PE07-029

Attachment 21

Matter # 13628

TRAVELERS

Suite 1200, P.O. Box 93
121 King St. West
Toronto, Ontario M5H 3T9
Tel (416) 366-8301
Fax (416) 366-0846
Toll 800-268-8481

St. Paul Fire & Marine Insurance Co.

April 17, 2007

Freightliner LLC
Attention: Brian T. Burton
4747 N. Channel Avenue
Portland, OR 97217-7699

Re: Our insured: 417 Bus Line Ltd.
Date of Loss: 11/20/2006
Our Claim #: 40332

Dear Mr. Burton:

This is further to your correspondence of January 18, 2007.

The insured's bus was deemed a total loss. The total amount of loss caused is $67,562.

Please find enclosed the engineering report, which states that the fire was caused by a manufacturing defect.

The salvage is at Impact Auto Auctions in Ottawa (613) 443-3171. If you wish to inspect it please do so immediately to avoid incurring additional storage fees.

We look forward to your response at your earliest convenience.

Regards,

Mariana Henriquez, CIP
Claims Representative
Travelers Insurance
416-601-4426

Encl. Engineering Report

TRAVELERS

Suite 1200, P.O. Box 93
121 King St. West
Toronto, Ontario M5H 3T9
Tel (416) 366-8301
Fax (416) 366-0846
Toll 800-268-8481

St. Paul Fire & Marine Insurance Co.

January 5, 2007

Thomas Built Buses Inc.
1408 Courtesy Road
High Point, NC 27260

Re: Our insured: 417 Bus Line Ltd.
Date of Loss: 11/20/06
Our Claim #: 40332

Please be advised that our insured's bus 2005 Thomas School Bus VIN # 1T88R4E1151[redacted] caught fire on November 20, 2006.

Our investigation reveals that the fire was caused by a manufacturer's defect and therefore we will be looking for payment for the damages caused to our insured's bus.

Regards,

Mariana Henriquez, CIP
Claims Representative
St. Paul Fire & Marine Insurance Company
1-800-268-8481 x 4426

FORENSIC ENGINEERING AND SCIENCE

Giffin Koerth

40 University Avenue
Suite 800
Toronto, ON M5J 1T1

T 416 368 1700
F 416 368 5576
forensics@giffinkoerth.com

ORIGIN & CAUSE OF 2005 THOMAS MVP SCHOOL BUS, CASSELMAN, ONTARIO

Our File: 62B610
Your File: 40 332
Date of Loss: November 20, 2006
Insured: [redacted]

Prepared for:

Ms. Mariana Henriquez
Travelers Insurance
1200 - 121 King Street West
Toronto, Ontario,
M5H 3T9

Participating Consultants:

Scott Broad, CFEI, CVFI, CCFI-C

Michael A. Learmonth, B.A.Sc., M.B.A., M.Eng., J.D., LL.B., CFEI, P.Eng.

REGISTERED PROFESSIONAL ENGINEER
M. A. LEARMONTH
Mar. 30/07
PROVINCE OF ONTARIO

March 30, 2007

giffinkoerth.com

1.0 SUMMARY

Giffin Koerth Forensic Engineering and Science was contacted by Mr. Paul Garvey of Travelers Insurance Company on December 7, 2006, regarding a fire that occurred to a 2005 Thomas MVP School Bus. We were asked to perform an origin and cause assessment of the matter.

This report is based on our examination of the incident bus, an exemplar bus and an independent engineering assessment.

In accordance with NFPA 921,[1] the *Guide for Fire and Explosion Investigations,*[2] it is our opinion that:

- The point of origin for this fire was at the left side of the drivers cab, within the exterior electrical access panel.
- The cause of the fire was electrical in nature due to the overheating of the Body Power Distribution Module Number 2 (PDM 2) due to the thinness of the copper circuits on the board.
- The PDM 2 input power connector likely partially separated from the circuit board, creating a high resistance connection, thereby heating surrounding combustible materials to the point of ignition.
- The National Highway Traffic Safety Association (NHTSA) had published a recall regarding the PDM circuit boards on the Thomas School Bus. The recall campaign number was 06V136000, however, only circuit board number 1 (PDM 1) was replaced during this campaign.
- It is our opinion that the PDM 2 power supply cable became partially separated from the circuit board due to the overheating caused by an inadequately sized circuit board conductor. This disconnect caused a high resistance connection and subsequent ignition of surrounding combustible materials including the wire insulation, plastic loom, and circuit board; and
- Therefore, in accordance with the above, and the methodology contained within NFPA 921, the *Guide for Fire and Explosion Investigations,* this fire must be classified as accidental, due to the manufacturing defect of the PDM 2 board.

