January 20, 2015

Mr. Jeff Quandt, Chief
Office of Defects Investigation, NVS-213
U.S. Department of Transportation

National Highway Traffic Safety Administration (NHTSA)
Office of Defects Investigation (ODI)
Room W48-312
1200 New Jersey Avenue SE
Washington, D.C. 20590

Reference: TIPM Design Review

Dear Mr. Quandt:

This voluntary submission contains FCA US LLC's responses to the various informal information requests related to Totally Integrated Power Module. These requests were in response to various design reviews and meetings between the Office of Defect Investigations ("ODI") and FCA US LLC Safety Office.

FCA US LLC is submitting to the Chief Counsel's Office, via courier for Wednesday delivery with a request for confidentiality, and additional detailed information responsive to these requests.

By providing the information contained herein, FCA US LLC is not waiving its claim to attorney work product and attorney-client privileged communications.

Sincerely,

Philip S. Hartnagel
Sr. Manager – Product Investigations and Campaigns

Attachment and Enclosures

Preliminary Statement

On April 30, 2009 Chrysler LLC, the entity that manufactured and sold the vehicles that are the subject of this Information Request, filed a voluntary petition for relief under Chapter 11 of Title 11 of the United States Bankruptcy Code.

On June 10, 2009, Chrysler LLC sold substantially all of its assets to a newly formed company now known as Chrysler Group LLC. Pursuant to the sales transaction, Chrysler Group LLC assumed responsibility for safety recalls pursuant to the 49 U.S.C. Chapter 301 for vehicles that were manufactured and sold by Chrysler LLC prior to the June 10, 2009 asset sale.

On June 11, 2009, Chrysler LLC changed its name to Old Carco LLC. The assets of Old Carco LLC that were not purchased by Chrysler Group LLC, as well as the liabilities of Old Carco that were not assumed, remain under the jurisdiction of the United States Bankruptcy Court – Southern District of New York (In re Old Carco LLC, et al., Case No. 09-50002).

Effective December 15, 2014, Chrysler LLC changed its name to FCA US LLC.

This voluntary submission contains FCA US LLC's ("FCA US") responses to the various informal information requests related to Totally Integrated Power Module-7 ("TIPM-7"). These requests were in response to various design reviews and meetings between the Office of Defect Investigations ("ODI") and FCA US Safety Office.

Questions and response appear in no particular order and attachments are indicated as appropriate.

The below five questions were sent by Jeff Quandt to FCA US via email on October 31, 2014.

1. Review FCA US's scope analysis for 14V-530 and updated comparisons of field data and technical differences between MY11 and MY12/13 WK/WD vehicles.

A1. FCA US's response to this question was provided previously in two different submissions.

A) DP14-004, Question 10, subpart (a), submitted on 11/25/2014.
B) TIPM-7 design review submitted voluntarily on 10/7/2014.

2. Review FCA US's technical assessments of:
a. Airbag warning lamp complaints;
b. Alleged fires/thermal incidents

A2. FCA US's response to this question was provided previously in the DP14-004-A10; submitted on 12/12/2014. As part of the submission FCA US provided a technical assessment of the one thermal event alleged to have been caused by the TIPM. FCA US's assessment, found in the DP14-004 response, provided detail supporting this event was not caused by the TIPM. In addition, see DP14-004 response dated 12/12/2014 within ENCLOSURE 10 in the file titled 5500 Thermal.pdf, (VIN CG142166), which provides photographs of the vehicle in question. In September 2014, the ODI sent a request for FCA US's assessment of additional vehicles with alleged thermal incidents. Of all VINs sent by ODI, only three had an alleged thermal event reported to FCA US. One was the above mentioned vehicle (VIN CG142166). Of the two remaining vehicles, neither was manufactured with a TIPM-7 body controller.

3. Review all warranty return analyses and reports associated with subject complaint vehicles or 14V-530 (including Barone TIPM).

A3. This information was provided previously and can be found in the DP14-004 response dated 11/25/2014 within ENCLOSURE 9 - CONF BUS INFO. Regarding the Barone TIPM from the 2011 Grand Cherokee (VIN BC[redacted]) which the Petitioner submitted to NHTSA, the inspection report has been completed. This report can be found in ENCLOSURE 3 CONF BUS INFO and is titled 00938-14 version 1 0 CONF BUS INFO.pdf. This report details the analysis of the Fuel Pump Relay and is consistent with other field returns for the condition in question.

4. Review FCA US's 14V-530 remedy program external relay validation, including component reliability and robustness assessment.

A4. This information was provided previously and can be found in the DP14-004-A9 response; submitted 11/25/2014. In addition, FCA US's validation testing was stopped after the relays passed three times life cycle testing. These relays showed no indications of any type of failure whatsoever.

