Auto Investigation #2

ENGINEERING REPORT

June 2006

PREPARED FOR: AUTO INSURANCE COMPANY #1

ATTENTION: MS. RENEE HARDING

INSURED: MR. WILLIE BROWN

DATE OF LOSS: JANUARY 2004

INSPECTION LOCATION: LOUISVILLE, KENTUCKY

POLICY NUMBER: N/A

CLAIM NUMBER: <omitted>

IC1 FILE NUMBER: <omitted>

Introduction

On January 2004, a 2000 Vehicle that was owned by Mr. Willie Brown of North Carolina caught fire while he was driving the vehicle near Louisville, Kentucky. Following the fire, the vehicle was moved to the Storage Facility #1 in Louisville, Kentucky.

On February 2004, Ms. Renee Harding of the Auto Insurance Company #1 contacted Investigation Company #1 (IC1) and requested IC1's assistance in determining the origin and cause of the fire. Reportedly, representatives of Vehicle Company #1 denied responsibility for conditions that might have caused the fire.

The author of this report, Scott A. Jones, P.E., Certified Vehicle Fire Investigator (C.V.F.I.) and Mechanical Engineer of IC1, (812) 944-9988, was assigned to conduct the investigation. Specifically, the author was requested to determine the origin and cause of the fire and to determine whether defect(s) in materials and workmanship might have had causation for the fire.

Damage restoration work was in progress at some point prior to the author's involvement. Auto Insurance Company #1 terminated the restoration work when the need for investigation of the fire origin and cause was realized.

The observations and conclusions from the investigation are included in this report.

Background

On March 2004, the author interviewed the insured and owner of the subject vehicle, Mr. Brown. Mr. Brown related the following:

- He purchased the vehicle as a used vehicle an April or May 2002.
- In January or February 2003, the active suspension system failed causing the vehicle to rub the ground when driving. A Vehicle Company #1 dealer in Knoxville, Tennessee repaired the system to his satisfaction.
- He reported no anomalous operating or maintenance conditions prior to the subject fire event.
- All preventive maintenance had been performed by Vehicle Company #1 dealerships since his ownership.

Observations

On February 2004, the author inspected the subject vehicle, a 2000 Vehicle, VIN <omitted>, at Storage Facility #1 in Louisville, Kentucky. The vehicle was parked in an enclosed service bay within the service area of the dealership.

There was little observed exterior fire damage on either the passenger's side – *Photograph 1* or driver's side – *Phonograph 2* of the vehicle. There was no observed fire damage on the rear side of the vehicle (*Photograph 3*).

Dry chemical fire extinguisher compound coated engine compartment components (*Photograph 4*). Compound concentration was greatest in and around the passenger's side aft corner of the compartment. The paint on the aft passenger's side corner of the engine compartment hood was damaged from heat or flame impingement as shown in *Photograph 5*. The inner surface of the hood was damaged as shown in *Photograph 6*.

By the time of the author's involvement, nearly all of the engine accessories situated in the passenger's side rear corner of the engine compartment had been removed (*Photograph 7*). The author discovered that dislocated components were stored in a large box situated near the vehicle (*Photograph 9*). A large, partially melted plastic housing that was associated with the heating system was returned to its installed position in the suspected origin region (*Photograph 8*).

Three components removed from the storage box had received heat damage: 1) the engine compartment fuse and relay panel, 2) the engine management computer, and 3) an additional large plastic housing associated with the heating system (*Photograph 10 – left to right*).

An unknown party had severed the conductor bundle leading to the fuse and relay panel to facilitate removal during the restoration (*Photograph 11*). The body of the panel was partially melted and charred as shown in the photograph. Nearly all of the plug-in relays that had been mounted at the top of the panel had been removed and were discovered on the top of the engine air cleaner (*Photograph 12*). The author eventually discovered a total of seven relays (*Photograph 13*). There were no conductor-to-conductor or conductor-to-ground electrical shorts discovered in the fuse and relay panel or any of the associated relays.

