



GENERAL MOTORS NORTH AMERICA
Structure & Safety Integration

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Vehicle Integrity Division
Office of Defects Investigation
NHTSA Enforcement
Room #5326
400 Seventh Street, S.W.
Washington, D.C. 20590

OFFICE OF DEFECTS
INVESTIGATION

GM-689

NVS-212lhs
PE06-017

Dear Mr. Cooper:

This letter is General Motors (GM) response to your information request (IR), dated May 19, 2006, regarding consumer allegations that the headlights installed in certain Chevrolet Impala vehicles manufactured by GM may fail without warning during normal vehicle operation.

The subject vehicles for this inquiry are 2002 model year (MY) Chevrolet Impala vehicles unless the inquiry item specifically identifies the subject vehicles as 2001–2003 MY Chevrolet Impala vehicles.

On May 24, 2006, NHTSA clarified the alleged defect is loss of headlight illumination, headlight flicker and/or dimming of the headlights that may occur during normal vehicle operation. Accordingly, searches conducted in formulating this response focus on failure modes that relate or may relate to the alleged condition of loss of headlight illumination, headlight flicker and/or dimming of the headlights.

Your questions and our corresponding replies are as follows:

1. **State, by model and model year, the number of MY 2001-2003 Chevrolet Impala vehicles GM has manufactured for sale or lease in the United States. Separately, for each subject vehicle manufactured to date by GM state the following:**
 - a. **Vehicle identification number (VIN);**
 - b. **Make;**
 - c. **Model;**
 - d. **Model Year;**
 - e. **Date of manufacture;**
 - f. **Date warranty coverage commenced; 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."

General Motors is providing the number of subject vehicles produced for sale or lease in the United States by make, model and model year in Table 1 below:

MAKE/MODEL	2001 MY	2002 MY	2003 MY	TOTAL
Chevrolet Impala	188,248	201,464	256,326	646,038

TABLE 1 VEHICLE PRODUCTION



The production information requested in 1a-1g is provided on the in the Attachment 1 CD, in the folder labeled: "Response for Q1;" refer to the Microsoft Access 2000 file labeled PRODUCTION DATA. GM is providing the state where the vehicle was shipped in response to request 1g. For some of the subject vehicles, which have incomplete warranty files, the GM warranty system does not contain a warranty start date or state where the vehicle was shipped and therefore these fields are blank in the Microsoft Access 2000 file.

2. **State the number of each of the following, received by GM, or of which GM is otherwise aware, that relate to or may relate to, the alleged defect in MY 2001-2003 Chevrolet Impala vehicles:**
 - a. **Consumer complaints, including those from fleet operators;**
 - b. **Field reports, including dealer field reports;**
 - c. **Reports involving a crash, injury, or fatality, based on claims against the manufacturer involving an injury or death, notices received by GM alleging or proving that an injury or death was related to or resulted from the alleged defect in a subject vehicle;**
 - d. **Property damage claims, including claims of a loss of vehicle control and/or crash in which the alleged defect is alleged to have contributed to impaired driver visibility;**
 - e. **Third-party arbitration proceedings where GM is or was a party to the arbitration; and,**
 - f. **Lawsuits, both pending and closed, in which GM is or was a defendant or codefendant.**

For subparts "a" through "c," 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 GM's assessment of the problem, with a summary of the significant underlying facts and evidence. For item "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.

The records that relate to or may relate to the alleged defect in 2001 – 2003 model year Chevrolet Impala vehicles have been categorized into the 3 tables below.

Table 2-1 below summarizes records that could relate to complete or intermittent loss of headlight illumination in the subject vehicles that may occur during normal vehicle operation.

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/FATALITIES*	NUMBER WITH FIRES*
Owner Reports	5	0	0	0	0	0
Field Reports	153	0	0	0	0	0
Not-In-Suit Claims	0	0	0	0	0	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	158	0	0	0	0	0
Total Vehicles with Reports (Unique VIN)	157	0	0	0	0	0

TABLE 2-1
 COMPLETE OR INTERMITTENT LOSS OF HEADLIGHT ILLUMINATION - REPORT BREAKDOWN
 * GM HAS NO FATALITY REPORTS
 N/A NOT APPLICABLE

Table 2-2 below summarizes records that could relate to headlight flicker in the subject vehicles that may occur during normal vehicle operation.

