

Ford Motor Company

Automotive Safety Office
Environmental and Safety Engineering

January 30, 2009

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation Safety Assurance
National Highway Traffic Safety Administration
1200 New Jersey Avenue, S.E. W45-302
Washington, D.C. 20590

Dear Ms. DeMeter:

Subject: PE08-066:NVS-212

The Ford Motor Company (Ford) response to the agency's December 9, 2008, letter concerning reports of alleged lighting control module (LCM) failure resulting in headlight failure in 2003 through 2005 model year Crown Victoria and Grand Marquis vehicles is attached.

The LCM provides power to the headlamps based on inputs received from the headlamp switch and the steering column mounted multifunction switch. The LCM uses an internal relay, mounted to a circuit board, to transmit power to the headlamps. Power interruptions through the solder joint connecting the relay terminals to the circuit board can affect headlamp function.

Review of modules obtained from complaint vehicles found that the solder joints between the terminals and the circuit board can experience fatigue cracking. Fatigue cracking may be caused by repeated thermal cycling and/or physical vibration. In the context of this subject, fatigue cracking of the headlamp relay solder joints is evidenced by the significant percentage of reports indicating that headlamp function is "intermittent." Such intermittent performance provides clear indication to a driver that the vehicle should be serviced. If left unrepaired, the cracks could grow until the headlamps will not turn on or off or are inoperative. Nevertheless, even in the event that a vehicle experiences a more prolonged loss of headlamp function while driving, the parking lamps and tail lamps remain illuminated and the turn signals and brake lamps continue to function normally. These lamps provide conspicuity and indication of driver intent to surrounding vehicles, such as lane changes or vehicle braking to exit the roadway. Additionally, the driver can also use the flash-to-pass feature to provide forward illumination while maneuvering the vehicle off of the roadway or to another safe location.

The overall rate of reports provided with this response is 6.7R/1000 which is significantly lower than rates relating to vehicles campaigned for headlamp outages, and similar to agency investigations that were closed without action. Further, this rate includes reports for all malfunctions, including headlamps that will not come on at vehicle start-up, headlamps that will not go off at vehicle shutdown, and intermittent outages where function

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quickly returns. The rate of reports for non-intermittent headlamp outage while driving is notably smaller, and significantly lower than in other agency investigations that have been closed without a field action.

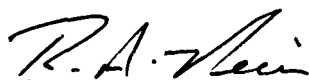
A review of the reports provided with this response found that Crown Victoria Police Interceptor (CVPI) vehicles experience the subject condition at twice the rate of civilian Crown Victoria and Grand Marquis vehicles. Crown Victoria taxis experience a higher rate than civilian units, but not as high as the CVPI. These differences are likely a result of the unique duty cycles experienced by these vehicles and because the condition relates to solder joint fatigue cracking.

A fair reading of the reports provided with this response and other similar investigations find that drivers are able to consistently and safely maneuver their vehicles immediately following headlamp outage. In fact, a review of the available real world data finds no crash or injury allegations associated with the subject of this investigation despite the number of vehicle repairs. The real world data demonstrate that drivers of vehicles that have experienced headlamp outage have successfully controlled their vehicles, without incident, and subsequently sought repair. The most common and notable complaint is relate to cost-of-repair. The repair cost can be substantial, especially for municipal fleets or retirees. Overall, cost, not safety, is the focus of calls to Ford's customer relationship center.

Ford recognizes that lighting malfunctions can potentially pose unreasonable risks of accidents and injuries and we take our responsibility to identify those situations very seriously. To that end, Ford had begun monitoring this subject in the fall of 2007 with the ensuing investigation focusing on CVPI vehicles because of the notably higher report rate associated with these vehicles as compared to the civilian units. Actions were undertaken to incorporate design improvements into LCM service parts to provide a more robust design, and to build up a supply of the improved parts for service. Ford has continued to monitor reports and the field performance of these modules to evaluate whether some type of action may be warranted. Based on the results of these ongoing analyses, the fact that other lighting systems remain functional during headlamp outage, and the low rate of reports compared to prior campaigns, no field service action recommendations have been brought to Ford's Field Review Committee. Ford continues to believe that balanced consideration of all of the factors support a conclusion that this condition in these vehicles does not present an unreasonable risk to safety.

