

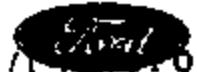
**EA02-025**

**FORD 10/27/03**

**APPENDIX N**

**BOOK 16 OF 61**

**PART 2 OF 4**



MOI LG : Rpbz a tip cnloqbo Gl mo.1 /15

RETURN TO FAP TPC:  
Procedure No. FAP03-176

**CRITICAL CONCERNS REVIEW GROUP**  
Authorized by Engineering Standards & System Engineering (ESSE), Technical Affairs

Page 1 of 12

Revision Date: (2004-07-10)

**1. PURPOSE**

This procedure describes the operating principles of the Critical Concern Review Group (CCRG) established within Ford Automotive Operations (FAO) to conduct reviews of potentially critical product concerns and potential compliance concerns affecting vehicles and their parts assigned to FAO Vehicle Centers.

**2. ACTIVITIES AFFECTED**

Advanced Manufacturing Engineering & Process Leadership	Marketing and Sales
Automotive Components Division	Material Planning and Logistics
Chassis Division	Powertrain Operations
Electrical and Fuel Handling Division	Product Development
Environmental and Safety Engineering	Purchasing
Glass Division	Quality and Process Leadership
	Vehicle Operations

**3. FORMS USED (PAPER OR ELECTRONIC EQUIVALENTS ARE EQUALLY ACCEPTABLE.)**

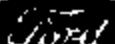
- 3.1 CCRG Concern Item Report Formats (See ).

**4. REFERENCES**

- 4.1 Corporate Records Management Retention Schedule (CRM)/regional Records Management System (e.g., European Records Retention Manual, ERRM).

**5. DEFINITIONS**

- 5.1 **Critical Product Concern:** Any product discrepancies that may result in hazards in vehicle operation or other undesirable vehicle characteristics and which may require correction in the field.



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Procedure No. FAP03-176

## CRITICAL CONCERNS REVIEW GROUP

Authorized by Engineering Standards & Systems Engineering (ESSE), Technical Affairs

Page 1 of 12

Revision Date: 12/20/2002

### 1. PURPOSE

This procedure describes the operating principles of the Critical Concern Review Group (CCRG) established within Ford Automotive Operations (FAO) to conduct reviews of potentially critical product concerns and potential compliance concerns affecting vehicles and their parts assigned to FAO Vehicle Centers.

### 2. ACTIVITIES AFFECTED

Advanced Manufacturing Engineering &  
Process Leadership  
Automotive Components Division  
Chassis Division  
Electrical and Fuel Handling Division  
Environmental and Safety Engineering  
Glass Division

Marketing and Sales  
Material Planning and Logistics  
Powertrain Operations  
Product Development  
Purchasing  
Quality and Process Leadership  
Vehicle Operations

### 3. FORMS USED (PAPER OR ELECTRONIC EQUIVALENTS ARE EQUALLY ACCEPTABLE.)

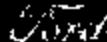
- 3.1 CCRG Concern Item Report Formats (See Attachment A).

### 4. REFERENCES

- 4.1 Corporate Records Management Retention Schedule (CRM)/regional Records Management System (e.g., European Records Retention Manual, ERRM).

### 5. DEFINITIONS

- 5.1 **Critical Product Concerns:** Any product discrepancies that may result in hazards in vehicle operation or other undesirable vehicle characteristics and which may require correction in the field.



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Procedure No. FAPB3-176

## CRITICAL CONCERNS REVIEW GROUP

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Revision Date: 19990420

- 5.2 Compliance Concerns: Any product discrepancies that may involve potential failure to meet a specification that relates to compliance with North American Federal/Canadian Motor Vehicle Safety Standards (F/CMVSS); European Community (EC), European Economic Community (EEC) or other European national requirements; or emissions standards of the Environmental Protection Agency (EPA) or of the State of California; or other National, State, Provincial or relevant regulations applicable in the country of sale.
- NOTE: This procedure does not cover the review of potential compliance concerns that relate to emissions standards
- 5.3 Field Action: Any non-compliance recall, safety defect recall, owner notification program or any other action taken to remedy a product discrepancy on customer vehicles which are no longer under the control of Ford Motor Company or its affiliates.
- 5.4 Critical Concern Review Group: Hereinafter referred to as the "CCRG," is a Market-based group within North America and Europe, comprised of representatives from affected Ford Customer Service Division (FCSD), Automotive Safety and Engineering Standards (ASES), Advanced Vehicle Technology (AVT), Vehicle Centers, Plant Vehicle Teams (PVT), Supplier Technical Assistance, Vehicle Operations, Automotive Components Division, Powertrain Operations, Electrical and Fuel Handling Division, Quality and other activities as applicable or as requested by the chair with the function of reviewing reports of potentially critical product concerns or potential compliance concerns.
- The AVT Design Analysis Manager, and the ASES Problems Coordinator will Co-Chair the North American meetings of the CCRG.
- The Environmental and Safety Engineering (Europe), Production Vehicle Safety Supervisor, will Chair the European meetings of the CCRG.
- 5.5 CCRG Agenda Items: Potentially critical product concerns or potential compliance concerns that have been identified by the CCRG as concerns that require further review, investigation, monitoring and/or reporting.