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/FATALITIES*	NUMBER WITH FIRES*
Owner Reports	3	0	0	0	0	0
Field Reports	102	0	0	0	0	0
Not-In-Suit Claims	0	0	0	0	0	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	105	0	0	0	0	0
Total Vehicles with Reports (Unique VIN)	104	0	0	0	0	0

TABLE 2-2
 HEADLIGHT FLICKER - REPORT BREAKDOWN
 GM HAS NO FATALITY REPORTS
 N/A NOT APPLICABLE

Table 2-3 below summarizes records that could relate to dimming of the headlights in the subject vehicles that may occur during normal vehicle operation.

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/FATALITIES*	NUMBER WITH FIRES*
Owner Reports	3	0	0	0	0	0
Field Reports	13	0	0	0	0	0
Not-In-Suit Claims	0	0	0	0	0	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	16	0	0	0	0	0
Total Vehicles with Reports (Unique VIN)	16	0	0	0	0	0

TABLE 2-3
 DIMMING OF HEADLIGHTS - REPORT BREAKDOWN

* GM HAS NO FATALITY REPORTS

N/A NOT APPLICABLE

GM's investigation of the alleged defect included a review of the incident reports to accurately assess the cause(s). Those incident reports that contained sufficient reliable information regarding cause were classified according to the 5 code descriptions listed in the Attachment 1 CD, folder labeled "Attachment 2A Incident Report Code Descriptions" The information was also added to the Attachment 1 CD, folder labeled "Response for Q3;" refer to Microsoft Access file named "Request Number Two Data."

Assessments of other incidents (from lawsuits and claims) may be attorney work product and/or privileged. Therefore, information and documents provided in this response, if any, consist only of non-attorney work product and/or non-privileged material for incidents that have been investigated and assessed.

The sources of the requested information and the last date the searches were conducted are tabulated in Table 2-4 below.

SOURCE SYSTEM	LAST DATE GATHERED
Corporate Central File	6/5/2006
Customer Assistance Center	6/5/2006
Technical Assistance Center	6/5/2006
Field Information Network Database (FIND)	6/1/2006
Company Vehicle Evaluation Program (CVEP)	6/5/2006
Field Product Report Database (FPRD)	6/1/2006
Legal / Employee Self Insured Services (ESIS) / Product Liability Claims and Lawsuits	5/24/2006

TABLE 2-4: DATA SOURCES

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:
- GM's file number or other identifier used;
 - The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
 - Vehicle owner or fleet name (and fleet contact person), address, and telephone number;
 - Vehicle's VIN;
 - Vehicle's make, model and model year;
 - Vehicle's mileage at time of incident;
 - Incident date;
 - Report or claim date;
 - Whether a crash is alleged;
 - Whether a fire is alleged;
 - Whether property damage is alleged;
 - Number of alleged injuries, if any; and
 - Number of alleged fatalities, if any.

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

GM is providing the requested information for 3(a-m) in the Attachment 1 CD, folder labeled "Response for Q3;" refer to Microsoft Access file named "Request Number Two Data."

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 GM used for organizing the documents.

Copies of the records summarized in Table 2-1, 2-2 AND 2-3 are embedded in the file provided in Attachment 1 CD GM; folder labeled "Response for Q3," refer to the Microsoft Access file. GM has organized the records by the GM file number within each attachment.

5. State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by GM to date that relate to, or may relate to, the

alleged defect in MY 2001-2003 Chevrolet Impala 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. GM's claim number;
- b. Vehicle owner or fleet name (and fleet contact person) and telephone number;
- c. VIN;
- d. Repair date;
- 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.

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

Tables 5-1 and 5-2 summarize by model year the regular and extended warranty claims for the subject vehicles that were collected by searching the labor codes and trouble codes that may be related to the alleged defect. A list of the labor codes and trouble codes is provided in response to item No. 6. A summary of the warranty claims, including the information requested in 5(a-k), is provided on the Attachment 1 CD; refer to the folder labeled, "Response for Q5."