The conductor bundles leading to the engine management computer were extensively damaged by fire (*Photographs 14 and 15 – opposite side*). Nearly all of the attached conductors had separated from their associated harnesses by tensile fracture of the conductor ends.

The engine compartment conductor harnesses that had connected to the fuse and relay panel and the engine management computer appeared as shown in *Photograph 16*.

A large portion of the interior dashboard materials had been removed from the passenger's compartment (*Photograph 17*). Conductor harnesses that were situated at the passenger's side of the engine firewall appeared as shown in *Photograph 18*. A large conductor harness passed from the passenger's compartment through the firewall as shown in *Photograph 19*.

The individual conductors associated with the engine management computer (*Photograph 20*), which was identified as shown in *Photograph 21*, were inspected. One of the conductors was discovered with fused copper strands and was severed by melting (*Photographs 22 and 23*).

One of the stranded conductors that was situated within an engine compartment harness (reference *Photograph 16*) showed evidence of arcing and was severed by melting. ***Figure 1***, which was developed from *Photograph 24*, shows the melted end of the conductor. The opposite side view of the conductor end is shown in *Photograph 25*.

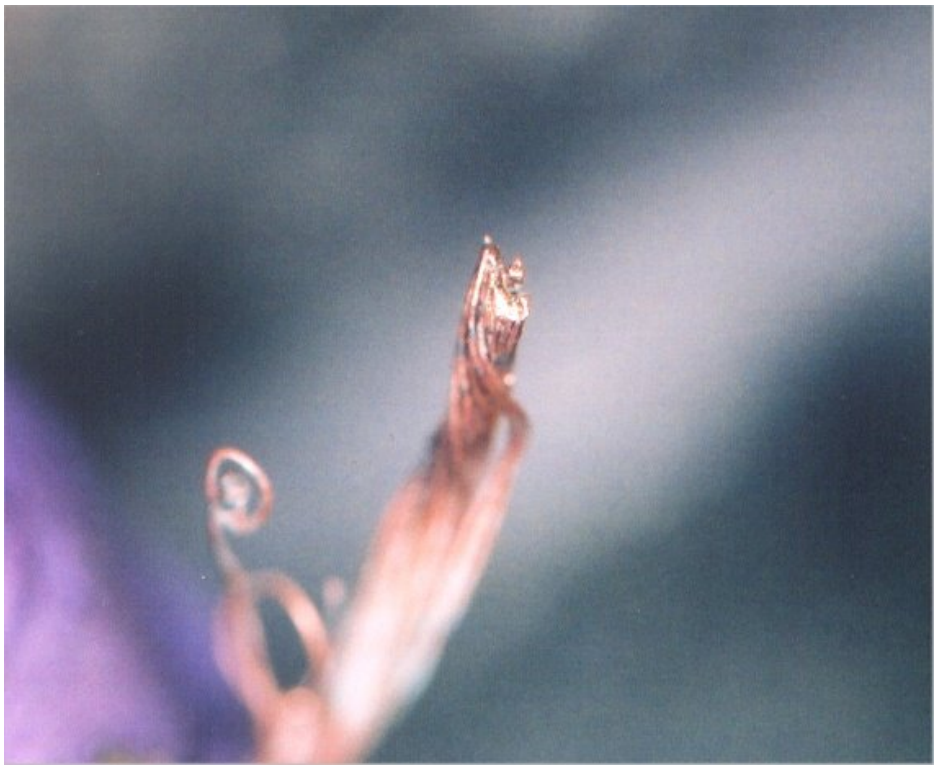

Figure 1 - Melted End of Engine Compartment Harness Conductor

The conductor harnesses that spanned between the passenger's compartment and engine compartment were laid out for inspection as shown in *Photograph 26*. Close inspection of the conductors (*Photograph 27*) showed one conductor that had experienced arcing and copper transfer from another conductor. The arcing appeared as shown in ***Figure 2***, which was developed from *Photograph 28*.

