GENERAL MOTORS NORTH AMERICA
Structure & Safety Integration

Inter-Organization

Date: May 18, 2004

GM-655 (PE04-031)

On The Cover:

GM Assigned IR Number
NHTSA Assigned Preliminary Evaluation Number
Number of Books
Allegation Title, Model Year and Make
Date Received from NHTSA
GM Reply Date

Book 1:

Tab (1) ..... GM Response Letter to NHTSA
Tab (2) ..... NHTSA IR
Tab (3).....GM Attachment (1) with (1) CD

GENERAL MOTORS NORTH AMERICA
Structure & Safety Integration

May 18, 2004

Jeffery L. Quandt, Chief
Vehicle Control Division
Office of Defects Investigation
NHTSA Safety Assurance
400 Seventh Street, S.W.
Washington, D.C. 20590

GM-655

NVS-213oat
PE04-031

Dear Mr. Quandt:

This letter is General Motors (GM) response to your information request (IR), dated March 30, 2004, regarding the alleged failure of electric power steering on 2004 Model Year Chevrolet Malibu vehicles. The subject vehicles for this investigation are 2004 Model Year Chevrolet Malibu vehicles.

Note: Information regarding the 2004 Model Year Saturn Ion vehicles is provided as requested.
Your questions and our corresponding replies are as follows:

1. **State, by model and model year, the number of MY 2004 Chevrolet Malibu and Saturn Ion vehicles GM has manufactured for sale or lease in the United States. Separately, for each MY 2004 Chevrolet Malibu and Saturn Ion 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." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

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

MODEL	2004 MY
2004 Chevrolet Malibu	90,887
2004 Saturn Ion	85,071
TOTAL*	175,958

TABLE 1 VEHICLE PRODUCTION

*Vehicle production as of April 8, 2004.

The production information requested in 1a-1g is provided on the CD in Attachment 1; refer to the Microsoft Access 2000 file in the folder labeled "PRODUCTION DATA". All of the subject vehicles are equipped with electric power steering assist.

The production information requested in 1a-1g does not include the state where an individual vehicle was sold, however, the "Data Collection Disc", Enclosure 1, provided with this request, does include a field for the two-digit abbreviation for the state where the vehicle was sold. GM is providing the state where the vehicle was shipped in response to this request. The GM database that contains VIN information does not include information on the state where an individual vehicle was sold. For some

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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, by model and model year, the number of each of the following, received by GM, or of which GM are otherwise aware, which relate to, or may relate to, the alleged defect in MY 2004 Chevrolet Malibu and Saturn Ion 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 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; and**
   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 "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 GM'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.

Table 2-1 and 2-2 below summarize records that could relate to the subject condition. GM has organized the records by the GM file number within each attachment.

TYPE OF REPORT	COUNT (INCLUDING DUPLICATES)	GM REPORTS	GM REPORTS CORRESPONDING TO NHTSA REPORTS	LOCATION OF REPORTS (ATTACHMENT)	PROPERTY DAMAGE	INJURIES/ FATALITIES*	CRASHES	FIRE
Owner Reports	85	85	0	2A-1	0	0	0	0
Field Reports and Technical Assistance System Reports	1507	1506	1	2B-1	0	1	2	0
Not-In-Suit Claims	0	0	0		0	0	0	0
Subrogation Claims	0	0	0		0	0	0	0
Third Party Arbitration Proceedings	0	0	0		0	0	0	0
Product Liability Lawsuits	0	0	0		0	0	0	0
Total (Including Duplicates)	1592	1591	1		0	1	2	0
Total (Excluding Duplicates)	1552	1551	1		0	1	2	0

TABLE 2-1: REPORT BREAKDOWN 2004 CHEVROLET MALIBU

*GM is not aware of any fatalities related to the subject condition.

Type of Report	Count (Including Duplicates)	GM Reports	GM Reports Corresponding to NHTSA Reports	Location of Reports (Attachment)	Property Damage	Injuries/ Fatalities*	Crashes	Fire
Owner Reports	4	4	0	2A-2	0	0	0	0
Field Reports and Technical Assistance System Reports	16	16	0	2B-2	0	0	0	0
Not-In-Suit Claims	0	0	0		0	0	0	0
Subrogation Claims	0	0	0		0	0	0	0
Third Party Arbitration Proceedings	0	0	0		0	0	0	0
Product Liability Lawsuits	0	0	0		0	0	0	0
Total (Including Duplicates)	20	20	0		0	0	0	0
Total (Excluding Duplicates)	20	20	0		0	0	0	0

TABLE 2-2: REPORT BREAKDOWN 2004 SATURN ION

*GM is not aware of any fatalities related to the subject condition.

The sources of the requested information and the last date the searches were conducted are tabulated in Table 2-3 below.