[1] NFPA is the National Fire Protection Association, a non-profit organization established in 1896 and headquartered in Quincy, Maryland whose mission is to reduce the worldwide burden of fire and other hazards in the quality of life by providing and advocating scientifically based consensus codes and standards, research, training and education (from the NFPA website at URL www.nfpa.org).
[2] NFPA 921, the *Guide for Fire and Explosion Investigations* is a consensus standard utilized by Certified Fire and Explosion Investigators and frequently referenced in legal proceedings. It was first published in 1992 and the current edition is 2004.

2.0 REPORTED INFORMATION

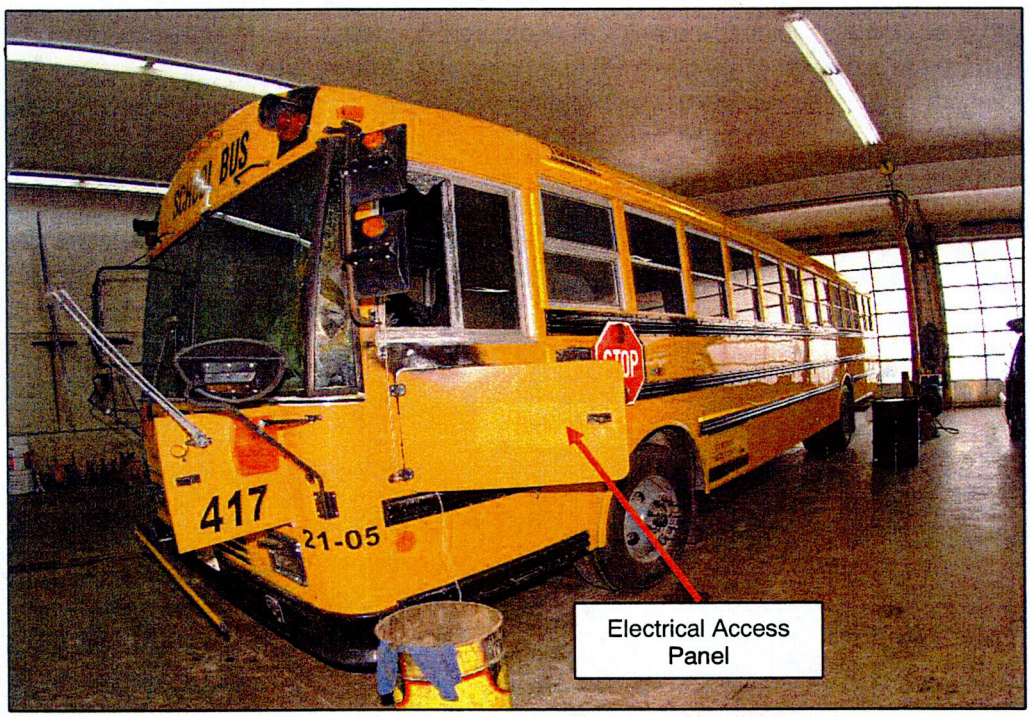
Mr. Paul Garvey of Travelers Insurance Company provided the following background information:

- The bus had been parked at the driver's residence, a farm, since the day prior to the fire;
- the bus was started in the morning and left to warm up;
- the husband of the driver noticed the bus on fire within a few minutes after starting;
- the fire was extinguished with a portable fire extinguisher; and
- the bus was towed to the 417 Bus Lines compound.

3.0 EXAMINATIONS

Mr. Scott Broad, CFEI, CVFI[3], of Giffin Koerth Forensic Engineering and Science was retained on December 7, 2006 to perform an independent engineering assessment as to the origin and cause of this fire. We attended the scene in Casselman, Ontario December 9, 2006 at 1000 hrs.

The incident vehicle was a yellow 2005 Thomas MVP School Bus (Photograph 1) and carried Ontario plate [redacted] The VIN (Vehicle Identification Number) was 1T88R4E1151[redacted] This was confirmed by the data sticker attached to the overhead panel above the front windshield.



Photograph 1 – Front left wide[4] angle view of the 2005 Thomas school bus

3.1 Exterior Examination

The exterior fire patterns were localized towards the front, left[5] quadrant of the bus with the heaviest damage biased towards the upper left corner of the electrical access panel. The driver's side window had been shattered and the front windshield was cracked on the left side, in front of the steering column. The remaining exterior appearance was of overall good condition except for a few superficial body scrapes.

[3] CVFI – *Certified Vehicle Fire Investigator.* This internationally recognized designation is awarded to members of the National Association of Fire Investigators (NAFI) who have successfully completed the requirements set out by the National Certification Board and possess a unique skill set associated with the investigation of vehicle fires.

