U.S. Department of Transportation

National Highway Traffic Safety Administration

ODI RESUME

OFFICE OF DEFECTS INVESTIGATION

NHTSA

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Investigation: EA 10-003
Prompted by: Consumer Complaint
Date Opened: 04/13/2010 **Date Closed:** 03/05/2012
Investigator: Bruce York-B
Approver: Frank Borris
Subject: HVAC Switch Failures

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: FORD MOTOR COMPANY
Products: 1997-2008 E350/450 Ford Cab/Chassis
Population: 1,076,975

Problem Description: The Blower Motor Control Switch on certain Ford E350/450 vehicles may overheat/melt and catch fire.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	3	27	30
Crashes/Fires:	3	64	67
Injury Incidents:	0	0	0
Fatality Incidents:	0	0	0
Other*:	196	746	942**

***Description of Other:** ODI reports from fleets, Mfr. warranty claims, for melting for burning Blower Motor Control Switches

** Count indicates duplicate reports received by ODI and manufacturer.

ACTION / SUMMARY INFORMATION

Action: This Engineering Analysis has been closed.

Summary:

This investigation was opened based on one complaint and reports from four transportation fleets alleging 182 blower motor control switch failures. ODI was concerned that these melting and burning switches could lead to an open flame that could spread throughout the vehicle.

After a comprehensive review of all data related to overheating blower motor control switches in the subject vehicles, ODI did not identify the existence of a safety defect trend. ODI reviewed 1,036 complaints, claims, and field reports of failed blower motor control switches and determined that only two fires were likely to have been caused by a failing subject blower motor control switch. This represents a failure rate of 0.2 R/100K on a population of 1,076,975 vehicles that have been in service for up to 14 years. ODI has found that when the subject switches do fail and begin to melt, they are constructed in a manner that typically prevents the failing switch from igniting and developing into an open flame.

Ford Motor Company has agreed to take two actions to further reduce the likelihood an overheated blower motor switch in the subject vehicles. Ford informed ODI that it has implemented a series of design changes to the subject switch that will help prevent it from developing internal high resistance short circuits. Ford has also informed ODI that it would release a Technical Service Bulletin (TSB-11-11-21) instructing subject vehicle owners to replace the electrical connector at the same time a failed switch is replaced.

In light of the low rate of failure resulting in open flame and fire spread on the subject vehicles, and Ford's actions to reduce the likelihood of a switch failure through switch design changes and a TSB, further use of agency resources

does not appear to be warranted. The closing of this investigation does not constitute a finding by NHTSA that no safety-related defect exists. The agency reserves the right to take further action if warranted by the circumstances.

The ODI complaints cited above can be reviewed at www-odi.nhtsa.dot.gov/complaints under the following (ODI) numbers: 10427875, 10114393, 10257890

For additional information, see the attached closing report.

ENGINEERING ANALYSIS CLOSING REPORT

SUBJECT VEHICLES: 1997-2008 E350/450 Ford Cab/Chassis Vehicles

EA No.: 10-003 **Date Opened: 13-Apr-10** **Date Closed: 05-Mar-12**

BASIS: ODI opened this investigation based on 1 complaint and reports from 4 transportation fleets alleging 182 blower motor control switch failures. Each fleet operates buses built on Ford E350 or E450 cutaway chassis. The Original Equipment Manufacturer (OEM) HVAC blower motor control switches (manufactured by Indak Manufacturing Corp.) have melted, smoked, burned and become inoperable on vehicles in each fleet.

THE ALLEGED DEFECT: The blower motor control switch on certain Ford E350/450 vehicles may overheat/melt and catch fire. This fire could possibly spread to the rest of the vehicle.

VEHICLE POPULATION: Ford sold 1,076,975vehicles in the United States. Table 1. shows the production volumes by model year and model.

Model Year	Model	Production	Model	Production
1997	Ford E-350	68807	Ford E-450	16768
1998	Ford E-350	73728	Ford E-450	17194
1999	Ford E-350	71363	Ford E-450	20622
2000	Ford E-350	61797	Ford E-450	17980
2001	Ford E-350	57812	Ford E-450	17782
2002	Ford E-350	60158	Ford E-450	23716
2003	Ford E-350	70734	Ford E-450	28218
2004	Ford E-350	56536	Ford E-450	24181
2005	Ford E-350	51808	Ford E-450	24514
2006	Ford E-350	102610	Ford E-450	52269
2007	Ford E-350	50826	Ford E-450	27164
2008	Ford E-350	55550	Ford E-450	24838

Table 1. Subject Vehicle Production Data

DESCRIPTION OF COMPONENTS: The blower motor control switch (pictured and identified in Figure 1.) in the subject vehicles is located on the instrument panel between the driver and front passenger seats. The HVAC blower motor control switch controls the defroster, heat, and air conditioning airflow inside the vehicle.

Power to the blower motor is supplied through a 50 amp fuse and passes current through a "blower motor relay." The relay is energized (passing current) when the ignition key is in the "run" position and the HVAC mode selector (pictured and identified in Figure 1.) is in any position except "off." When the relay is energized, current passes from the fuse to the blower motor, the blower motor control switch and a blower motor resistor package. The resistor package places different resistances in series with the switch, depending on switch position, to regulate the blower motor speed. The resistor package is protected from overheating by a thermal limiting device. Note that the front blower motor system does not have an "off" position. Whenever the blower motor relay is energized, the blower motor fan operates at some speed. No current passes through the blower motor control switch (i.e. all current passes through the resistor package) when the blower motor switch is in the "lo" position.

