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DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

Denial of Motor Vehicle Defect Petition

AGENCY: National Highway Traffic Safety Administration, (NHTSA), DOT.

ACTION: Denial of a petition for a defect investigation.

SUMMARY: This notice sets forth the reasons for the denial of a petition, DP14-004, submitted by the Center for Auto Safety (the petitioner) to the Administrator of NHTSA by a letter dated August 21, 2014, under 49 CFR part 552. The petition requests the agency to initiate a safety defect investigation into alleged failures of Totally Integrated Power Modules (TIPMs) installed in sport utility vehicles, trucks, and vans built by Chrysler FCA (Chrysler) beginning in the 2007 model year. The petitioner alleges that TIPM defects may result in the following safety defect conditions: engine stall, airbag non-deployment, failure of fuel pump shutoff resulting in unintended acceleration, and fire.

After conducting a technical review of: 1) Consumer complaints and other material submitted by the petitioner; 2) information provided by Chrysler in response to information requests regarding TIPM design, TIPM implementation and the complaints submitted by the petitioner; and 3) Chrysler safety recalls 14V-530 and 15V-115 addressing a fuel pump relay defect condition that may result in engine stall while driving in certain vehicles equipped with TIPM body control modules; and the likelihood that additional investigations would result in a finding that a defect related to motor vehicle safety exists, NHTSA has concluded that further investigation of the issues raised by the petition is not warranted. The agency, accordingly, has denied the petition.

FOR FURTHER INFORMATION CONTACT: Mr. Kareem Habib, Vehicle Control Division, Office of Defects Investigation, NHTSA, 1200 New Jersey Avenue, SE, Washington, DC 20590. Telephone 202-366-8703. E-mail Kareem.Habib@dot.gov.

SUPPLEMENTARY INFORMATION:

I. INTRODUCTION

Interested persons may petition NHTSA requesting that the agency initiate an investigation to determine whether a motor vehicle or item of replacement equipment does not comply with an applicable motor vehicle safety standard or contains a defect that relates to motor vehicle safety. 49 CFR 552.1. Upon receipt of a properly filed petition, the agency conducts a technical review of the petition, material submitted with the petition, and any additional information. § 552.6. After considering the technical review and taking into account appropriate factors, which may include, among others, allocation of agency resources, agency priorities, and the likelihood of success in litigation that might arise from a determination of a noncompliance or a defect related to motor vehicle safety, the agency will grant or deny the petition. § 552.8.

II. DEFECT PETITION BACKGROUND INFORMATION

By a letter dated August 21, 2014, the Center for Auto Safety (CAS) submitted a petition to NHTSA under 49 U.S.C. §30162 requesting "*a safety defect investigation into failures associated with the Totally Integrated Power Module (TIPM) installed in Chrysler SUV's, trucks, and vans beginning in the 2007 model year*." On August 27, 2014, CAS sent NHTSA a supplemental letter identifying 24 fatal crashes from Chrysler Early Warning Reporting (EWR) submissions that CAS alleged may be related to TIPM failures (Supplement I). On September 8,

2014, CAS sent another supplemental letter to NHTSA with 35 additional complaints allegedly related to TIPM failures (Supplement II). On September 25, 2014, NHTSA's Office of Defects Investigation (ODI) opened DP14-004 to evaluate the petition for a grant or deny decision. In a September 29, 2014 letter to CAS, ODI acknowledged receipt of the petition and requested additional information from CAS in support of its allegations that TIPM malfunctions may result in airbag non-deployment or unintended acceleration caused by the fuel pump failing to shutoff. After opening DP14-004, ODI received four additional CAS complaint supplements on September 30, 2014 (Supplement III), November 13, 2014 (Supplement IV), January 14, 2015 (Supplement V), and April 1, 2015 (Supplement VI).

The CAS petition provided the following broad allegation of defect conditions in TIPM modules:

> *Chrysler TIPM failures result in a variety of safety-related issues in multiple vehicle components, many of which have the potential for destructive results. Not only do Chrysler's faulty TIPMs result in vehicle stalling, they have also been implicated in airbag non-deployment, random horn, headlight, taillight, door lock, instrument panel and windshield wiper activity, power windows going up and down on their own, failure of fuel pump shutoff resulting in unintended acceleration, and fires. In the interim, these owners remain at the mercy of a defect which many have likened to the vehicle being possessed and uncontrollable. A look at consumer complaints filed with CAS suggests a better name for the TIPM - Totally Inept Power Module.*

Additionally, CAS referenced a recent filing of a class action lawsuit in the United States District Court, Central District of California, Velasco et al vs. Chrysler LLC, Case No. CV13-08080-DDP-VBKx affecting fifteen different Chrysler models and cited recalls 07V-291 and 13V-282. According to CAS, "*neither of these recalls was sufficient to address the TIPM problem throughout Chrysler's fleet, instead focusing on a highly limited set of vehicles and*

circumstances. Given the number and range of complaints related to Chrysler TIPMs, it is time for NHTSA to formally investigate TIPM failures across the board in 2007 and later models".