[4] Some of the wide angle photographs were taken using a Nikon 10.5 mm fish-eye lens. This lens allows a very wide perspective, but yields some barrel distortion so that straight lines in reality tend to bow in the photographs.

[5] For the purpose of this report, locations and orientations are referenced to the driver's position, facing forward, in the left hand seat.

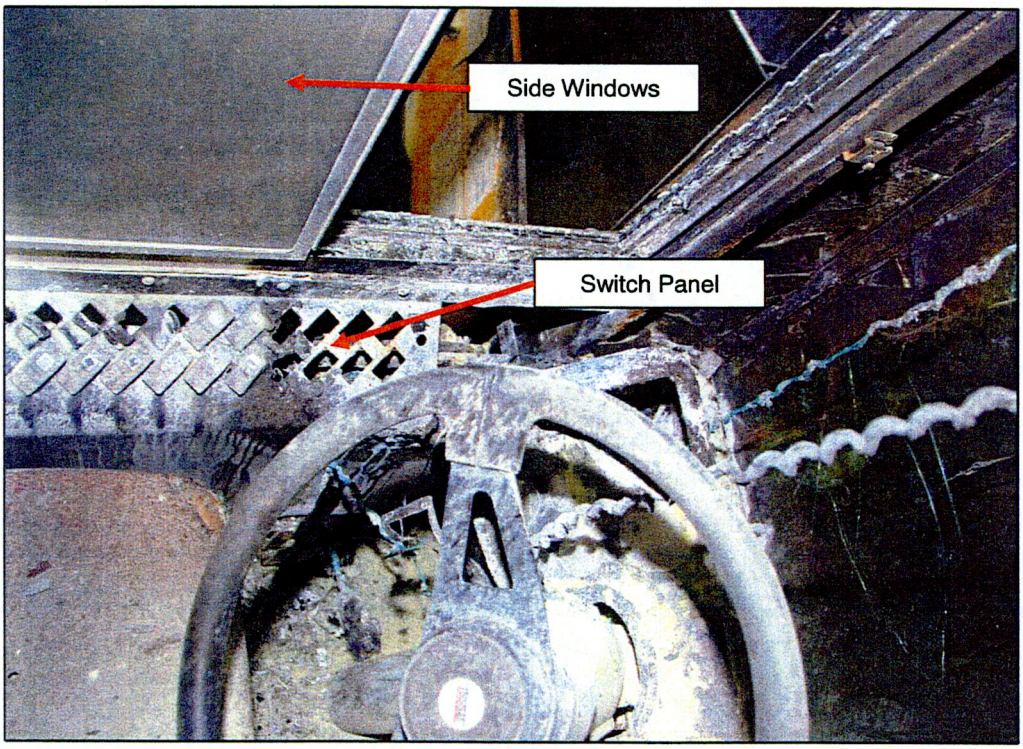
3.2 Interior Examination

Prior to our fire scene reconstruction[6], we conducted a series of ignitable liquid residue tests using our TIF 8800A combustible liquid detector. We divided the floor of the driver's cab into 1 ft. by 1 ft. grids and tested each square foot. We did not locate any area that indicated the presence of such a liquid.

All fire impingement within the passenger compartment was restricted to the front left corner. The remainder of the interior space was covered in a layer of smoke condensate.[7]

The fire propagated to the driver's compartment below the left side window frame, through the electrical switch panel (Photograph 2). There was minimal damage to the floor area below, the seat beside, or to several of the switches towards the rear of the panel which further supported that entry location. The fire also propagated to the left side of the dash board but was suppressed at that point, likely due to the use of the fire extinguisher.

We examined the underside of the left side switch panel and the forward dashboard for indications of failure. We did not find any significant circumstances contributable to the ignition of the fire.