Source System	Last Date Gathered
Corporate Central File	4/19/2004
Customer Assistance Center	4/21/2004
Technical Assistance Center	4/15/2004
Field Information Network Database (FIND)	4/19/2004
Company Vehicle Evaluation Program (CVEP)	4/6/2004
Captured Test Fleet (CTF)	4/6/2004
Early Quality Feedback (EQF)	4/26/2004
Field Product Report Database (FPRD)	4/13/2004
Legal / Employee Self Insured Services (ESIS)	4/13/2004

TABLE 2-3: 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:

- **a. GM'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;**
- **h. Report or claim date;**

i. **Whether a crash is alleged;**
j. **Whether a fire is alleged;**
k. **Whether property damage is alleged;**
l. **Number of alleged injuries, if any; and**
m. **Number of alleged fatalities, if any.**

Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

The requested information is provided on the CD in Attachment 1, in a folder labeled Response to Q3; refer to the Microsoft Access 2000 file in the labeled " 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 model, model year, and category (i.e., consumer complaints, field reports, etc.) and describe the method GM used for organizing the documents.**

Copies of the records identified in item 2 are provided in the attachments listed in Table 2-1. 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 2004 Chevrolet Malibu and Saturn Ion 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." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

The 3,788 regular warranty claims for the subject vehicles that may be responsive to this request, are summarized in Tables 5A and 5B below. A summary of these warranty reports is provided in Attachment 1 CD; refer to the folder labeled "Response for Q5".

Regular Warranty Claims for Steering Column/Motor Replacement (Labor Code E7630, E7631, E7680)

MODEL	MODEL YEAR	WARRANTY CLAIMS
Chevrolet Malibu	2004	3,735
Saturn Ion	2004	51
TOTAL		3,786

TABLE 5A

Extended Warranty Claims for Electric Power Steering Replace

MODEL	MODEL YEAR	WARRANTY CLAIMS
Chevrolet Malibu	2004	0
Saturn Ion	2004	0
TOTAL		0

TABLE 5B

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. The warranty data was last gathered on May 12, 2004.

A summary of warranty claims that may relate to the subject condition is provided on the CD in Attachment 1, in the folder labeled Response to Q5; refer to the Microsoft Access 2000 file labeled "REQUEST NUMBER FIVE - WARRANTY DATA."

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 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.

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 MY 2004 Chevrolet Malibu and Saturn Ion vehicles. State, by model and model year, the terms of the new vehicle warranty coverage offered by GM on MY 2004 Chevrolet Malibu and Saturn Ion 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 GM offered for MY 2004 Chevrolet Malibu and Saturn Ion vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.

The regular warranty data from the GM CARD Database was collected by searching the labor codes listed in table 6-1. Table 6-2 lists the trouble codes associated with the warranty data.

LABOR CODE	DESCRIPTION:
E7630	Upper Column and Assist Assembly, Electronic Power Steering – Replace
E7631	Motor and Controller Assembly, Electronic Power Steering – Replace
E7660	Column Assembly, Steering – Replace

TABLE 6-1 LABOR CODES USED IN WARRANTY SEARCH

TROUBLE CODE	DESCRIPTION
00	FREIGHT CLAIMS
0B	OBDII Code used
0L	
1A	BENT
1B	CASTING DEFECT
1D	BROKEN
1E	BURNED
1G	CHIPPED
1H	CLOGGED/RESTRICTED/BLOCKED
1J	COLLAPSED
1K	CRACKED
1N	BURRS
1R	DOES NOT MATCH
1Y	FOREIGN MATERIAL
2C	GLAZED
2E	CLEARANCE-EXCESSIVE
2F	CLEARANCE-TOO TIGHT
2G	IMPROPERLY CUT
2H	IMPROPERLY INSTALLED
2K	IMPROPERLY SEALED
2L	INCORRECT PRESSURE
2N	INSUFFICIENT LUBRICATION
2P	INSUFFICIENT SEALANT
2S	KINKED
2T	INCORRECT TORQUE
2W	LOOSE
3A	MISADJUSTED/MISALIGNED
3D	MISSING
3E	
3F	NOT CONNECTED
3K	BALANCE/IMBALANCE
3L	OUT OF CALIBRATION
3M	OUT OF ROUND
3N	POOR MACHINING
3P	POOR RELEASE
3X	REGISTERS INCORRECTLY
4A	SCORED
4C	

4D	SHEARED
4G	STRIPPED
4N	WARPED/WAVY/WRINKLED
4Q	WEAK
4X	WORN
6B	COMPONENT-GROUND
6C	COMPONENT-INOPERATIVE
6D	COMPONENT-INTERMITTENT
6E	COMPONENT-MISSING
6F	COMPONENT-OPEN
6G	COMPONENT-SHORTED
6H	CONNECTOR-BENT/DAMAGED
6J	CONNECTOR-CORRODED
6M	CONNECTOR-DISCONNECTED
6N	CONNECTOR-PARTIAL CONNECTED
6Q	
6S	LAMP(BULB)-DEFECTIVE
6T	LAMP(BULB)-CONTAINS MOISTURE
7D	WIRE - SHORTED TO GROUND
7J	WIRE-CHAFFED
7L	WIRE-CUT/BROKEN/OPEN
7R	WIRE-PINCHED
7W	ELECTRICAL INTERFERENCE
92	
93	TECHNICAL SERVICE BULLETIN
95	SPECIAL POLICY
96	CAMPAIGN
99	PDI
9Z	NO TROUBLE FOUND
OB	OBDII Code used

TABLE 6-2 TROUBLE CODES USED IN WARRANTY SEARCH

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.