Maximum current flow through the blower motor control switch occurs when it is in the "hi" position. The blower motor is designed to draw a maximum of 27.3 amps under normal conditions. The blower motor switch is rated to operate at 35 amps continuously. The wiring connecting the blower motor and switch circuitry utilizes a combination of 10 gauge and 12 gauge wiring. There are many factors that determine current carrying capacity for wire, including the wire gauge, wire length, operating environment, and type of wire insulation. Ford provides general guidance to vehicle modifiers that 12 gauge wire has a maximum current capacity of 30 amps and 10 gauge wire has a maximum current capacity of 40 amps.

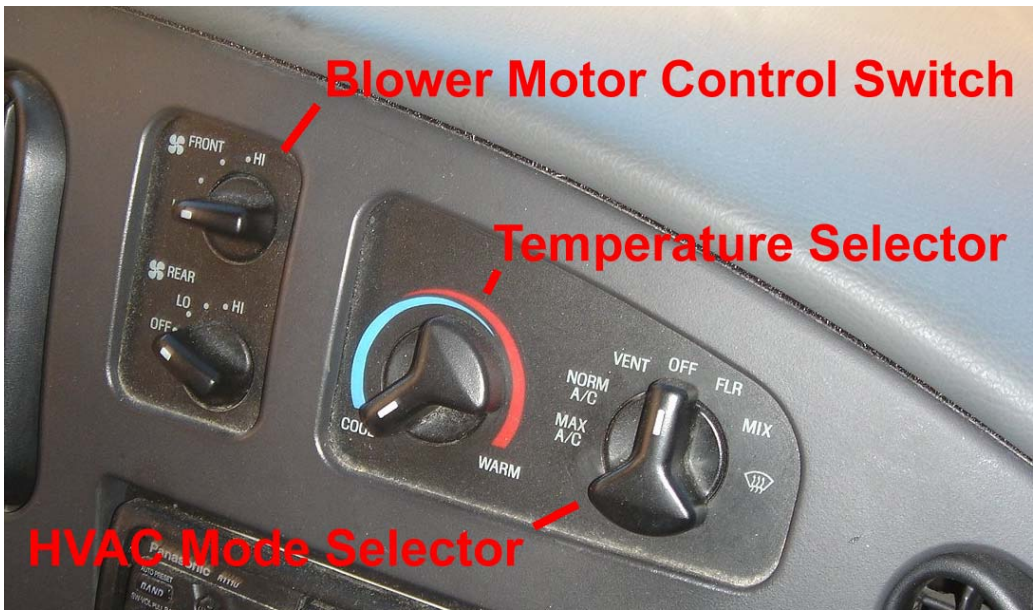

Figure 1. HVAC System Controls

CORRESPONDENCE: Table 2. lists the correspondence dates between Ford/Indaak and NHTSA.

MFR	NHTSA to MFR	MFR to NHTSA	Confidentiality		
			Date of Request	Date of NCC Response	Items Confidential
Ford	14-Dec-2009	12-Feb-2010	16-Feb-2010	30-July-2010	App. H
Ford	17-Jun-2010	28-Jul-2010	-	-	-
Ford	05-Jul-2011	19-Jul-2011	-	-	-
Indak	17-Jun-2010	02-Aug-2010	-	-	-
Indak	05-Jul-2011	20-Jul-2011	-	-	-

Table 2. Investigation Correspondence

PROBLEM EXPERIENCE: Blower motor control switch failures were considered in this investigation based on the Early Warning Reporting (EWR) definition of "fire", which is as follows: Fire means combustion or burning of material in or from a vehicle as evidenced by flame. The term also includes, but is not limited to, thermal events and fire-related phenomena such as smoke and melting, but does not include events and phenomena associated with a normally functioning vehicle such as combustion of fuel within an engine or exhaust from an engine.

At the time of this report, ODI has received 3 consumer complaints and multiple reports from 4 transportation fleets alleging a total of 199 switch failures manifesting conditions meeting the EWR definition of "fire"[1]. Each of the 4 transportation fleets operates buses built on a Ford E350 or E450 cutaway chassis. The OEM HVAC blower motor control switches have allegedly melted, smoked, burned or developed open flame and become inoperable on vehicles in each fleet. In many cases there were multiple (up to 5) switch failures occurring on a single vehicle. Some drivers reported a burning smell or smoke coming from the dash. Three of the fleets reported vehicle fires where the fire involved areas of the vehicle beyond the blower motor control switch and appeared to have originated in the dashboard area. No injuries were reported.

ODI has received 91 reports, from Ford, of blower motor switch failures meeting the EWR definition of "fire"[2]. Of the 91 incidents, 64 involved incidents where fire consumed a portion of the vehicle beyond the blower motor control switch (regardless of the origin of the fire). ODI also received information reflecting 746 warranty claims meeting the EWR fire definition[3]. Of these claims, 20 described fire damage beyond the blower motor control switch. No injuries were reported.