5. Review FCA US's technical analysis and verification of TIPM-7 fuel relay fault partition and isolation (i.e., How FCA US verified that the fuel pump relay fault is isolated to that part and assessed other components that could be affected (e.g., TIPM, fuel pump, battery)?

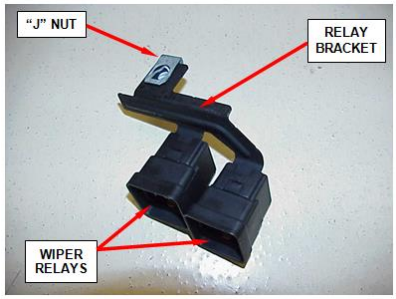
A5. During the investigation, FCA US has reviewed significant numbers of narratives and repair histories. There has been no indication to suggest, or support that a failure at the fuel pump relay may lead to or cause any damage to other components in the vehicle.

The following questions represent a summary of discussions held during the 10/7/2014 TIPM design review between FCA US VSO and NHTSA ODI.

6. Please provide a picture of the remedy external relay used for J28.

A6. The relay used for the J28 remedy is shown below.

- CBL3J280AA Wiring Harness Overlay Package



7. Can FCA US provide backup data for arc characterization in pre remedy J28 fix?

A7. FCA US has been unable to locate a scope plot of J28 condition arc.

8. Can FCA US provide the Fuel Pump differences between TIPM-7 models and who are the suppliers for the other pumps and programs?

A8. FCA US has summarized most of the TIPM-7 Fuel Pump data in the file titled TIPM-7 Fuel Pump matrix summary CONF BUS INFO.pdf and can be found in ENCLOSURE 8 CONF BUS INFO.

9. If the Engine stalls, does the PCM understand and know that and then shut off the pump?

A9. The PCM monitors engine revolutions per minute ("RPM"). In a stall or near stall situation, once the engine drops below a RPM threshold (~350rpms) for more than ~2.5 seconds, the PCM will shut down the engine and fuel pump. This occurs whether the pump is already off or not. If however the Fuel Pump relay in the TIPM-7 is stuck on, the pump is not able to shut off without external intervention. In this situation no fuel is pumped out of the tank. When the engine is off, the fuel pump recycles back into the tank.

10. How are relays rated?

A10. Numerous factors and considerations are used in the rating of relays. In this case, FCA US specified the application and usage to our TIPM-7 Outside Design and Development ("ODD") supplier and the relay in question was selected by the ODD supplier.

11. Have you sampled other vehicles with TIPM-7 to look at relay contacts?

A11. During the investigation, FCA US analyzed field data for all vehicles which contain a TIPM-7. The results of this analysis did not support the need for tear down of non WK and WD fuel pump relays, due to the extremely low rate and random occurrence of fuel pump relay malfunction.

12. Looking for where the protective diodes are on the TIPM board? In addition, NHTSA would like physical pictures and logical schematics for the TIPM-7.

A12. This data is confidential data owned by the ODD supplier. FCA US does not possess all of this data. In addition, FCA US submitted in the 11/25/2014 response the TIPM7C and TIPM7S fuel pump schematics. Please find this information in the 11/25/14 submission – BATES - DP14-004 - CHRYSLER – 000004. All additional data would need to come from the ODD supplier.

13. Can FCA US provide all VOQs found in their analysis, including ones determined to be not related.

A13. FCA US would welcome the opportunity to exchange VOQs with ODI that each organization has determined to be probative of this investigation.

14. Can FCA US provide information about returned part analysis?

A14. Please see A3 above.

15. What systems are being powered by the RUN-ONLY feed and which are powered by RUN-START feed. – looking for a list that line up with airbag light VOQs.

A15. FCA US has provided Run-Only and Run-Start circuit traces for three vehicles. Two of these vehicles have a TIPM-7. The third vehicle, a 2014 model year ("MY") Grand Cherokee does not have a TIPM-7 but is representative to the TIPM-7 version vehicle. This information can be found in the file titled Run-Only and Run-Start traces JK RT WK CONF BUS INFO.xlsx and can be found in ENCLOSURE 15 CONF BUS INFO.

16. Can FCA US provide information for 3 Thermal VOQs with some pictures of relevant information?

A16. Please see A2 above.

17. Does FCA US have a study to prove that this transient only affects the Fuel Pump relay circuit?

A17. Please see A5 above.

18. The function(s) of the daughter PCB board # 2840932800100. The other two logic and power boards were identified per the 10/07/2014 WebEx presentation.

A18. FCA US has previously submitted this high level information in the voluntary submission on 10/7/2014. For more specific information please refer to A12.

Within the TIPM there are two Printed Circuit Boards ("PCB"). In order to clarify FCA US has provided in ENCLOSURE 18 a file titled TIPM Nomenclature.pdf. This file describes the Upper Fuse Housing, the Power PCB, and the Logic PCB.