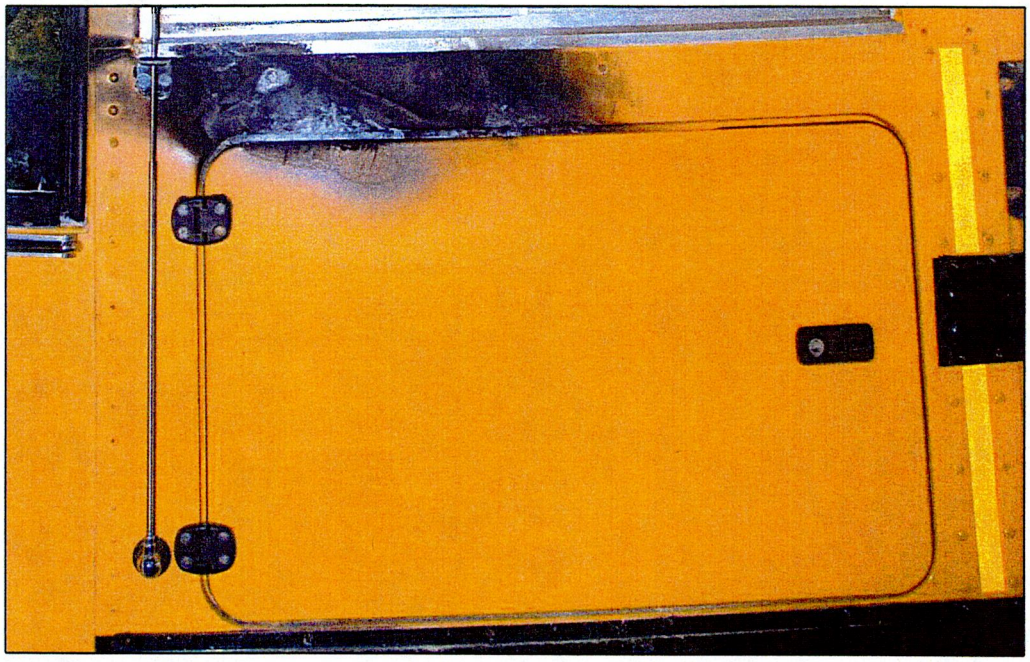
Photograph 2 – Looking down at switch panel showing forward biased fire propagation

[6] From NFPA 921 – *Fire scene reconstruction* is the process of recreating the physical scene during the fire scene analysis through the removal of debris and the replacement of contents or structural elements in their pre-fire positions.

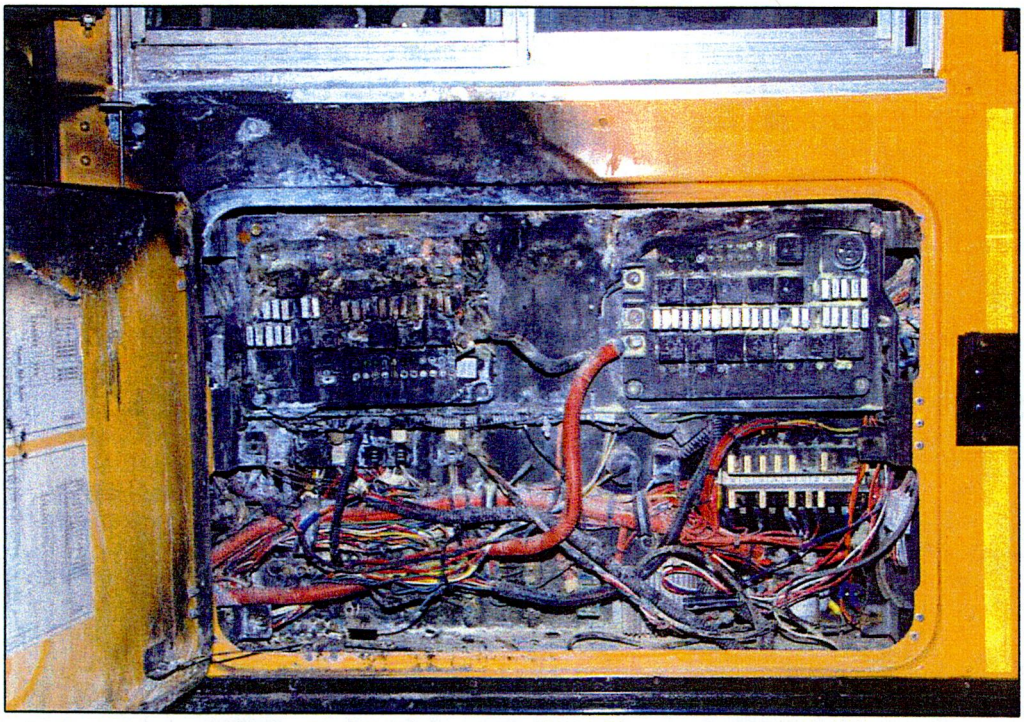
[7] From NFPA 921 – *Smoke Condensate* – The condensed residue of suspended vapours and liquid products of incomplete combustion.

3.3 Electrical Access Panel

Closer examination of the fire consumption damage sustained by the Thomas Built Bus revealed that the majority of the damage was contained within the front left electrical panel cavity. There was also evident fire and heat impingement displayed on the external body panels (Photograph 3 and 4).