III. SUMMARY OF THE PETITION

The petitioner requests that NHTSA formally investigate TIPM failures across the board in 2007 and later models and cites the following allegations:

1. **Vehicle Stall**

   CAS stated in the defect petition letter and complaint Supplements III and IV that:

   TIPM failure contributes to a range of problems in vehicle electric components, the safety issue which continues to present itself in complaints is stalling, often in traffic where the dangers are obvious. The most often cited TIPM failure is a loss of vehicle power that can create a dangerous stall condition at any speed. Additionally, a survey of complaints related to Chrysler TIPMs suggests that a stall/no-start condition is most reported outcome of TIPM failure, leaving drivers without power in traffic and stranded for unknown periods of time before the vehicle regains the capacity to be started.

2. **Airbag Non-deployment**

According to CAS defect petition letter and complaint Supplement IV, *"Not only do Chrysler's faulty TIPMs result in vehicle stalling, they have also been implicated in airbag non-deployment. As NHTSA knows from the GM ignition switch mass defect, it is virtually impossible to be sure that an airbag will deploy until there is a crash. Complaints directly citing airbag system warnings can be found in the complaints received by CAS".*

3. **Unintended Acceleration**

CAS uses the term "unintended acceleration" in complaint letter Supplement IV dated November 13, 2014, *"to indicate reports where the vehicle continued to move or accelerate when the operator did not want this to happen. TIPM issues related to acceleration appear to arise from lack of fuel pump shut-off as well as problems with gear shift, throttle, and cruise*

control. Consumer problems related to acceleration, gear and/or throttle control may be found in CAS complaints."

4. <u>Fire and Other Symptoms</u>

According to CAS defect petition letter and complaint Supplement IV, *"Chrysler's faulty TIPMs have also been implicated in fires. Additionally, there are numerous complaints alleging bizarre and unexplained headlight and taillight failure, windshield wiper activity, instrument panel failure, and door lock problems."*

5. <u>EWR Fatalities</u>

CAS included as Attachment A to Supplement I what it believes to be EWR information for all fatal crashes involving TIPM failure. CAS claims that *"[s]ince the TIPM functions as the central gateway for all vehicle electronics, there are multiple EWR component codes that could point to the defect. There are 24 such crashes involving 28 deaths that the agency must consider in reviewing our petition, at least twelve of which have been the subject of DI requests. There are also a large number of injury crashes reported to EWR that involve these components."*

6. <u>Class Action Lawsuit</u>

The petition references a class action lawsuit as evidence of the breadth and scope of "the actual TIPM problem."[1] The class action cited by the petition was originally filed on November 1, 2013. The plaintiffs in the original complaint, which were not limited to TIPM equipped vehicles, included 2 MY 2011 Jeep Grand Cherokee owners, a MY 2011 Dodge Grand Caravan owner and a MY 2008 Chrysler 300 owner[2]. The lawsuit provided the following description of the alleged defect and affected vehicles:

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[1] The petition references Velasco et al vs Chrysler LLC, Case No. 13-cv-08080-DDP-VBK, in the United States District Court for the Central District of California as "incorporated herein by reference, covering fifteen different Chrysler models over a number of model years."

[2] The MY 2008 Chrysler 300 is not equipped with a TIPM body control module.

> "*Plaintiffs and the Class members they propose to represent purchased or leased 2008 model year Chrysler 300 and 2011-2012 model year Jeep Grand Cherokees, Dodge Durangos, and Dodge Grand Caravans equipped with defective Totally Integrated Power Modules, also known as TIPMs. The TIPM controls and distributes power to all of the electrical functions of the vehicle, including the vehicle safety and ignition systems. Vehicles equipped with defective TIPMs progress through a succession of symptoms that begin with an inability to reliably start the vehicle and lead to, among other things, the vehicle not starting, the fuel pump not turning off and the engine stalling while driving*."

A second amended complaint for the class action was filed on May 5, 2014, listing seven plaintiffs and redefining the scope of vehicles as all Chrysler vehicles equipped with TIPM-7 modules. The plaintiffs in the amended complaint consist of 6 MY 2011 Jeep Grand Cherokee owners and 1 MY 2011 Dodge Durango owner. The plaintiffs all alleged experiencing "no-start" concerns, with one also alleging a fuel pump run-on condition and another reporting a single incident of engine stall while driving. The amended complaint continued to focus on problems with starting, engine stall while driving and fuel pumps that do not turn off, while adding "headlights and taillights shutting off" and "random and uncontrollable activity of the horn, windshield wipers, and alarm system" to the claimed TIPM deficiencies. The class action does not include airbag non-deployment, unintended acceleration or fire among the alleged consequences of the claimed TIPM defect.