[1] *See* Table 3, Failure Reports, which indicates that at EA close there were 3 owners reported failures where the fire was external to the switch and 196 owner reported failures where there was a melted switch.
[2] *See* Table 3, Failure Reports, which indicated that the manufacturer reported 64 failures where the fire was external to the switch and 27 failures where there was a melted switch.
[3] *See* Table 3, Failure Reports, Warranty Claims (fire external to switch) and Warranty Claims (Melted switches).

Evidence Collection. ODI focused on those incidents where the "fire" involved more of the vehicle than just a melted blower motor control switch. A count of the incidents alleging a fire external to the switch totals 87 incidents[4].

The amount and quality of the evidence varied considerably in the fire complaints received by ODI. Therefore, to better assess which fires had evidence of blower motor control switch involvement, ODI carefully analyzed all of the available information and called vehicle owners to gather additional information when necessary.

For these alleged 87 "fire external to the switch" incidents, ODI sought any photographs taken of the vehicle during or after the fire, receipts for any service performed before or after the fire, eyewitness accounts of the fire, cause and origin fire investigation reports written by a professional fire investigator, physical evidence including the blower motor control switch removed from the vehicle, and owner's testimony as to what events occurred before the fire. ODI attempted to contact owners, insurance companies, fire investigators, attorneys, and eye witnesses in order to gather the required evidence.

ODI evaluated the evidence collected relating to an alleged fire external to the switch to evaluate whether the fire appeared to be caused by a failed blower motor control switch.
ODI used the following protocols in determining whether to include an incident beyond a melted blower motor switch as a "fire" for the purpose of this investigation:

To mark an incident as a "No":

(1) If, after review of the evidence collected, the alleged fire did not appear to be caused by a failed blower motor control switch; or
(2) If the complainant/owner could not be contacted.[5] This "No" did not mean that the fire was not related to the blower motor control switch, but that not enough data could be collected to make a determination.

To mark an incident as a "Yes":

(1) The fire originated in the area where the blower motor control switch is located (center of dash board between the driver and front passenger seats) and (2) there was evidence of blower motor control switch failure prior to the fire (e.g., inoperable blower motor, certain blower motor speeds not working, melted blower motor knob, hot blower motor knob); or
(2) Evidence of blower motor switch failure was discovered during post-fire forensic examination.

Failure data: As noted above, after reviewing all of the complaints received by ODI during investigations PE09-055 and EA10-003 there were a total of 87 incidents reported on Ford E-350 and E-450 model vehicles where fire had consumed portions of the vehicle external to, and were potentially related to, a blower motor control switch failure. A breakdown of the incidents by model and model year is provided in Table 3.

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[4] *See* Table 3, Failure Reports at EA Close, Owner Reported Failures (fire external to switch) is a total of 67 and Warranty Claims (fire external to switch) is 20. Therefore there are a total of 87 reports at EA Close alleging a fire external to the switch.

[5] The complainants could often not be contacted. The owners may have moved or changed contact information.

Problem Experience	At Date EA Open		As Date EA Closed	
	ODI	MFR	ODI	MFR
Owner Reported Failures (Fire external to switch)	3	34	3	64
Owner Reported Failures (Melted switches)	180	21	196	27
Field Reports	0	0	0	0
Warranty Claims (Fire external to switch)	-	6	-	20
Warranty Claims (Melted switches)	-	585	-	726
Crash Incidents	0	0	0	0
Injury Incidents	0	0	0	0
Fire Spread Incidents (Believed caused by Blower Motor Switch)	0	0	0	2

Table 3. Failure Reports

Using the criteria described in the Evidence Collection section above, ODI identified a total of 2 of the 87 incidents reported involving an actual fire that spread beyond the blower motor control switch ("fire spread incidents") that could be confirmed or are believed to be related to blower motor control switch failures.

As part of this investigation, ODI determined the complaint rates for both melting of blower motor control switches and fire spread incidents" that ODI believes resulted from the blower motor control switches. The results of the rate analyses are shown in Chart 1.