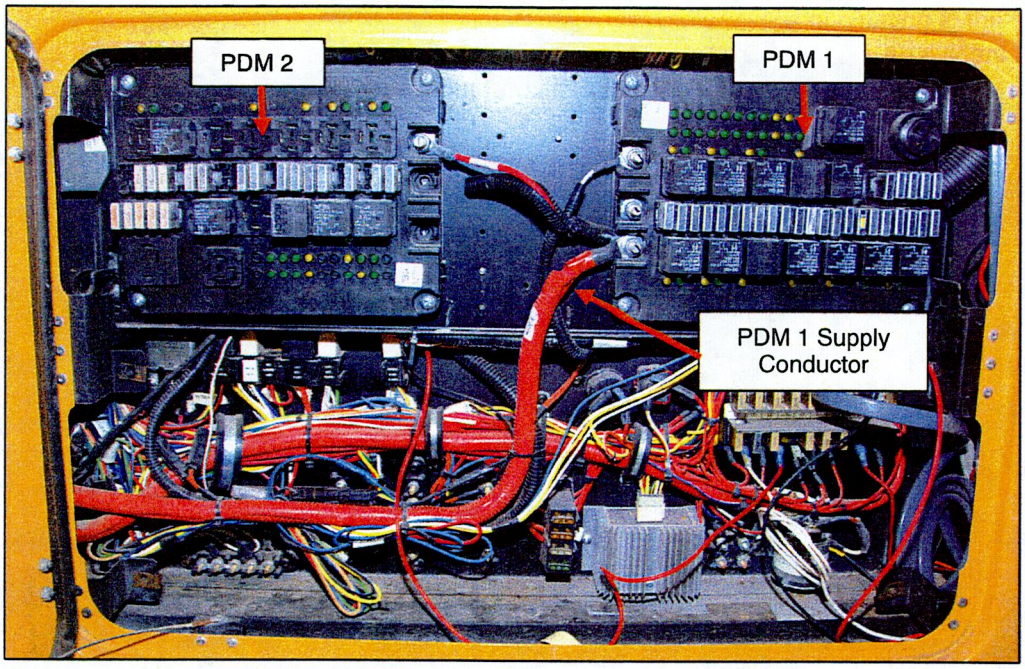


Photograph 3 – View of the left top corner of the access panel (closed)



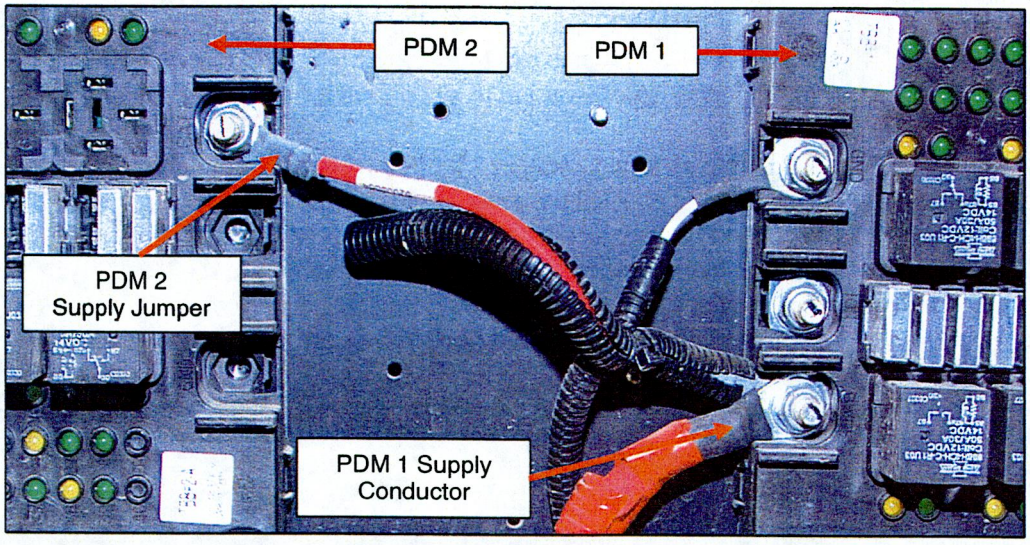
Photograph 4 – View of the left top corner of the access panel (opened)

Contained within the electrical access panel were Power Distribution Modules (PDMs). PDM 1 was located at the rear and PDM 2 was located at the front (Photograph 5). The two PDM panels were used to distribute electrical power to the various vehicle branch circuits while at the same time providing overload protection using electrical relays, fuses, and breakers.