7. <u>Petition issues</u>

ODI identified several issues with the scope and supporting evidence for defect allegations in the petition submitted by CAS. The petition was unnecessarily broad in scope and included several alleged defects that had no factual basis. After failing to identify any clear basis for several of the petition allegations, ODI included a request for supporting information for claims regarding airbag non-deployment and unintended acceleration in its September 29, 2014 petition acknowledgement letter. The CAS response, provided in a November 13, 2014 letter, did not provide any technical basis for claims of airbag non-deployment and appeared to equate

any illumination of the airbag warning lamp with TIPM failure, even when the complaint clearly cited other causes for the airbag system fault (e.g, "faulty wiring in passenger front seat causing airbag failure warning to illuminate"[3] and "open circuit in drivers [sic] seat airbag"[4]). Several other complaints cited by CAS do not allege any airbag failures but, in apparent reference to CAS petition claims, state that TIPM failure "can cause the airbags to not deploy."

With regard to the basis for its claims that TIPM failures can result in unintended acceleration, CAS repeated its allegation that such failures are associated with fuel pump shut-off failures[5], even while acknowledging that none of the reports that it provided actually involved instances where fuel pumps failing to shut off resulted in unintended acceleration.[6] ODI notes that claims that unintended acceleration is caused by, or related to, a "lack of fuel pump shut-off" are not supported by any known incidents. Moreover, any allegation that a running fuel pump can, absent extremely idiosyncratic failures of many other systems, cause a vehicle to accelerate on its own demonstrates a fundamental misunderstanding of basic automotive engineering.

IV. ODI ANALYSIS

A. <u>Scope Analysis</u>

The CAS petition requests investigation of alleged failures of TIPM modules in Chrysler light vehicles, with no reference to the automotive industry body control technology implementations or architecture functionality distinctions: *"The CAS hereby petitions the National Highway Traffic Safety Administration (NHTSA) to initiate a safety defect investigation into failures associated with the Totally Integrated Power Module (TIPM) installed in Chrysler*

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[3] Identified by CAS as complaint number 62.
[4] Identified by CAS as complaint number 146.
[5] The CAS November 13, 2014 letter states that, "TIPM issues related to acceleration appear to arise from lack of fuel pump shut-off as well as problems with gear shift, throttle, and cruise control."
[6] The CAS November 13, 2014 letter states that, "There are quite a few consumer complaints in both CAS and NHTSA databases citing lack of fuel pump shutoff that result in stalling and/or nonstart condition but do not produce uncontrolled acceleration." This statement, which also misstates the effects of fuel pump shutoff failure, acknowledges the absence of any related complaints of unintended acceleration.

SUV's, trucks, and vans beginning in the 2007 model year". Interpreted broadly, the CAS petition potentially affects approximately 10 million[7] vehicles equipped with TIPM-6 or TIPM-7 modules. The petition scope does not appear to recognize the functional distinctions between TIPM-6 and TIPM-7. The petition also does not distinguish between the significant electronics technology differences between the relay based TIPM-7 and an all solid-state Field Effect Transistors (FET) TIPM-6.

TIPM-7 vehicle function outputs (such as fuel pump control, wiper/washer control…etc.) are a mix of electro-mechanical relays and solid state FET devices equipped with digital Serial Peripheral Interface (SPI) communication ports while TIPM-6 vehicle function outputs are strictly solid state SPI-based FET devices with no electro-mechanical relays. Relays are electro-mechanical devices with specific inherent break down mechanisms including, but not limited to, the degradation of the mechanically coupled moving contact spring arm and contact resistance[8]; both are design elements that do not exist in silicon only devices associated with TIPM-6. Similarly, TIPM-7 implementations include a fuse for overcurrent protection while the TIPM-6 system design uses an integrated silicon overcurrent protection feature specific to solid state devices.

ODI is interpreting the petition as a request for investigation of only vehicles equipped with the TIPM-7 (subject vehicles) for the following reasons: 1) the petition refers to TIPM installed in Chrysler vehicles "beginning in the 2007 model year" and TIPM-7 was introduced in the 2007 model year; 2) the affected models listed in the petition and in the class action lawsuit

[7] Chrysler SUV's, trucks, and vans equipped with TIMP-7 and TIPM-6 beginning MY 2007.
[8] Fuel pump relays were tested in simulated vehicle environments incorporating variable factors such as relay type; relay manufacture, simulated fuel pump current and inductance levels of representative TIPM-7 vehicles.

referenced by the petition are all TIPM-7 vehicles[9]; 3) approximately 93 percent[10] of the complaints submitted by CAS involve vehicles equipped with TIPM-7; 4) only 3 percent of CAS complaints are related to vehicles equipped with TIPM-6 and ODI's review of these complaints did not identify any safety defect trends[11]; and 5) the significant technical differences between the TIPM-6 and TIPM-7 modules as described above.