## 6. EXCLUSIONS

None.

**CRITICAL CONCERNS REVIEW GROUP**  
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Replaces Date: 12/01/07

**7. PROCEDURE**

**7.1 Concern Reporting**

- 7.1.1 Each CCRG member is responsible for informing the applicable CCRG Chair of reports of potentially critical product concerns and potential compliance concerns that arise within their activity. If the responsible Vehicle Line or Engineering Director, or higher level management is notified directly of a concern, the appropriate CCRG Chair must also be informed.
- 7.1.2 The first time an item is reported to a CCRG Chair, it will generally be through one of the following mechanisms:
  - 7.1.2.1 Notification in advance of a scheduled meeting, either in person, by FACSIMILE, electronic mail, or by telephone, of a potential "walk-in" item.
  - 7.1.2.2 Presentation as a "walk-in" item during the scheduled meeting of a potential concern not discovered early enough to be reported in advance.
  - 7.1.2.3 Presentation of an item at the CCRG meeting during the regularly scheduled reports given by the applicable Ford Customer Service Division representative of potential concerns discovered in field usage.

**CRITICAL CONCERNS REVIEW GROUP**  
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Review Date: N/A

**7.2 Concern Review**

- 7.2.1 Following initial notification of a potential critical product concern, the appropriate CCRG Chair, with the advice of the group, will determine whether the item will become an agenda item, warranting further CCRG review and reporting at subsequent meetings by the design responsible activity; or if the item is a potential North American compliance concern to be referred to the ASSE Compliance Engineering Manager for investigation and disposition; or if the item is a potential non-North American compliance concern to be referred to the CCRG where the affected vehicle is being marketed for investigation and disposition. If requested, the CCRG Chair may provide the affected CCRG representative with a one or two-week time period to coordinate a preliminary investigation with the appropriate design responsible activity to assist in determining, with the advice of the group, whether or not an item should be on the agenda. If the responsible activities' representative recommends that the item should not be on the agenda, the appropriate CCRG Chair, with the advice of the group, may accept an oral report from the responsible activities' representative providing the rationale for closure without further action. Potential North American compliance concerns are directly referred to the ASSE Compliance Engineering Manager.
- 7.2.2 The Chair is to assign timing objectives and responsibility for investigation or evaluation of agenda items to CCRG representatives from the appropriate organizations. In general, when more than one vehicle line or VC is affected, the responsibility will be assigned to the activity with the largest volume of affected vehicles. The investigation/evaluation will address questions of:
- 7.2.2.1 Concern verification, through appropriate vehicle, component, lab or other testing as required.
- 7.2.2.2 Concern magnitude, expressed in terms of the number of plants and vehicles potentially affected and the anticipated duration of the difficulty.
- 7.2.2.3 Concern severity, expressed in terms of the probability and nature of resultant hazardous vehicle performance, if any, in the field.
- 7.2.2.3 Concern recognition and isolation capabilities, as applied to field environments.
- 7.2.2.4 Concern correction capabilities, expressed in terms of production and service units.

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- 7.2.2.5 Actions required to preclude concern recurrence.
- 7.2.3 Status reports on the progress of all matters assigned for investigation or evaluation are to be submitted to the applicable CCRG by the representative from the responsible activity or activities or as designated by the Chair. These reports may be oral until resolved, at which time a report, as outlined in Section 8.4.1 of this procedure, will be submitted.
- 7.2.4 Group review is unnecessary when the existence of a critical product concern has been definitely determined and verified that it clearly involves a hazard in vehicle operation in the field. Such matters are to be referred directly to the applicable Vehicle Line Director and the Field Review Committee (FRC) for disposition. Verified North American compliance concerns are to be directly reported to the ASES Compliance Engineering Manager for disposition. Verified non-North American compliance concerns are to be directly reported to the applicable Vehicle Line Director and Field Review Committee for disposition. Each such matter should nevertheless be reported to the CCRG Chair for information and record keeping purposes.