The warranty data provided has limited analytical value in analyzing the field performance of a motor vehicle component. The warranty records do not contain sufficient information to establish the condition of the part at the time of the warranty correction; and service personnel may not consistently use the appropriate labor and trouble codes. Warranty numbers represent claims by our dealers for reimbursement for parts and labor costs incurred in performing warranty service for our customers. Consequently, some of these warranty claims are not related to the alleged defect.

In order to identify warranty claims that may be related to the alleged defect from this broad list of warranty claims GM compiled a randomly selected list of claims that did not have a dealer verbatim or the dealer verbatim did not contain sufficient information indicating that the claim may be related to the alleged defect. GM called a number of dealers on this list of warranty claims for detailed information related to the customer's concern. The additional information related to the customer concern was used to better identify warranty claims that are related to the alleged defect as explained in detail in response to item No 6. Table 5-3 summarizes by model year the warranty claims for each failure mode resulting from the warranty analysis.

MODEL	2001MY	2002MY	2003MY	TOTAL
Chevrolet Impala	1,986	1,615	1,876	5,477

TABLE 5-1: REGULAR WARRANTY CLAIMS

MODEL	2001MY	2002MY	2003MY	TOTAL
Chevrolet Impala	362	380	225	967

TABLE 5-2: EXTENDED WARRANTY CLAIMS

FAILURE MODE	2001MY	2002MY	2003MY	TOTAL
Headlights Out	387	311	360	1,056
Headlights Flicker	20	17	18	55
Headlights Dim	1	0	1	2
TOTAL	408	328	379	1,113

TABLE 5-3: REGULAR WARRANTY FAILURE MODE CLASSIFICATION BY ANALYSIS

The sources of the requested information and the last date the searches were conducted are tabulated in Table 5-4 below.

SOURCE SYSTEM	LAST DATE GATHERED
GM CARD --regular warranty	5/26/2006
Motors Insurance Corporation (MIC) – extended warranty	6/6/2006
Universal Warranty Corporation (UWC) – extended warranty	5/26/06

TABLE 5-4: DATA SOURCES

GM searched the GM North America Claim Adjustment Retrieval Database (CARD-regular warranty), the Motors Insurance Corporation (MIC-extended warranty), and the Universal Warranty Corporation (UWC-extended warranty) databases to collect the warranty data for this response.

GM's warranty database does not contain the following information: vehicle owner's name or telephone number, replacement part number description, or customer concern statement. GM is providing a field labeled "Verbatim Text" in response to request 5K (dealer/technician comment). The verbatim text is an optional field in the GM warranty system for the dealer to enter any additional comments that may be applicable to the warranty claim. The verbatim text field is not required to be completed for every warranty claim.

The MIC extended warranty system does not contain the following information: repairing dealer code, vehicle owner information, trouble code, trouble code description, part number, part description or verbatim. The UWC extended warranty system does not use the GM labor code or labor code description and it does not contain the repairing dealer code, trouble code or trouble code description.

6. Describe in detail the search criteria used by GM 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 GM on MY 2001-2003 Chevrolet Impala 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)

related to the alleged defect that GM offered for the subject vehicles and state the number of vehicles that are covered under each such extended warranty.

The GM regular warranty and MIC extended warranty claims that may relate to the subject condition were collected by searching for the labor codes listed in Table 6-1 below. The list of trouble codes used during the search is included in Table 6-2 below. Universal Warranty Corporation (UWC) does not use labor codes or trouble codes. The UWC extended warranty claims were collected by searching for the alleged defect.