The TIPM-7 population includes approximately 4.7 million Chrysler sport utility vehicles, trucks, and vans across 11 vehicle platforms beginning in model year 2007 (Table 1). ODI conducted a detailed review of complaint narratives submitted by CAS and consumers including careful analysis of vehicle repair histories, warranty claims obtained from the manufacturer and any available Customer Assistance Inquiry reports (CAIR). In total, there were 296 complaints submitted by the petitioner in the original petition and five supplements, including 271 complaints related to the subject vehicles equipped with TIPM-7. ODI's complaint analysis focused on vehicles equipped with TIPM-7.

Models (Platforms)	Model Years	Population
Chrysler Town and Country/Dodge Grand Caravan (RT)	2008-14	1,632,250
Jeep Wrangler (JK)	2007-14	962,098
Ram 1500/2500/3500/4500and5500 (DS/DJ/DD/DP)	2009-12	929,036
Jeep Grand Cherokee/Dodge Durango (WK/WD)	2011-13	526,939
Jeep Liberty (KK)	2008-12	331,717
Dodge Nitro (KA)	2007-11	198,581
Dodge Journey (JC)	2009-10	156,537
Total TIPM-7	2007-14	4,737,158

Table 1. TIPM-7 Population.

[9] The CAS petition references a recent filing of a class action lawsuit in US District Court, Velasco et al vs. Chrysler LLC affecting fifteen different Chrysler models in which CAS cited the same fifteen vehicle models in the defect petition dated August 21, 2014. The Court order referenced by CAS specifically cited TIPM-7 in Case No. CV 13-08080 DDP, Dkt. No. 42, *"Plaintiffs allege that the TIPM with which the Class Vehicles are equipped, referred to as TIPM 7."*

[10] Percentage based on CAS complaints through Supplement V.

[11] The remaining CAS complaints are associated with vehicles equipped with Front Control Module and Body Control Modules.

B. TIPM Function

TIPM-7 is a controller area network (CAN) based body controller integrated with an electrical power distribution center; and is designed to support centralized and distributed vehicle control functions. The TIPM-7 electrical architecture features three levels of functional interactions with other vehicle systems: 1) power only interaction- circuits that only pass through the integrated fuse box (e.g. occupant restraint controller); 2) power and data transfer interaction for circuits that pass through the power distribution center with no TIPM control function (e.g. powertrain controller and transmission controller); and 3) power and control interaction for circuits that pass through the power distribution center and are directly controlled by the TIPM. The latter include power and control logic for exterior lighting, windshield wiper/washer, door lock, and horn. A distinguishing feature of the TIPM-7 from other Chrysler body controllers is the integration of the fuel pump relay.

C. Fuel Pump Relay Defect

In a September 3, 2014 letter to NHTSA, Chrysler submitted a Defect Information Report (DIR) identifying a defect in the fuel pump relay (FPR) within the TIPM-7 which can result in a no start or stall condition in approximately 188,723 model year (MY) 2011 Jeep Grand Cherokee (WK) and Dodge Durango (WD) vehicles manufactured from January 5, 2010 through July 20, 2011 (14V-530). In a February 24, 2015 letter, Chrysler submitted a second DIR expanding the scope of the FPR defect condition to include an additional 338,216 MY 2012 through 2013 Jeep Grand Cherokee vehicles manufactured from September 17, 2010 through August 19, 2013 and MY 2012 through 2013 Dodge Durango vehicles manufactured from January 18, 2011 through August 19, 2013 (15V-115). Chrysler identified the root cause as deformation of the relay contact spring due to the heat caused by contact power, ambient temperature around the fuel

pump relay, and battery voltage. These factors, present in combination and in high amounts, led to premature fuel pump relay failures, which usually resulted in a no-start concern. When the fuel pump relay fails while driving, the fuel pump will cease to function and the engine will shut off or "stall." In the case of a stall, the vehicle maintains power and functionality for certain features, such as hazard indicators, seat belt pre-tensioners and airbags. Chrysler's recall remedy involved installing a new, more robust fuel pump relay, external to the TIPM.

