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## REMOTE CHILD AIR BAG-RELATED FATALITY INVESTIGATION

CASE NUMBER - IN09008

LOCATION - Louisiana

VEHICLE - 1987 Mercedes Benz 190E

INCIDENT DATE - December 2008

Submitted:

August 4, 2009



Contract Number: DTNH22-07-C-00044

Prepared for:

U.S. Department of Transportation  
National Highway Traffic Safety Administration  
National Center for Statistics and Analysis  
Washington, D.C. 20590-0003

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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**

1. <i>Report No.</i> IN09008		2. <i>Government Accession No.</i>		3. <i>Recipient's Catalog No.</i>	
4. <i>Title and Subtitle</i> Remote Child Air Bag-Related Fatality Investigation Vehicle - 1987 Mercedes Benz 190E Location - Louisiana			5. <i>Report Date:</i> August 4, 2009		
			6. <i>Performing Organization Code</i>		
7. <i>Author(s)</i> Special Crash Investigations Team #2			8. <i>Performing Organization Report No.</i>		
9. <i>Performing Organization Name and Address</i> Transportation Research Center Indiana University 501 S. Madison Street Bloomington, Indiana 47403-2452			10. <i>Work Unit No. (TRAIS)</i>		
			11. <i>Contract or Grant No.</i> DTNH22-07-C-00044		
12. <i>Sponsoring Agency Name and Address</i> U.S. Department of Transportation (NVS-411) National Highway Traffic Safety Administration National Center for Statistics and Analysis Washington, D.C. 20590-0003			13. <i>Type of Report and Period Covered</i> Technical Report Crash Date: December 2008		
			14. <i>Sponsoring Agency Code</i>		
15. <i>Supplementary Notes</i> Remote investigation of an alleged inadvertent air bag deployment involving a 1987 Mercedes Benz 190E					
16. <i>Abstract</i> <p>This report covers a remote investigation of an alleged inadvertent air bag deployment involving a 1987 Mercedes Benz 190E that resulted in the death of a 14-month-old male. According to the driver, the Mercedes had been traveling west in the westbound lane of a two-lane residential street. The Mercedes' driver drove off the road into a parking space, parallel to the roadway, in front of her house and parked the Mercedes in her accustomed manner. She put the automatic transmission selector lever in the "Park" position and opened the driver's door, intending to exit the vehicle along with the other occupants. The driver asked the adult passenger in the second row left position to remove the 14-month-old male from his child safety seat in the second row right position and hand the child to the driver through the center console area. The driver placed the child on the right side of her lap and turned the ignition key to the "Off" position. As she withdrew the key from the key slot, the driver's steering wheel-mounted air bag allegedly deployed inadvertently, contacting the child and pushing him against the driver. The child was transported via ground ambulance to a local hospital. He was subsequently transferred to another medical facility, where he was pronounced dead approximately four hours post-incident. The child's injuries included skull fractures, brain injuries and cervical vertebrae fractures/dislocations. The driver had owned the Mercedes for eight months. The Supplemental Restraint System (SRS) warning lamp had been illuminated continuously, whenever the ignition was on, for the entire eight months. The Mercedes had never been taken to a mechanic who was knowledgeable about this vehicle's automatic restraint system and the driver did not understand that the illuminated SRS warning lamp indicated a potential problem with the automatic restraint system.</p>					
17. <i>Key Words</i> Air Bag Inadvertent Deployment			18. <i>Distribution Statement</i> General Public		
19. <i>Security Classif. (of this report)</i> Unclassified		20. <i>Security Classif. (of this page)</i> Unclassified		21. <i>No. of Pages</i> 7	22. <i>Price</i>

TABLE OF CONTENTS

IN09008

Page No.