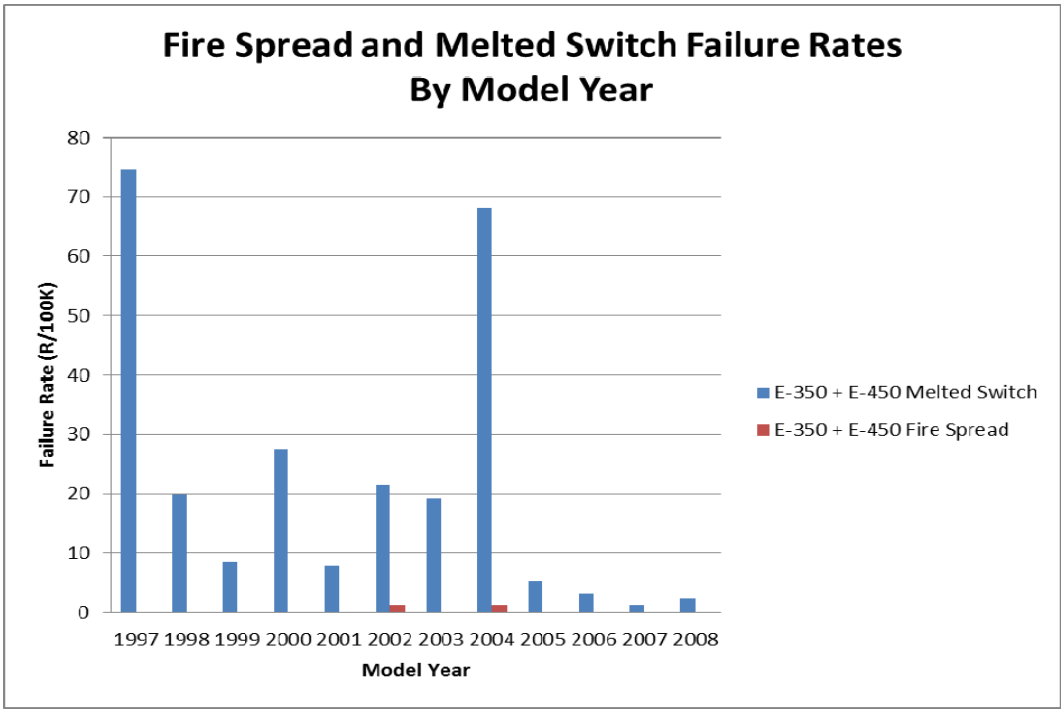

Chart 1. Complaint Rate Analysis

Chart 1. indicates the failure rate of blower motor control switches that resulted in a fire spreading to components other that the switch itself is very low. There were only two incidents where ODI believes this type of fire occurred. The overall failure rate for fire spreading from the blower motor control switch is 0.2 R/100K for the entire population of subject vehicles.

Chart 1. also shows that the rate of blower motor control switches melting or burning is higher for certain model year vehicles. ODI believes the reason for the large differences in failure rates between the model years results from how the failures were reported to the office. The majority of the failures were reported to ODI from 4 fleets. These fleets often do not have large numbers of vehicles from each model year and in some cases may only have vehicles from select model years. For this reason the majority of the data reported to ODI was from a very narrow group of model year vehicles and resulted in certain model years being over represented. ODI does not believe there is a design or manufacturing difference that is driving these differences in failure rates. ODI's opinion is supported by the warranty claims data that is derived from a much larger population of vehicles. The overall rate for melted or burned switches is 20.6 R/100K for the entire subject vehicle population. The average (first switch failure) mileage for these vehicles is 139,010 miles.

WARRANTY DATA: Warranty data submitted by Ford in response to ODI's December 14, 2009 and June 17, 2010 information request (IR) letters identified 746 warranty claims potentially related to the alleged defect condition in the subject vehicles. The data indicate that the alleged defect condition, identified from claims of blower motor control switches melting, smoking, burning or developing open flame and becoming inoperable, has been reported on 0.07 percent for the subject vehicles. These warranty claim rates are shown in Chart 2 for each model year vehicle. Of the 746 claims, none was found to have developed open flame caused by a blower motor control switch failure. The standard warranty coverage for the subject vehicles is 3

years or 36,000 miles. Although the average failure mileage for complaint vehicles is 139,010 miles (well outside the warranty coverage period), the average failure mileage for the warranty claims provided by Ford is 56,246 miles (also outside standard coverage) and shows that the warranty data does provided some indication of blower motor switch failure rates. The switches in these claims were covered by "good will" or extended warranty policies.