Detailed analysis of relay material composition, lab reports and fuel pump system design reviews performed by Chrysler and Continental that ODI reviewed in examining the petition identified the root cause of the premature relay failure to be contact erosion and the deformation of the contact spring due to under-hood temperatures around the fuel pump relay, current draws, and fuel pump inductance levels specific to Delphi fuel pumps installed on MY 2011-2013 Jeep Grand Cherokee and Dodge Durango vehicles. Vehicle fuel pump system measurements indicated that WK/WD vehicles have the highest current draw and inductance while RT minivans have the lowest current draw coupled with lower fuel pump inductance. Relay durability test data provided by Chrysler indicated that other TIPM-7 vehicle platform relays substantially outlasted relays tested in a simulated WK/WD environment. NHTSA believes that because the current draw is lower for other vehicles equipped with the TIPM-7 than for the WK/WD vehicles, the risk of fuel pump relay deformation for these other vehicles is lower than for the WK/WD vehicles.

On October 20, 2014, ODI sent an Information Request (IR) letter to Chrysler requesting production, complaint, and warranty claim data related to the complaints provided by CAS and ODI complaints involving stall while driving allegations potentially related to TIPM faults. The IR letter also requested information related to the fuel pump relay root cause analysis and

technical data regarding TIPM design and construction. Analysis of the field data submitted indicated that the WK/WD vehicles exhibited significantly higher complaint rates related to FPR failures than other subject vehicles (Table 2). The data show that the primary failure mode of the fuel pump relay is a no-start condition, with no-starts and starts followed immediately by stall accounting for approximately 68% of the complaints for both the recalled WK/WD vehicles and the non-recalled subject vehicles.

TIPM-7 Vehicles		Fuel Pump Relay Failure Mode									
		Stall While Driving		Start with Immediate Stall		No-Start		Pump Run-On		Total	
Fuel Pump Relay Recalls	Platforms	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Recalled	WK/WD	37	7.0	4	0.8	82	15.6	3	0.6	126	23.9
Non-recalled	JC	2	1.3	0	0.0	3	1.9	0	0.0	5	3.2
	KA	1	0.5	0	0.0	2	1.0	0	0.0	3	1.5
	RT	1	0.1	1	0.1	4	0.2	1	0.1	7	0.4
	JK	1	0.1	0	0.0	3	0.3	0	0.0	4	0.4
	Ram	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	KK	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Total	5	0.1	1	0.0	12	0.3	1	0.0	19	0.5
Grand Total TIPM-7		42	0.9	5	0.1	94	2.0	4	0.1	145	3.1

Table 2. Fuel Pump Relay Complaint Analysis, by Total Failure Rate[12]
(all rates are in complaints per 100,000 vehicles).

ODI's analysis of all confirmed FPR failures identified a total of 145 complaints, including 42 resulting in at least one incident of stall while driving. The recalled WK/WD vehicles, which comprise only 11 percent of the subject vehicle population, account for 126 of the total FPR related complaints (87 percent) and 37 of those involving stall while driving (88 percent). This analysis combined with overall warranty claim data analysis and vehicle test data

[12] Complaint data in Table 2 is limited to CAS complaints and ODI VOQ's potentially related to stall while driving that were identified prior to ODI's information request letter to Chrysler for DP14-004.

related to FPR root cause analysis indicate that, based on currently available information, the scope of recalls 14V-530 and 15V-115 adequately address the FPR defect condition.

D. <u>Other Stall While Driving Defects</u>

In addition to the analysis of complaints related to confirmed FPR failures to assess the scope of Chrysler recalls 14V-530 and 15V-115, ODI also examined all stall while driving complaints allegedly related to TIPM failures in the subject vehicles to assess whether any other engine stall related defect conditions may exist in the subject vehicles that are not already addressed by a safety recall. ODI's analysis did not identify any specific TIPM faults resulting in incidents of stall while driving that are not already addressed by safety recalls[13] and analysis of complaints did not identify any additional defect trends associated with potentially TIPM-related stall while driving that warrant additional investigation.

ODI's analysis identified a total of 131 complaints alleging TIPM related stall while driving incidents. Fifty-five (55) of the complaints were found to be unrelated to TIPM failures, including 10 associated with a defect condition addressed by alternator replacement recall 14V-634.[14] A total of 76 complaints were identified that were either confirmed to be related to a TIPM fault condition (49) or where either the FPR or other, unspecified, TIPM fault condition may have been the cause (27).[15] Table 3 shows the failure rates for potentially TIPM related stall while driving incidents for the recalled WK/WD vehicles and for each of the non-recalled platforms. These data do not indicate a stall while driving defect trend outside of the recall population.

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[13] In addition to FPR recalls 14V-530 and 15V-115, Chrysler previously initiated recall 07V-291 to address a defect condition in approximately 81,000 MY 2007 JK and KA vehicles associated with the PCM momentarily shutting the engine down due to a prolonged (75ms) TIPM microprocessor reset triggered by a vehicle-wide CAN bus error event.