BACKGROUND . . . . . 1

INCIDENT CIRCUMSTANCES . . . . . 1

CASE VEHICLE: 1987 MERCEDES BENZ 190E . . . . . 2

    CASE VEHICLE DAMAGE . . . . . 2

    CASE VEHICLE CHILD PASSENGER KINEMATICS . . . . . 4

    CASE VEHICLE CHILD PASSENGER INJURIES . . . . . 4

    CASE VEHICLE DRIVER . . . . . 6

    CASE VEHICLE FRONT RIGHT PASSENGER . . . . . 6

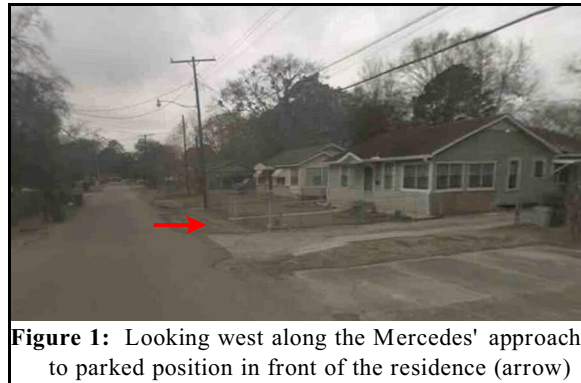
    CASE VEHICLE BACK LEFT PASSENGER . . . . . 6

SCENE SKETCH . . . . . 7

The focus of this investigation is the alleged inadvertent deployment of the steering wheel-mounted air bag in a 1987 Mercedes Benz 190E, which resulted in the death of a 14-month-old male. This incident was brought to the National Highway Traffic Safety Administration's attention on February 19, 2009 by an article posted on the website of an area television station. The incident occurred in December 2008, at 1653 hours, in Louisiana, and was investigated by the applicable municipal police department. This contractor contacted the investigating police agency on February 20, 2009 and cooperation was established on March 5, 2009. This investigation was assigned on March 6, 2009. The Mercedes was impounded and inspected by the police department with technical assistance from the manufacturer. The Mercedes' driver was contacted on July 6, 2009. She provided limited information, but declined further discussion on the advice of her attorney. This report is based on the police incident report, supplemental police investigative reports and police photographs, a verbatim transcript of the police interview with the Mercedes' driver, the investigating officer's summary of the manufacturer's inspection, a partial interview with the driver, medical treatment data for the injured child, and this contractor's evaluation of the available evidence.

#### INCIDENT CIRCUMSTANCES

***Incident Environment:*** The trafficway on which the Mercedes had been traveling was a 2-lane, undivided, residential city street, traversing in an east-west direction. It was daylight and the weather was clear. The asphalt roadway was dry, travel worn but free of any major defects, and had one lane in each direction. There were no shoulders, curbs or sidewalks on either side of the roadway, with the paved surface adjoining the front yard lawns of the houses along the street. The house where the incident occurred had a chain link fence around the front yard, with approximately three meters (ten feet) of lawn between the fence and the edge of the street pavement.



**Figure 1:** Looking west along the Mercedes' approach to parked position in front of the residence (arrow)

***Pre-Incident:*** The following summary of the sequence of events is based on the driver's statement to the police. The Mercedes had been traveling west in the westbound lane. The driver drove off the roadway into her front yard, parallel to the roadway (between the fence and the roadway), and parked the vehicle in her accustomed manner (**Figure 1**). She put the automatic transmission selector in the "Park" position and opened the driver's door, intending to exit the vehicle along with the other occupants. The driver asked the second row left adult passenger to remove the second row right child passenger from the child safety seat and hand the child through the center console area to the driver. The driver placed the small child on the right side of her lap and turned the vehicle's ignition to the "Off" position.

***Incident:*** As the driver withdrew the ignition key from the key slot, the driver's air bag allegedly deployed inadvertently, contacting the child and pushing him against the driver.

**Post-Incident:** There was no damage to the Mercedes other than the deployed steering wheel air bag. The Mercedes was not moved until the police transported it to the impound facility.

**CASE VEHICLE**

The case vehicle was a 1987 Mercedes Benz 190E rear wheel drive, 4-door, 5-passenger sedan (VIN: WDBDA28D0HF-----) equipped with a first generation driver's air bag and a retractor pretensioner for the driver's safety belt (**Figures 2 and 3**), with manual lap-and-shoulder safety belts for the four outboard seat positions and a lap-only safety belt in the second row center position. This vehicle did not have a passenger air bag or any other automatic restraints. The police investigation revealed that the driver had owned this vehicle for eight months. The investigation further revealed that the Supplemental Restraint System (SRS) warning lamp had been illuminated continuously, whenever the ignition was turned on, for the entire eight months. The Mercedes had never been taken to a mechanic who was knowledgeable about the automatic restraint system in this vehicle. The driver/owner did not understand that the illuminated SRS warning lamp indicated a potential problem with the air bag system.