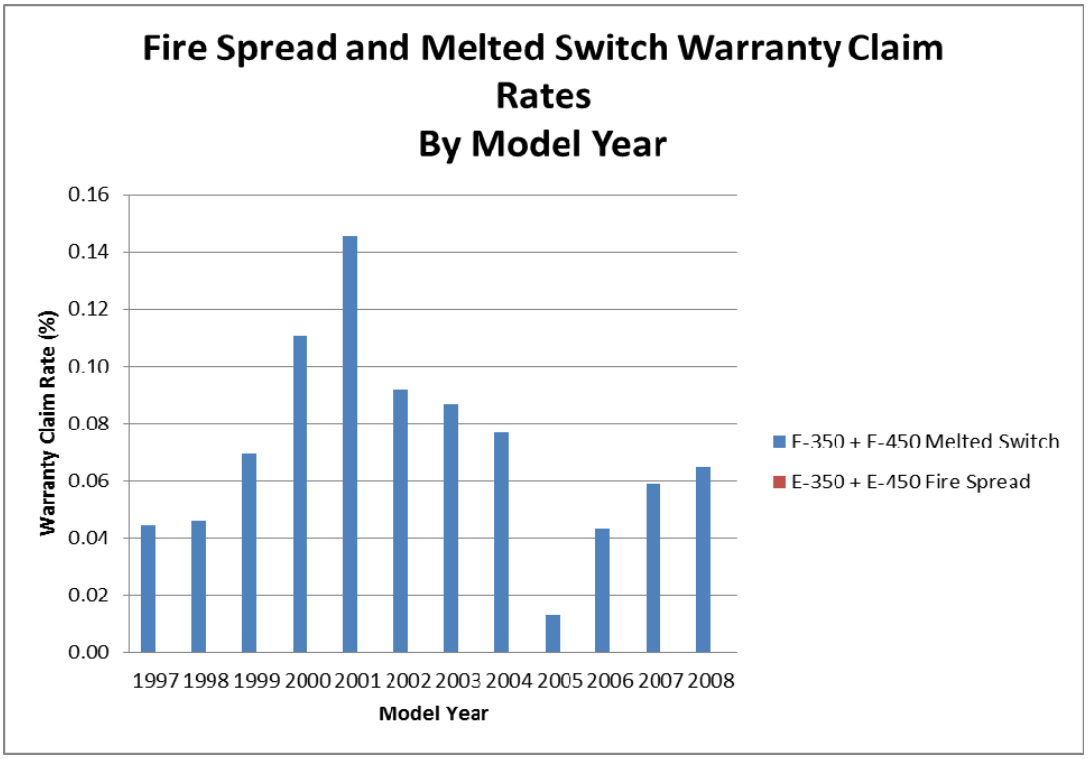

Chart 2. Warranty Rate Analysis

PREVIOUS INVESTIGATIONS: ODI has conducted one other investigation involving a vehicles blower motor control switch. Investigation EA01-001 focused on fires occurring in certain 1995 through 1999 Ford vehicles. At the time the investigation was opened, ODI had received consumer complaints alleging that the blower switch/resistor/wiring harnesses on the subject vehicles were overheating and burning. In some cases the consumers alleged that the vehicle had caught on fire. During the course of the investigation it was discovered that the cause of the fires was not a defect in the blower switch design but was instead a problem with the resistor in the system. Ford recalled the vehicles (01V-230) and replaced the heater blower resistor and wiring jumper harness. The number of vehicle affected by the recall was 335,532. The number of vehicles that experienced an open flame and fire that spread within the vehicle and that could be attributed to the defective resistor was 93. This presented a failure rate of 27.7 R/100K.

VRTC TESTING:

To determine if blower motor switch failures (overheating and melting with smoke and fumes) would be likely to cause a vehicle fire or a safety risk to driver or passengers, NHTSA utilized the Vehicle Research and Test Center (VRTC) to conduct testing. VRTC tested blower motor

switches, exposed to various environmental conditions, to determine what effect the conditions had on the occurrence and severity of melting and ignition events. Testing was conducted from December 2009 through August 2011.

These environmental conditions included increasing the resistance between the internal switch contacts, adding a drag force to the blower motor (thus increasing the current in the circuit), dither testing that oscillated the switch contacts small amplitudes to simulate vibration in the vehicle instrument panel, arc testing to represent the switch being rotated (thus opening and closing the internal switch contacts), and vibration\impact testing to represent the vehicle traveling over rough roads.

In addition to simulated environmental testing, VRTC purchased two vehicles (both of which had experienced multiple blower motor control switch failures) for inspection and testing. The electrical systems on these vehicles were inspected to understand what environmental condition(s) might be causing the blower motor switches to overheat. VRTC also collected and inspected 36 blower motor switches that had experienced an overheat condition. These switches were disassembled and inspected in an effort to understand if there were any discernible patterns.

Test Results: An overheating blower motor switch in the subject vehicles does not typically result fire under normal operating conditions.

VRTC also found the following during testing:

1. Testing on blower motor switches at VRTC indicates they can overheat, smoke, and melt but they are not likely to ignite and burn at normal power levels. The switches did not overheat in VRTC tests unless the switch was modified to increase resistance. They did not ignite unless the current was quickly set to 50 amps.

2. A 50-amp time lag fuse is installed as original equipment to protect the blower circuit against high current. If resistance in the switch or connector increases, the 50-amp fuse does not prevent overheating and melting.

3. VRTC estimated these fuses would open in three to four minutes at 80 amps, which is enough time to melt a switch if internal resistance is too high.

4. In most of the overheat tests conducted by VRTC, when the plastic base melted, the contacts separated and the switch developed an open circuit. Although not by design, the switch acted as its own fuse. In one test where the wiring was tie-wrapped and supported in a way that pushed the contacts together, the switch ignited with 50 amps current (generating 130 watts of heat) after 2 minutes.

5. The polymer materials in the switches do not appear to be flame retardant. In the overheat tests and other tests where the materials were ignited with an open flame, the fire became self-sustaining; it dripped flaming plastic, and flame spread until the entire case was consumed. The polymers are described as slow burning in DuPont literature from Indak, the switch manufacturer. They are classified as HB per UL 94 meaning that a horizontal sample self-extinguished before spreading four inches. The Underwriters Laboratory 94 HB rating is the lowest (least flame retardant) rating. It is described as “generally suitable for attended, portable, intermittent-duty, household appliance enclosures, like hair dryers”.

6. VRTC found that internal switch resistance increased, but did not find a definite cause for increased resistance in the switches. VRTC hypothesized that it was the result of oxides or carbon deposits. Pitting on the contacts may aid the buildup of resistive material. Pitting was observed on the stationary contacts at the detent positions for Hi, Med-Hi, Med-Lo and ground.

7. The wiring connectors can also be a point of high resistance. Out of 20 switches received with connectors, 12 had heat damage on both switch and connector and 8 had damage primarily in the connector.