Photograph 5 – Exemplar view of PDM 1 and PDM 2

PDM 1 was energized by a heavy gauge, stranded conductor routed from the main electrical distribution panel at the front of the vehicle. The heavy gauge supply conductor was protected by a 150 amp circuit breaker mounted on the chassis circuit breaker block, located on the main electrical panel. PDM 2 was energized by a lighter gauge electrical jumper routed from the PDM 1 input terminal post (Photograph 6).

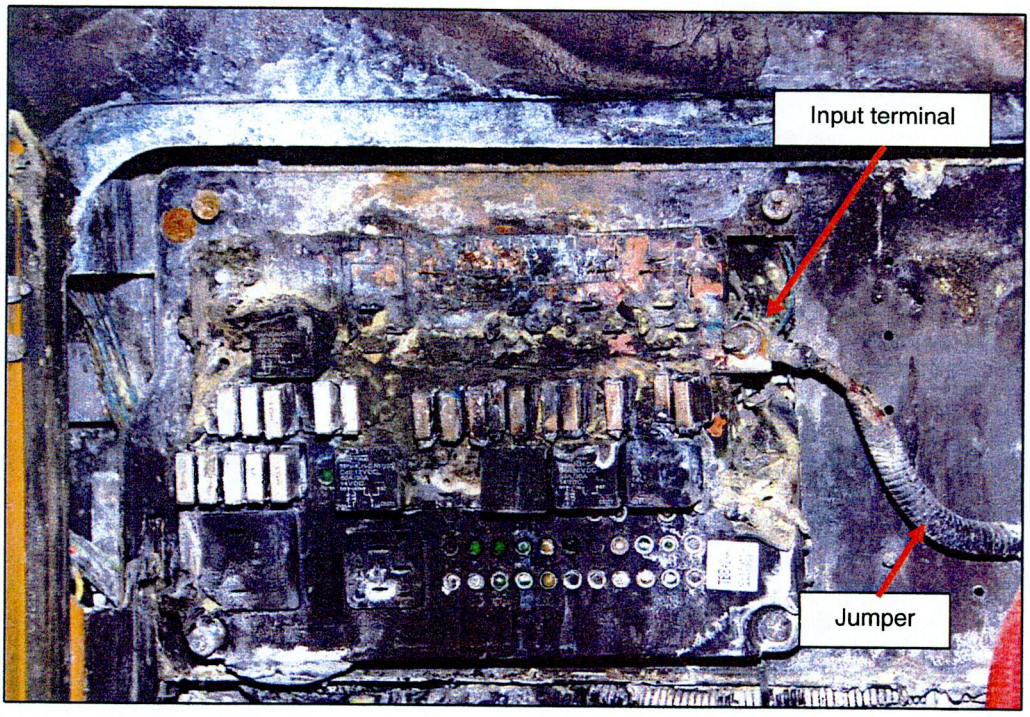


Photograph 6 – Exemplar view of jumper wire powering PDM 2 from PDM 1

3.4 Access Panel Fire Damage

The fire damage within the electrical access panel was biased towards the upper left side of the space and showed evident venting to the exterior of the panel and upwards along the bus body.

There was greater damage to PDM 2 than PDM 1 with the damage originating in the area of the electrical input terminal on PDM 2 (Photograph 7). There was an evident fire pattern that extended from the input terminal area on PDM 2 upwards into the cavity space above the board.