If you have any questions concerning this response, please feel free to contact me.

Sincerely,



James P. Vondale

Attachment

FORD MOTOR COMPANY (FORD) RESPONSE TO PE08-066

Ford's response to this Preliminary Evaluation information request was prepared pursuant to a diligent search for the information requested. While we have employed our best efforts to provide responsive information, the breadth of the agency's request and the requirement that information be provided on an expedited basis make this a difficult task. We nevertheless have made substantial effort to provide thorough and accurate information, and we would be pleased to meet with agency personnel to discuss any aspect of this Preliminary Evaluation.

The scope of Ford's investigation conducted to locate responsive information focused on Ford employees most likely to be knowledgeable about the subject matter of this inquiry and on review of Ford files in which responsive information ordinarily would be expected to be found and to which Ford ordinarily would refer. Ford notes that although electronic information was included within the scope of its search, Ford has not attempted to retrieve from computer storage electronic files that were overwritten or deleted. As the agency is aware, such files generally are unavailable to the computer user even if they still exist and are retrievable through expert means. To the extent that the agency's definition of Ford includes suppliers, contractors and affiliated enterprises for which Ford does not exercise day-to-day operational control, we note that information belonging to such entities ordinarily is not in Ford's possession, custody or control.

Ford has construed this request as pertaining to vehicles manufactured for sale in the United States, its protectorates and territories.

Ford notes that some of the information being produced pursuant to this inquiry may contain personal information such as customer names, addresses, telephone numbers, and complete Vehicle Identification Numbers (VINs). Ford is producing such personal information in an unredacted form to facilitate the agency's investigation with the understanding that the agency will not make such personal information available to the public under FOIA Exemption 6, 5 U.S.C. 552(b)(6).

Answers to your specific questions are set forth below. As requested, after each numeric designation, we have set forth verbatim the request for information, followed by our response. Unless otherwise stated, Ford has undertaken to provide responsive documents dated up to and including December 9, 2008, the date of your inquiry. Ford has searched within the following offices for responsive documents: Sustainability, Environment and Safety Engineering, Ford Customer Service Division, Purchasing, Global Core Engineering, Office of the General Counsel, and Product Development.

Request 1

State within the body of the response letter a summary, by model and model year, the number of subject vehicles Ford has manufactured for sale or lease in the United States. Separately, for each subject vehicle manufactured to date by Ford, state the following:

- a. Vehicle identification number (VIN);
- b. Make;
- c. Model;
- d. Model Year;
- e. Date of manufacture (in "yyyy/mm/dd" date format);
- f. Date warranty coverage commenced (in "yyyy/mm/dd" date format); and

- g. The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).

Provide the table in Microsoft Access 2000, or a compatible format, entitled "PRODUCTION DATA."

Answer

Ford records indicate that the approximate total number of Crown Victoria and Grand Marquis vehicles sold in the United States (the 50 states and the District of Columbia) and its protectorates and territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands) is 517,945.

The number of subject vehicles sold in the United States by model and model year is shown below:

Model	2003 MY	2004 MY	2005 MY
Crown Victoria	106,228	74,426	69,465
Grand Marquis	105,659	92,299	69,868

The requested data for each subject vehicle is provided electronically in Appendix A (filename: 2009-01-30 Appendix A) on the enclosed CD.

