400 Seventh Street, S.W.
Washington, D.C. 20590

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Dear Crash Data Researchers/Users:

Thank you for choosing crash data from the National Highway Traffic Safety Administration (NHTSA) for your research or other use. The information contained in this motor vehicle crash report is collected, maintained and distributed in accordance with Public Law 89-564. In accordance with this Public Law, NHTSA is required not to release any case information until completion of quality control procedures. These procedures include a review of the case material to extract all names, licenses and registration numbers, non-coded interview material, non-research related researcher comments in the margins, non-factual data, and the production number portion of the vehicle identification number (VIN).

If you requested NHTSA to query its database files in order to identify a specific crash, then that query was made using non-personal descriptors you provided for use in our search. This motor vehicle crash may have been identified from a data search and matches the general, non-personal descriptors you provided, but we cannot confirm that this is the specific crash report you requested.

If you have any questions with regard to the above procedures, please contact the Field Operations Branch, Crash Investigation Division, National Center for Statistics and Analysis at 202-366-4820. Again, please be advised that we cannot confirm that this is the case that you have specifically requested nor can we certify the information to be correct.

*** *** ***

ZIMMERMAN

TRANSPORTATION SCIENCES CENTER
ACCIDENT RESEARCH GROUP

Division of Calspan Corporation
[redacted]

CALSPAN ON-SITE EVALUATION OF NCAP TEST VEHICLE FIRE
CALSPAN CASE NO. 94-37
VEHICLE: 1995 FORD CONTOUR
TEST LOCATION: [redacted] OH
DATE [redacted] 1994

Contract No. DTNH22-94-D-07058

Prepared for:

U.S. Department of Transportation
National Highway Traffic safety Administration
Washington, D.C. 20590

DISCLAIMER

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are 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 STANDARD TITLE PAGE

1. *Report No.* 94-37	2. *Government Accession No.*	3. *Recipient's Catalog No.*
4. *Title and Subtitle* Calspan On-Site Evaluation of NCAP Test Vehicle Fire Vehicle - 1995 Ford Contour Location - [redacted] OH		5. *Report Date:* [redacted] 1995 6. *Performing Organization Code*
7. *Author(s)* Accident Research Group		8. *Performing Organization Report No.*
9. *Performing Organization Name and Address* Transportation Sciences Center Accident Research Group Division of Calspan Corporation [redacted] [redacted] New York [redacted]		10. *Work Unit No.* 1115 (5090-5099) 11. *Contract or Grant No.* DTNH22-94-D-07058
12. *Sponsoring Agency Name and Address* U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		13. *Type of Report and Period Covered* Technical Report Crash Test Date [redacted] 14. *Sponsoring Agency Code*

15. *Supplementary Notes*
On-site evaluation of an NCAP test vehicle to determine the root cause of flames which vented through the deployed passenger side air bag module assembly.

16. *Abstract*

This on-site investigation focused on a 1995 Ford Contour that was crash tested at [redacted] in [redacted] OH, on [redacted] 1994. The vehicle was tested for the NHTSA New Car Assessment Program (NCAP) at an impact speed of 56.3 km/h (35.0 mph). The Contour was equipped with a dual driver and passenger side air bag system which deployed as a result of the barrier test. Immediately following the test, [redacted] technicians detected flames venting from the upper left quadrant of the passenger side air bag module assembly. It was therefore believed that the fire was related to the deployment of the passenger side air bag system. [redacted] personnel detected the flames and extinguished the fire without fire related damage to the interior of the vehicle.

A systematical teardown of the vehicle was performed by a [redacted] technician. In attendance was a crash investigator from [redacted] and numerous representatives from [redacted]. All parties observed the removal of interior components and thoroughly examined removed components for evidence of heat and fire. It was determined that the root cause of the flames was related to the compression of insulation material against the heater fan resistor coils. The coils were hot as the fan speed switch was set in its lowest position and the ignition was turned to the on-position. The crash displaced the engine rearward into the engine compartment passenger compartment cowl which resulted in intrusion of the cowl. As a result, the plastic jacket which protected the coils was fractured by the intrusion and the insulation was compressed against the coils causing the flames.