LABOR CODE	DESCRIPTION:
N2290	Switch Headlamp- Replace
N2310	Switch Headlamp Dimmer – Replace*
N2355	Switch Multifunction – Replace

TABLE 6-1 LABOR CODES USED IN WARRANTY SEARCH

TROUBLE CODE	DESCRIPTION:	TROUBLE CODE	DESCRIPTION:
1A	Bent	6D	Component-Intermittent
1B	Casting Defect	6F	Component-Open
1D	Broken	6G	Component-Shorted
1E	Burned	6H	Connector-Bent/Damaged
1G	Chipped	6J	Connector-Corroded
1H	Clogged/Restricted/Blocked	6L	Connector-Missing
1J	Collapsed	6M	Connector-Disconnected
1K	Cracked	6N	Connector-Partial Connected
1Y	Foreign Material	6P	Connector-Seal Damaged
2E	Clearance-Excessive	6Y	Socket-Open
2F	Clearance-Too Tight	6Z	Socket-Shorted
2G	Improperly Cut	7B	Terminal-Backed Out
2H	Improperly Installed	7C	Terminal-Bent/Damaged
2W	Loose	7D	Wire-Shorted to Ground
3A	Misadjusted/Misaligned	7F	Terminal-Not Crimped/Shorted
3F	Not Connected	7G	Wire-Burned-Ext.-Heat
3G	Not Drilled	7H	Wire-Burned-Int.-Heat
3L	Out of Calibration	7J	Wire Chaffed
3N	Poor Machining	7K	Wire-Crossed in Connector
3P	Poor Release	7R	Wire-Pinched
3X	Registers Incorrectly	7S	Wire-Ring Terminal Disconnected
4A	Scored	7T	Wire-Ring Terminal Loose
4G	Stripped	7W	Electrical Interference
4Q	Weak	93	Technical Service Bulletin
4X	Worn	95	Special Policy
4Z	Wrong Part	96	Campaign
6B	Component-Ground	98	Customer Satisfaction
6C	Component-Inoperative		

TABLE 6-2 TROUBLE CODES USED IN WARRANTY SEARCH

GM reviewed this broad list of regular warranty claims, any claims that clearly did not relate to the alleged defect based on a review of the dealer verbatim, customer code, trouble code and repair cost were removed and are not being provided. From the 5,428 remaining claims that did not have a dealer verbatim or the dealer verbatim lacked sufficient information with which to determine that the claim may be related to the alleged defect GM randomly selected claims to be used to contact repairing dealers.

GM called the repairing dealer for information regarding the customer's concern and the reason for the warranty repair. Additional information was acquired from the repairing dealer for a statistically relevant sample of 200 of the warranty claims providing a 95% confidence level in the information. Information obtained from the repairing dealer is being provided in the Attachment 1 CD folder labeled "Response for Q6;" refer to the Microsoft excel file.

The additional dealer information establishes that 78.5% of the 5,428 warranty repairs were for reasons other than the alleged defect. In other words, only 1,113 (20.5%) of these claims processed at that time using the same labor codes that were used in the GM search for regular warranty claims were found to relate to the alleged condition. Table 5-3 shows the results of applying this warranty analysis to the warranty claims data.

The subject vehicles are covered by a bumper-to-bumper new vehicle warranty for three years or 36,000 miles whichever occurs first. Many different extended warranty options are available through GM dealerships. They are offered at different prices and for varying lengths of time, based on customer's preference, up to 7 years from the date of purchase or up to a total of 100,000 vehicle miles. The number of extended warranty coverage contracts on the subject vehicles that have been sold by MIC regardless of status (in-force, expired, cancelled) as of July 24, 2006 is contained in Table 6-3.

MODEL	2001MY	2002MY	2003MY	TOTAL
Chevrolet Impala	42,044	39,683	45,662	127,389

TABLE 6-3: MIC EXTENDED WARRANTY COVERAGE IN FORCE

- 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 GM 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 such communication that GM may be planning to issue within the next 120 days.**

GM is not aware of any service, warranty or other documents that relate or may relate to the subject condition in the subject vehicles, that GM has issued to dealers, regional or zone offices, field offices, fleet purchasers or other entities.

General Motors is not planning to issue in the next 120 days, any service, warranty or other technical documents or communications to its dealers, regional offices, zone offices or other entities regarding the subject condition in the subject vehicles.

The preceding information was collected from GM Service Operations. The data collection was completed on June 12, 2006.

- 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, GM. 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.

The information listed in Table 8-1 below is a summary of actions performed by or for GM regarding the subject condition on the 2001 – 2003 MY Chevrolet Impala vehicles. Documents and additional supporting information is included on the Attachments as noted in the table.