Request 2

State within the body of the response letter, the number of each of the following, received by Ford, or of which Ford are otherwise aware, which relate to, or may relate to, the alleged defect in the subject vehicles:

- a. Consumer complaints, including those from fleet operators;
- b. Field reports, including dealer field reports;
- c. Reports involving a fire, crash, injury, or fatality, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
- d. Property damage claims;
- e. Third-party arbitration proceedings where Ford is or was a party to the arbitration; and
- f. Lawsuits, both pending and closed, in which Ford is or was a defendant or codefendant.

For subparts "a" through "d," state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

In addition, for items "c" through "f," provide a summary description of the alleged problem and causal and contributing factors and Ford's assessment of the problem, with a summary of the significant underlying facts and evidence. For items "e" and "f,"

identify the parties to the action, as well as the caption, court, docket number, and date on which the complaint or other document initiating the action was filed.

Answer

For purposes of identifying reports of incidents that may be related to the alleged defect and any related documents, Ford has gathered "owner reports" and "field reports" maintained by Ford Customer Service Division (FCSD), and claim and lawsuit information maintained by Ford's Office of the General Counsel (OGC).

Descriptions of the FCSD owner and field report systems, and the criteria used to search each of these are provided electronically in Appendix B (filename: 2009-01-30 Appendix B) on the enclosed CD.

The following categorizations were used in the review of reports located in each of these searches:

Category	Allegation
A1	Allegation that headlights go out while driving, due to LCM
A2	Allegation that headlights are intermittent, due to LCM
A3	Allegation that headlights won't turn on/turn off/inop, due to LCM
A4	Allegation that headlights go out ambiguous/not while driving, due to LCM
B1	Allegation that headlights go out while driving, ambiguous as to LCM
B2	Allegation that headlights are intermittent, ambiguous as to LCM
B3	Allegation that headlights won't turn on/turn off/inop, ambiguous as to LCM
B4	Allegation that headlights go out ambiguous/not while driving, ambiguous as to LCM

We are providing electronic copies of reports categorized as "B" as "non-specific allegations" for your review because of the broad scope of the request. Based on our engineering judgment, the information in these reports is insufficient to support a determination that they pertain to the alleged defect.

Owner Reports: Records identified in a search of the Master Owner Relations Systems (MORS) database, as described in Appendix B, were reviewed for relevance and categorized in accordance with the categories described above. The number and copies of relevant owner reports identified in this search that may relate to the agency's investigation are provided in the MORS III portion of the electronic database contained in Appendix C (filename: 2009-01-30 Appendix C) on the enclosed CD. The categorization of each report is identified in the "Category" field.

When we were able to identify that responsive (i.e., not ambiguous) duplicate owner reports for an alleged incident were received, each of these duplicate reports was marked accordingly, and the group counted as one report. In other cases, certain vehicles may have experienced more than one incident and have more than one report associated with their VINs. These reports have been counted separately.

Legal Contacts: Ford is providing, in Appendix B, a description of Legal Contacts and the activity that is responsible for this information, OGC. Ford's OGC is responsible for handling product liability lawsuits, claims, and consumer breach of warranty lawsuits and arbitrations against the Company. To the extent that responsive (i.e., not ambiguous) owner reports indicate that they are Legal Contacts, Ford has gathered the related files from the OGC. Non-

privileged documents for files that were located that are related to the responsive owner reports are provided electronically in Appendix D (filename: 2009-01-30 Appendix D).

Field Reports: Records identified in a search of the Global Common Quality Indicator System (GCQIS) database, as described in Appendix B, were reviewed for relevance and categorized in accordance with the categories described above. The number and copies of relevant field reports identified in this search that may relate to the agency's investigation are provided in the GCQIS portion of the electronic database contained in Appendix C on the enclosed CD. The categorization of each report is identified in the "Category" field.

When we were able to identify that responsive duplicate field reports for an alleged incident were received, each of these duplicate reports was marked accordingly, and the group counted as one report. In other cases, certain vehicles may have experienced more than one incident and have more than one report associated with their VINs. These reports have been counted separately. In addition, field reports that are duplicative of owner reports are provided in Appendix C but are not included in the field report count.