**7.3 Agenda Item Disposition**

- 7.3.1 Once included as an agenda item, a potential critical product concern will remain so until:
  - 7.3.1.1 It is definitely determined that, though a concern exists, it does not require any field action. In such cases, a closure report is submitted, the agenda item is closed and the concern is referred to the appropriate design activity and the Vehicle Line Director or PVT Manager for disposition.
  - 7.3.1.2 All identified actions have been taken to correct the item in production, and any suspected units have been isolated for corrective repair action on Company property and a closure report, as outlined in Section 8.4.1 of this procedure, is submitted.

**NOTE:** Closure reports must be signed by the responsible design manager unless the signature of a lower level individual is deemed appropriate by the CCRG Chair.

*Ford*

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Procedure No. FAP03-176

## CRITICAL CONCERNS REVIEW GROUP

Authorized by Engineering Standards & Systems Engineering (ESSE), Technical Affairs

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Revised Date: 1998-07-20

- 7.3.1.3      The item is referred to the FRC for review and disposition. Items referred to the FRC will remain on the applicable CCRG agenda pending disposition by the FRC. Once the FRC has reached a decision, the CCRG Chair will inform the CCRG members of the action taken and the item will be closed from the agenda. The minutes will reflect the action taken.
- 7.3.2      When it appears to the CCRG that an agenda item involves a potential critical product concern or a potential European compliance concern with no potential North American compliance implications, the CCRG members will assist the Chair in formulating investigative or concern resolution plans and timing constraints for concern resolution. The activity with design responsibility is responsible for permanently resolving the concern, conducting internal activity management appraisals as required and submitting a closure report as outlined in Section 8.4.1. of this procedure.  
  
NOTE: Closure reports must be signed by the responsible manager unless the signature of a lower level individual is deemed appropriate by the CCRG Chair. If definite and clear-cut rationale exists that an agenda item does not warrant further action or consideration as a critical product concern or a potential European compliance concern, an oral report to this effect by the responsible activities' representative will be acceptable at the discretion of the Chair.
- 7.3.3      When it appears to the CCRG that an agenda item involves a potential North American compliance concern, that item will be referred by the CCRG Chair to the ASES Compliance Engineering Manager for investigation and disposition. As required, Compliance Engineering will maintain a liaison with the CCRG. Furthermore, the CCRG Chair will inform the appropriate Vehicle Line Director that a potential North American compliance concern has been referred to ASES Compliance Engineering. Items referred to ASES Compliance Engineering will remain on the CCRG agenda pending disposition. Once disposition has been determined, Compliance Engineering will inform the CCRG of the actions taken. The item will be closed from the agenda and the notes will reflect the actions taken.

**CRITICAL CONCERNS REVIEW GROUP**

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Revision Date: 19990529

- 7.3.4 When it appears to the CCRG that an agenda item may involve both potentially critical product concerns and potential North American compliance concerns, the CCRG will process the potentially critical product concerns as specified in 7.3.2, above, and in addition will refer the potential North American compliance concerns to the ASEES Compliance Engineering Manager, who will process those concerns as specified in 7.3.3, above. As required, the CCRG will maintain liaison with Compliance Engineering during the processing of agenda items having both potentially critical product concerns and potential North American compliance concerns.
- 7.3.5 All records acquired or generated must be retained in accordance with the Corporate Records Management Manual. This includes all documentary materials, films, tapes and all other forms of information storage media. Such records include, but are not limited to, communications from vehicle users and memoranda of user complaints; reports and other documents related to work performed under, or claims made under, warranties; service reports or similar documents from dealers or Company field personnel; and any lists, compilations, analyses or discussions of such complaints contained in internal or external correspondence of the Company. Records should be saved whenever doubt exists.

**8. GENERAL RULES**

**8.1 Objectives of the CCRG**

- 8.1.1 To screen and initially investigate reports of potentially critical product concerns, to consensus on those items requiring further investigation and to refer potential North American compliance concerns to the ASEES Compliance Engineering Manager for investigation and disposition. Other potential compliance concerns will be reviewed in the CCRG meetings where the affected vehicle is being marketed.