<p>Action 8-1: Beam change tolerance study - section view of Beam Change Switch Start Date: 2/2002 End Date: 3/2002 Engineering Group: Kostal of America Engineering Attachments: Documents can be found on Attachment 2 CD, "Response to Q8 Confidential" folder, "Action 8A Beam change tolerance study section B-B" Description: Drawing showing tolerance stacks critical to switch function. Summary of Action: Shows critical dimensions for the beam change switch.</p>
<p>Action 8-2: PRTS N122151 Multifunction Switch – Headlamp Dimmer Start Date: 4/30/2003 End Date: 10/13/2003 Engineering Group: GM Engineering, GM Vehicle Warranty Engineering Mid Lux Car Attachments: Documents can be found on Attachment 2 CD, "Response to Q8 Confidential" folder, "Action 8B PRTS 122151" Description: High beam headlamps inoperative. Customer complaints include: high beams will not turn off, high beams will not stay on, headlight operation erratic & headlights go off with high beam switch actuation. Summary of Action: Root cause identified to be high beam slider plunger tip wearing over time. Revise the tear drop plunger to allow mechanical function to properly activate when lever is constantly loaded. Engineering change to Beam Change Module.</p>
<p>Action 8-3: Delphi Multi Function Switch Product Specification Part No. 26051442 Start Date: 5/1996 End Date: current Attachments: Documents can be found on the PE06-017 Delphi Complete Copy CD, "CL06-006-005 Product Specification Part No. 26051442. Description: Subject Component product specifications Summary of Action: The specifications used in the component design and testing.</p>
<p>Action 8-4: PV Test Reports - Beam Change Durability Start Date: 1996 End Date: 4/1996 Engineering Group: Kostal of America Engineering Attachments: Documents can be found on Attachment 2 CD, "Response to Q8 Confidential" folder, "Action 8C: test report AEB 0393_96_96", , "Action 8D: test report AEB 0424_96", , "Action 8E: test report AEB 0635_96", "Action 8F: test report AEB 0423_96", "Action 8G: test report AEB 0457_96", Description: Validation test reports for beam change Summary Action: Shows part as "ok" after test was completed</p>

<p>Action 8-5: Engineering Logbook Start Date: 5/2006 End Date: 7/2006 Engineering Group: GM Engineering Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8H Logbook" Description: Summary of "open Issues" ongoing in the Engineering investigation of the alleged defect. Summary Action: The investigation action items are documented as closed or open based on color (blue=CLOSED, yellow=OPEN)</p>
<p>Action 8-6: Multifunction Switch DFMEA (Sub-System FMEA) Start Date: 5/2006 End Date: 6/2006 Engineering Group: Kostal of America Engineering/GM Engineering Attachment: Documents can be found on Attachment 2 CD, "Response to Q8 Confidential" folder, "Action 8I-A Multifunction Switch DFMEA Kostal", "Action 8I Impala Headlamp Sub-System FMEA Analysis Tool" Description: Multifunction Switch DFMEA and Sub-system design failure mode analysis used to assess performance and identify contributing factors to the failure modes Summary Action: Sub-System meets performance requirements</p>
<p>Action 8-7: 5-Whys (Root Cause and Corrective Action) Start Date: 6/2006 End Date: 7/2006 Engineering Group: Delphi Automotive Systems Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8J 5-Whys" Description: Summary of root cause analysis Summary Action: Identifies potential root cause</p>
<p>Action 8-8: Critical Dimensions, Control Plan Start Date: 6/2006 End Date: 7/2006 Engineering Group: Kostal of America Engineering Attachment: Documents can be found on Attachment 2 CD, "Response to Q8 Confidential" folder, "Action 8K Critical Dims", "Action 8K-1A Kostal Control Plans" Description: List of dimensions with tolerances critical to the beam change function Summary Action: Critical dimension List</p>
<p>Action 8-9: Beam Change Validation Report (55k Cycles) Start Date: 6/2006 End Date: 7/2006 Engineering Group: Kostal of America Engineering Attachment: Documents can be found on Attachment 2 CD, "Response to Q8 Confidential" folder, "Action 8L Val_Report 2006.MX.1726" Description: Test Report for the durability test on the beam change Summary Action: Parts completed test and meet the electrical requirements</p>
<p>Action 8-10: Returned parts Tear Down, Dimensional Measurements. Start Date: 6/2006 End Date: 6/2006 Engineering Group: Kostal of America Engineering Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8M Switch Teardown Report 28JN06", "Action 8N returned parts measurements 17JL06", Description: Summary of returned parts that were disassembled and analyzed. List of the critical dimensions measured on actual parts that were returned from the field Summary Action: Some parts did exhibit non-conformance to beam change specifications. Part by part dimensional data with drawing requirement and tolerance</p>