VOQ Data: This information request had an attachment that included 12 Vehicle Owner's Questionnaires (VOQs) for 16 vehicles. Ford made inquiries of its MORS database for customer contacts, and its CQIS database for field reports regarding the vehicles identified on the VOQs. Ford notes that in some instances where the VOQ does not contain the VIN or the owner's last name and zip code, it is not possible to query the databases for owner and field reports specifically corresponding to the VOQs. Any reports located on a vehicle identified in the VOQs related to the alleged defect are included in the MORS and CQIS portions of the electronic database provided in Appendix C and have been identified by a "Y" in the "VOQ Dup" field. Ford notes that a number of the VOQs indicate headlamp troubles without specifically referencing the LCM. We believe there is insufficient information to conclude that these VOQs relate to the subject of this investigation.

Crash/Injury Incident Claims: For purposes of identifying allegations of accidents or injuries that may have resulted from the alleged defect, Ford has reviewed responsive owner and field reports, and lawsuits and claims. No allegations of accidents or injuries, that may have resulted from the alleged defect, have been identified.

Claims, Lawsuits, and Arbitrations: For purposes of identifying incidents that may relate to the alleged defect, Ford has gathered claim and lawsuit information maintained by Ford's OGC. Ford's OGC is responsible for handling product liability lawsuits, claims, and consumer breach of warranty lawsuits and arbitrations against the Company.

Lawsuits and claims gathered in this manner were reviewed and there are no responsive lawsuits or claims.

Request 3

Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:

- a. Ford's file number or other identifier used;
- b. The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
- c. Vehicle owner or fleet name (and fleet contact person), address, and telephone number;

- d. Vehicle's VIN;
- e. Vehicle's make, model and model year;
- f. Vehicle's mileage at time of incident;
- g. Incident date (in "yyyy/mm/dd" date format);
- h. Report or claim date (in "yyyy/mm/dd" date format);
- i. Whether a fire or crash is alleged;
- j. Whether property damage is alleged;
- k. Number of alleged injuries, if any; and
- l. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA."

Answer

Ford is providing owner and field reports in the electronic database contained in Appendix C on the enclosed CD in response to Request 2. To the extent information sought in Request 3 is available for owner and field reports, it is provided in the database.

Request 4

Produce copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method Ford used for organizing the documents.

Answer

Ford is providing owner and field reports in the electronic database contained in Appendix C on the enclosed CD in response to Request 2. To the extent information sought in Request 4 is available, it is provided in the referenced appendices.

Request 5

State within the body of the response letter a summary, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by Ford to date that relate to, or may relate to, the alleged defect in the subject vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign.

Separately, for each such claim, state the following information:

- a. Ford's claim number;
- b. Vehicle owner or fleet name (and fleet contact person) and telephone number;
- c. VIN;
- d. Repair date (in "yyyy/mm/dd" date format);
- e. Vehicle mileage at time of repair,
- f. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
- g. Labor operation number;

- h. Problem code;
- i. Replacement part number(s) and description(s);
- j. Concern stated by customer; and
- k. Comment, if any, by dealer/technician relating to claim and/or repair; and
- l. Type of claims/issue (liquid spill or loose wiring if not readily identifiable from the repair code or the part replacement fields).

Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA."

Answer

Records identified in a search of the AWS database, as described in Appendix B, were reviewed for relevance and categorized in accordance with the categories described in the response to Request 2. The number and copies of relevant warranty claims identified in this search that may relate to the agency's investigation are provided in the AWS portion of the electronic database contained in Appendix C (filename: 2009-01-30 Appendix C) on the enclosed CD. The categorization of each report is identified in the "Category" field.

When we were able to identify that duplicate claims for an alleged incident were received, each of these duplicate claims was marked accordingly and the group counted as one report. In other cases, certain vehicles may have experienced more than one incident and have more than one claim associated with their VINs. These claims have been counted separately. Warranty claims that are duplicative of owner and field reports are provided in Appendix C but are not included in the report count above.