## CRITICAL CONCERNS REVIEW GROUP

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Revision Date: 12/2006/02

**NOTE:** Any activity that recognizes a potential North American compliance related concern should refer the concern to the ASSE Compliance Engineering Manager as well as to the activity which has design responsibility for the concern vehicle or components and to the North American CCRG. Any activity that recognizes a potential European compliance related concern should refer the concern to the design responsible activity of the concern vehicle or components and to the European CCRG.

- 8.1.2 To direct the gathering of pertinent information regarding those concerns that initial investigation indicates may require further investigation.
  - 8.1.3 To facilitate the coordination of corrective actions as may be necessary to resolve verified critical product concerns.
  - 8.1.4 To maintain a liaison and provide such support as requested by ASSE Compliance Engineering during the evaluation of potential North American compliance concerns.
  - 8.1.5 To facilitate the coordination of preventative actions required to preclude recurrence of critical concerns.
- 8.2 Conduct of CCRG Meetings**
- 8.2.1 The CCRG will conduct separate Market-based meetings in North America and Europe. The North American meetings will be held twice a week and the European meetings will be held bi-weekly.  
Exceptions are Company scheduled holidays or at the discretion of the respective Chair. Special meetings of each group that involve specific members may be called at the discretion of the respective Chair.
  - 8.2.2 Each CCRG Administrator will provide all applicable CCRG representatives and Vehicle Line Directors a copy of the agenda items to be discussed at each regularly scheduled meeting. The agenda itself will include a brief description of each potential concern and its respective CCRG introduction date.
  - 8.2.3 Walk-in of any potential agenda items may be presented by any team member.
- 8.3 CCRG Participation**
- 8.3.1 Each activity listed in Section 5.4. of this procedure is responsible for appointing a knowledgeable representative to act as a liaison between their activity and the CCRG.

## CRITICAL CONCERNS REVIEW GROUP

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Review Date: 12/2007

- 8.3.2 Each activities' representative, accompanied when necessary by appropriate designated personnel, acts as a CCRG participant. In addition, these representatives must be available for immediate contact on, and response to, reports involving potentially critical product concerns and/or potential compliance concerns.
- NOTE: Concern resolution for each vehicle line will be coordinated by the responsible Vehicle Line Director or their designee.
- 8.3.3 CCRG participants must be empowered to communicate and act on behalf of their activity on topics which are discussed at CCRG meetings.
- 8.3.4 Persons who are not regular representatives to the CCRG may attend meetings at the discretion of the Chair. The duration of the attendance by these persons at meetings is also determined by the Chair. Suppliers and other non-Ford personnel may attend at the Chair's discretion, but their presence must be disclosed to the Chair and the CCRG prior to the start of the meeting.
- 8.4 Documentation of CCRG Activity
- 8.4.1 Generally, an assignment to report on each agenda item will be made by the appropriate CCRG Chair. At the discretion of that appropriate CCRG Chair, the report may be verbal or written to follow the 8D outline illustrated in Attachment A or the Field Review Committee Evaluation Paper (14-D) format published by FCSD, Vehicle Service and Programs.
- NOTE: Sections of Attachment A which are deemed not applicable or required, will be so designated by the appropriate Chair.
- 8.4.2 An authorized closure memo which includes the rationale for resolution or closure and preventative actions to preclude concern recurrence is required from the responsible activities' management. At the discretion of the appropriate CCRG Chair, an alternate approval level may be designated.

**CRITICAL CONCERNS REVIEW GROUP**  
Authorized by Engineering Standards & Systems Engineering (E&SE), Technical Affairs

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- 8.4.3 The appropriate CCRG Administrator will maintain meeting files relating to each agenda item. The Administrator or identified CCRG representative will also maintain individual files on agenda items, or on any concern deemed necessary by the Chair. The files will contain all documentation relative to the item gathered for CCRG review from the time of item introduction until the time of disposition by the applicable CCRG, including rationale for actions taken.
- 8.4.4 All CCRG records acquired or generated must be retained in accordance with the Corporate Records Management Manual.

**9. QUALITY RECORDS**

The following records are maintained by the responsible activities in accordance with the Corporate Records Management (CRM) Retention Schedule as indicated:

08.03 Agenda Files for Quality Reports      Active + 5 years (see 8.4.3)

Note: Regional Records Management System may be used in lieu of the CRM.