17. *Key Words* New Car Assessment Program (NCAP) 56.3 km/h (35.0 mph) barrier test Dual driver and passenger side air bags Heater resister coils	18. *Distribution Statement* General Public

19. *Security Classif. (of this report)* Unclassified	20. *Security Classif. (of this page)* Unclassified	21. *No. of Pages* 17	22. *Price*

CALSPAN ON-SITE EVALUATION OF NCAP TEST VEHICLE FIRE
CALSPAN CASE NO. 94-37
VEHICLE: 1995 FORD CONTOUR
TEST LOCATION: TRC ([redacted], OH)

TECHNICAL SUMMARY

This investigation focused on the source of a fire that originated in the passenger compartment of a 1995 Ford Contour immediately following a full scale crash test for the NHTSA sponsored New Car Assessment Program (NCAP). The NCAP test was performed at th[redacted] in [redacted] OH, on [redacted] 1994. The Ford Contour was subjected to a full frontal barrier test at a velocity of 56.3 km/h (35.0 mph). Within minutes of the test, [redacted] technicians observed flames extending out of the left upper quadrant of the deployed passenger side air bag module assembly. The technicians immediately extinguished the flames with a dry chemical fire extinguisher and prevented the vehicle from fire damage.

The source of the fire was initially believed to be related to the deployment of the passenger side air bag module assembly. The Ford Contour was examined by representatives of Ford Motor Company and Calspan's Special Crash Investigation Team on [redacted] 1994, and was systematically dismantled by a [redacted] technician to determine the root cause of the fire.

The involved 1995 Ford Contour GL was a four door sedan that was manufactured in [redacted], 1994 and was identified by the following vehicle identification number (VIN): 1FALP65L6SK[redacted] The [redacted] Test Number was [redacted] The vehicle was equipped with dual driver and passenger side air bags which deployed as a result of the 56.3 km/h (35.0 mph) barrier test. During the test, the vehicle contained Hybrid III crash dummies in both the driver and right front positions which were belted into the respective positions by the manual 3-point lap and shoulder belt systems. These belt systems were equipped with adjustable B-pillar mounted D-rings and double belt webbing at the buckle assemblies that were sewn together in an energy management system. Both stitch patterns separated from dummy loading during the test. The actual test speed of the vehicle at impact was reported at 56.2 km/h (34.9 mph).

TRC personnel measured the maximum crush to the Ford Contour at 40.2 cm (15.8") located on the bumper facia right of the vehicle's centerline. Crush values across the full frontal width of the vehicle were as follows: L = 152.4 cm (60"), C_1 = 31.5 cm (12.4"), C_2 = 36.2 cm (14.3"), C_3 = 39.7 cm (15.6"), C_4 = 40.2 cm (15.8"), C_5 = 39.4 cm (15.5"), C_6 = 36.5 cm (14.4"). The transverse mounted Duratec 2.5 liter DOHC V-6 cylinder engine was displaced rearward into the engine/passenger compartment cowl which intruded into the passenger compartment.

Immediately following the barrier test, all high-speed cameras shut down and [redacted] technicians approached the vehicle to perform the typical post-test tasks which include placing a pan under the vehicle to catch fuel in the event fuel leakage. A technician was positioned at the left C-pillar area

of the vehicle with a fuel pan retrieving fuel that was leaking out of the fuel tank/filler tube area. A second technician approached the vehicle from the right side. Simultaneously, both technicians detected flames extending from the upper left quadrant of the deployed passenger side air bag module. They immediately called for assistance and technicians responded with fire extinguishers that were available at the test site. The technicians sprayed the area of flames with a dry chemical-type fire extinguisher which rapidly extinguished the flames. The rapid detection and response by the technicians prevented the vehicle from sustaining fire damage.

The Ford Contour was placed in a garage bay at the [redacted] facility where it was inspected on [redacted] by Calspan and Ford representatives. All test equipment, the Hybrid III crash dummies, and the vehicle's hood and trunk lid were removed from the vehicle prior to our arrival. The air bag system and the instrument panel were intact. There was dry-chemical fire extinguisher residue on the right instrument panel, around the passenger side air bag module assembly. There was no fire damage to the deployed passenger side air bag or to the instrument panel area.

The passenger side air bag module cover flap was constructed of a steel backer panel with a vinyl exterior cover. The flap was found in the full opened position against the windshield. The left corner and center area of the passenger side module cover flap contacted and cracked the windshield.