[14] For recall 14V-634, vehicles equipped with the 3.6L engine and 160 Amp Alternator may experience a rapid alternator failure having limited or no detection, which can result in vehicle shutdown/shut off and/or fire.

[15] Unknown/possible TIPM's include several for which the condition could not be duplicated by the servicing dealer.

TIPM-7 Vehicles		Not related to TIPM			Potentially TIPM related			
Fuel Pump Relay Recalls	**Platforms**	**Alternator recall 14V-634**	**Other Non-TIPM[16]**	**Total**	**Fuel Pump Relay**	**Possible TIPM**	**Total**	**Total Rate (C/100k)**
Recalled	WK/WD	10	17	27	40	14	54	10.2
Non-recalled	KA	0	5	5	1	3	4	2.0
	JC	0	1	1	2	1	3	1.9
	RT	0	9	9	4	6	10	0.6
	Ram	0	5	5	1	2	3	0.3
	JK	0	6	6	1	1	2	0.2
	KK	0	2	2	0	0	0	0.0
	Total	0	28	28	9	13	22	0.5
Grand Total TIPM-7		10	45	55	49	27	76	1.6

Table 3. Stall While Driving Analysis, All Causes[17].

Additionally, the recalled WK/WD vehicles and other TIPM-7 platforms differ significantly when age and exposure are considered. The subject vehicles range from less than 1 year to up to 9 years of service exposure, while the recalled WK/WD vehicles range in age from 2 to 5 years of service. Most of the WK/WD complaints involved the MY 2011 vehicles recalled under 14V-530, which account for 98 (78%) of the total WK/WD FPR complaints shown in Table 2 and 48 (89%) of the potentially TIPM related WK/WD stall complaints shown in Table 3. Table 4 shows complaint data related to FPR failures resulting in stall while driving for the subject vehicles for just MY 2011 vehicles. The recalled MY 2011 WK/WD vehicles account for 25 percent of production, 88 percent of confirmed FPR stall while driving incidents and 81 percent of all potentially TIPM related stall while driving incidents in MY 2011 subject vehicles.

[16] Faults reported in repair histories included WIN control module faults, PCM faults, engine misfire and other engine compartment components and harness issues.
[17] Table 3 includes all CAS (through Supplement VI) and ODI complaints related to allegations of SWD.

MY 2011 TIPM-7 Vehicles			Potentially TIPM related			
Fuel Pump Relay Recalls	**Platforms**	**Population**	**Verified TIPM (FPR)**	**Possible TIPM**	**Total**	**Total Rate (C/100k)**
Recalled	WK/WD	188,723	36	12	48	25.4
Non-recalled	JC	0	0	0	0	0.0
	KA	35,609	0	0	0	0.0
	RT	137,740	4	4	8	5.8
	JK	103,881	0	0	0	0.0
	Ram	242,676	1	2	3	1.2
	KK	56,939	0	0	0	0.0
	Total	576,845	5	6	11	1.9
Grand Total MY 2011		765,568	41	18	59	7.7

Table 4. Stall While Driving Analysis, Potentially TIPM related, MY 2011 only.

E. Airbag Non-Deployment

The CAS petition alleges that TIPM failures are responsible for airbag non-deployments. ODI examined this contention and finds it has no merit. First, ODI's analysis of the airbag system architecture in the subject vehicles indicates that airbag control is performed by the Occupant Restraint Control (ORC) module in the Chrysler vehicles and the TIPM-7 functions only to provide power to the ORC and does not contain any logic for airbag deployment control or crash event discrimination. Second, the TIPM supplies power to the ORC through two independent fused power feeds providing an extra level of redundancy and safety to the airbag system in the subject vehicles.[18] Third, ODI did not identify any mechanisms for TIPM failure or power disruptions in a crash event. Fourth, any interruption in power resulting from such a failure would not interfere with the ORC deployment decision or prevent it from operating on

[18] The use of independent power feeds is a level of functional safety that makes the power delivery for the ORC module in the subject vehicles fairly robust in comparison to the airbag ECU's in many peer designs reviewed by ODI.

reserve power.[19] Lastly, the complaint data offered by the petitioner, analysis of ODI complaint data, and analysis of EWR death and injury claims cited by the petitioner that were related to airbag deployment also failed to support a finding that TIPM failures have caused any incidents of airbag non-deployment (see **Section F. EWR Fatalities**). ODI's review of CAS and ODI complaints related to airbags and TIPM did not identify any incidents where a TIPM failure was followed by a crash event or any non-deployment incidents in which the airbags would have been expected to deploy or were associated with evidence of TIPM malfunction.