**10. RECORD OF REVISIONS**

Date	Authorized by
19931222	E&SE
19960322	E&SE
19960521	B. Bohan
19961028	B. Bohan
19970315	B. Bohan
19970523	B. Bohan
19980520	B. Bohan

NOTE: Denotes area of change from previous issue.

**11. ATTACHMENTS**

Attachment A CCRG Agenda Item Report Formats

**CRITICAL CONCERNS REVIEW GROUP**  
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Revision Date: 12/2003

**ATTACHMENT A**

**CCRC AGENDA ITEM REPORT FORMATS**

**FORMAT #1 - SD WITH COVER LETTER**

When an SD is submitted as part of the report, at the discretion of the Chair, a one page cover letter containing the following information in addition to the SD is sufficient:

**TITLE** - one or two lines containing the model years, vehicle models and concern identification.

1. Briefly summarize the nature of the concern. Include the suspect vehicle quantity and percent potentially affected.
2. State that the attached SD addresses root cause (causal factors), containment actions, temporary and permanent corrective actions at the Vehicle Assembly Plant and applicable supplier locations. NOTE: The cover letter must include these items if they are not already mentioned in the SD.
3. Provide an assessment of effect on vehicle operation.
4. Provide rationale for concern closure (i.e.; why no field action is necessary).
5. Signature of responsible manager.

**FORMAT #2 - STAND ALONE CLOSURE PAPER**

**TITLE** - one or two lines containing the model years, vehicle models and concern identification.

(The body of the letter shall contain the following. The format can be by section as shown below or in prose covering the following sections.)

- I. **CONCERN DESCRIPTION** - Identify what went wrong, concern components, vehicles and markets affected.
- II. **CONTAINMENT ACTIONS** - Production build dates, on-site rework, actions taken at plant and supplier.
- III. **CONCERN INVESTIGATION** - Describe root cause, describe any tests and engineering evaluations used in the investigation.
- IV. **CORRECTIVE ACTIONS** - Short term and permanent, describe how these will prevent recurrence.
- V. **ASSESSMENT OF EFFECT ON VEHICLE OPERATION** - Address hazards in vehicle operation, compliance, customer satisfaction, overtness of condition or any other undesirable vehicle characteristics as appropriate.

**RETURN TO FAP TOC**  
Procedure No. FAP03-176

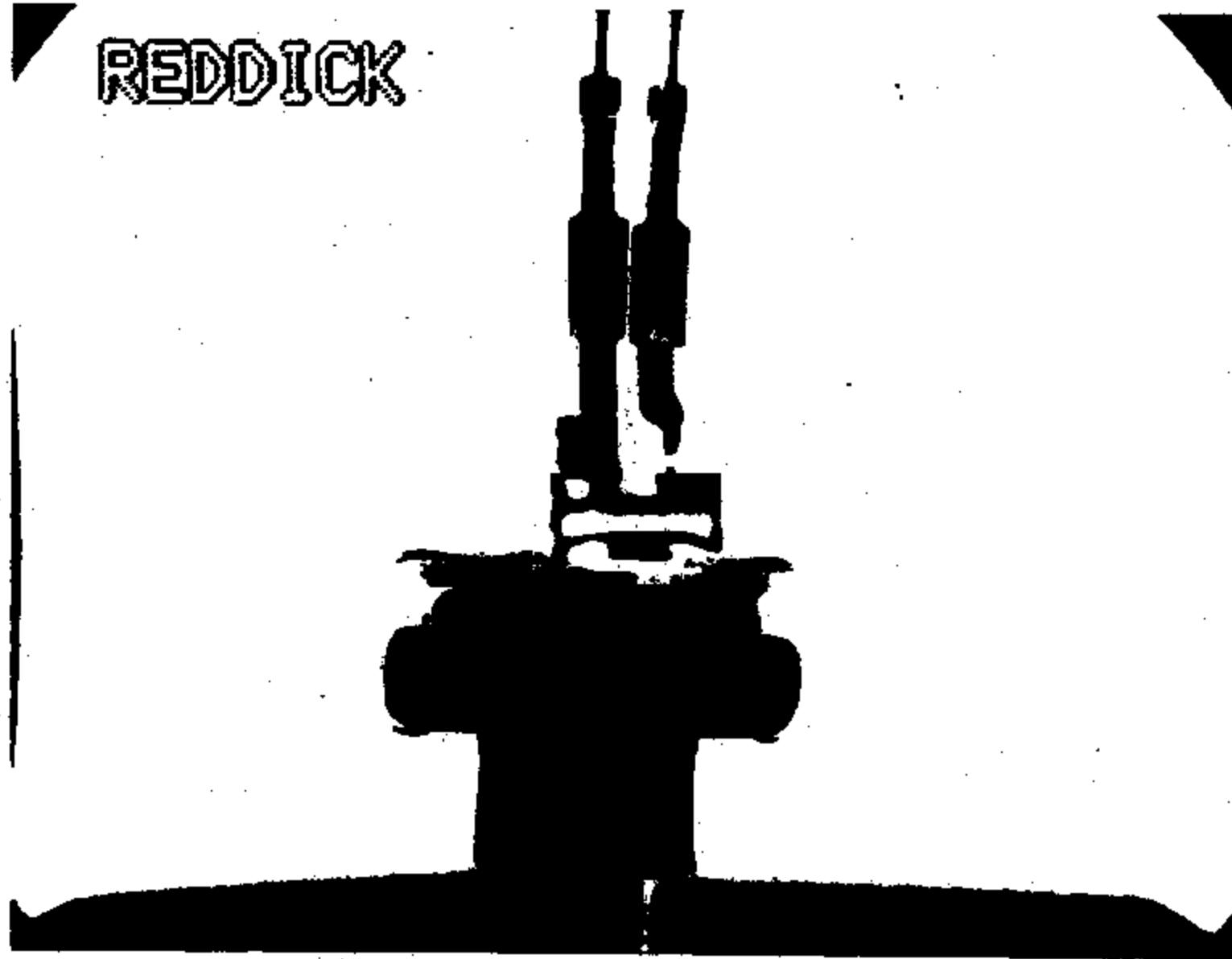
**CRITICAL CONCERNS REVIEW GROUP**  
Authorized by Engineering Standards & Systems Engineering (ESSE), Technical Affairs