8. Drivers complain about the switches getting hot and melting. Sometimes the knob melts and they cannot change the setting. They can only turn the blower off by turning off the mode selector switch.

FAILURE MODES: Based on testing and analysis of failed switches, ODI believes that there are two failure modes involved with the subject blower motor control switch.

The first mode involves over heating of switch components resulting from resistance building up between internal switch contacts. As discussed in the Description of Components section above, the blower motor control switch has four speed settings. When the switch is rotated from one speed to another, metal contacts inside the switch slide from one set of terminals to another (see Figure 2.). As the contacts bridge the different terminal sets current flows through various resistors thus altering the amount of current to the blower motor and the speed.

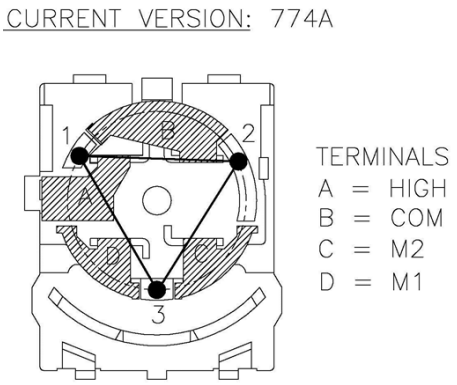

Figure 2.

When the contacts separate and re-join the terminals, a small arc occurs that can cause pitting in the terminal material and can potentially lead to a high resistance connection. This high resistance can then lead to overheating of the switch materials. In addition to the pitting that occurs on the terminals, products of the arcing can potentially interact with grease that is inside the switch (as a lubricant) and act to further increase resistance between the contacts. Figure 3. shows the two halves of the contact set inside the switch. The one half of the contact set is attached to the knob turned by the operator. This first half is forced against the second half by a set of 3 small springs. When the operator wants to change the blower motor speed, the switch is rotated, forcing 3 round detents on the first half (that make electrical connections with the second half) to slide across plastic bridges. As the detents slide off of the plastic bridges and again make electrical contact (thus completing a different circuit and changing the blower motor speed) an

arc can occur. Figure 4. shows a close-up image of the leading edge of a terminal (from a failed switch) following one of the plastic bridges where pitting in the terminal material can be seen.

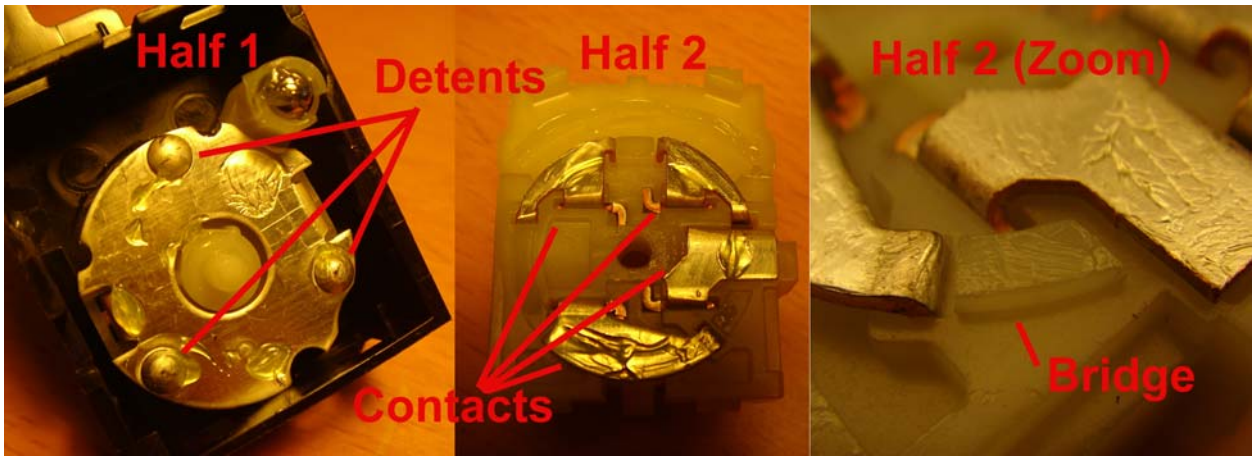

Figure 3.

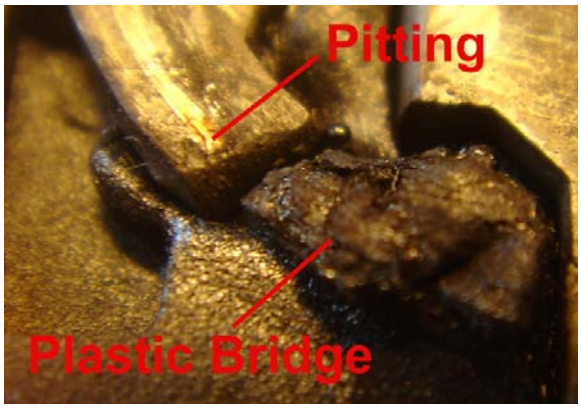

Figure 4.

