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## REMOTE AIR BAG DEPLOYMENT REPORT

CASE NUMBER - IN99-060

LOCATION - NEW JERSEY

VEHICLE - 1998 CHRYSLER CONCORDE LX

CRASH DATE - March 1998

Submitted:

March 29, 2000

Revised:

September 8, 2000



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National Highway Traffic Safety Administration

National Center for Statistics and Analysis

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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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15. <i>Supplementary Notes</i> Remote air bag deployment investigation involving a 1998 Chrysler Concorde LX, four-door sedan, with manual safety belts and dual redesigned front air bags, and a 1993 Chevrolet Lumina					
16. <i>Abstract</i> This report covers a remote investigation of an air bag deployment crash that involved a 1998 Chrysler Concorde LX (case vehicle) and a 1993 Chevrolet Lumina APV minivan (vehicle #2). This crash is of special interest because the case vehicle was equipped with redesigned air bags that deployed as a result of the collision events, and the case vehicle's restrained driver (51-year-old male) was fatally injured and his restrained front right passenger (47-year-old female) sustained police-reported "incapacitating" injuries. The case vehicle was traveling south in the southbound lane of a two-lane, two-way, undivided state highway. Vehicle #2 was traveling north in the northbound lane of the same roadway. The crash occurred in the southbound lane of the roadway when vehicle #2 drifted over the centerline. The front left third of the case vehicle was impacted by the front left half of vehicle #2, causing the case vehicle's driver and front right passenger air bags to deploy. The investigating officer indicated the case vehicle's driver braked and deposited pre-impact skidmarks. The case vehicle driver was restrained by his available, active, three-point, lap-and-shoulder safety belt system and sustained, according to his autopsy, multiple closed head injuries, fracture of the 6th cervical vertebra, bilateral rib fractures, various abdominal injuries, and a multiplicity of abrasions, contusions, and minor lacerations. He was pronounced dead approximately 15 hours post-crash. The case vehicle's front right passenger was restrained by her available, active, three-point, lap-and-shoulder safety belt system. She sustained police-reported incapacitating injuries and was transported from the scene by ambulance to a medical facility. Her injuries and treatment status are not known.					
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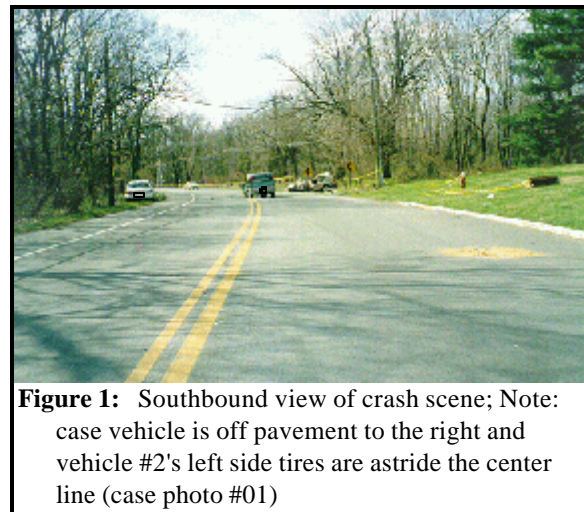
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Additional photographs are available in SCI EDCS case IN99-060

This case was brought to the NHTSA's attention by a review of the 1998 Fatality Analysis Reporting System (FARS) in February 1999. The crash involved a 1998 Chrysler Concorde LX (case vehicle) and a 1993 Chevrolet Lumina APV minivan (vehicle #2). The crash occurred in March 1998, at 7:50 a.m., in New Jersey, and was investigated by the applicable township police department. This crash is of special interest because the case vehicle was equipped with redesigned air bags that deployed as a result of collision events, and the case vehicle's restrained driver [51-year-old, White (unknown if Hispanic) male] was fatally injured and the restrained front right passenger (47-year-old female, race/ethnicity unknown) received police-reported "incapacitating" injuries. The Police Crash Report was received in April 1999, with both the police photographs and the autopsy report received in October. This report is based on the Police Crash Report, the case vehicle driver's autopsy report, police photographs, occupant kinematic principles, and this contractor's evaluation of the evidence.