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 General Motor's warranty system does not contain information on the number of vehicles that have extended warranty coverage.

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 communication that GM is planning to issue within the next 120 days.

GM is not aware of any past service or warranty documents that relate to the subject condition, that GM has issued to dealers, regional or zone offices, field offices, fleet purchasers or other entities. GM has however, distributed a voicemail report January 19, 2004 to its dealers regarding the subject condition in the subject vehicle. The voicemail report is included in the Attachment 1 CD, Response to Q7 file.

General Motors plans to issue a service bulletin in the next 120 days regarding the subject condition. The service bulletin is being implemented to provide improved diagnosis of steering system complaints on the subject vehicles. A draft of the proposed service bulletin is also included in the Attachment 1 CD, Response to Q7 file. .

The preceding information was collected from GM Service Operations. The data collection was completed on May 3, 2004.

8. Provide a description of how the subject system functions within the subject vehicle.

2004 Chevrolet Malibu - Electric Power Steering Assist System

The Electric Power Steering Assist System (EPS) in the subject vehicles provides variable steering assistance based on steering wheel torque, steering wheel position and vehicle speed. The EPS uses the powertrain control module (PCM), body control module (BCM), power steering control module (PSCM), discrete battery voltage supply circuit, steering shaft torque and position sensor, power steering motor, driver information center (DIC), and serial data circuit to perform the system functions. The steering column has an input shaft, from the steering wheel to the torque and position sensor, and an output shaft, from the torque and position sensor to the steering shaft coupler. The input and output shafts are separated by a torsion bar, where the torque and position sensor is located. The steering shaft coupler is connected to the steering rack and pinion unit that is connected to the front wheels through the tie rods. The Delphi assembly drawing (CL04-010-209) shows the major component locations in the subject vehicles.

The steering torque and position sensor utilizes resistive film technology and contains redundant wipers moving along a resistive strip. The wipers provide dual signals for torque and position to the PSCM. As the steering wheel is turned, the torsion bar twists and one of the torque signals increases as the other signal decreases. The PSCM recognizes the change in the input signals as steering position and steering column shaft torque. Using predetermined system tuning, the correct amount of power assist is applied through the power steering motor based on steering column torque, position and vehicle speed.

The PSCM also uses the steering wheel torque and position sensor to determine the steering system on-center position. As the steering wheel is turned, dual signals representing the on-center steering wheel position increase and decrease as the steering wheel is turned. Depending on the steering wheel position and vehicle speed, the PSCM will command the power steering motor to the steering system on-center position. The PSCM has the ability to detect malfunctions within the power steering system. When the input signals are out of a predetermined range, an audible chime is sounded, the DIC displays a POWER STEERING warning message, the SERVICE VEHICLE SOON indicator illuminates, trouble codes are set and the system is disabled. When system malfunctions occur, a calibrated, "Soft Shut-down" feature disables the EPS at a predetermined ramp down rate. The failsafe ramp down feature reduces the steering wheel kickback experienced by the driver if the vehicle is making a large angle maneuvers.

2004 Saturn Ion - Electric Power Steering Assist System

The Electric Power Steering Assist System (EPS) in the 2004 Saturn Ion provides variable steering assistance based on steering wheel torque and vehicle speed. Steering wheel position is not measured in the 2004 Saturn Ion. The torque sensor detects the torque applied by the driver on the steering wheel. Algorithms stored in the controller process the torque and speed information to drive the EPS motor (located on the column); the motor provides the power assistance through a reduction gear located on the steering column.

The torque sensor in the 2004 Saturn Ion utilizes a non-contact magna-flux method of measuring steering wheel torque. The sensor contains coils and detecting rings made of magnetic materials. Alternating current is applied at the coil terminals. When steering wheel torque is applied to the input shaft, a torsion bar causes the detecting rings to be twisted. The overlap areas between detecting rings 1 and 2 is changed according to the twist angle. By changing the overlap area between detecting rings 1 and 2, the magnetic characteristic is changed around the detecting coil. This causes a change in impedance, as a result of applying the alternating current. The impedance of compensation coil remains unchanged. The terminal voltage between detecting coil and compensation coil is changed depending on the steering wheel input torque. By detecting the voltage difference between torque sensor output voltages 1 and 2, steering wheel input torque can be detected. A compensation coil is used because the coil impedance is sensitive to temperature changes.

As described earlier, the amount of power steering assist provided is based on vehicle speed and measured steering wheel torque.
GM is providing mechanical drawings of the 2004 Chevrolet Malibu and 2004 Saturn Ion EPS systems and related components. The drawings listed above have been included in the Attachment 1 CD Response to Q8 file.

9. **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 9-1 below is a summary of actions performed by GM and Delphi regarding the subject condition on the 2004 Chevrolet Malibu. The Delphi Test and Analysis information from Delphi document CL04-10-023 is reproduced and included below. Documents and additional supporting information is included in the Attachment 1 CD Response to Q9 file.

