861.21	Air bag
	Trachobronchial tree hemorrhage	442699.3,4	862.8	Air bag
	Scalp hemorrhage	190402.1,9	920.00	Windshield

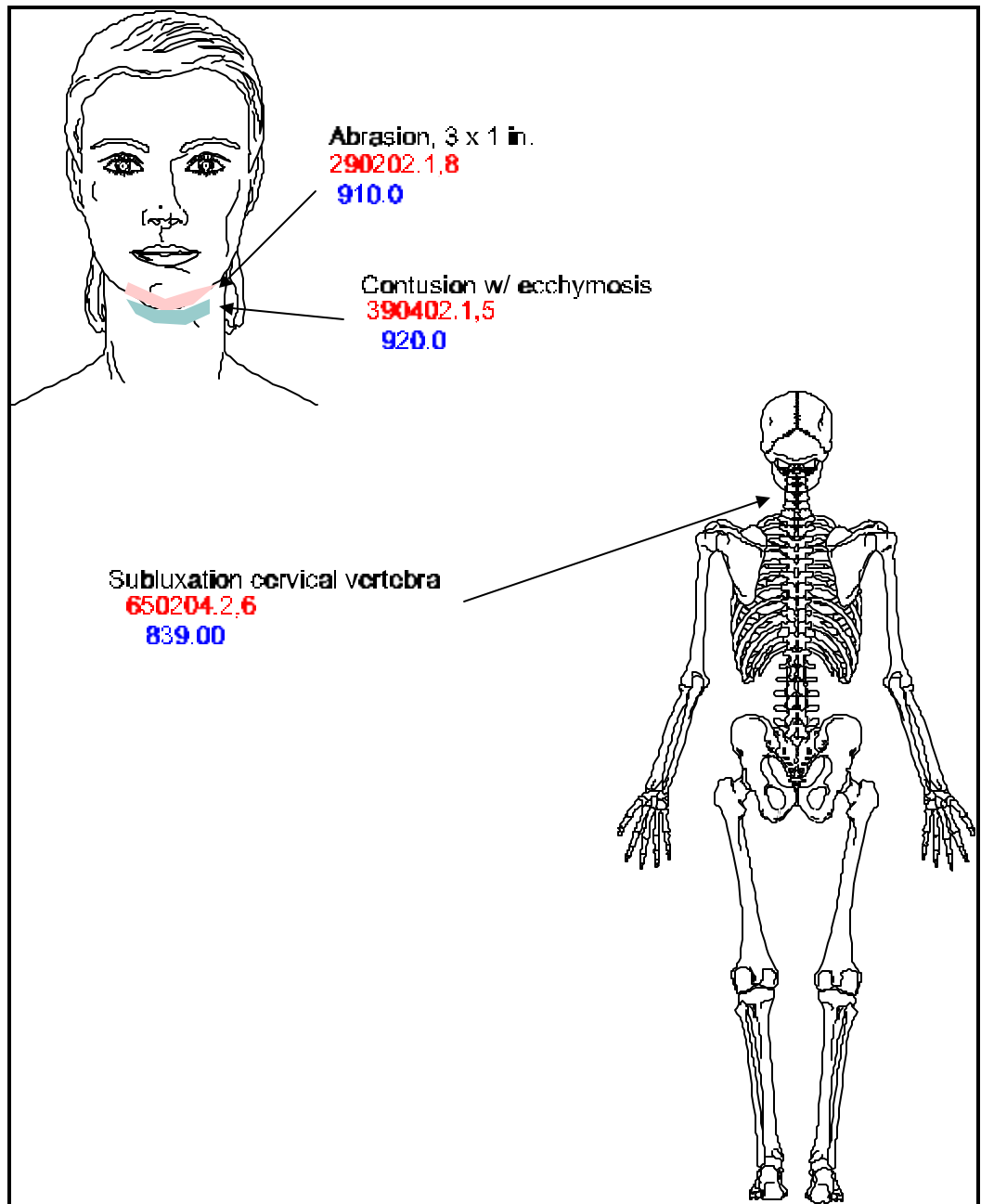


Figure 7. Facial and neck injuries

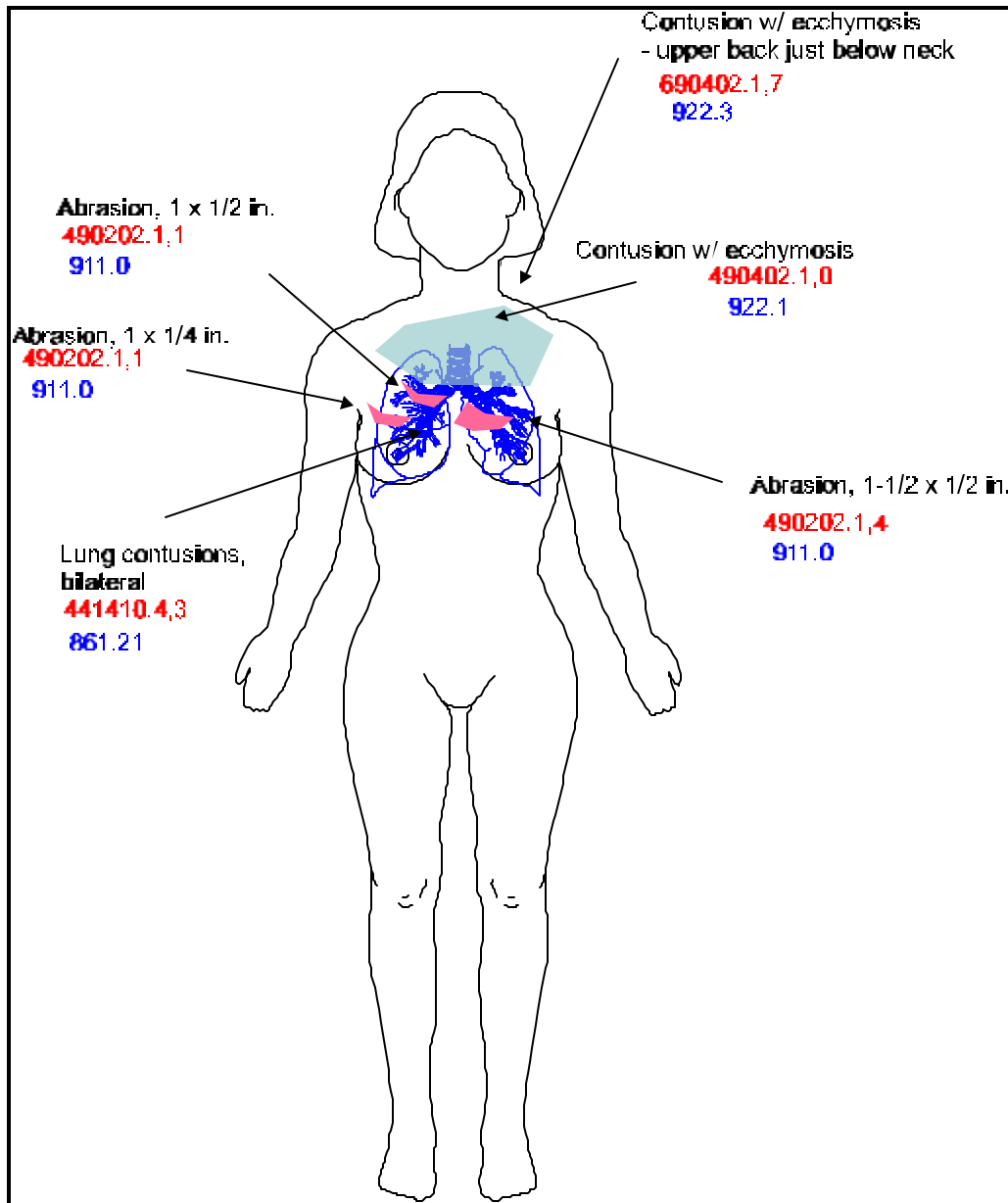


Figure 8. Upper extremity injuries

Other vehicle

	<u>INJURY</u>	<u>OIC CODE</u>	<u>ICD-9</u>	<u>SOURCE</u>
Driver:	Laceration, left side of head	19006001,2	873.0	Side glass

Occupant Kinematics

The case vehicle was equipped with a driver's side air bag and a top-mount passenger side air bag. The passenger air bag was rectangular and measured 45 cm (17.7 in.) laterally by 52 cm (20.4 in.) vertically with a maximum excursion of 56 cm (22 in.). At the time of the inspection, the right front seat was positioned 90 cm (35.4 in.) rearward of the face of the instrument panel, 103 cm (40.5 in.) rearward of the base of the module cover. Essentially, this was the middle track position. There was a 20 x 20 cm (7.8 x 7.8 in.) patch of skin found on the right side face of the air bag. There was also a small blue fabric transfer just to the left of the skin transfer.