The second potential failure mode occurs on a replacement switch after the original switch in the vehicle has failed. Often, after the original switch has failed as a result of the first failure mode (described above), only the switch itself is replaced. The plastic electrical connector that joins the switch to the electrical system is usually not replaced. However this connector can be damaged when the original switch fails. Although it may not be obvious to the naked eye, the electrical connectors can become enlarged as a result of thermal expansion. When this connector is attached to the new replacement switch, the connections can be loose resulting in high resistance and an over heat condition. ODI found that many of the switch failures had occurred on a vehicle that had experienced a previous switch failure. In some cases, a vehicle had up to 5 blower motor switches fail. In most cases the time and mileage between each successive failure decreased, which indicates that the electrical connections were getting looser with each switch failure.

WARNING SYMPTOMS: There are normally no warning lights or other indicators that a blower motor control switch is about to melt or burn. In some cases drivers reported that prior to

the switch starting to melt or burn, they noticed one or more blower motor speed levels not working. The initial indications that a switch failure is developing normally involve smelling burning plastics, smoke from behind the dash, or a switch knob that is hot to the touch.

During the investigation, ODI interviewed drivers of vehicles that had experienced blower motor switch failures to determine if the smoke generated from a melting switch was sufficient to cause distraction. None of the drivers interviewed indicated that the smoke was severe enough to distract them or significantly concern the passengers in the vehicle. These interviews included school bus drivers as well as emergency vehicle drivers.

FORD'S EVALUATION OF THE ALLEGED DEFECT: Ford's review and analysis did not identify any trend or pattern related to blower motor control switch fires in the subject vehicles. Ford points out that many of the 1.1 million subject vehicles have well over a decade of service and report several hundred thousand miles. Ford estimates that the subject vehicles, as a group, have accumulated over 128 billion miles. Ford believes many of the subject vehicles are used in severe-duty applications (such as airport shuttle service or public transit where the vehicles are operated nearly constantly in all weather conditions) and despite this usage, age, mileage, and/or hours of operation the vehicles have performed extremely well. Ford has not been able to establish that there has been one incident in which an open flame resulted from a malfunction of this switch. Ford believes that multiple switch repairs on vehicles are likely related to unaddressed electrical connector damage rather than additional switch failures. Ford believes if a switch failure is accompanied by heating, the harness electrical connector terminals likely also experience heat exposure. Consequently, the terminal clamp load may be reduced even if no visible damage is identified, potentially resulting in resistive heating at the terminal/terminal blade interface with the new switch. Ford feels heat generated from the terminal/terminal blade interface can be transferred directly to the internal portions of the switch and lead to switch failure. This phenomenon is a possible explanation for the apparent reduction in accumulated miles between the first switch replacement and subsequent switch replacement on the same vehicle, as observed in the data provided by the agency.

Ford states in their IR response letter dated July 19, 2011 that "the preponderance of real world data continues to support that there is no trend or pattern of front blower switch failure leading to actual fires in the subject vehicles. Despite the severe usage profile of these vehicles and the fact that switches are occasionally replaced and found to be melted, there is no evidence indicating these switch failures result in actual fire or flames, much less any fire that propagates throughout the entire vehicle. Even using the agency's broadest definition of "fire", the report rate is still remarkably low. The benign nature of the reports relating to this subject continue to support a conclusion that front blower motor switch failure does not pose an unreasonable risk to motor vehicle safety in these vehicles".

ODI ANALYSIS: This investigation was opened based on 182 blower motor control switch failures. ODI was concerned that these melting and burning switches could lead to open flame spreading to the remainder of the vehicle. ODI reviewed 1,036 warranty claims, field reports and consumer complaints received on a population of 1,076,975vehicles with up to 14 years in service. From these reviews, only 2 "fire spread" incidents were believed to have been caused by a blower motor switch failure. This represents a failure rate of 0.2 R/100K on a population of 1,076,975vehicles that have been in service for up to 14 years.

The primary concern during this investigation was to understand how, with so many burning and melting switches, there were so few actual "open flame" fires. ODI also wanted to understand why multiple failures were occurring on some vehicles and why the time and mileage between each successive failure decreased.

Through analysis and component testing, ODI found there were two primary reasons why an overheating switch did not result in an open flame that would then spread to the remainder of the vehicle. The first reason was that the switch acts as its own circuit protection. As the switch starts to overheat and melt, the switch comes apart and causes the electrical circuit to open and prevent further overheating. The second reason was that the resistance within the switch and the current available in the blower motor circuit were not normally sufficient to cause the switch to heat to the point where the switch materials ignite.

Multiple switch failures occurring on a single vehicle were, in most cases, determined to be the result of having replaced the failed switch without having replaced the associated electrical connector. This electrical connector, it was found, could have been damaged at the time of the first failure resulting in a poor electrical connection with the replacement switch. The quality of this connection deteriorated with each successive switch failure and replacement.

REASON FOR CLOSING: After a comprehensive review of all data related to overheating blower control switches in the subject vehicles, ODI has not identified the existence of a safety related defect trend. ODI reviewed 1,036 complaints, claims, and field reports and determined that only 2 fires were likely to have been caused by a failing subject blower motor switch. ODI has found that when the subject switches do fail and begin to melt, they are constructed in such a way and made from materials that minimize the potential of igniting and developing into an open flame.