Action: PRTS+ Data - Incident # N123868 **Start Date:** 6/13/2002 **End Date:** 6/6/2002 **Engineering Groups:** GM Response to Q9 **Action:** Incident Report - MOTOR ASM-P/S ASST, EPS - ELEC. ASSIST P/STR. - LOSS OF FUNCTION **Summary of Action:** Engineering report regarding the failure of EPS on pre-production vehicle. No information regarding diagnosis and repair
Action: Column Assist Assembly Validation Summary **Start Date:** 8/16/2002 **End Date:** 2/28/2003 **Engineering Group:** Delphi Automotive Systems CL04-010-024 **Description:** GM Analysis/Development/Validation testing of Furukawa Torque sensor **Summary of Action:** Form that summarizes Delphi compliance with GM component ADV Testing.
Action: Torque and Position Sensor Validation Summary **Start Date:** 3/15/2002 **End Date:** 2/26/2003 **Engineering Group:** Delphi Automotive Systems CL04-010-025 **Description:** GM Analysis/Development/Validation testing of Furukawa Torque sensor **Summary of Action:** Summary of ADV testing performed on the EPS system by Delphi
Action: PRTS+ Data - Incident # N139186 **Start Date:** 7/24/2003 **End Date:** 9/17/2003 **Engineering Group:** GM Response to Q9 **Description:** Loss of Power steering assist during vehicle validation test **Summary of Action:** EPS torque and position sensor failed during durability test, set codes C0550 and C0545, and dash lamps illuminated, replaced steering column
Action: PRTS+ Data - Incident # N146787 **Start Date:** 10/7/2003 **End Date:** 10/10/2003 **Engineering Group:** GM Response to Q9 **Description:** Loss of Power steering assist at low vehicle speed **Summary of Action:** No information available regarding diagnosis or repair
Action: Fishbone Diagram **Start Date:** 11/2003 **End Date:** 3/31/2004 **Engineering Group:** Delphi Automotive Systems CL04-010-029 **Description:** List possible Root Causes of Gold Slip Ring Intermittent Signal Noise **Summary of Action:** Red-X project initiated to determine cause of plating process variation
Action: Bench Test – Whelan Return **Start Date:** 12/1/2003 **End Date:** 12/1/2003 **Engineering Group:** Delphi Automotive Systems CL04-010-031 **Description:** Diagnosis of early Epsilon field return for DTC-17 issue **Summary of Action:** Failure of power and ground slip rings of sensor, not specific to rotational positions.
Action: Warranty Failure Detection Plan **Start Date:** 1/8/2004 **End Date:** 1/8/2004 **Engineering Group:** Delphi Automotive Systems CL04-010-033 **Description:** Provide flow diagram to diagnose expedited warranty returns for DTC-17 issue **Summary of Action:** Flow chart created to expedite warranty returns

Action: Sensor Noise File Library
Start Date: 1/10/2004
End Date: 2/17/2004
Engineering Group: GM and Delphi Automotive Systems
CL04-010-096
Description: Delphi/GM Warranty – Warranty Analysis of several Epsilon field returns for sensor related trouble codes. Tests performed by Delphi
Summary of Action: Torque sensor Noise was primarily generated on Ground and POWER slip rings, noise generation was intermittent

Action: Slip Ring Plating Analysis Report (Ney)
Start Date: 1/14/2004
End Date: 2/11/2004
Engineering Group: Delphi Automotive Systems and Deringer – Ney
CL04-010-115
Description: Delphi –contracted independent laboratory to determine root cause of slip ring failure on warranty return sample
Summary of Action: Compared warranty return sensor with virgin sensor and PVS sample. Found plating process of warranty return sample to contain Teflon particles prohibiting proper gold plating of contacts.

Action: PRTS+ Data - Incident # N152134
Start Date: 1/20/2004
End Date: 1/27/2004
Engineering Group: GM
Response to Q9
Description: Steering column operation is intermittent, Trouble code C0545 is set
Summary of Actions: Found grease contamination of torque sensor. EPS system replaced

Action: VIN 11343 Teardown Photos
Start Date: 1/21/2004
End Date: 1/21/2004
Engineering Group: Delphi Automotive Systems
CL04-010-072
Description: Low power microscope photos of alleged failed sensor
Summary of Action: No definitive cause identified, heavy wear on stand-off posts, scratch on gold slip ring, misc. particle debris

Action: 28JA04 Epsilon Sensor Management Review
Start Date: 1/28/2004
End Date: 1/28/2004
Engineering Group: GM and Delphi Automotive Systems
Description: Delphi – Update management of Malibu EPS issues
Summary of Action: Determined original torque sensor addition of Teflon caused improper plating of gold. Replaced original sensor with BI sensor indefinitely

Action: Sensor Red-X Analysis Summary
Start Date: 2/12/2003
End Date: 4/2/2004
Engineering Group: GM and Delphi Automotive Systems
CL04-010-172
Action: Delphi/GM Warranty Determine Root cause for sensor POWER and GND slip ring noise
Summary of Action: Determined plating process changes after sensor PV3 validation caused poor sensor performance