Requests for "goodwill, field or zone adjustments" received by Ford to date that relate to the alleged defect that were not honored, if any, would be included in the MORS reports identified above in response to Request 2. Such claims that were honored are included in the warranty data provided.

Request 6

Describe in detail the search criteria used by Ford to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State, by make and model year, the terms of the new vehicle warranty coverage offered by Ford on the subject vehicles (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that Ford offered for the subject vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.

Answer

Detailed descriptions of the search criteria, including all pertinent parameters, used to identify the claims provided in response to Request 5 are described in Appendix B.

For 2003 through 2005 model year Crown Victoria and Grand Marquis vehicles, the New Vehicle Limited Warranty, Bumper-to-Bumper Coverage begins at the warranty start date and lasts for three years or 36,000 miles, whichever occurs first. Optional Extended Service Plans

(ESPs) are available to cover various vehicle systems, time in service and mileage increments. The details of the various plans are provided electronically in Appendix E (filename: 2009-01-30 Appendix E) on the enclosed CD. As of the date of the information request, 87,813 new vehicle ESP policies have been purchased on 2003 through 2005 model year Crown Victoria and Grand Marquis vehicles.

Request 7

Produce copies of all service, warranty, and other documents that relate to, or may relate to, the alleged defect in the subject vehicles, that Ford has issued to any dealers, regional or zone offices, field offices, fleet purchasers, or other entities. This includes, but is not limited to, bulletins, advisories, informational documents, training documents, or other documents or communications, with the exception of standard shop manuals. Also include the latest draft copy of any communication that Ford is planning to issue within the next 120 days.

Answer

For purposes of identifying communications to dealers, zone offices, or field offices pertaining, at least in part, to lighting control module failure resulting in headlamp failure on the subject vehicles, Ford has reviewed the following FCSD databases and files: The On-Line Automotive Service Information System (OASIS) containing Technical Service Bulletins (TSBs) and Special Service Messages (SSMs); Internal Service Messages (ISMs) contained in CQIS; and Field Review Committee (FRC) files. We assume this request does not seek information related to electronic communications between Ford and its dealers regarding the order, delivery, or payment for replacement parts, so we have not included these kinds of information in our answer.

A description of Ford's OASIS messages, ISMs, and the Field Review Committee files and the search criteria used are provided in Appendix B.

OASIS Messages: Ford has identified no TSBs that relate to this investigation. Ford identified one SSM that relates to erratic headlamp operation in autolamp mode during daytime driving; that SSM recommends LCM replacement to resolve the concern. A copy of this SSM is provided in Appendix F (filename: 2009-01-30 Appendix F). Certain reports reference this message; however, it is not possible to conclusively determine if the reports relate to daytime driving, therefore, Ford is including these reports in Appendix C.

Internal Service Messages: Ford has not identified any ISMs that may relate to the alleged defect in the subject vehicles.

Field Review Committee: Ford has not identified any field service action communications that may relate to the alleged defect in the subject vehicles.

Request 8

Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, Ford. For each such action, provide the following information:

- a. Action title or identifier;
- b. The actual or planned start date;
- c. The actual or expected end date;
- d. Brief summary of the subject and objective of the action;
- e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
- f. A brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

Answer

Ford is construing this request broadly and is providing not only studies, surveys, and investigations related to the alleged defect, but also notes, correspondence, and other communications that were located pursuant to a diligent search for the requested information. Ford is providing the responsive non-confidential documentation in Appendix G (filename: 2009-01-30 Appendix G).

To the extent that the information requested is available, it is included in the documents provided. If the agency should have questions concerning any of the documents, please advise.

Ford is submitting additional responsive documentation as Appendix H (filename: 2009-01-30 Appendix H) with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR, Part 512.