<p>Action 8-11: Fault Tree Start Date: 6/2006 End Date: 7/2006 Engineering Group: GM Engineering and Kostal of America Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8O Fault Tree Analysis" Description: Potential root cause analysis and corrective action for the beam change contact Summary Action: Supports the teardown and root cause</p>
<p>Action 8-12: Warranty Return Evaluation. Warranty returns dimensional measurement for critical components. Description of component parts critical to the beam change mechanism Start Date: 6/2006 End Date: 7/2006 Engineering Group: Kostal of America Engineering Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8P warranty returns dimensional check results", "Action 8Q component tooling inventory", "Response to Q8" folder, "Action 8T warr_return_report", "Action 8U switch RMA reports" and "Action 8W Warranty Parts Return Request" Description: Evaluation of potential root cause based on warranty returned parts. List of dimensional data collected from field returns on critical components Summary Action: Summarizes actual part data from the field return parts</p>
<p>Action 8-13: Tooling Change Timing Plan Start Date: 6/2006 End Date: 8/2006 Engineering Group: Kostal of America Engineering Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8R tool correction plans" Description: Roll-out for tooling corrections by component Summary Action: Timing plan</p>
<p>Action 8-14: Dimensional data for new components Start Date: 6/2006 End Date: 7/2006 Engineering Group: Kostal of America Engineering Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8S component measurements" Description: beam change components dimensional measurements by cavity Summary Action: Shows condition of tool by cavity for molded parts over time</p>
<p>Action 8-15: Failure Analysis Weibull Start Date: 6/2006 Start Date: 7/2006 Engineering Group: GM Engineering Attachment: Documents can be found on Attachment 1CD, "Response to Q8" folder, "Action 8 1A Failure Rate Weibull" Description: Weibull of alleged defect in the subject vehicles. Summary Action: Predicted failure rates at 1 – 7 years.</p>

9. Describe all modifications or changes made by, or on behalf of, GM in the design, material composition, manufacture, quality control, supply, or installation of the subject components, from the start of production to date, which relate, or may relate, to the

alleged defect in MY 2001-2003 Chevrolet Impala 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 numbers (service and engineering) of the original component;
- e. The part number (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 GM is aware of which may be incorporated into vehicle production within the next 120 days.

GM is providing a summary of the product engineering information requested in 9(a-h), along with copies of the related Engineering Work Order (EWO) and Temporary Work Order (TWO) documents in Attachment 1 CD, folder labeled: "Response for Q9."

GM is not planning to incorporate any modifications or changes into production of the subject vehicles that relate to the alleged defect within the next 120 days.

- 10. Provide a complete engineering description and appropriate engineering drawings/schematics of the subject headlight system electrical circuitry and components installed in the subject vehicles.**

The headlamp sub-system consists of the following:

- High Beam Bulbs (Qty=2) Sylvania #9005
- Low Beam Bulbs (Qty=2) Sylvania #9004
- Forward Lamp Harness
- Body Electrical Center (BEC) with fuse for right front lamps (10A) and a fuse for the left front lamps (15A)
- I/P harness
- Headlamp Switch Assembly
- Steering Column Assembly
 - Column with Steering Wheel
 - Wire Harness
 - Multi-Function Switch (T/Signal, Wipe/Wash, Headlamp and Beam Change w/Flash to Pass)
- Daytime Running Lamp Relay
- Body Control Module
- Headlamp Relay

The power is fed through the bulbs to the beam change switch module and then to ground per the mechanization. The ground is switched by a headlamp relay. The high and low beam function is activated when the driver moves the left lever (multifunction switch) toward themselves (rear of the vehicle). This switching is done by the beam change module in the multifunction switch that switches power to ground at the switch. When changing from low to high beam or high to low beam, the contacts inside the beam change module are designed to

"make" before "break". This means that there must be contact on either the high beam contacts or the low beam contacts at all times. The flash to pass function is controlled by a separate set of contacts inside the beam change module and activates the high beam only. These contacts assure the make before break of the beam change. If the vehicle has fog lamps the High beam circuit is monitored by the BCM.