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Revision Date: 12/20/2010

- VI. RECOMMENDATION** - Provide rationale to support closure with no field action required (other than a TSB or OASIS if deemed appropriate).
- VII. SIGNATURE** - Authorization of design/release responsible manager. NOTE: If an investigation concludes that field action should be considered, an FCSD Field Review Committee Evaluation Paper must be prepared.

REDDICK



3713 1554

ORIGINAL X-RAYS WITH STEVE LARVENE  
COSTMAN LTD

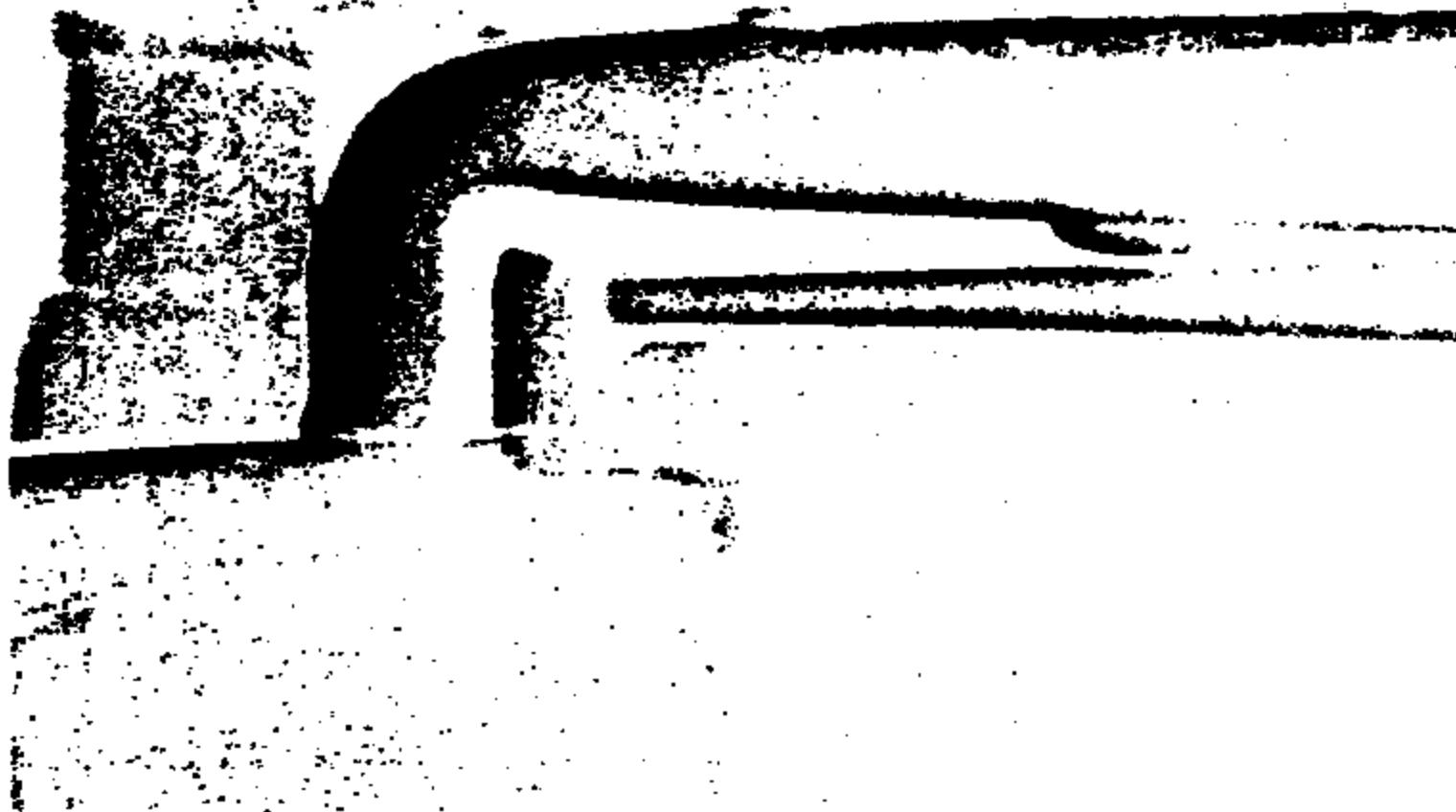
1976/11/17

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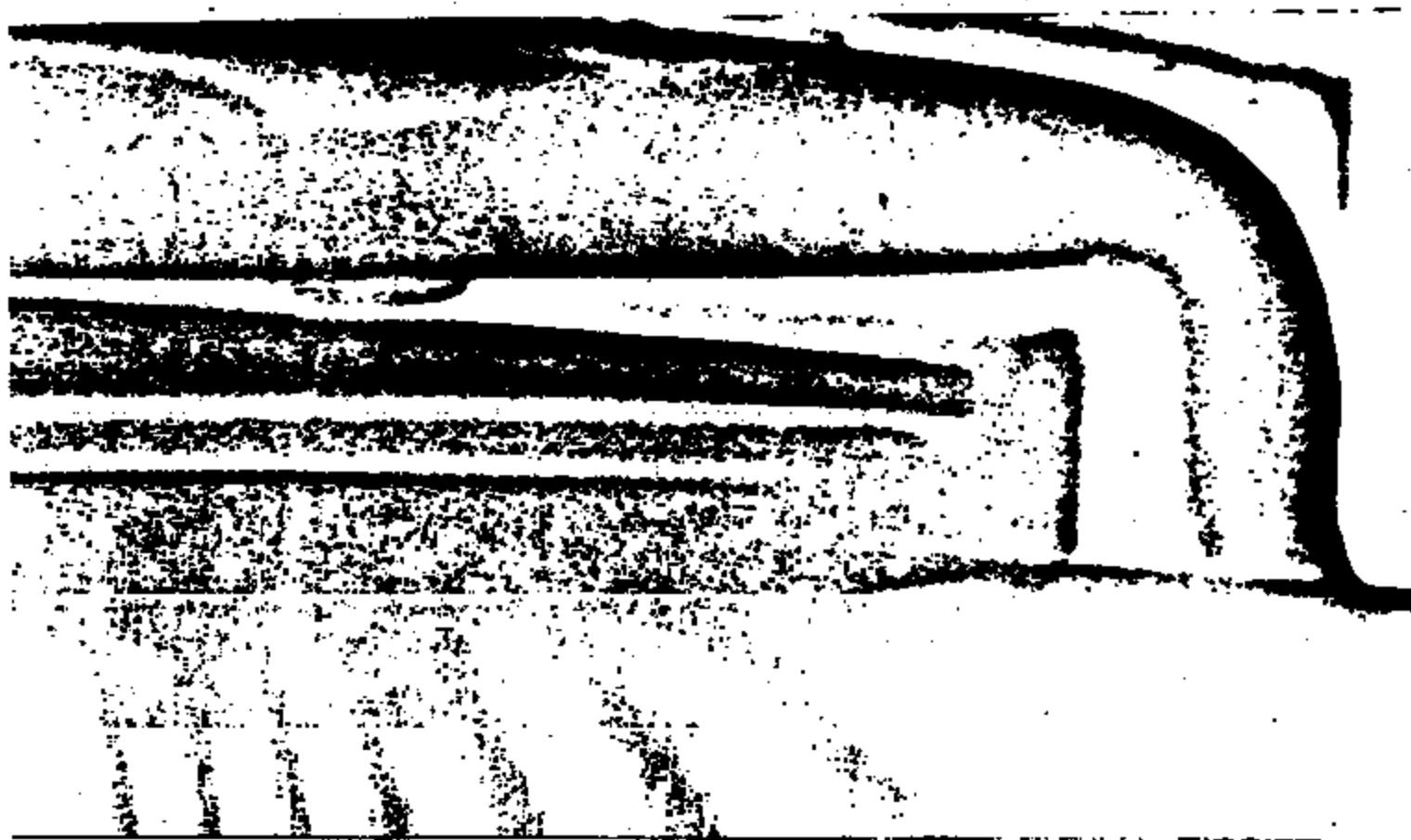