In the interest of ensuring a timely and meaningful submission, Ford is not producing non-responsive materials or items containing little substantive information. Examples of the types of materials not being produced are meeting notices, raw data lists (such as part numbers or VINs) without any analytical content, duplicate copies, non-responsive elements of responsive materials, and draft electronic files for which later versions of the materials are being submitted. Through this method, Ford is seeking to provide the agency with substantive responsive materials in our possession in the timing set forth for our response. We believe our response meets this goal. Should the agency request additional materials, Ford will cooperate with the request.

Request 9

Describe all modifications or changes made by, or on behalf of, Ford in the design, material composition, manufacture, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles. For each such modification or change, provide the following information:

- a. The date or approximate date on which the modification or change was incorporated into vehicle production;
- b. A detailed description of the modification or change;
- c. The reason(s) for the modification or change;
- d. The part number(s) (service and engineering) of the original component;
- e. The part number(s) (service and engineering) of the modified component;

- f. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
- g. When the modified component was made available as a service component; and
- h. Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that Ford is aware of which may be incorporated into vehicle production within the next 120 days.

Answer

A table of the requested changes is provided electronically as Appendix I (filename: 2009-01-30 Appendix I) on the enclosed CD.

Request 10

Provide an overall functional description and electrical schematic diagram to illustrate and describe the operation of the subject component. Identify all inputs and output commands particularly as relates to the alleged defect.

Answer

The lighting control module (LCM) is a microprocessor-based module that controls several vehicle subsystems. It responds to electrical input signals from various switches, sensors, and external modules. The LCM controls the following lighting functions: headlamps with autolamps (if equipped), turn signal lamps/hazard flasher lamps, cornering lamps, parking lamps, and demand lighting. Demand lighting includes: front dome lamps, rear reading lamps, instrument panel interior lamps, glove compartment lamp, vanity mirror lamp, luggage compartment lamp, and engine compartment lamp (police vehicles only). The LCM also interfaces with certain other features, including: door ajar chime, key-in ignition chime, safety belt chime, the horn for lock confirmation, panic alarm (if equipped with remote keyless entry), the horn for the perimeter alarm (if equipped), and heated rear backlight.

The LCM receives both dedicated power inputs (Vbatt1, Vbatt2, Vbatt3, and flasher input) and digital inputs from various switches or sensors to determine and power the appropriate output(s) (e.g. headlamps, dome lamps).

There are four internal relays that control demand lighting, headlamps, parking lamps, and flashers (hazard lamps and turn signals respectively). Each relay is responsible for one of these functions.

The headlamp switch, depending on position, provides a digital input to the LCM, closing one of the internal relays, providing power to the appropriate function. Vbatt1 powers the demand lighting features. Vbatt2 sends power to the headlamps and the multifunction switch, with the multifunction switch determining whether low beams or high beams are activated. The flash-to-pass function is not controlled or powered by the LCM. Vbatt3 powers the parking lamps. The flasher input powers the hazard/turn lamps via the multifunction switch. Additionally, the LCM receives an input from the wiper park switch and turns on the parking lamps and headlamps when the wiper is turned on, even if the headlamp switch is in the off or parking lamp position.

Schematics for the lighting control module are being provided for each model year. The electrical schematics are being provided confidentially in Appendix H, Tab G - Engineering

Design Drawings. Note: There are references to daytime running lamps and/or fog lamps. Please disregard these references as this equipment was not available for United States market vehicles.

Request 11

Produce two each of the following:

- a. Exemplar sample of each base design version of the subject component and the next design version;
- b. Field return sample of the subject component exhibiting the subject failure mode; and
- c. Any kits that have been released, or developed, by Ford for use in service repairs to the subject component/assembly which relate, or may relate, to the alleged defect in the subject vehicles.

Answer

Ford is providing two field return modules that exhibit the subject failure mode. The field return modules are labeled with the VIN and the corresponding reports are provided in Appendix C. Ford is also providing two current service modules. Ford was unable to obtain the base design version of the module because it is no longer manufactured for original installation or service.