Action: Slip Ring Cycling and Swap Study
Start Date: 2/13/2004
End Date: 2/16/2004
Engineering Group: Delphi Automotive Systems
CL04-010-146
Action: Slip ring and contact brush wear comparison testing
Summary of Action: Test showed difference in performance between slip rings of production sensor VS PV3 sample

Action: PRTS+ Data - Incident # N154362
Start Date: 2/20/2004
End Date: 3/25/2004
Engineering Group: GM
Response to Q9
Description: Incident Report – Replace steering column for intermittent, begin Warranty Root Cause Analysis operation, (See # N152134)
Summary of Actions: (See PRTS+ # N152134)

Action: Dither Test Start Date: 2/25/2004 End Date: 2/26/2004 Engineering Group: GM and Delphi Automotive Systems CL04-010-157 Action: Accelerated wear testing of sensor slip rings Summary of Action: Two of five samples exhibited slip ring failure during test. Slip ring noise most prevalent in dithered areas
Action: Furukawa 5-Phase for Unauthorized Change Start Date: 4/9/2004 End Date: 4/9/2004 Engineering Group: Delphi Automotive Systems and Furukawa CL04-010-197 Action: Document unauthorized gold plating process change by Furukawa Summary of Action: Furukawa is to discontinue use of low friction plating process, use new improved sensor case (with ribs)
Action: Sensor Reliability Testing Start Date: 4/26/2004 End Date: 4/26/2004 Engineering Group: GM and Delphi Automotive Systems Action: Delphi – test sensor to determine life cycle of Furukawa sensor Summary of Action: TBD

TABLE 9-1 SUMMARY OF ACTIONS RELATED 2004 CHEVROLET MALIBU ELECTRIC POWER STEERING

10. 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 system, 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 numbers (service and engineering) of the original system/component;
e. The part number (service and engineering) of the modified system/component;
f. Whether the original unmodified system/component was withdrawn from production and/or sale, and if so, when;
g. When the modified system/component was made available as a service system/component; and
h. Whether the modified system/component can be interchanged with earlier production systems/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.

Delphi has provided the following information (Table 10-1) regarding changes to manufacturing/quality control, which may relate to malfunctions of the Electric Power Steering Assist.

System Part Number	Component Part Number	Change Number	Date of Vehicle Incorporation	Description of Change	Reason for Change	Interchangeable with other Parts
22687709	26085186 - Sensor	N/A	2/2/2002	Gold slip ring plating change (include PTFE material: process revisions)	Sensor Supplier unauthorized change	Yes
22687709	26085186 - Sensor	N/A	7/14/2003	Correction to soldering tip alignment process for position sensor resistor	Quality Improvement	Yes
22687709	A/M Assembly	N/A	8/10/2003	Reduce excess 10-tooth grease from input shaft above sensor area	Process control improvement	Yes
22687709	26085186 - Sensor	EWO #1218706	8/30/2003	Revise clamp ring design on sensor lower rotor	Ease of assembly at Delphi plant	Yes
22687709	26085186 - Sensor	ECR 10200734 0	11/25/2003	Add vision system and fiducial for position sensor resistor in-process inspection	Process verification	Yes
22687709	A/M Assembly	N/A	1/7/2004	Add flexible hose, reduce pressure to 10-tooth shaft grease delivery system	Process control improvement	Yes
22687709	26085186 - Sensor	Temp EWO #286730	1/22/2004	Widen slot in assist mechanical housing for sensor neck	Variation reduction for sensor assembly	Yes
22687709	A/M Assembly	EWO #2191522	2/3/2004	Replace 26085186 sensor with 26096028 sensor; revise column service kit part number	Reliability concern with 26085186 sensor	Yes, with minor modification to Delphi assembly fixture. No effect on system interchangeability
10373948		N/A	2/5/2004	Revised column service kit part numbers: Replaced 22687709 column assembly with 10373948	Reflect change to new Bi torque sensor in column assembly	Yes

TABLE 10-1 MODIFICATIONS AND CHANGES TO THE ELECTRIC POWER STEERING SYSTEM

A summary of the above information is included in the Attachment 1 CD, in a folder named Response to Q10.

11. Produce each of the following:

a. One exemplar sample of each design version of the subject system for the MY 2004 Chevrolet Malibu and Saturn Ion vehicles;

b. Field return samples of the subject system, or any component of the subject system, exhibiting the subject failure mode; and

c. Any kits that have been released, or developed, by GM for use in service repairs to the subject system which relate, or may relate, to the alleged defect in the subject vehicles.

GM and Delphi are providing the following systems and components for your review:

- One exemplar steering column assembly for a 2004 Chevrolet Malibu with the updated torque and position sensor.
- One field return sample of a steering column from a 2004 Chevrolet Malibu with the old torque and position sensor.