The instrument panel mounted headlamp switch signals are inputs to the Body Control Module (BCM). When the instrument panel mounted headlight switch is in the OFF position the BCM will turn on the headlamp relay based on the day/night input signal from the light sensor mounted on the I/P. When the headlamp switch is in the ON position, the BCM will override the light sensor input and close the headlamp relay. This will turn on the headlights.

A high level diagram of the Impala headlight system electrical circuitry can be found in the Attachment 1CD, "Response to Q10" folder, in the "Attachment 10A Impala Headlight System High level Diagram" file.

The headlight system electrical circuitry schematics are provided on the in the Attachment 1 CD, in the folder labeled: "Response for Q10;" refer to the folder labeled 10B Impala Headlight System Schematics.

Engineering drawings of the subject vehicle headlight switch are provided on the Attachment 2 CD, in the folder labeled "Confidential Attachment 10C Headlight Switch Drawings".

The engineering drawing of the subject vehicle multifunction switch can be found on the PE06-017 Delphi Complete Copy CD, "CL06-006-117 Eng Drawing Part Number 26093873 and the Attachment 2 CD, in the folder labeled "Confidential Attachment 10D Kostal Multifunction Switch Drawing".

11. Provide two samples each of the subject vehicle's headlight switch and multifunction switch.

Enclosure 11 contains, (a) two exemplar samples of the design version of the headlight switch, and (b) two exemplar samples of the of the design version of the multifunction switch installed in the subject vehicles.

12. State the number of each of the following that GM 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 sale (including the cut-off date for sales, if applicable):

- a. Headlight switch; and
- b. Multifunction switch.

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 and model year, any other vehicles of which GM is aware that contain the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

An electronic summary table of the requested service part information for the subject components is provided on the attachment 1 CD, in the folder labeled "Response to Q12;" refer to the Microsoft Excel file. GM does not offer any kits that have been released or developed for use in service repairs specifically related to the subject condition.

These sales numbers represent sales to dealers in the US and Canada. This data has limited analytical value in analyzing the field performance of a motor vehicle component because the records do not contain sufficient information to establish the reason for the part sale. It is not possible from this data to determine the number of these parts that have been installed in the subject vehicles or the number remaining in dealer or replacement part supplier inventory.

This table contains service part numbers, part description, part usage information including the GM vehicles that contain the identical component, part sales figures by month and calendar year, and the supplier's name and address, contact name and phone number. The General Motors Service Parts System does not contain a title of a contact person for each component and is therefore unable to provide this information.

13. Provide GM'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.**

GM has extensively investigated the alleged condition, tested and examined returned parts, analyzed warranty claim data and contacted repairing dealers to acquire information relevant to the subject condition. GM believes there is no unreasonable risk to motor vehicle safety for the following reasons:

The condition occurs under limited conditions and is short lived.

- the condition will only occur; 1) when components in the beam change module are out of dimension from wear and 2) the driver pulls slowly on the multifunction switch stalk, creating the potential for the switch to become balanced between the high and low beam positions. The condition will not occur if the driver completely pulls the multifunction switch stalk toward them the full extent of travel when making a beam change.
- Any movement of the multifunction switch stalk will move the plunger out of the balanced condition and immediately restore headlight illumination (high or low beam). Movements can be as slight as vibration.

The current and projected rates of occurrence are low.

- the cumulative IPTV rate (2.23) for warranty and GM reports of loss of headlights, headlight flicker and dimming of headlights is low
- the cumulative IPTV rate (1.96) for warranty and GM reports of loss of headlights is even lower
- Weibull analyses of the warranty data and GM reports shows the cumulative IPTV rate (4.67@ 5 years) and the incremental 2 year projected rate (2.6 IPTV) for loss of headlights, headlight flicker and dimming of headlights is low
- the cumulative IPTV rate (4.14@ 5 years) expected for the occurrence of loss of headlights is even lower

- these rates for inoperative headlights are generally considered not an unreasonable risk to safety
- there are no reported crashes, injuries, or fatalities.