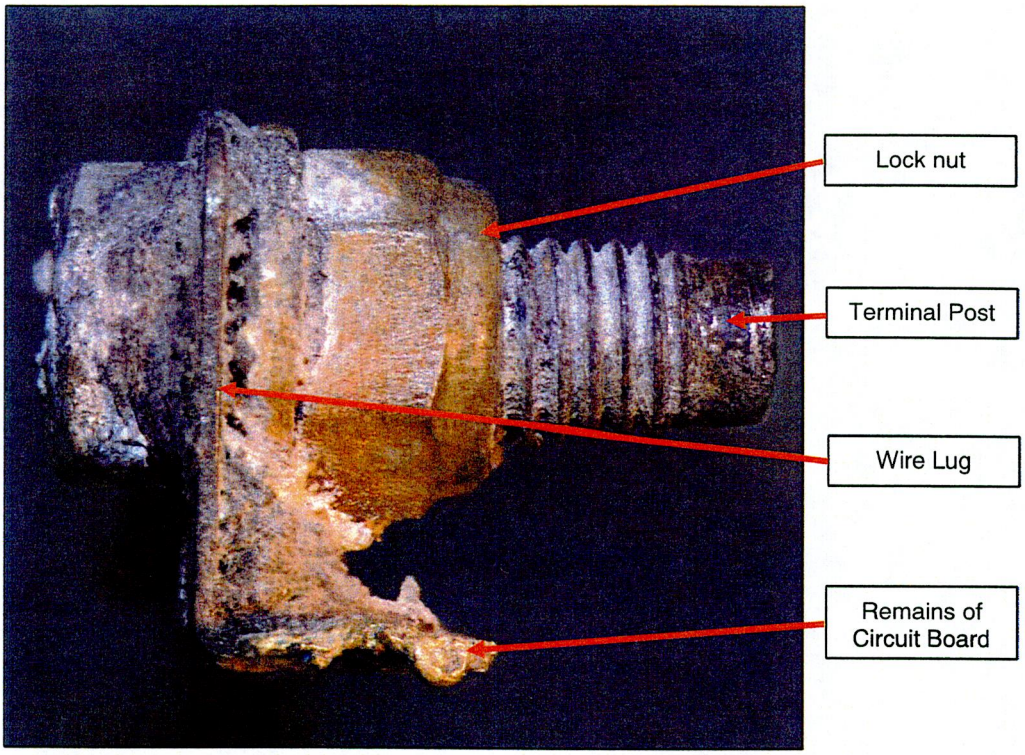


Photograph 7 – Looking at PDM 2 showing fire patterns rising from circuit board

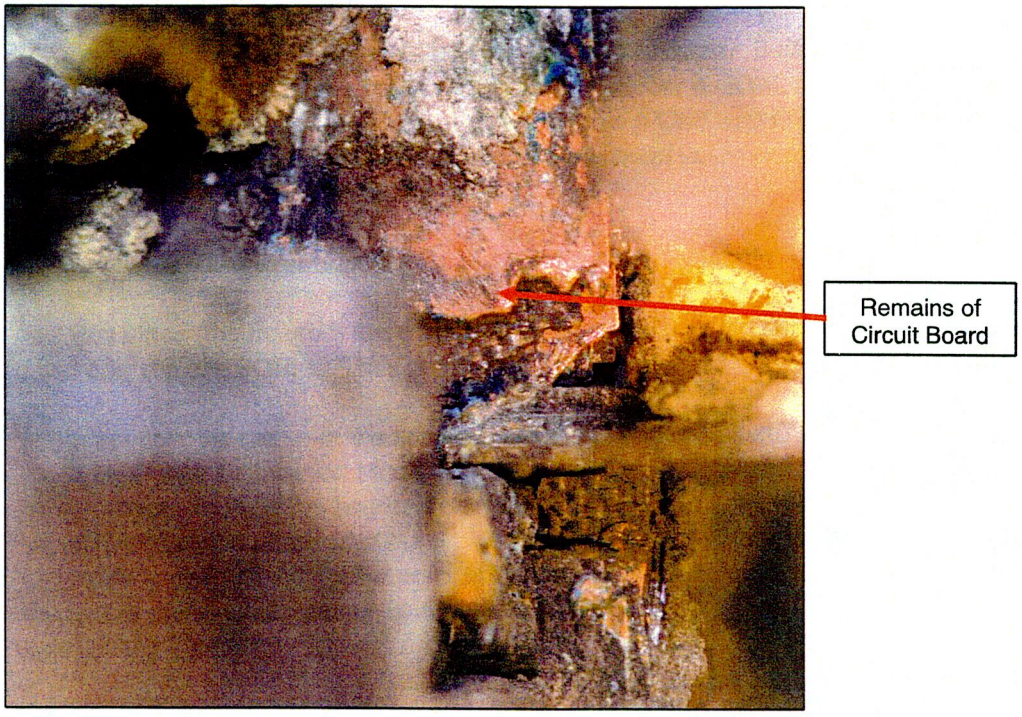
There was evidence of prolonged burning above PDM 2 as witnessed by the oxidation of the metal in that area. Further, the plastic used to cover the panel had suffered fire consumption damage from the middle of the board upwards.

The electrical jumper cable from PDM 1 to PDM 2 was detached at the PDM 2 end. The terminal post, normally mounted to the medial side of PDM 2, had broken free of the board and was still secured to the lug at the end of the conductor. The copper conductor trace[8] from PDM 2 was still attached to the terminal post and exhibited signs of overheating and separation (Photograph 8). In addition, the copper circuit on the PDM 2 board exhibited similar characteristics (Photograph 9).

[8] Circuit boards are composed of a layer of copper laminated and etched on a board made from fiberglass and epoxy resin.



Photograph 8 – Close-up view of the PDM 2 terminal connector with melted copper trace



Photograph 9 – Close-up view of the PDM 2 circuit board showing melted copper trace

4.0 DISCUSSIONS AND CONCLUSIONS

The remaining fire patterns within the left side exterior electrical access panel clearly define the area of origin for this fire at the upper left side, at PDM 2. The fire damage to PDM 2 and the lack of damage to the abundance of plastic and consumable material throughout the cavity below and to the rear of PDM 2 further narrow this point of origin.