Following the exterior inspection of the fire area, all of the involved parties agreed to initiate the tear-down procedure of the instrument panel. The [redacted] technician removed the upper instrument panel which provided visual access of the passenger side air bag module and the surrounding area. Minimal melting of fractured plastic components and insulation material was noted forward of the upper right quadrant of the air bag module assembly. In addition, a small diameter defroster/vent tube was compressed against the inflator assembly of the passenger side module by intrusion of the engine compartment/passenger compartment cowl. This defroster tube was melted at several points from its contact with the inflator, however, there was no indication of fire or flame. At this point, it became apparent that the source of the flames was not air bag related and that the source was located below the module assembly.

The next step involved the removal of the glove compartment door which provided a view of the lower instrument panel area. The heater/AC fan was located forward and inboard of the glove box. This unit was housed in a plastic-type assembly that was fractured at multiple sites by intrusion of the cowl and toe pan. An inspection of the area forward of the fan assembly revealed evidence of additional fire related damage which consisted of melted plastic and charred type surfaces.

The passenger side air bag module was removed from the vehicle and inspected for evidence of fire. There was no indication of excessive heat of flame to the module assembly. The heater duct tubing that was identified above was fused to the back side of the inflator. This resulted from the heat generated by the inflation process and the compression of the tubing against the module from intrusion. The steel cover (flap) of the passenger side air bag module was stamped with a identification number of [redacted] The module assembly was identified with a bar coded label which contained Ford Part No. [redacted] and Module Serial No. [redacted]

Multiple fractured plastic components were retrieved from the upper right toe pan area of the vehicle. The next step of the examination process involved the removal of the instrument panel cross support which extended between the A-pillars. This required the removal of numerous bolts and wiring harnesses which were affixed to the cross support. Following this process, the mid toe pan and cowl area were assessable. The flames appeared to have originated in this area, at the right lower quadrant of the air conditioning (A/C) core exchanger. The right side of the plastic surround for the A/C core was melted and yielded evidence of fire (charred). The technician removed the A/C core assembly which required the cutting of the A/C tubing in the engine compartment.

Following removal of this component, the source of the fire was evident. The heater blower switch resistor assembly which regulates the blower motor speed was displaced by the intrusion of the cowl. The plastic-type housing that incorporated the A/C core and the heater blower switch resistor assembly was fractured by the intrusion, thus exposing the resistor coils to the insulation material that was positioned around the A/C core. The insulation was subsequently compressed against the exposed resistor coils. The coils were hot since the instrument panel mounted fan speed switch was turned to the lowest speed position and the ignition switch was turned to the run-position. The heat generated by the resistor coils ignited the insulation and the flames vented through the upper instrument panel at the corner of the passenger side air bag module. The heater blower switch resistor assembly was identified with Ford Part No. [redacted]

Although the fire was extinguished in an early stage and there was no significant damage to the vehicle, the potential did exist for the fire to spread and consume the vehicle. A real world threat of a post-crash fire for this vehicle in a frontal crash of this magnitude is possible.

SELECTED PRINTS

1. & 2. Post-test front three-quarter views of the 1995 Ford Contour.

3. & 4. Perpendicular views showing the extent of frontal crush.

