



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

Memorandum

Subject: ACTION: EA08-010 Memo to Public File

Date: May 18, 2009

From: Derek Rinehardt
Office of Defects Investigation

In Reply Refer To: NVS-213

To: Valencia Johnson,
Vehicle Controls Division
Office of Defects Investigation

This memorandum contains a response from General Motors concerning a letter submitted to ODI by M-Heat Investors, LLC dated April 6, 2009. The letter responds to allegations, concerning the Microheat Heated Washer Fluid Module, made in the M-Heat Investors, LLC letter. M-Heat Investors, LLC alleged the module was not the source of the fires in GMT900 platform vehicles subject of recall 08V-441 and NHTSA investigation EA08-010.

Attachments:

1. Copy of a letter dated 5/13/2009 sent by Gay Kent, Director of Product Investigations of General Motors Corporation.



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May 13, 2009

Jeffrey L. Quandt, Chief
Vehicle Control Division
Office of Defects Investigation
National Highway Traffic Safety Administration
1200 New Jersey Ave., S. E., Room W48-307
Washington, D.C. 20590

Dear Mr. Quandt:

This letter is GM's response to a letter and Engineering Test Report submitted to NHTSA by M-Heat Investors, LLC, dated April 6, 2009, relating to closed NHTSA Investigation EA08-010 and NHTSA Recall 08V-441. As you know, GM announced a safety recall for vehicles equipped with Microheat Heated Washer Fluid System (HWFS) MH35 modules after determining that a Printed Circuit Board (PCB) short circuit in the unit may cause other electrical features to malfunction, create an odor or cause smoke and in some rare cases cause a fire. This determination was made based on review of field incident vehicle inspections, field report review and examination of returned HWFS warranty parts.

M-Heat Claim:

M-Heat's letter claims that "In 2006, GM requested Microheat to increase its protection diode in later generation modules to 400 volts based on GM's experience with transients in certain of its vehicles. GM asked Microheat to implement this change, even though the GM design specification for the vehicle stated that protection for up to a negative 150 volt transient was sufficient..."

GM Response:

In the second quarter of 2007, GM reviewed the design of Microheat's modified MH37 HWFS (the original HWFS system released for production was designated MH35). The review was conducted primarily from an electromagnetic compatibility (EMC) viewpoint and GM observed that the initial MH37 design had the same fast reverse battery protection diode as used in the MH35. This fast acting, high-frequency device has the ability to rectify radio-frequency (RF) energy from sources, such as cellular phones. However, this rectification may create a false DC or amplitude-modulated (AM) signal which can be interpreted by electronic modules as input state changes that can, for instance, falsely mimic an ignition switch cycle. The design purpose of this diode application in the HWFS is to block reverse DC voltages normally found when electronic modules are wired incorrectly. GM traditionally recommends a slower bandwidth diode for this purpose. Although M-Heat correctly notes that the diode selected does have a 400V reverse voltage breakdown, the recommendation for use in this PCB circuit is based on the RF detection characteristics and not specifically transient characteristics.

Microheat did not report any issues related to transients during both component and vehicle EMC validation testing of the MH35 unit which included the original (RS1D) diode. GM believes the change to the 1N4004-type diode in the MH37 module was based on a recommended design practice and not Microheat test results.

Product Investigations

M-Heat Claim:

The M-Heat letter also includes the statement that, "...non-conforming 400 voltage(sic, volt) transients generated by sources other than Microheat's windshield washer fluid heater module, and not moisture, most likely cause the 'short-circuit' on the PC boards and other thermal events witnessed on field returns..."

GM Response:

M-Heat's statement assumes that the transients imposed on the test samples included in the Engineering Test Report are applicable for the Microheat MH35 module. As installed in GM vehicles, the Microheat HWFS module is powered from a direct battery feed (not switched) and it is not realistic to experience a -400 volt, 2ms duration transient pulse.

The M-Heat report (data provided with the letter dated 06 Apr 09) states that the MH35 HWFS design passes both revisions of the GMW3097 EMC specification, which include transients, with no damage. Additionally, the M-Heat data show that the MH35 design passed both revisions of the EMC specification for Pulse #1 (e.g. both the -100V and -150V) pass with no damage, even though not required by GM. The Engineering Report shows that M-Heat had to stress the HWFS module with a significantly higher energy level (up to 288 times) than the GMW3097 EMC specification requires in order to damage the Microheat MH35 module with transients.

Accordingly, GM believes the after-the-fact testing performed by M-Heat on the HWFS module is far beyond the requirements that GM would expect on any electronic module installed in GM vehicles that is connected on the battery feed. If this type of overstress transient existed in GM's vehicles on the battery feed, GM would expect significant warranty claims for other electronic modules in those vehicles. To date, GM is unaware of any warranty claims on other electronic modules related to voltage transients.

Conclusion:

During the NHTSA investigation, GM identified 41 reports of underhood fire incidents in the nearly 2.5 million subject vehicles and 64 reports of underhood fire incidents in over one million peer vehicles. These reports alleged multiple causes for underhood fires including: engine oil, transmission oil, coolant, gasoline, power steering fluid, heated washer fluid module, miscellaneous electrical systems, wire chaffing, non-GM installed aftermarket accessories and unknown. With the exception of the HWFS, no additional trends were found.

GM identified 36 reports for full size trucks and utilities where a HWFS module PCB short circuit is suspected. Additionally, 232 warranty return HWFS modules from the subject and other GM vehicles were inspected. Of the 232 warranty return units that were inspected and retested for functionality, it was determined that 171 units operated properly. The remaining 61 modules did not pass the functionality test. As a team, GM and Microheat believe the units that functioned properly were returned because customers were unfamiliar with the heated washer fluid system operation and dealer technicians then misdiagnosed the HWFS module as not functioning properly. As a result, GM issued a dealer service bulletin to further explain the system operation.

Finally, GM acknowledged that the MH35 HWFS module may experience a short circuit between the battery feed and low signal ground and could possibly result in an underhood fire with the key off and the vehicle unattended. These results are based on vehicle fire inspections and the Microheat failure analysis report # CR-G-0581 of the MH35 HWFS for the 2007 MY GMC Yukon Denali (VIN 1GKFK66867J222538 - Texas), which stated, "that an unknown mechanism caused a parasitic conductive path to form across the modules main positive battery input to the low current ground return. This conductive path ultimately led to a high current short circuit between battery (VBAT) and low current ground (LCG) on the PCB...". As a result of these findings, GM initiated a safety recall campaign. The NHTSA recall (08V-441), requires GM dealers to install an in-line fuse in the low signal ground circuit for vehicles equipped with the Microheat MH35 HWFS module. To date, GM has not identified any additional underhood fires related to the HWFS module on GMT900 vehicles in which the recall service was performed. Further, GM maintains that the conclusions and field remedy that resulted from the original investigation are correct.

If you require further information, please do not hesitate to call me.

Sincerely,



Gay P. Kent
Director
Product Investigations

Enclosure

cc: Peter Jacullo, M-Heat Investors