19. The locations of the added capacitor protection circuits (CN Change # DP011-250-AA).

A19. It is FCA US's understanding that some capacitor changes or additions were made on the CN referenced above. These changes were made on circuits within the TIPM, unrelated to the fuel pump circuit and relay. There were no changes noted specifically to the Fuel Pump circuit.

The following questions and requests for information represent FCA US's understanding from the discussions between FCA US VSO and NHTSA ODI during a meeting held at the Department of Transportation on 12/17/2014.

20. Can FCA US provide the list of systems powered off the Run only feed and the Run Start feed?

A20. Please see A15 above.

21. How are the two power feeds run through the TIPM?

- **a. A block diagram indicating IGN R/O and IGN R/S circuit connection to the airbag ORC module and showing the power feeds. Please also list feed fuse ampacity.**
- **b. A FCA US technical statement documenting the explanation referenced in the meeting that neither IGN R/S nor IGN R/O airbag feeds will be affected by any TIPM relay fault or malfunction on the medium, logic or power boards. Technical statement should also document the explanation referenced in the meeting that the ORC ability to deploy airbags is unaffected when power is disrupted on one feed (IGN R/S or IGN R/O) and even if the ABWL is active.**

A21.
a) Please refer to ENCLOSURE 21 CONF BUS INFO and the file titled TIPM RUN RUN START CONF BUS INFO.pdf for the block diagram and fuse amperage.

b) There are no faults that occur, prior to TIPM failure that affect the RUN START or RUN ONLY feeds to the ORC. As stated in DP14-004 in A10,

> ***Only a TIPM failure could affect all vehicle power, including the redundant power feeds to the Occupant Restraint Control ("ORC") module, therefore potentially affecting airbag deployment. Chrysler is not aware of any incidents of this scenario in the subject complaint vehicles. Chrysler's response on September 15, 2014 to the ODI request of September 3, 2014 regarding TREAD EWR in the file named DI Responses to 24 Crashes re TIPM.pdf, further supports that there is no record of non-deployment due to TIPM-7 failure or malfunction.***

The FCA US Airbag Control Module (Occupant Restraint Controller) utilizes two power feeds (Ignition "Run/Start" and Ignition "Run"). During a normal drive cycle both feeds are present providing battery voltage to the ORC module. The system is designed so that each feed alone is capable of providing the necessary power to the module and to deploy all required restraints.

The loss of power from one ORC power feeds will result in an Airbag Warning Lamp, but will not affect deployment capability.

22. How do we know, in a crash and non-deployment, if there was a loss of power to the Occupant Restraint Controller ("ORC") pre-event or if it was a proper non deployment?

A22. In the event of a crash the following steps / decisions can be used to determine if the ORC was powered or not at the time of the event.

- If any of the vehicle airbags or seatbelt pretensioners deployed, the ORC was powered.
- If neither airbags nor pretensioners deployed in a crash,
    - Plug into the vehicle and/or ORC and check for a non-deployment Event Data Record report
        - Occurs when there is a Delta Velocity of 5mph or more within a 150ms time window
        - Only 2010 Ram 3500 Cab/chassis vehicles do not have event data record capability.
    - Plug into vehicle and look for the ORC Loss of Communication DTC
        - This DTC will be stored in a number of different modules on the CAN BUS, not just the ORC module.
    - If there is no DTC stored in any module, OR, no module is able to be read, OR, the vehicle did not meet the deployment criteria, an accident scene analysis and reconstruction is used to determine if a deployment was warranted or not.

NOTE: On September 3, 2014 the ODI sent to FCA US, 24 VINs which had DI incidents with a request for analysis. In FCA US's response, dated 9/15/2014, it was determined that none of the incidents has a non-deployment due to a TIPM-7 malfunction, ORC malfunction, or a non-powered ORC module. This analysis was completed using a full review of all available data.

23. The exemplar parts we sent, can we provide the tear down reports and owner complaints/field reports/warranty claims for the relays and / or TIPMs we sent?

A23. The exemplar parts which FCA US sent to the ODI in December 2014 have associated tear down reports completed by the ODD supplier. These reports were already submitted in the DP14-004 response dated 11/25/2014 within ENCLOSURE 9 in the file titled 00949-14 version 1 2014-11-18 CONF BUS INFO.pdf. The associated VINs for the parts sent to ODI are listed below. Customer complaints, field reports and warranty claims can be found, organized by VIN, in ENCLOSURE 23 CONF BUS INFO.