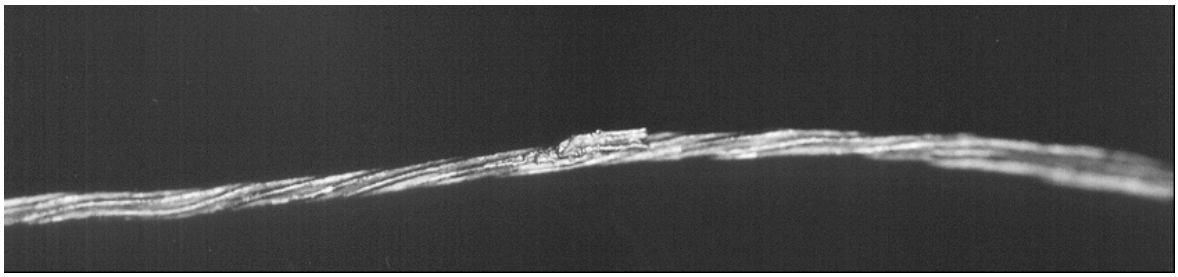

Figure 2 - Passenger's Compartment Harness Conductor That Was Damaged by Arcing

Discussion/Conclusions

Inspection of the subject Vehicle revealed that the fire origin was centered about the passenger's side aft quadrant of the engine compartment. There were no indications that the fire had extended into the passenger's compartment. The fire appeared to have been a short duration fire that was centered about the fuse and relay panel or engine management computer conductor harnesses.

The author inspected the large gauge battery conductors that spanned from the trunk-mounted battery to the engine starter. There were no indications of conductor-to-conductor or conductor-to-ground shorting. There were no indications of electrical shorting or grounding on any conductor situated outside the suspected fire origin region.

Two conductors were discovered severed by melting: 1) a stranded conductor that was attached to the engine management computer (reference *Photographs 22 and 23*) and 2) a stranded conductor that was attached to one of the engine compartment-mounted conductor harnesses (reference ***Figure 1***). In addition, one conductor situated in the conductor harness that spanned between the passenger compartment and engine compartment was discovered with arcing and metal transfer from another conductor (reference ***Figure 2***).

Unnamed restoration personnel had dissociated the subject damaged conductors from their respective harnesses prior to the author's involvement. The author was therefore unable to observe the conductors in situ. An exemplar vehicle was not available for inspection at the time of the site visit.

By examination of the length of the subject conductors and placement of the conductors in proximity to the probable mounted location of the fuse and relay panel and the engine management computer, it is believed that the subject shorted and arced conductors were situated in the suspected fire origin region at the time of the fire.

It is believed that the electrical insulation on the subject conductors failed by chaffing with each other and/or adjacent (grounded) chassis structure. As a result of the failure of the electrical insulation, it is believed that the conductors came into intermittent contact with each other.

It is believed that the ignition source for the fire was heat generated by inadvertent current flow during the electrical arcing. It is believed that the first fuel to the fire was the electrical insulation surrounding the conductors. It is believed that Vehicle Company #1, acting as the design and manufacturing agent for the subject vehicle, did not adequately provide chafe protection for the subject conductors. It is believed that Vehicle Company #1 is responsible for the conditions that led to the subject fire loss.

Evidence

The author isolated the engine harness and passenger compartment harness segments that contained the referenced arced and melted conductor segments as shown in *Photographs 29 and 30*, respectively. The engine management computer was retained as evidence. All three items (*Photograph 31*) were transferred to the custody of the author using an IC1 Property Release Form signed by a Storage Facility #1 representative. The items are available for inspection upon approval by Auto Insurance Company #1.

The analysis and conclusions are based upon information reviewed to date, plus general engineering knowledge and experience. Information reviewed at a later date may warrant modifying or augmenting the conclusions.

We appreciate the opportunity to work with you on this evaluation. Pending further direction, this file is considered closed. Please let us know whether we can be of further assistance to you.

Sincerely,

Investigation Company #1

Scott A. Jones, P.E., C.V.F.I.
Mechanical Engineer