**Figure 2:** Entire left side of the Mercedes during police inspection, at impound facility



**Figure 3:** Entire front of the Mercedes at impound facility; note, absence of frontal impact damage

**CASE VEHICLE DAMAGE**

The Mercedes was inspected at the police impound facility by the investigating police officer and a technician from the manufacturer. The vehicle had been jacked up and was resting on four jack stands with the wheels off the floor. The undercarriage and all surfaces of all the wheels and tires were inspected. All the tires were holding pressure and there was no visible evidence to suggest a recent impact. The manufacturer's recommended tire size is P185/65R15. The two front tires were of this size while the right rear was size P195/60R15 and the left rear was size P185/60R15. Each of the four tires was a different make and model.



**Figure 4:** Star-shaped crack in the Mercedes' windshield, confirmed as pre-existing damage

The inspection of the Mercedes' exterior revealed minor damage in several locations. There was a star-shaped crack in the windshield, approximately 25 cms. (10 inches) below the header and right of center (**Figure 4**). The driver/owner stated that this crack had been present when she acquired the vehicle and the inspection did not reveal any evidence to contradict the driver's statement. The several exterior dents and scrapes were examined closely by the investigating officer and the manufacturer's representative. Based on the degree of oxidization in damaged areas and the presence of dirt and street grime, the investigating officer and the manufacturer's representative concluded that none of these areas of minor damage had occurred recently enough to be related to the alleged inadvertent air bag deployment, and none of damaged areas represented an impact of sufficient magnitude to cause an air bag deployment.



**Figure 5:** Front right foot well with carpet and panels removed, revealing electrical system components

The manufacturer's technical representative brought a kit of tools, instruments, test protocol instructions, a table of acceptable values for test readings, and a replacement restraint control module. Various cover panels and sections of the carpeting were removed to reveal portions of the vehicle's electrical system components and the SRS control module (**Figures 5 and 6**). The manufacturer's representative confirmed that all of the components were correct for this vehicle and appeared to be the originally installed equipment. During the testing procedures, the system exhibited a malfunction consistent with the driver's statement: when power was applied to the system, the SRS warning lamp remained illuminated (in a correctly functioning system, the SRS warning lamp should go off after a three-to-five second self-test procedure). One of the test procedures involved disconnecting the vehicle's control module and connecting the vehicle's wiring system to a replacement control module. When this test was performed, the SRS warning lamp went off after the self-test procedure. The manufacturer's representative concluded that the SRS warning lamp was illuminated due to a malfunction in the control unit or its connection to the wiring system, and that such a malfunction could cause an inadvertent deployment. The control module and wiring harness were not removed for further evaluation because to do so would be destructive and would exceed the scope of the search warrant under which the case vehicle was being inspected.



**Figure 6:** Access to the SRS control module, behind the radio in the center instrument panel console

Based on the driver's statement to the police, the child passenger (14-month-old male) had just been removed from a child safety seat in the second row right seating position and handed to the Mercedes' driver through the space between the two front row bucket seats. The driver sat the child on the right side of her lap and was beginning to exit the vehicle when the driver's air bag allegedly deployed inadvertently (**Figures 7 and 8**), contacting the child as he sat in the driver's lap. The driver was not able to provide any details about the air bag deployment or the child's interaction with the air bag, and there is no knowledge of the child's position after the deployment. Based on this limited information, it is probable that the deploying air bag struck the right side of the child's head and torso, with the force of the air bag pushing him against the driver.



Figure 7: Driver's seat area prior to disassembly



Figure 8: Driver's air bag fabric, front portion, after disassembly of the air bag module

**CASE VEHICLE CHILD PASSENGER'S INJURIES**

The child was transported by ground ambulance to a local hospital and was subsequently transferred to another medical facility where he was pronounced dead approximately four hours post-incident. The investigating officer requested that an autopsy should be performed. The coroner's office later advised that an autopsy would not be performed because the several physicians involved in treating the child all agreed that the death was a direct result of very recent injuries that were characteristic of an air bag deployment.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
1	Nonanatomic brain injury with loss of consciousness; asystole, PEA <sup>1</sup> , unresponsive, pupils fixed, dilated, nonreactive; flaccid, GCS= 3	critical 160824.5,0	Air bag, driver's	Probable	Emergency room records

<sup>1</sup> The following term is defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:

**PEA:** pulseless electrical activity

**pulseless electrical activity:** continued electrical rhythmicity of the heart in the absence of effective mechanical function; it may be due to uncoupling of ventricular muscle contraction from electrical activity or may be secondary to cardiac damage with respiratory failure and cessation of cardiac venous return. Called also *electromechanical dissociation*.



Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
2	Contusion, brain, adjacent to left depressed skull fracture and right posterior temporal lobe	serious 140620.3,3	Other occupant: driver {air bag related}	Possible	Emergency room records
3 4	Hemorrhage, intraventricular, in posterior left occipital horn of left ventricle and 3 <sup>rd</sup> and 4 <sup>th</sup> ventricles	severe 140678.4,2 140678.4,9	Air bag, driver's	Probable	Emergency room records
5 6	Hemorrhage, subarachnoid, over convexities, around Circle of Willis, and tentorial spaces	serious 140684.3,1 140684.3,2	Air bag, driver's	Probable	Emergency room records
	Hydrocephalus, obstructive, with dilation of lateral and 3 <sup>rd</sup> ventricles	Not coded			Emergency room records
7 8	Fracture, depressed, 3 mm (0.1 in), squamous portion of left temporal bone, extending through left temporal bone to near sagittal suture Fracture, depressed, 7 mm (0.3 in), posterior left parietal bone	serious 150200.3,8 150404.3,2	Other occupant: driver {air bag related}	Possible	Emergency room records
9	Fracture right orbital floor with opacification right maxillary sinus	moderate 251202.2,1	Air bag, driver's	Probable	Emergency room records
10	Fracture, obvious, right mid-humerus, not further specified	moderate 752602.2,1	Unknown	Unknown	Emergency room records
11	Traumatic cervical spine injury, C <sub>1</sub> -C <sub>4</sub> , not further specified	unknown 615099.7,6	Air bag, driver's	Probable	Emergency room records
12	Dislocation {subluxation} atlanto-occipital with slight rotation	moderate 650208.2,6	Air bag, driver's	Probable	Emergency room records
13	Fracture pedicles C <sub>3</sub> with body fractured off pedicles	serious 650226.3,6	Air bag, driver's	Probable	Emergency room records
14	Dislocation (distraction), 1.5 cm (0.6 in), C <sub>3</sub> body and above from C <sub>4</sub> and below with 5 mm (0.2 in) leftward offset of C <sub>3</sub> and above and angulation to left	moderate 650204.2,6	Air bag, driver's	Probable	Emergency room records
15	Abrasion left scalp, not further specified	minor 190202.1,2	Other occupant: driver {air bag related}	Possible	Emergency room records
16	Abrasion right side of scalp, not further specified	minor 190202.1,1	Air bag, driver's	Probable	Emergency room records

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source	Source Confidence	Source of Injury Data
17	Contusion {hematoma} right occipital scalp	minor 190402.1,1	Unknown injury source	Unknown	Emergency room records
18	Abrasions left posteriolateral upper arm	minor 790202.1,2	Seat back, driver's {air bag related}	Possible	Emergency room records
19	Abrasions left posteriolateral thigh, not further specified	minor 890202.1,2	Unknown injury source	Unknown	Emergency room records

#### CASE VEHICLE DRIVER

The Mercedes' driver (28-year-old female) had removed her lap-and-shoulder safety belt system, the 14-month-old child had been handed to her, and she was preparing to exit the vehicle when the driver's air bag allegedly deployed inadvertently. The driver was not transported by ambulance to a hospital, and she did not sustain any police-reported injuries as a result of this incident. The driver stated that she was dazed and confused after the incident and could not recall any details about the deployment. The driver reported that she had a swollen jaw and no other injury, and she did not seek any medical treatment.

#### CASE VEHICLE FRONT RIGHT PASSENGER

The Mercedes' front right passenger (12-year-old male) had removed his lap-and-shoulder safety belt and was preparing to exit the vehicle at the time of the incident. The 12-year-old was not transported by ambulance to a hospital and did not sustain any police-reported injuries as a result of this incident.

#### CASE VEHICLE SECOND ROW LEFT PASSENGER

The Mercedes' second row left passenger (56-year-old male) had just finished removing the 14-month-old from the child safety seat and passing him to the driver. This occupant was not transported by ambulance to a hospital and did not sustain any police-reported injuries as a result of this incident.