- One operating sample of the early production torque and position (part #26085186) sensor from a 2004 Chevrolet Malibu. The sensor can be identified by the black ribbed case.
- One failed field return of the early production torque and position (part #26085186) sensor from a 2004 Chevrolet Malibu. The sensor is tagged (failed POWER slip ring fault) and can be identified by the black ribbed case.
- One operating sample of the current Delphi replacement torque and position (part #26096028) sensor from a 2004 Chevrolet Malibu. The sensor can be identified by the light color case.
- One exemplar steering assist mechanism from a 2004 Saturn Ion with a torque and position sensor installed.

NOTE: When the subject vehicle is repaired for the subject condition the torque and positions sensor is replaced with the steering column assembly (Part #10373948). The Power Steering Control Module (PSCM) and power steering assist motor are reused from the original assembly.

Photos of the Delphi steering column and torque and position sensor are included in included in the CD labeled Attachment 1 in the file identified as Responses to Q11 and are describe as follows:

- CL04-010-202: Replacement column assist assembly
- CL04-010-203: Assist mechanism assembly (disassembled) with Furukawa Torque and Position Sensor installed.
- CL04-010-204: Assist mechanism assembly (disassembled) with BI Torque and Position Sensor installed.
- CL04-010-205: Furukawa Torque and Position Sensor as installed.
- CL04-010-206: BI Torque and Position Sensor as installed.
- CL04-010-207: Furukawa Torque and Position Sensor disassembled.
- CL04-010-208: BI Torque and Position Sensor disassembled.

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:

a. Subject component; and
b. Any kits that have been released, or developed, by GM 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 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 component is included in the Attachment 1 CD, in a folder named Response to Q12.

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 other 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. Furnish 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.

a. The causal or contributory factors are as follows:

i) Contamination of the torque and position sensor from the separation of grease applied to the steering column assembly.
ii) Electrical noise generated on the POWER and Ground slip ring surfaces of the torque and position sensor. The electrical noise is generated as the sensor contact brushes move along the slip ring surfaces when the steering wheel is rotated.

b. The mechanisms:

i) Contamination of the torque and position sensor was found in subject vehicles in January 2004. The contamination was attributed to the manufacturing process of applying grease to the steering column assembly. The application pressure and grease line length caused the grease to separate before it was applied. The grease was applied to the steering column assembly and over time, it seeped into the torque and position sensor, causing contamination of the circuit board contacts and brushes. This caused the torque sensor input signals to be intermittent and therefore, the power steering was disabled.
ii) The electrical noise is caused by an insufficient gold plating retention process and excessive slip ring wear on the torque and position sensor circuit board.
(1) An unauthorized change by the sensor supplier of adding Polytetrafluoroethylene (PTFE - Teflon) to the plating process of the sensor circuit board caused the gold plating layer to be sporadic. The voids in the gold plating caused premature wear of the slip ring and the generation of electrical noise.
(2) During rotations of the steering wheel, the redundant contact brushes move in and out of the deviations in the Power and Ground gold plated slip rings.

c. The failure modes:

i) The grease contamination in the torque and position sensor causes an intermittent loss of POWER, Ground, torque or position signals to the Electric Power Steering (EPS) Motor control system. When the signal loss is detected, the EPS system is shut down until the next ignition cycle.
ii) Electrical noise is generated as the redundant contact brushes move along the gold plated contacts of the torque and position sensor circuit board. When the steering wheel is turned, the contacts will travel through the voids in the gold slip rings and may cause intermittent signal loss. The programmed sensor diagnostics are a function of error magnitude and duration. When the maximum signal error occurs for more than 30 ms, the EPS system is disabled until the next ignition cycle.

d. GM does not believe the subject condition presents an unreasonable risk to motor vehicle safety for the following reasons:

   i) The system has been designed that in the event of a torque sensor error in excess of the diagnostic limits (maximum error for longer than 30 ms), the steering system will default to manual steering mode and the vehicle can be steered in a safe and controlled manner.
   ii) The mechanical linkage between steering wheel and road surface is similar to other steering rack systems used by other motor vehicle manufacturers for many years.
   iii) The driver is alerted by an audible chime, the DIC displays POWER STEERING, and the service vehicle soon lamp is illuminated when the EPS system shuts down.
   iv) GM has incorporated a soft-shutdown feature that ramps down the power steering assist when a loss of steering sensor input signal occurs. This feature prevents unwanted steering wheel kickback that may occur while maneuvering out of a curve.
   v) Power steering assist is generated based on steering wheel torque, position and vehicle speed. The amount of power steering assist provided is greatest at low speeds (such as parking lot maneuvers) and is reduced as vehicle speed increases. Therefore, the loss of power steering assist is unlikely to be associated with crashes on streets and highways.
   vi) As stated in the Vehicle Owner Questionnaires, customers who have reported loss of power steering assist have been able to maneuver their vehicles and bring them to a controlled stop.
   vii) There has been a single minor injury - not related to a crash and two minor (low speed) crashes to date.

e. The warnings experienced by the operator during the subject condition are as follows.

   i) An audible chime is sounded.
   ii) The "Service Vehicle Soon" lamp illuminates
   iii) The message "Power Steering" is displayed on the DIC.