5. Circles represent location of front mounted air bag crash sensors.

6. Manufacturer's vehicle identification label on left front door.

7. Overall view of the deployed driver's side air bag.

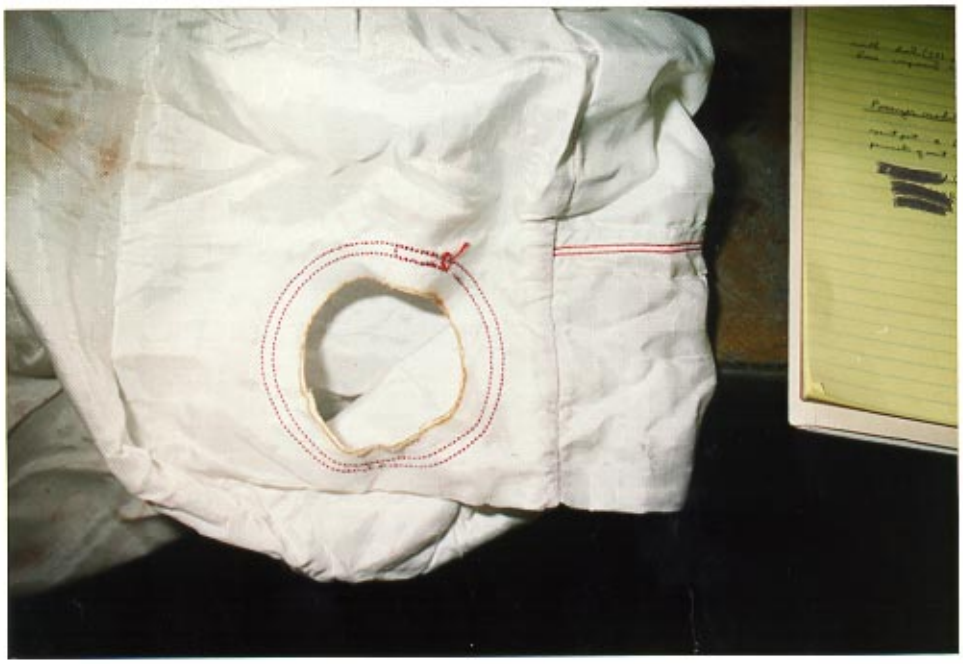
8. Vent ports and upper flap configuration of the driver's side air bag.

9. Lower flap configuration.

10. Separated energy management stitching in the right front belt buckle assembly.

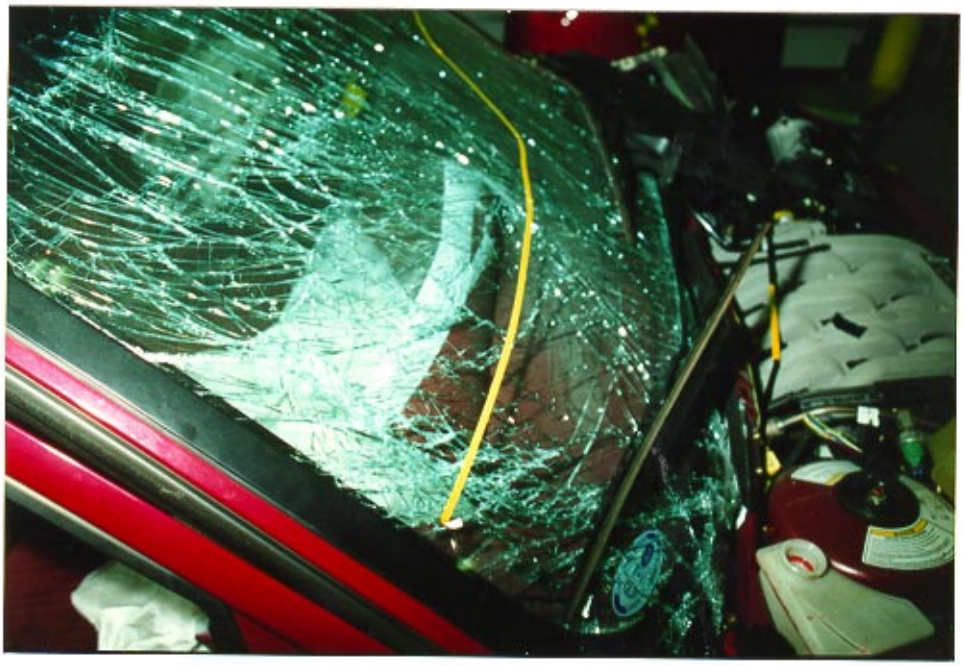
11. Overall view of the deployed passenger's side air bag.