### CRASH CIRCUMSTANCES

The case vehicle was traveling south in the southbound lane of a two-lane, two-way, undivided state highway (**Figure 1**). Vehicle #2 was traveling north in the northbound lane of the same state highway. It was daylight, with no adverse weather or roadway defects reported. The roadway was bituminous, dry, curved left (southbound), and level. The posted speed limit was 72 km.p.h. (45 m.p.h.). Traffic control devices present were four Chevron Alignment Signs (Manual on Uniform Traffic Control Devices, W1-8) for southbound traffic, a double solid yellow (no passing) center line, and single solid white edge lines delineating the east and west pavement verges. A diamond warning sign of indeterminate legend for southbound traffic is visible in the police photographs near the curve's northern tangent point. All traffic control devices were visible. Vehicle #2 drifted over the centerline into the southbound lane. The investigating officer indicated the case vehicle's driver braked and deposited pre-impact skidmarks. No indication of steering was reported. The crash occurred in the southbound lane of the roadway.



**Figure 1:** Southbound view of crash scene; Note: case vehicle is off pavement to the right and vehicle #2's left side tires are astride the center line (case photo #01)

The front left third of the case vehicle was impacted by the front left half of vehicle #2, causing the case vehicle's driver and front right passenger air bags to deploy. The case vehicle rotated approximately 90 degrees counterclockwise and its center of gravity traveled an estimated 4.6 meters (15 feet) south-southwest off the west pavement edge, across the asphalt shoulder, onto a grassy roadside, and came to rest facing east-northeast after impacting an embankment on the west roadside. Vehicle #2 rotated approximately 180 degrees counterclockwise, its center of gravity traveled an estimated 13.7 meters (45 feet) north-northeast, and it came to rest in the southbound lane facing south-southeast with both left side tires astride the center line. The crash severity for the case vehicle was estimated as high [greater than 40 km.p.h. (25 m.p.h.)].

The case vehicle was a front wheel drive, 1998 Chrysler Concorde LX, five passenger, four-door sedan (VIN: 2C3HD46JXWH-----) equipped with a 3.2 liter, V-6 gasoline engine and a four-speed automatic transmission with a console-mounted shift lever. It was equipped with four-wheel anti-lock brakes. The wheelbase for the case vehicle was 287 centimeters (113.0 inches). No odometer reading was reported. The case vehicle was towed from the scene due to disabling damage.

The case vehicle sustained direct contact damage to its front left corner (**Figure 2**). This direct damage consisted of rearward crush and displacement of the front bumper and fascia, the left side of the grille, the left headlamp assembly, all engine compartment components left of the left stub frame (including the left front fender), the left side steering assembly, the left front suspension system, and the left front wheel and tire shoved under the left lower A-pillar (**Figure 3**). Due to extrication efforts by rescue personnel that resulted in the complete removal of the case vehicle's left front door, the cutting of both upper A-pillars and B-pillars, and the roof peeled rearward, it is not known if direct damage extended to the left front A-pillar and the forward left front door seam. There was a minor post-impact engine compartment fire that further damaged the hood and windshield, masking their crash deformation. Indirect damage included the shortening and buckling of the left rocker panel, buckling of the left rear door, shattering of the left rear door glazing (kernelized), leftward pull of the right front fender, and a missing right front headlamp assembly. Based on available police photographs, the CDC for the case vehicle was estimated as: **12-FLAE-6** (direction of principal force 350 (-10) degrees). The WinSMASH reconstruction program, with CDC-only estimated crush profile, provided a borderline reconstruction, but the results appear reasonable. The case vehicle's estimated Total, Longitudinal, and Lateral Delta Vs are, respectively: 62.6 km.p.h. (38.9 m.p.h.), -61.6 km.p.h. (-38.3 m.p.h.), and 10.9 km.p.h. (6.8 m.p.h.).



**Figure 2:** Front left damage to case vehicle; Note: A- and B-pillars cut and roof peeled for extrication; fire damage to hood and windshield (case photo #07)



**Figure 3:** Close-up view of case vehicle's front left damage; Note: post-impact location (arrow) of left front wheel (case photo #08)

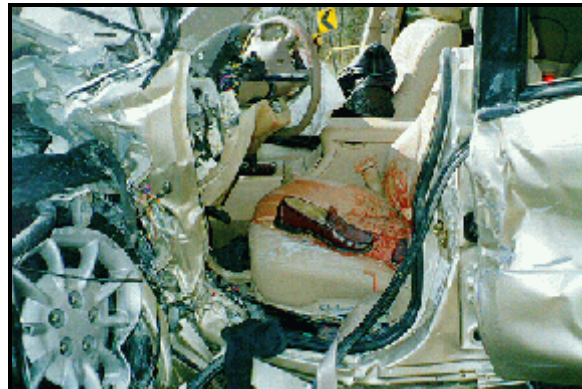
The case vehicle did sustain damage from a second impact, to the back or possibly the right rear corner area, when it slid into an embankment on the west roadside. Available police photographs do not provide sufficient coverage of the rear bumper deformation for a valid estimate of a CDC to be attempted, but the damage that is visible suggests the Delta V would be relatively low.