Ford Motor Company has agreed to take two actions to further reduce the likelihood of the subject switches starting to overheat. Ford informed ODI that it has implemented a series of design changes to the subject switch that will help prevent it from developing internal high resistance short circuits. The modifications include increasing the length of the internal switch terminals (see Figure 5.) so as to eliminate the contacts from having to cross a plastic bridge and arcing as they first strike the following terminal. The contacts will move from one terminal to another while always maintaining one of circuits controlling the blower motor speed. Ford will also change the shape of the detent on the switch contacts from a round shape to an oval shape. This will further reduce the likelihood of an arc being generated as the contact moves from one terminal to another (see the Failure Modes section above for a detailed description of how the contacts function). A third change that will be made involves silver plating the contacts and terminals resulting in a better electrical connection with less resistance between the mating surfaces.

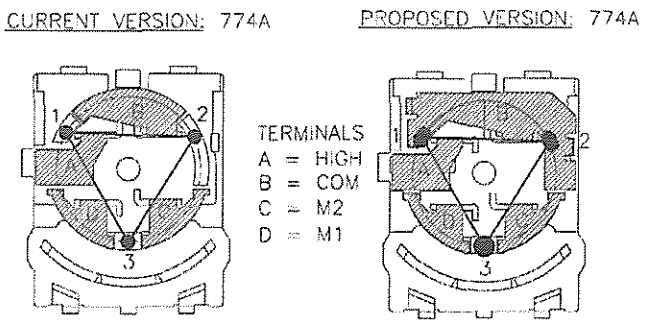

Figure 5.

Ford has also informed ODI that it would release a Technical Service Bulletin (TSB-11-11-21) and customer satisfaction campaign instructing subject vehicle owners to replace the electrical connector at the same time a failed switch is replaced. This bulletin will help eliminate multiple failures from occurring after an initial failure (should one occur). These two actions address the very real customer satisfaction issue that exists with the switches...i.e., the loss of blower control as a result of melting and overheating.

In light of the low rate of failure resulting in open flame and fire spread on the subject vehicles, and Ford's actions to reduce the likelihood of a switch failure through switch design changes and a TSB, further use of agency resources does not appear to be warranted. The closing of this investigation does not constitute a finding by NHTSA that no safety-related defect exists. The agency reserves the right to take further action if warranted by the circumstances.

Bruce B. York

Safety Defects Engineer — Date: 3/5/2012

I Concur:
Frank Borris

Director, Office of Defects Investigation — Date: 3/5/12

York, Bruce (NHTSA)

From: Nevi, Raymond (R.A.)
Sent: Tuesday, October 25, 2011 8:37 AM
To: York, Bruce (NHTSA)
Subject: EA10-003

Bruce,

This is to confirm details discussed in an October 24, 2011 telephone conversation related to EA10-003. Preparation of a Technical Service Bulletin (TSB) has been initiated with a target publication date of October 28, 2011. The TSB will instruct technicians to replace the wiring connector to the blower motor switch anytime a blower motor switch is replaced to ensure optimal electrical connection between the new switch and the wiring harness connector. The replacement pigtail is readily available; the bulletin will identify all parts by part number.

Additionally, a revised blower motor switch is being released and expected to be available in production and service in May 2012. The revised switch will be interchangeable with the current switch and the stock of former service switches will be scrapped when the new switch is available. The revised switch will incorporate the robustness improvements discussed in the referenced telephone conversation.

Please contact me if you have any further questions.

Ray

R. A. Nevi
Assistant Director
Global Automotive Safety Compliance
Automotive Safety Office

BLOWER MOTOR INOPERABLE OR ONLY FUNCTIONS ON ONE SPEED

TSB 11-11-21

FORD:
1997-2012 E-Series

ISSUE
Some 1997-2012 E-Series vehicles may experience a blower motor that is inoperative, operates incorrectly, or that only functions on one speed.

ACTION
Follow the Service Procedure steps to correct the concern.

SERVICE PROCEDURE

1. Replace the blower motor switch following Workshop Manual (WSM), Section 412.
2. Replace the blower motor switch pigtail following Wiring Diagram procedures for proper wiring repair.
3. If the concern is still present, follow normal diagnostics. Refer to WSM, Section 412-00.

PART NUMBER	PART NAME
E6DZ-19986-A	Blower Motor Switch
1U2Z-14S411-BB	Pigtail

WARRANTY STATUS: Eligible Under Provisions Of New Vehicle Limited Warranty Coverage
IMPORTANT: Warranty/ESP coverage limits/policies are not altered by a TSB. Warranty/ESP coverage limits are determined by the identified causal part and verified using the OASIS part coverage tool.

OPERATION	DESCRIPTION	TIME
MT111121	Use SLTS Operations If Available; Claim Additional Diagnosis Or Labor Performed As Actual Time.	Actual Time

DEALER CODING

BASIC PART NO.	CONDITION CODE
19986	42

NOTE: The information in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford or Lincoln dealership to determine whether the Bulletin applies to your vehicle. Warranty Policy and Extended Service Plan documentation determine Warranty and/or Extended Service Plan coverage unless stated otherwise in the TSB article.The information in this Technical Service Bulletin (TSB) was current at the time of printing. Ford Motor Company reserves the right to supercede this information with updates.The most recent information is available through Ford Motor Company's on-line technical resources.