12. Close-up view of the passenger side module assembly.



13. Passenger side vent ports; superficial singeing around port.

14. Circled area identifies location of the flames.

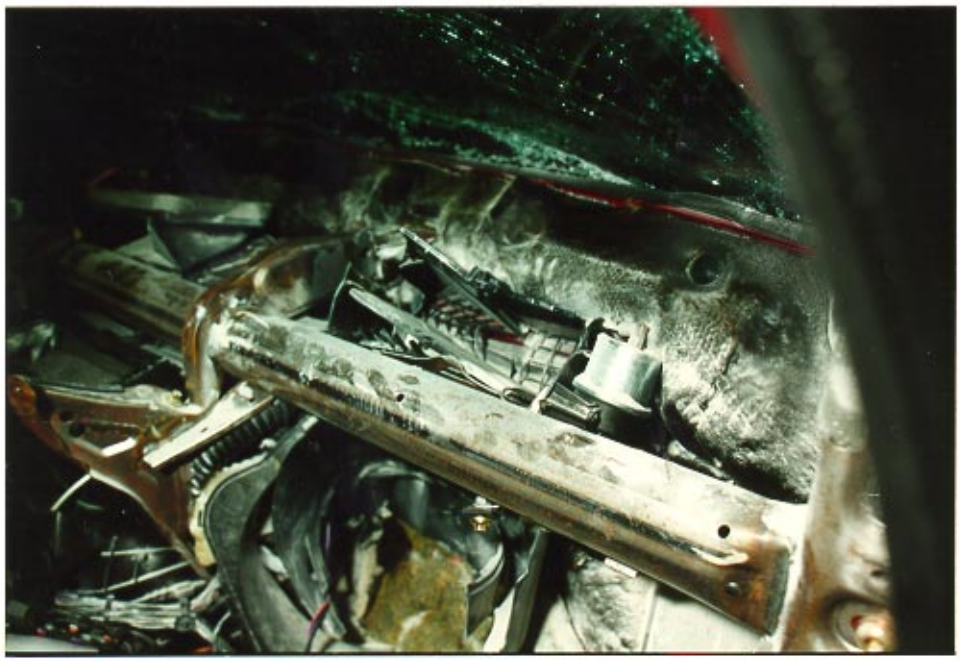


15. Passenger side module cover flap contact with windshield.

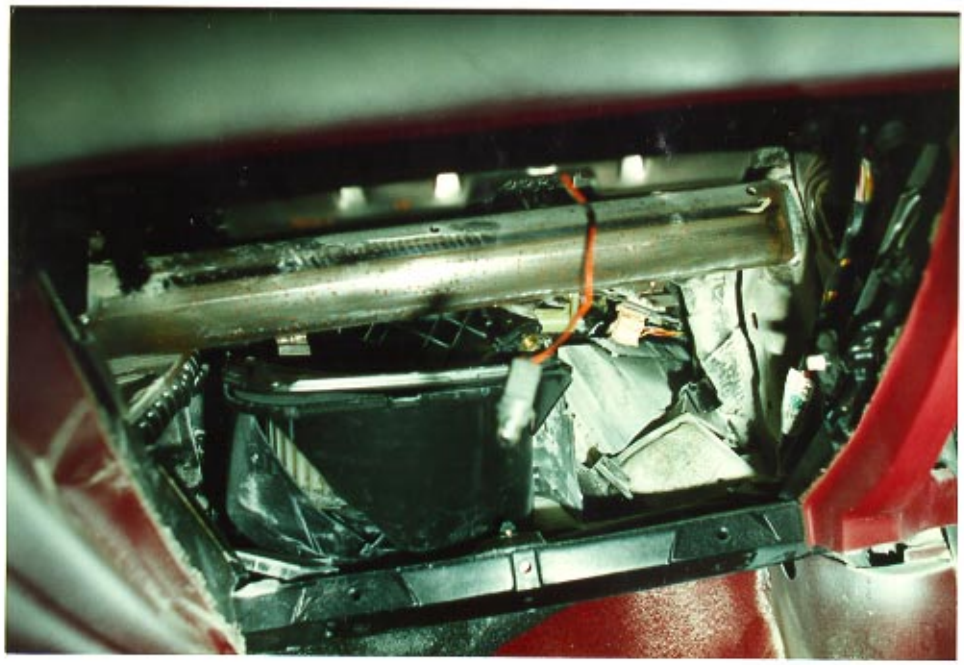
16. Heater tube compressed against the air bag generator.