The remainder of GM's response provides additional evidence that substantiates GM's conclusion that the alleged safety defect does not exist.

Attachments "Action 8I-A Multifunction Switch DFMEA Kostal" and "Action 8I Impala Headlamp Sub-System FMEA Analysis Tool" located on the Attachment 2 CD respond to 13 a, b, and c.

These subsystem failure mode analysis tools supported by warranty analysis, dealer repair orders, testing and analysis done on returned parts and the information contained in the GM reports show that the beam change module is the component affected by a condition that may cause the alleged failure.

The beam change module is part of the Multi-Function Switch assembly (MFS). Beam change and flash to pass are functions performed by pulling the lever (MFS stalk) toward the driver. Some returned parts that were analyzed exhibited a condition where the beam change switch can become balanced in a position that resulted in both the low and high beam contacts being open. This condition in the beam change module can result in loss of low and/or high beam lamps until the flash to pass function, controlled by a separate set of contacts inside the beam change module, activates the high beam.

The condition is caused by wear on the components in the beam change module combined with slowly pulling the MFS stalk. The turn signal, cruise control and wiper functions are not affected. The loss of headlight illumination would indicate to the driver the subject condition was occurring or subject component was malfunctioning.

GM was able to repeat the condition on field returned parts by pulling slowly on the lever (MFS stalk) and releasing it. Any further lever movement, even slight, or contact with the steering column, corrects the condition and the beam change module makes contact on the high or low beam side of the beam change module. Analysis of warranty reports and repair orders show that replacing the multifunction switch corrected the alleged condition.

The 15 incident reports (VOQs) included with this inquiry indicate that 8 allege loss of headlight illumination, 4 allege the headlights dimmed and 3 allege the headlights flicker. These alleged failures may have resulted from the contributory factors and failure mechanisms noted above. GM has examined multifunction switches removed from 2 of the VOQ subject vehicles. These multifunction switches did exhibit the loss of headlights condition.

* * *

General Motors requested assistance and documents from suppliers in responding to items 8, 9, 10 and 11 and this response includes those documents received from suppliers.

Except for the documents received from suppliers, this response is based on searches of General Motors Corporation (GM) locations where documents determined to be responsive to your request would ordinarily be found. As a result, the scope of this search did not include, nor could it

reasonably include, "all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of GM (including all business units and persons previously referred to), who are or, in or after 1998, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

- a. Design, engineering, analysis, modification or production (e.g. quality control);
- b. Testing, assessment or evaluation;
- c. Consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
- d. Communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers."

This response was compiled and prepared by this office upon review of the documents produced by various GM locations, and does not include documents generated or received at those GM locations subsequent to their searches.

Please contact me if you require further information about this response or the nature or scope of our searches.

Sincerely,



Gay P. Kent
Director

Product Investigations

Attachments

**GM689
PE06-017**

GM CONFIDENTIALITY LETTER

**GM CONFIDENTIALITY LETTER
HAS BEEN REMOVED FROM THIS
ATTACHMENT AND SUPPLIED TO
THE OFFICE OF THE CHIEF COUNSEL**

**GM689
PE06-017**

SUPPLIER CONFIDENTIALITY LETTER

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**GM689
PE06-017**

ATTACHMENT "1"
GM NON-CONFIDENTIAL MATERIAL

**GM689
PE06-017**

ATTACHMENT "2"

GM CONFIDENTIAL MATERIAL

**GM CONFIDENTIAL MATERIAL
HAS BEEN REMOVED FROM THIS
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**GM689
PE06-017**

ATTACHMENT "3"

DELPHI CONFIDENTIAL MATERIAL

**DELPHI CONFIDENTIAL MATERIAL
HAS BEEN REMOVED FROM THIS
ATTACHMENT AND SUPPLIED TO
THE OFFICE OF THE CHIEF COUNSEL**