Request 12

State the number of each of the following that Ford has sold that may be used in the subject vehicles by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of the sale (including the cut-off date for sales, if applicable).

- a. Subject component; and
- b. Any kits that have been released, or developed, by Ford for use in service repairs to the subject component/assembly.

For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number). Also, identify by make, model, model year, and number sold, any other vehicles of which Ford is aware that contain the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

Answer

As the agency is aware, Ford service parts are sold in the U.S. to authorized Ford and Lincoln-Mercury dealers. Ford has no means by which to determine how many of the parts were actually installed on vehicles, the vehicle model or model year on which a particular part was installed, the reason for any given installation, or the purchaser's intended use of the components sold.

Ford is providing the total number of Ford service replacement lighting control modules by part number (both service and engineering) and month and year of sale, where available, in Appendix J (filename: 2009-01-30 Appendix J) on the enclosed CD. Information pertaining to production and service usage for each part number, and supplier point of contact information, is included in Appendix J.

Request 13

Furnish Ford's assessment of the alleged defect in the subject vehicle, including:

- a. The causal or contributory factor(s);
- b. The failure mechanism(s);
- c. The failure mode(s);
- d. The risk to motor vehicle safety that it poses;
- e. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component was malfunctioning; and
- f. The reports included with this inquiry.

Answer

The LCM provides power to the headlamps based on inputs received from the headlamp switch and the steering column mounted multifunction switch. The LCM uses an internal relay, mounted to a circuit board, to transmit power to the headlamps. The headlamp relay is soldered to a circuit board at six different terminals and the relay is epoxy coated. Power interruptions through the solder joint connecting the relay terminals to the circuit board can affect headlamp function because the relay is unable to open and/or close as intended.

Review of modules obtained from complaint vehicles found that the solder joints between the terminals and the circuit board can experience fatigue cracking. Integrity of the joint is related to the size of the opening in the circuit board relative to the size of the terminal and to the process used to epoxy-coat the outside of the relay, i.e., the epoxy coating may wick onto the terminals, reducing adhesion between the solder and the terminal. These conditions can affect the soldering process, such that sufficient solder may not be applied between the board and the terminal. If an insufficient amount of solder is present, the solder joint may not be robust and be susceptible to fatigue cracking. Fatigue cracking may be caused by repeated thermal cycling and/or physical vibration.

Solder joint fatigue cracking is progressive by nature. In the context of this subject, fatigue cracking of the headlamp relay solder joints is evidenced by the significant percentage of reports indicating that headlamp function is "intermittent." Such intermittent performance provides clear indication to a driver that the vehicle should be serviced. A vehicle that continues to be operated despite intermittent headlamp performance may begin to experience more prolonged, though intermittent, outages, as the fatigue cracks grow. If left unrepaired, the cracks could grow until the headlamps will not turn on or off or are inoperative. In fact, a review of reports provided with this response found the vast majority indicate that the headlamps are either "intermittent" or "won't turn on/off/inop."

Some of the reports provided with this response allege headlamp outage while driving that is not intermittent but more prolonged. These outages appear to result from the solder joint fatigue cracking and it is likely that these prolonged outages were preceded by shorter, more intermittent outages. Nevertheless, even in the event that a vehicle experiences a more prolonged loss of headlamp function while driving, the parking lamps and tail lamps remain illuminated and the turn signals and brake lamps continue to function normally. These lamps provide conspicuity and indication of driver intent to surrounding vehicles, such as lane changes or vehicle braking to exit the roadway. Additionally, the driver can also use the flash-to-pass feature, as it is not controlled by the LCM, to provide forward illumination while maneuvering the vehicle off of the roadway or to another safe location. In fact, review of the reports found

several where drivers noted their use of this function following headlamp outage. Oftentimes, shutting off the headlamp switch for a short time allows the solder joint to sufficiently cool and regain headlamp function. Again, this is evidenced by reports from several drivers that lighting function returned after a brief period of time, permitting them to maneuver their vehicle to a preferred location or final destination.