17. Melted heater tube fused to the heat shield around the generator.

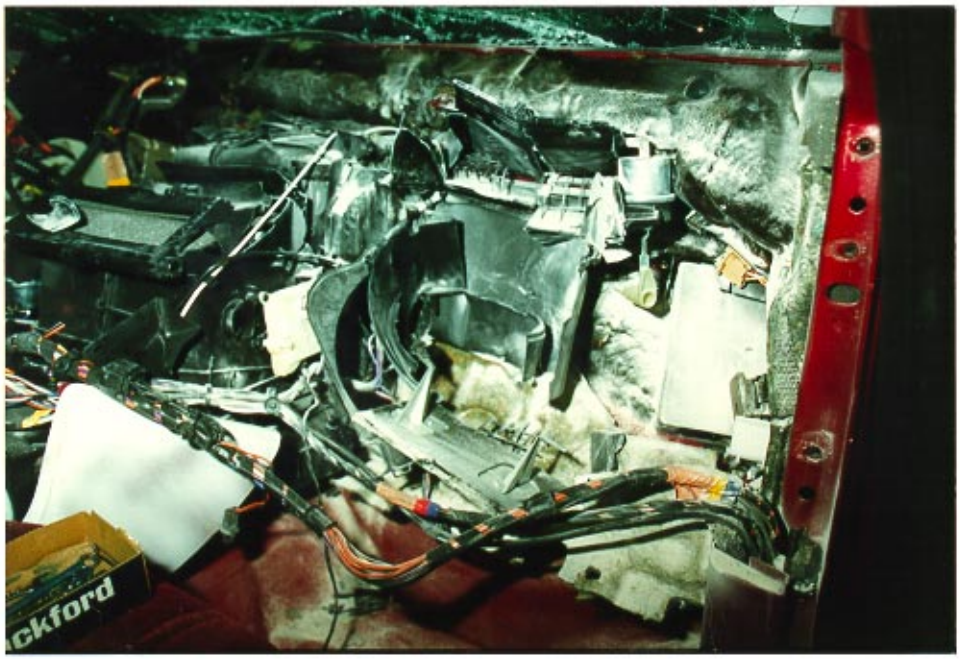
18. Area where the flames vented from the instrument panel.



19. Upper instrument panel and insulation with the passenger side air bag module removed.



20. View through glove box area of the fractured heater blower motor assembly.



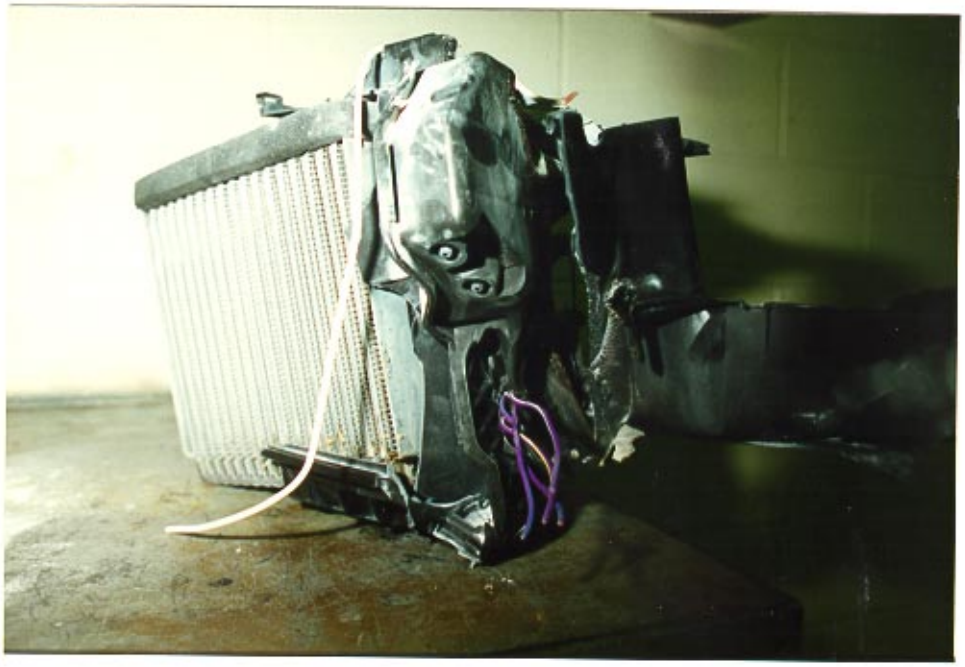
21. Overall view of the heater assembly with the instrument panel removed.