TIPM Serial No.	VIN
W2220A0304	BC [redacted]
W1161D0161	BC
W3620C0111	BC
W0171D0174	BC
W2700C0922	BC

Table 1: Exemplar relays with corresponding tear down reports found in 00949-14 version 1 2014-11-18 CONF BUS INFO.pdf

24. Of all the TIPMs we have had returned and analyzed by Conti, how many have had NTF?

A24. FCA US is currently working with the ODD supplier to attempt to compile the requested data. The field data has shown that in many cases, dealer technicians are unable to reliably recreate the customer complaint. As the customer experiences increased frequency of one or more fuel pump relay conditions, the likelihood of dealers reproducing issue increases. In addition, bench testing of returned modules has shown that many modules have fuel pump relay circuit continuity. FCA US has communicated in the past that these customer conditions begin intermittently. This is one explanation for failure to diagnose at a dealer. An additional explanation is the ease of TIPM-7 replacement and the complex electrical integration within the vehicle. As noted in DP14-004, ENCLOSURE 10, many TIPM-7s have been replaced in error where there was no malfunction of the TIPM-7.

25. CAS complaint of the 2013 Challenger – do we have an inspection report for this vehicle?

A25. FCA US has reviewed incident and incident reports for the 2013 Dodge Challenger (VIN DH[redacted]). Contrary to the statement by the Petitioner, the vehicle in question does not contain a TIPM of any version. As FCA US has indicated to the ODI in the 10/7/2014 voluntary submission, this vehicle contains another type of Body Controller and not a TIPM. Regarding the specific incident noted in the Petitioner's letter, there was no FCA US incident inspection completed for this vehicle. The lack of vehicle inspection indicates that there was no request made to FCA US by any party, nor was there any need to inspect the vehicle. The police report stated a suspected or likely medical condition as the cause of the incident. Finally, the police report does not indicate unintended acceleration as the Petitioner alleges.

26. When the actual speed and the cruise control set speed gap is significant, is there an acceleration limit and if so, what is the limit?

A26.
For standard cruise control there is no acceleration limit during a resume action. There are however calibration settings which are used to provide a smooth acceleration feeling to the customer. This helps avoid the perception of any sudden acceleration changes.

For adaptive cruise control, the maximum acceleration target is based on vehicle speed in addition to the time gap (#1, #2, #3) the user selects. The highest acceleration rate is for time gap #1 and has been provided in Table 2 below.

Engine Size	Time Gap #1 Accel target ≤12 KPH (m/s^2)	Time Gap #1 Accel target >12 KPH (m/s^2)
Small (2.9L & 3.6L)	1.7	1.1
Med (3.0L)	1.7	1.0
Large (5.7L & 6.4L)	1.7	1.1
Sport Mode	1.8	1.4

Table 2: Acceleration limits by engine displacement.

27. Does FCA US know how many up-fit vehicles we have sold and therefore how many may have the potentially to up-fit incorrectly by an external up-fitter?

A27. FCA US is able to provide the number of incomplete vehicles that FCA US has sold with a TIPM-7 body controller. Please refer to the file titled TIPM Dealer Information CONF BUS INFO.pdf within ENCLOSURE 27 CONF BUS INFO.

28. The ODI would like the information FCA US has for the Erica Watson MY 2013 WD component return analysis.

A28. FCA US is in the process of attempting to retrieve the part from the customer for further analysis. As a result, we are not yet able to provide tear down and analysis data for this vehicle.

29. A FCA US technical statement documenting the explanation referenced in the meeting that the fuel relay fault or malfunction is partitioned and will not affect any other TIPM function. Similarly, as referenced in the meeting, all other TIPM functions (such as wipers, horn…etc.) are fault partitioned and will not affect the fuel pump relay or cause a malfunction.

A29. Please see A5 above.

The following questions and requests for information represent FCA US's understanding from the discussions between FCA US VSO and NHTSA ODI investigator Kareem Habib during a phone call on 01/09/2015.

30. Please describe the clock-spring failure referenced in DP14-004 A10 assessment response.

A30. The vehicle in question had an airbag warning light and the reason stated was due to a clock-spring failure. This vehicle (VIN 8L[redacted]) was part of the response to PE11-019. There was a field action taken on some 2007 and 2008 JKs. This vehicle however, was not part of the L37 campaign.

31. Please describe WIN issues.

A31. There are some wireless ignition node ("WIN") issues which may be leading to mis-diagnosis of TIPM-7 related issues. These issues are related to WIN – frequency operated battery ignition key ("FOBIK") communication in many cases and will either prevent the vehicle from starting or allow the vehicle to start but then immediately stall. Both of these conditions are also noted as potential TIPM-7 fuel pump relay conditions.

32. **Please provide updated CAIR and Warranty data to ODI since the last data was pulled for the 10/7/2014 TIPM presentation**.

A32. FCA US is still compiling and reviewing new data from the field to determine the updated data that is related or maybe related to the TIPM-7 fuel pump relay. This data represents additional complaints made to the company between 8/21/2014 – 01/09/15.