The Run-Start and Run-Only relays are integral to the TIPM and provide power to multiple circuits including the ORC. The Run-Start relay is powered during engine crank and both the Run-Start and Run-Only relays are powered when the ignition is in RUN mode. Examination of the airbag system architecture for the subject vehicles shows that power flows in the Run-Only and Run-Start condition through the TIPM-7 to the ORC through two independent and redundant fused power feeds. The ORC dual feed safety strategy is designed so that each power feed alone is capable of providing the necessary power to deploy all required restraints. According to Chrysler's IR response, the loss of power from one ORC power feed will result in an Airbag Warning Lamp (ABWL), but will not affect deployment capability. The ORC is still able to evaluate sensor inputs, determine if a deployment is required, and deploy airbags as needed. In the event of a loss of a single power feed, whether the IGN_RS or the IGN_RO feed, the ORC will set a specific fault code and turn on the ABWL.

If for any reason the ORC loses both power feeds while the vehicle remains powered, the instrument cluster will set a fault and activate the ABWL. None of the CAS or ODI complaints reviewed by ODI contained evidence that either a single or dual power loss to the ORC occurred.

[19] There is a minimum of 150ms of back-up power internal to the ORC that is available as reserve power in the event of power interruption during a crash event.

Simultaneous power loss on both ORC feeds could result from a complete TIPM failure. However, in the event of a complete TIPM failure, the vehicle will lose power to multiple other systems with instrument cluster lights indicating faults in systems powered through the TIPM. None of the repair history records provided by Chrysler included any evidence of faults indicating a loss of power to the ORC or other vehicle systems resulting from a failure of the power feed from the TIPM. Complaints reporting active ABWL were either related to internal ORC malfunctions or other SRS (Supplemental Restraint System) component failures such as seat harness or clock spring shorting conditions.

The petitioner identified complaints citing airbag system warnings as evidence of TIPM failures resulting in possible airbag non-deployments. These complaints, once analyzed, were found to be either related to specific airbag system component malfunctions (such as seat harness, clock spring failures...etc.), or occurred in vehicles subject to previous TIPM-7 recalls, ORC recalls (13V-282),[20] or inadvertent ignition key (WIN/FOBIK) displacement recalls (11V-139 and 14V-373). None of the incidents reported by the petitioner, ODI complaints or EWR claims cited by the petitioner can be traced to a TIPM fault that resulted in a loss of power to the ORC.

F. <u>Unintended Acceleration</u>

ODI finds no basis for CAS claims that TIPM failures have resulted in incidents of unintended acceleration, either based on a technical review of the vehicle powertrain control function area or analysis of complaints. The Powertrain Control Module (PCM) performs all engine and transmission management control functions in the Chrysler vehicles and the TIPM functions only to provide power to the PCM and does not contain any torque management

[20] For recall 13V-282, Occupant Restraint Control (ORC) module resistor may fail from electrical overstress (EOS), resulting in airbag light and loss of head restraint function.

control logic. ODI reviewed each complaint submitted by CAS and consumers and did not identify any evidence of TIPM, or any other vehicle component, failures resulting in unintended acceleration.

The petitioner's allegations of UA resulting from the fuel pump failing to shut-off after "key-off" vehicle shutdown are premised on an incorrect belief that continued fuel pump operation and presence of fuel line pressure would somehow translate into un-commanded acceleration. The fuel pump only makes fuel available to the engine; actual use of that fuel is controlled by the PCM through the fuel injectors, not the pump. Moreover, once fuel is fed to the engine cylinders by the fuel injectors, it must have both a stoichiometric air mass from the throttle and be ignited by a spark, which are also controlled by the PCM. When the ignition has been turned "Off", power is removed from the PCM, the electronic throttle is disabled and the ignition system no longer provides a spark. If a TIPM failure resulted in the fuel pump continuing to run after the key is turned off, the most likely harmful result would be a dead battery.

Analyses of the UA incidents alleged to have occurred by the petitioner do not support a finding of any TIPM failure or any other vehicle malfunction. For example, CAS cited an incident involving a MY 2013 Dodge Challenger. According to CAS Supplement IV, *"You will find attached to this letter an accident report from a May 2014 crash involving unintended acceleration in Vancouver, WA. The vehicle involved, a 2013 Dodge Challenger, is not a model included in the CAS petition, but does contain a TIPM that is the alleged source of the acceleration event".* The referenced attachment provided a 42-page police report and photographs. According to the police report, the Challenger passed directly in front of a patrol car within approximately 20-30 feet. The report specifically indicates that the operator's head

position appeared to be downward with chin resting against the chest. The crash occurred when the operator did not make any attempts to slow or steer the vehicle to negotiate a roundabout. The PAR report made no reference to unintended acceleration or any attempts by the driver to slow down the vehicle or avoid property damage. Finally, ODI notes that the 2013 Challenger is not equipped with a TIPM.