Figure 9. Skin transfer on air bag

In addition to the skin transfer on the air bag, skin fragments were found on the windshield 10 cm (3.9 in) below the header. The windshield was fractured at this location. The right front visor was damaged due to occupant contact; it was deformed and the built-in mirror had been dislodged. A cloth transfer was found on the lower instrument panel and a portion of the panel had been broken away by occupant contact.



Figure 10. Overview of interior, case vehicle

The right front occupant was seated in a forward facing fashion. Prior to impact, the driver braked, bringing the occupant closer to the instrument panel. It appears that at impact this occupant went forward and up at or around the time of deployment. The deploying air bag caught the occupant beneath the chin and in the chest. The occupant continued her forward motion and contacted the windshield with her head. The air bag lifted her up bringing some portion of her head into contact with the visor. As the air bag deployed fully, the occupant was forced backwards toward her seat, where she came to rest.

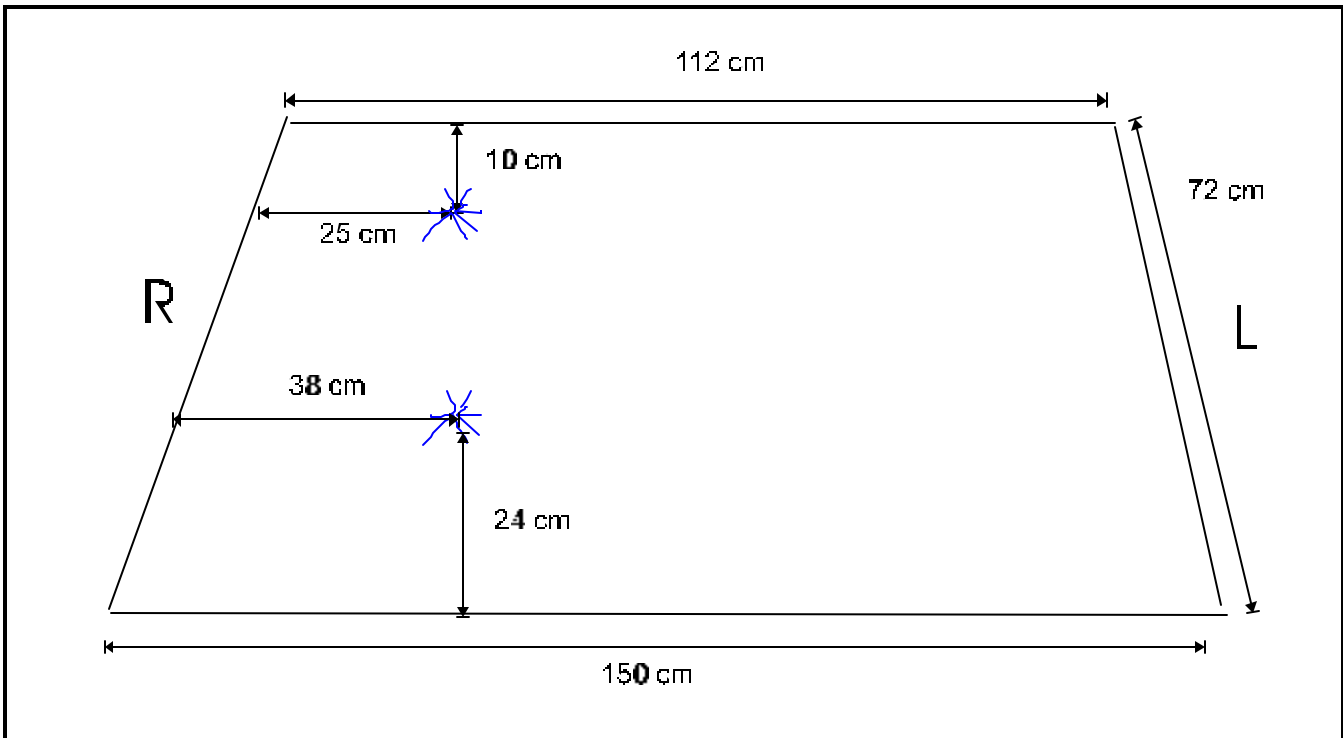


Figure 11. Windshield contacts