22. Charred and melted path of the flames through the mid panel area.

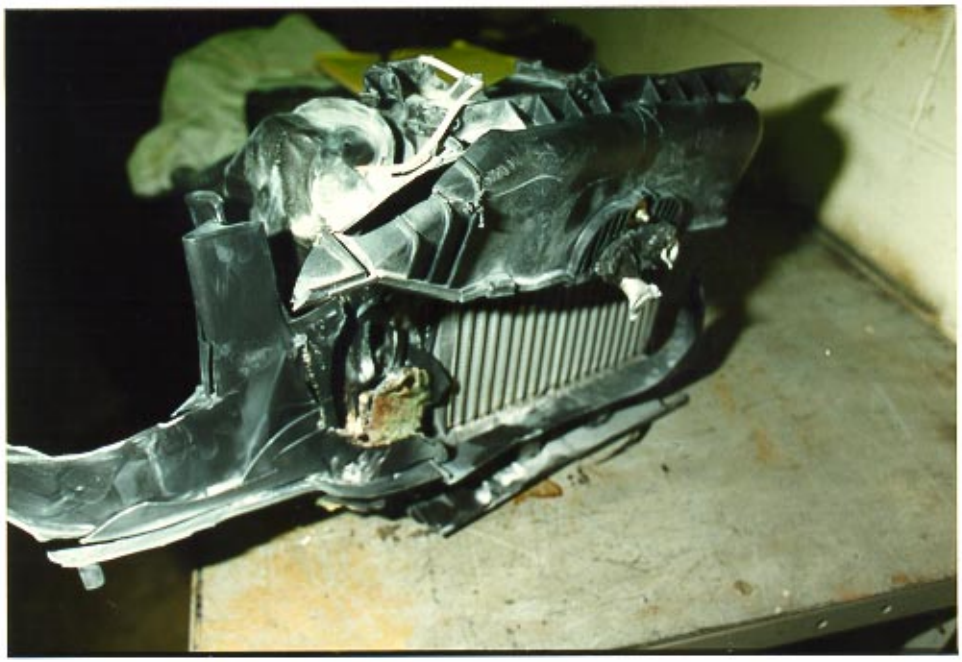
23. Overall view with the instrument panel and crossbar removed.

24. Charred insulation adjacent to the A/C core.

25. Source of the fire at the heater blower switch resistor assembly.



26. A/C core removed with charred and melted area surrounding the switch resistor component.

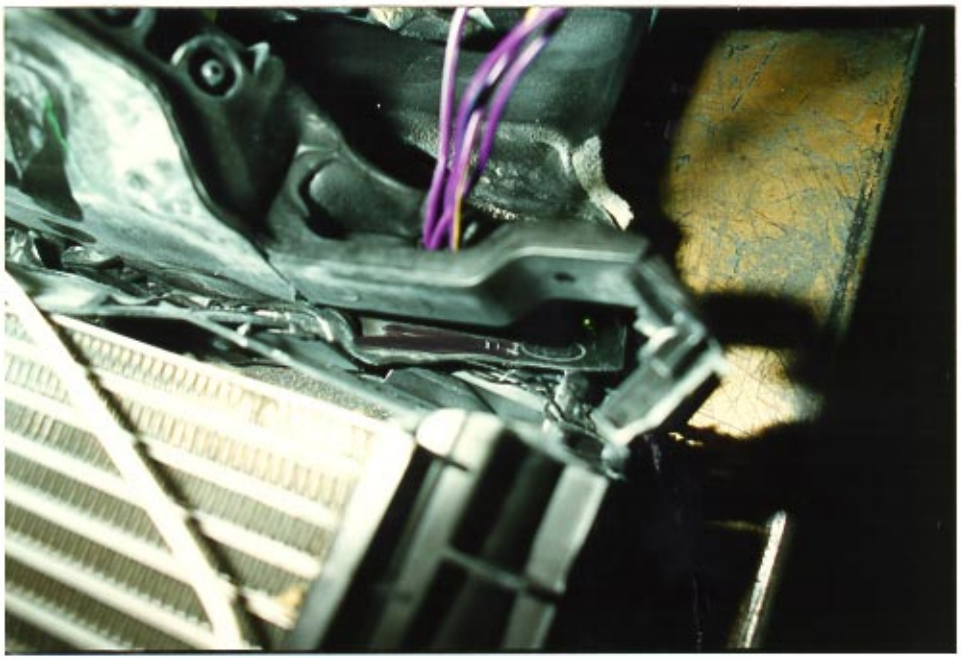


27. Forward aspect of the A/C core assembly with burned insulation at lower left quadrant.

28. Close-up view of the burned insulation.

29. Profile view of the insulation and the exposed resistor coils.

30. Damaged switch with the exposed resistor coils.



31. Ford part number stamped into switch assembly.

32. Removed instrument panel with heat and A/C control switches in their respective positions.