G. Fire and Other Symptoms

ODI finds no basis for CAS claims that TIPM failures have resulted in vehicle fires or any other failure modes representing potential safety hazards. Vehicle inspection reports of the alleged fires in the petition letter and supplemental submissions lack any evidence of a safety related defect or a trend of such defects in the subject vehicles. Allegations reporting fire or smoke are either related to external aftermarket vehicle body builder up-fitter integration[21] or thermal damage in the alternator diode with no damage beyond the alternator assembly, recall 14V-634.

Additionally, ODI carefully analyzed the petitioner data related to headlight and taillight failure, windshield wiper activity, instrument panel failure, and door lock problems. Vehicle functions related to TIPM-7 EX-2 relays typically fail in an active state[22] with no loss of system functionality. ODI's analysis of complaints provided by CAS and received by the agency did not identify any patterns or trends related to loss of headlights or taillights while driving or to driver distraction from unexpected activation of windshield wipers/washers, horn or car alarm while

[21] Inspection and assessment confirmed that the cause of this incident was improper installation of aftermarket equipment. There are two aftermarket wire bundles extending from the B+ cable, which are secured using a non OEM aftermarket nut. There was significant aftermarket wiring throughout the vehicle that was not installed, or connected in accordance with the Chrysler provided Ram Body Builders Guide.

[22] Active state typically involves a powered relay.

driving due to TIPM malfunction.[23] No safety related defect or a trend of such defects in the subject vehicles is observed.

H. <u>EWR Fatalities</u>

ODI's analysis of 24 EWR death claims identified by CAS in Supplement I as potentially related to TIPM failures,[24] did not identify any evidence that TIPM faults caused or contributed to any of the incidents. None of the reports cited by the petitioner alleged loss of control or airbag non-deployment due to loss of power from the TIPM module. The petitioner posits that there was a loss of power to the ORC and other vehicle systems in the referenced crash and non-deployment events that led to the death and injury.

Sixteen (16) of the reports cited by CAS are related to TIPM-7 equipped vehicles and included 6 death and injury incidents in which a frontal airbag, side airbag, or pre-tensioner successfully deployed, demonstrating the integrity of power delivery from the TIPM was not compromised before or during the collision event. Of the remaining reports, two reports did not involve any claims relating to loss of control or airbag non-deployment, or any other vehicle defect.[25] The remaining claims were related to an unpowered rollaway due to documented incorrect gear selection, an alleged sudden acceleration with no evidence of any throttle control or brake system faults, a brake failure claim, 3 airbag non-deployments with crash dynamics that did not warrant deployment, and 2 non-deployment where the non-deployment may have involved inadvertent ignition key (WIN/FOBIK) displacement.[26]

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[23] Repair records indicated malfunctions outside of TIPM, e.g. wiper stalk.
[24] According to CAS Supplement I: "Since the TIPM functions as the central gateway for all vehicle electronics, there are multiple EWR component codes that could point to the defect. These codes include airbags, electrical system, engine and engine cooling, exterior lighting, fire related, powertrain, service brake, speed control, and unknown".
[25] The "claims" were simply requests for assistance with downloading EDR data for the crash event.
[26] Both vehicles were 2008 Chrysler Town and Country minivans that were in the scope of WIN/FOB recall 14V-373.

V. CONCLUSION

ODI's analysis of the CAS allegations of TIPM defects resulting in stall while driving, airbag non-deployment, unintended acceleration, fire and other faults identified a single defect condition related to 1 of over 60 different circuits in the TIPM assembly. The most common effect of this defect condition, related to the fuel pump relay, was a no-start concern, but it could also result in stall while driving. This fuel pump relay defect was limited to approximately 11 percent of the 4.7 million subject vehicles equipped with TIPM-7 and has been addressed by safety recalls 14V-530 and 15V-115. No valid evidence was presented in support of claims related to airbag non-deployment, unintended acceleration or fire resulting from TIPM faults and these claims were found to be wholly without merit based on review of the field data and design of the relevant systems and components.

Except insofar as the petitioner's contentions relate to the defect condition addressed by the Chrysler recalls, the factual bases of the petitioner's contentions that any further investigation is necessary are unsupported. In our view, additional investigation is unlikely to result in a finding that a defect related to motor vehicle safety exists or a NHTSA order for the notification and remedy of a safety-related defect as alleged by the petitioner at the conclusion of the requested investigation. Therefore, the petition is denied. This action does not constitute a finding by NHTSA that a safety-related defect does not exist. The agency will take further action if warranted by future circumstances.

Authority: 49 U.S.C. 30162(d); delegations of authority at CFR 1.95.

Frank S. Borris II,
Acting Associate Administrator for Enforcement,
National Highway Traffic Safety Administration,
U.S. Department of Transportation.

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