Ford acknowledges that LCM repair cost is relatively high, from \$400-\$800 depending on related diagnostic procedures, etc. In fact, review of reports finds cost-of-repair to be a common and notable complaint. A detailed review of the 87 responsive MORS (owner) reports was undertaken to understand customer comments relating to this subject. A large majority of the reports, 52, focused on the cost of the repair. Only 13 reports make any reference to potential safety related concerns. However, even seven of those 13 reports also make reference to the cost of the repair. The repair cost can be substantial, especially for municipal fleets that are experiencing budget cuts or for retirees living on fixed incomes. The remaining 22 reports relate to customer feedback on dealership service, length of time to diagnose the concern, or a customer request to have Ford document that they had an LCM repair performed. Overall, cost, not safety, is the focus of calls to Ford's customer relationship center.

A review of reports found that Crown Victoria Police Interceptor (CVPI) vehicles experience the subject condition at twice the rate of civilian Crown Victoria and Grand Marquis vehicles. Crown Victoria taxis experience a higher rate than civilian units, but not as high as the CVPI. These differences are likely a result of the unique duty cycles experienced by these vehicles and because the condition relates to solder joint fatigue cracking. Additionally, police units often have aftermarket lamps added that may place further strain on the LCM, depending on where the aftermarket installer chooses to wire in the additional lamps.

The overall rate of reports provided with this response is 6.7R/1000 which is significantly lower than rates relating to vehicles campaigned for headlamp outages, and similar to agency investigations that were closed without action. Further, this rate includes reports for all malfunctions, including headlamps that will not come on at vehicle start-up, headlamps that will not go off at vehicle shutdown, and intermittent outages where function quickly returns. The rate of reports for non-intermittent headlamp outage while driving is notably smaller, and significantly lower than in other agency investigations that have been closed without a field action.

A fair reading of the reports provided with this response and other similar investigations find that drivers are able to consistently and safely maneuver their vehicles immediately following headlamp outage. In fact, a review of the available real world data finds no crash or injury allegations associated with the subject of this investigation despite the number of vehicle repairs. A thorough review of the reports and understanding of the system function provides some context for the real world data. As previously noted, the vehicle remains conspicuous to surrounding vehicles and pedestrians during a headlamp outage because the parking lamps and tail lamps continue to function normally. The driver is provided with full operation of turn signals, hazard lamps, and brake lamps, allowing the driver to appropriately signal their driving intent. A driver travelling in an unlit area can operate the flash-to-pass feature, providing temporary lighting to allow the vehicle to be maneuvered to the roadside or to another preferred location. Several reports indicate recognition and use of this functionality. Still, the most common complaints are that the headlamps do not turn on/off/inoperative or that they are intermittent. These conditions immediately place the driver on notice that there is a condition requiring repair and that appropriate interim action should be taken. The real world data demonstrate that drivers of vehicles that have experienced headlamp outage have successfully controlled their vehicles, without incident, and subsequently sought repair.

Ford recognizes that lighting malfunctions can potentially pose unreasonable risks of accidents and injuries and we take our responsibility to identify those situations very seriously. To that end, Ford began monitoring this subject in the fall of 2007 with the ensuing investigation focusing on CVPI vehicles because of the notably higher report rate associated with these vehicles as compared to the civilian units. Actions were undertaken to incorporate design improvements into LCM service parts to provide a more robust design, and to build up a supply of the improved parts for service. Ford has continued to monitor reports and the field performance of these modules to evaluate whether some type of action may be warranted. Based on the results of these ongoing analyses, the fact that other lighting systems remain functional during headlamp outage, and the low rate of reports compared to prior campaigns, no field service action recommendations have been brought to Ford's Field Review Committee. Ford continues to believe that balanced consideration of all of the factors support a conclusion that this condition in these vehicles does not present an unreasonable risk to safety.

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