<u>In Summary</u>

The 2004 Chevrolet Malibu EPS malfunction occurs when the electrical input signals from the torque and position sensor are not within predetermined parameters. When a loss or "out of range" torque is detected, an audible chime is sounded, the Driver Information Center displays "Power Steering", the "Service Vehicle Soon" lamp is illuminated, and the "Soft Shut-down" feature is enabled. The steering system then defaults to manual steering mode, such that, the vehicle can be steered in a safe and controlled manner. Failure of the EPS has no effect on the mechanical linkage between the steering wheel, steering rack and wheels. The amount of power steering assist provided is greatest at low speeds and is reduced as vehicle speed increases. Therefore, the loss of power steering assist is unlikely to be associated in any way with accidents or injuries.

f. Table 13-f details GM's assessment of the VOQ reports included with this inquiry.

VOQ	Subject Vehicle	GM Assessment
10064930	2004 Chevrolet Malibu	The VOQ states the steering wheel did not return to center after turn and loss of power assist at a stoplight. GM cannot readily identify records it may have about this vehicle and customer without owner information or the VIN. GM cannot further evaluate the report without retrieving records or inspecting the vehicle and relevant parts.

10052253	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist and power steering failure was indicated on the DIC. GM cannot readily identify records it may have about this vehicle and customer without owner information or the VIN. GM cannot further evaluate the report without retrieving records or inspecting the vehicle and relevant parts.
10061850	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist and power steering message was illuminated on the DIC. The vehicle service lamp was also illuminated. GM cannot readily identify records it may have about this vehicle and customer without owner information or the VIN. GM cannot further evaluate the report without retrieving records or inspecting the vehicle and relevant parts.
10064006	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist. GM warranty records indicate that the steering column has been replaced as required for such a failure.
10048032	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist. GM warranty records indicate that the steering column has been replaced as required for such a failure.
10058469	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist and power steering was displayed on the DIC. GM cannot readily identify records it may have about this vehicle and customer without owner information or the VIN. GM cannot further evaluate the report without retrieving records or inspecting the vehicle and relevant parts.
10062671	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist and power steering message was illuminated on the DIC. The vehicle service lamp was also illuminated. GM warranty records indicate that the steering column has been replaced as required for such a failure.
10062107	2004 Chevrolet Malibu	The VOQ states the driver experienced loss of power steering assist and power steering was displayed on the DIC. GM cannot readily identify records it may have about this vehicle and customer without owner information or the VIN. GM cannot further evaluate the report without retrieving records or inspecting the vehicle and relevant parts.

TABLE 13-F GM ASSESSMENT OF VOQ REPORTS

General Motors assessment of the reports included with this inquiry indicate that the alleged electric power steering assist malfunctions may be attributable to the causal or contributory factors identified above in response to item 13a.

* * *

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, " including 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 1999, 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,

FOR GAY KENT

Gay P. Kent
Director
Product Investigations

Attachments

GM-655

U.S. Department
of Transportation
National Highway
Traffic Safety
Administration

400 Seventh Street, S.W.
Washington, D.C. 20590

Original Rec'd 4-13-04
w/VOQs + CD

APR 5 2004

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NVS-213cat
PE04-031

Ms. Gay P. Kent, Director
Product Investigations
General Motors Corporation
30500 Mound Road - Mail Code 480-106-304
Warren, MI 48090-9055

Dear Ms. Kent:

This letter is to inform you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) has opened a Preliminary Evaluation (PE04-031) to investigate allegations of electric power steering failure in MY 2004 Chevrolet Malibu vehicles manufactured by General Motors Corporation, and to request certain information.

This office has received eight (8) reports of electric power steering failure in MY 2004 Chevrolet Malibu vehicles. The complaints allege that the driver suddenly lost all electric power steering assistance while driving and without warning making the vehicle difficult to steer. There have been no reports of crashes or injuries associated with the allegations. A copy of each of the reports is enclosed for your information.

Unless otherwise stated in the text, the following definitions apply to these information requests:

- **Subject vehicles:** all MY 2004 Chevrolet Malibu vehicles manufactured for sale or lease in the United States.
- **Subject system:** all electric power steering systems installed as original equipment or sold as replacement parts on the subject vehicles.
- **GM:** General Motors Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including 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 1999, 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.

- **Alleged defect:** electric power steering failure.

- **Document:** "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all non-identical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, tel-ex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by GM, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a non-identical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)"also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by GM or not. If a document is not in the English language, provide both the original document and an English translation of the document.

- **Other Terms:** To the extent that they are used in these information requests, the terms "claim," "consumer complaint," "dealer field report," "field report," "fire," "fleet," "good will," "make," "model," "model year," "notice," "property damage," "property damage claim," "rollover," "type," "warranty," "warranty adjustment," and "warranty claim," whether used in singular or in plural form, have the same meaning as found in 49 CFR 579.4.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Insofar as GM has previously provided a document to ODI, GM may produce it again or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the organization of this information request letter (including all individual requests and subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

Please repeat the applicable request verbatim above each response. After GM's response to each request, identify the source of the information and indicate the last date the information was gathered.