Intrusion to the case vehicle driver's area was substantial. The lower left A-pillar was displaced rearward and inward, as was the left corner of the instrument panel. The steering column and steering wheel were pushed rearward. Possible deformation to the driver's toe pan and foot well areas, as well as the upper A-pillar, windshield header, and the left roof rail cannot be determined.

#### CASE VEHICLE DRIVER

The case vehicle's driver [51-year-old male, White (unknown if Hispanic), 180 centimeters and 153 kilograms (71 inches, 338 pounds)] was restrained by his available, manual, three-point, lap-and-shoulder safety belt system. His pre-crash seat adjustments, steering wheel position, and posture are not known. He was discovered unconscious and entrapped in his vehicle and, once extricated from the case vehicle, was transported from the scene by an unknown source to a medical facility. He was pronounced dead approximately 15 hours post-crash. The following discussion of the case vehicle driver's injuries is based on the Police Crash Report, a complete autopsy report on the driver, on-scene police photographs, and occupant kinematic principles.

The case vehicle's driver was probably seated in a normal driving posture with his back against the seat back, at least one hand on the steering wheel, and one of his feet likely on the brake pedal and the other on the floor. Investigating officers reported pre-impact braking by the case vehicle. This pre-impact braking likely caused the case vehicle's driver to move slightly forward. The vehicle-to-vehicle impact caused the case vehicle's driver and front right passenger air bags to deploy. The restrained driver likely moved forward and slightly to the left (**Figure 4**). He contacted his deploying air bag, causing bilateral periorbital ecchymosis and swelling, and contusions to the right upper lip and medial lower lip. The steering assembly



**Figure 4:** Case vehicle driver's seat area intrusion and damage; Note: steering wheel and column displacement and reduced left front door exit area (Case photo #13)

intruded and the driver deflated the air bag, contacting the steering wheel rim, spokes and hub. He sustained a diffuse contusion surrounding the umbilicus, bilateral rib fractures (left posterior ribs 7, 8 and 9; right posterolateral ribs 8 and 9), a laceration of the pleura on the left, and lacerations to the spleen. In addition, he sustained an unknown injury to his left kidney such that surgical removal was required prior to his death. The counterclockwise rotation caused the driver to move further leftward and his head probably contacted the intruding windshield, windshield header and left A-pillar. He sustained small lacerations to the forehead and anterior scalp, a laceration to the left eyebrow, a subgaleal/subperiosteal hemorrhage in the left frontal-parietal area, subdural hemorrhage over the convexities, a subarachnoid hemorrhage in the left occipital tip, a small subarachnoid hemorrhage in the anterior frontal lobe, slight compression of the ventricles, multiple punctate hemorrhages in the left temporal white matter, and a fracture of the sixth cervical vertebra. He also sustained bilateral contusions to the anterior knees and an abrasion to the left knee, probably from contact with the lower instrument panel, and bilateral abrasions

to the medial malleoli, possibly from toe pan contact. His left side probably contacted the vehicle's left side interior surface. He sustained a laceration behind the left ear, possibly from contacting the door's glazing, and also sustained the unknown injury to his left kidney, possibly while rebounding and contacting the left side armrest or hardware.

**CASE VEHICLE DRIVER INJURIES**

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1.	Subdural hemorrhage over the convexities, bilateral	140654.5 critical	Left windshield, header and/or A-pillar	Probable	Autopsy
2.	Multiple punctate hemorrhages, left temporal white matter	140644.4 severe	Left windshield, header and/or A-pillar	Probable	Autopsy
3.	Subarachnoid hemorrhage over the left occipital tip	140684.3 serious	Left windshield, header and/or A-pillar	Probable	Autopsy
4.	Subarachnoid hemorrhage, anterior frontal lobe	140684.3 serious	Left windshield, header and/or A-pillar	Probable	Autopsy
5.	Slightly compressed ventricles	140662.3 serious	Left windshield, header and/or A-pillar	Probable	Autopsy
6.	Bilateral rib fractures with intercostal hemorrhage: right posterolateral 8, 9; left posterior 7, 8, 9	450230.3 serious	Steering wheel hub and spokes	Probable	Autopsy
7.	Fracture, 6th cervical vertebra, NFS	650216.2 moderate	Left windshield, header and/or A-pillar	Probable	Autopsy
8.	Superficial lacerations, spleen	544222.2 moderate	Steering wheel rim	Probable	Autopsy
9.	Left kidney surgically removed post-crash, NFS	541699.2 moderate	Left side armrest or hardware	Possible	Autopsy
10.	Lacerated pleura, right (penetrated by fx of rib 8)	441800.2 moderate	Steering wheel hub and spokes	Probable	Autopsy
11.	Multiple small lacerations, forehead	290602.1 minor	Left windshield, header and/or A-pillar	Probable	Autopsy



Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
12.	Multiple small lacerations, anterior scalp	190602.1 minor	Left windshield, header and/or A-pillar	Probable	Autopsy
13.	Subgaleal/subperiosteal hemorrhage, left frontal-parietal area	190402.1 minor	Left windshield, header and/or A-pillar	Probable	Autopsy
14.	Laceration, left eyebrow	290602.1 minor	Left windshield, header and/or A-pillar	Probable	Autopsy
15.	Laceration behind left ear	190602.1 minor	Left door glazing	Possible	Autopsy
16.	Bilateral periorbital ecchymosis	297402.1 minor	Driver's air bag	Probable	Autopsy
17.	Contusions, right upper lip and medial lower lip	290402.1 minor	Driver's air bag	Probable	Autopsy
18.	Diffuse contusion surrounding umbilicus	590402.1 minor	Steering wheel rim	Probable	Autopsy
19.	Contusions, anterior knees bilaterally	850802.1 minor	Left instrument panel	Probable	Autopsy
20.	Abrasion, left knee	890202.1 minor	Left instrument panel	Probable	Autopsy
21.	Abrasions, medial malleoli, bilateral	890202.1 minor	Toe pan	Possible	Autopsy

### CASE VEHICLE FRONT RIGHT PASSENGER

The case vehicle's front right passenger (47-year-old female, race/ethnicity unknown, height and weight unknown) was wearing her available, manual, three-point, lap-and-shoulder safety belt system. Her kinematics likely mirrored those of the driver. Because of the post-impact fire, she was removed from the case vehicle by witnesses and placed on the west shoulder, south of the case vehicle's final rest position. Investigating officers reported her condition as "incapacitated" and unconscious, with internal head injuries. She was transported from the scene by an unknown means to a medical facility. Her injuries and treatment status are not known.

### VEHICLE #2

Vehicle #2 was a front wheel drive, 1993 Chevrolet Lumina APV, five passenger, minivan (VIN:

**Vehicle #2 (Continued)**

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1GNDU06D8PT-----) equipped with a 3.1 liter, V-6 gasoline engine and a three-speed automatic transmission with a steering column-mounted shift lever. It was equipped with an anti-lock brake system. The wheelbase for vehicle #2 was 279 centimeters (109.8 inches). No odometer reading was reported. Vehicle #2 was towed from the scene due to disabling damage.

Vehicle #2 sustained direct contact damage to the left half of the front plane (**Figure 5**), including: the front left bumper and fascia displaced rearward; the front grille shattered and missing; the front hood deflected to the right, with the left half sheared off and its left side hinge missing; left half of the front engine compartment bracket housing displaced rearward; left half of the radiator shoved rearward; left front fender missing; left front wheel and tire displaced rearward under the lower A-pillar; the left front door glazing shattered and its sheet metal panel missing; the left upper A-pillar shoved rearward; and the left side of the windshield separated from the left A-pillar and splintered (**Figure 6**). Based on police photographs, the estimated CDC for vehicle #2 was: **12-FYAW-6** (direction of principal force 350 (-10) degrees). The WinSMASH reconstruction program, with a CDC-only estimated crush profile, provided a borderline reconstruction, but the results appear reasonable. Vehicle #2's estimated Total, Longitudinal, and Lateral Delta Vs are, respectively: 68.8 km.p.h. (42.8 m.p.h.), -67.7 km.p.h. (-42.1 m.p.h.), and 11.9 km.p.h. (7.4 m.p.h.).



**Figure 5:** Vehicle #2's front left damage (case photo #16)



**Figure 6:** Left side view of vehicle #2's front left damage; Note: post-impact position of left front wheel (arrow) and reduced left front door exit area (case photo #19)

Vehicle #2's driver (41-year-old male; race/ethnicity, height, and weight not known) was reportedly not wearing his available, manual, three-point, lap-and-shoulder safety belt system. He was the sole occupant in vehicle #2. His pre-crash seat adjustments, steering wheel position, and posture are not known. He was found unconscious in his vehicle and was transported from the scene by an unnamed source to a medical facility. He sustained police-reported incapacitating injuries, the most serious of which was internal to the head. Blood samples from vehicle #2's driver yielded a BAC of 0.235%.