We examined the ignition, charging, and fuel injection systems and found no signs of visible failure. The hot engine components that are often involved in vehicle fires were not located in the general area of the fire origin and, although the vehicle had just been started, can thus be eliminated as viable fire causes.

It is unlikely that the fire was intentionally set by the driver because of the timing of the fire (recently started and left to warm-up), the location (at the top of the electrical panel) and the fact that none of the indicia of arson[9] as listed in NFPA 921 were present.

Carelessly discarded smoking materials can also be eliminated based on the area of origin.

A search of the National Highway Traffic Safety Administration (NHTSA) vehicle recall database revealed that the 2005 Thomas Built Buses were subject to a recall campaign. The campaign number was 06V136000 (Appendix A).

The campaign highlighted the fallowing fault:

- *"Certain MY (model year) 2004 through 2006 Thomas Built HDX, EF, and FS-65 school buses manufactured between October 4, 2004, and February 14, 2006. The Body Power Distribution Module (PDM) was manufactured with copper circuits that are too thin for the electrical loads encountered, possibly causing the board to overheat."*

- *"If the PDM overheats it may generate smoke and could result in a fire."*

417 Bus Lines (the Insured) were advised of the recall and further informed that they need only replace PDM 1. They completed this service.

In our opinion, the cause of the fire was electrical in nature due to the overheating of the Body Power Distribution Module Number 2 (PDM 2) due to the thinness of the copper input circuit on the board. The PDM 2 input power connector likely partially separated from the board creating a high resistance connection thereby heating the surrounding components to the point of ignition. The physical observations found at the end of the terminal connector and the circuit board were indicative of an overheating situation.

[9] From NFPA 921 – The indicia of arson referred to in this paragraph refers to Chapter 22 "Incendiary Fires".

Therefore, in accordance with the above, and the methodology contained within NFPA 921, the Guide for Fire and Explosion Investigations, this fire must be classified as accidental, due to the manufacturing defect of the PDM 2 board.

It should be noted that during our examination of the Thomas Built Bus, we conducted no destructive testing of the PDM circuit boards nor retained any items of evidence. It is requested that Giffin Koerth Forensic Engineering and Science be in attendance should further testing be required, or requested by other interested parties.

Appendix A

APPENDIX A – RECALL NOTICE FOR THE 2005 THOMAS BUILT BUS

Help

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1-888-327-4236

TTY
- 1-800-424-9153 or
- 1-202-484-5238

Search Results

Report Date : **December 8, 2006 at *12:17 PM***

NHTSA Campaign ID number : **06V136000**

New Search

Print Version

Make / Models :	Model/Build Years:
THOMAS BUILT BUSES / EF	2004-2006
THOMAS BUILT BUSES / FS-65	2004-2006
THOMAS BUILT BUSES / HDX	2004-2006

Manufacturer : FREIGHTLINER LLC

NHTSA CAMPAIGN ID Number : 06V136000

Mfg's Report Date : APR 21, 2006

Component: ELECTRICAL SYSTEM:FUSES AND CIRCUIT BREAKERS

Potential Number Of Units Affected : 11666

Summary:

CERTAIN MY 2004 THROUGH 2006 THOMAS BUILT HDX, EF, AND FS-65 SCHOOL BUSES MANUFACTURED BETWEEN OCTOBER 4, 2004, AND FEBRUARY 14, 2006. THE BODY POWER DISTRIBUTION MODULE (PDM) WAS MANUFACTURED WITH COPPER CIRCUITS THAT ARE TOO THIN FOR THE ELECTRICAL LOADS ENCOUNTERED, POSSIBLY CAUSING THE BOARD TO OVERHEAT.

Consequence:

IF THE PDM OVERHEATS IT MAY GENERATE SMOKE AND COULD RESULT IN A FIRE.

Remedy:

THOMAS BUILT WILL NOTIFY OWNERS AND WILL REPLACE THE PDM'S THIN COPPER CIRCUITS WITH THICKER COPPER CIRCUITS. THE RECALL BEGAN ON JUNE 30, 2006. OWNERS MAY CONTACT THOMAS BUILT AT 1-877-660-4938.

Notes:

FREIGHTLINER RECALL NO. FL-475. CUSTOMERS MAY CONTACT THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'S VEHICLE SAFETY HOTLINE AT 1-888-327-4236 (TTY: 1-800-424-9153); OR GO TO HTTP://WWW.SAFERCAR.GOV.

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