1. State, by model and model year, the number of MY 2004 Chevrolet Malibu and Saturn Ion vehicles GM has manufactured for sale or lease in the United States. Separately, for each MY 2004 Chevrolet Malibu and Saturn Ion 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." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

2. State, by model and model year, the number of each of the following, received by GM, or of which GM are otherwise aware, which relate to, or may relate to, the alleged defect in MY 2004 Chevrolet Malibu and Saturn Ion 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 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; and
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 "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 GM'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.

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. GM'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;
   h. Report or claim date;
   i. Whether a crash is alleged;
   j. Whether a fire is alleged;
   k. Whether property damage is alleged;
   l. Number of alleged injuries, if any; and
   m. Number of alleged fatalities, if any.

   Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

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

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 2004 Chevrolet Malibu and Saturn Ion 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." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

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 MY 2004 Chevrolet Malibu and Saturn Ion vehicles. State, by model and model year, the terms of the new vehicle warranty coverage offered by GM on MY 2004 Chevrolet Malibu and Saturn Ion 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 GM offered for MY 2004 Chevrolet Malibu and Saturn Ion vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.

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 communication that GM is planning to issue within the next 120 days.

8. Provide a description of how the subject system functions within the subject vehicle.

9. 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.

10. 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 system, 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 numbers (service and engineering) of the original system/component;
    e. The part number (service and engineering) of the modified system/component;
    f. Whether the original unmodified system/component was withdrawn from production and/or sale, and if so, when;
    g. When the modified system/component was made available as a service system/component; and
    h. Whether the modified system/component can be interchanged with earlier production systems/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.

11. Produce each of the following:
    a. One exemplar sample of each design version of the subject system for the MY 2004 Chevrolet Malibu and Saturn Ion vehicles;
    b. Field return samples of the subject system, or any component of the subject system, exhibiting the subject failure mode; and
    c. Any kits that have been released, or developed, by GM for use in service repairs to the subject system which relate, or may relate, to the alleged defect in the subject vehicles.

12. State the number of each of the following that GM has sold that may be used in MY 2004 Chevrolet Malibu and Saturn Ion vehicles by system/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. Subject system or any component of the subject system; and
b. Any kits that have been released, or developed, by GM for use in service repairs to the subject system.

For each system/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 subject system as the MY 2004 Chevrolet Malibu vehicle, whether installed in production or in service, and state the applicable dates of production or service usage.

13. Furnish 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.

This letter is being sent to GM pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49 and to request reports and the production of things. It constitutes a new request for information. GM's failure to respond promptly and fully to this letter could subject GM to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. (Other remedies and sanctions are available as well.) Please note that maximum civil penalties under 49 U.S.C. § 30165 have increased as a result of the recent enactment of the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Public Law No. 106-414 (signed November 1, 2000). Section 5(a) of the TREAD Act, codified at 49 U.S.C. § 30165(b), provides for civil penalties of up to $5,000 per day, with a maximum of $15 million for a related series of violations, for failing or refusing to perform an act required under 49 U.S.C. § 30166. This includes failing to respond to ODI information requests.

If GM cannot respond to any specific request or subpart(s) thereof, please state the reason why it is unable to do so. If on the basis of attorney-client, attorney work product, or other privilege, GM does not submit one or more requested documents or items of information in response to this information request, GM must provide a privilege log identifying each document or item withheld, and stating the date, subject or title, the name and position of the person(s) from, and the person(s) to whom it was sent, and the name and position of any other recipient (to include all carbon copies or blind carbon copies), the nature of that information or material, and the basis for the claim of privilege and why that privilege applies.

GM's response to this letter, in duplicate, together with a copy of any confidentiality request, must be submitted to this office by May 18, 2004. Please refer to PE04-031 in GM's response to this letter. If GM finds that it is unable to provide all of the information requested within the time allotted, GM must request an extension from me at (202) 366-5207 no later than five

business days before the response due date. If GM is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information GM then has available, even if an extension has been granted.

If GM claims that any of the information or documents provided in response to this information request constitute confidential commercial material within the meaning of 5 U.S.C. § 552(b)(4), or are protected from disclosure pursuant to 18 U.S.C. § 1905, GM must submit supporting information together with the materials that are the subject of the confidentiality request, in accordance with 49 CFR Part 512, as amended (68 Fed. Reg. 44209 et seq; July 28, 2003), to the Office of Chief Counsel (NCC-113), National Highway Traffic Safety Administration, Room 5219, 400 Seventh Street, S.W., Washington, D.C. 20590. GM is required to submit two copies of the documents containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted.

If you have any technical questions concerning this matter, please call Cheryl Tuosto of my staff at (202) 366-1869.

Sincerely,

Jeffrey L. Quandt, Chief
Vehicle Control Division
Office of Defects Investigation

Enclosure 1, One (1) CD ROM titled Data Collection Disc containing three files
Enclosure 2, Eight (8) Consumer Complaints

GM655
PE04-031

ATTACHMENT "1"