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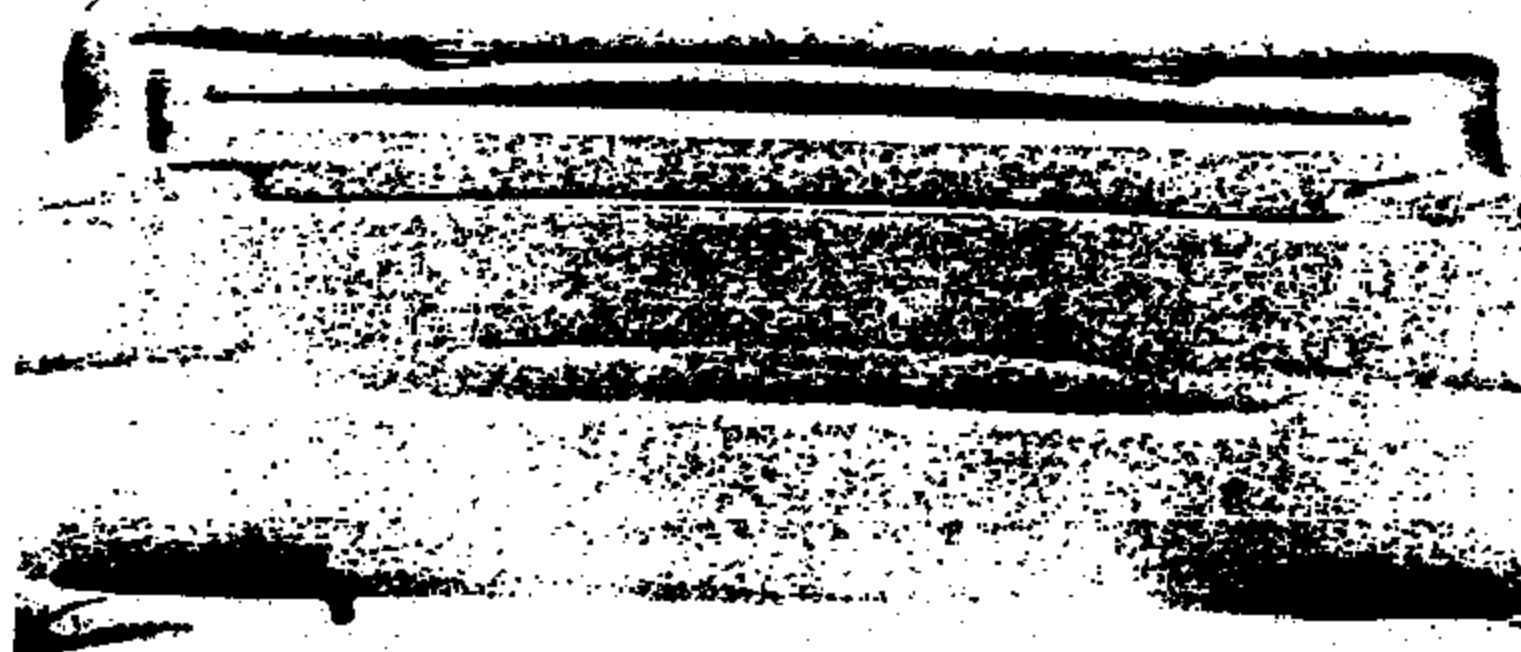


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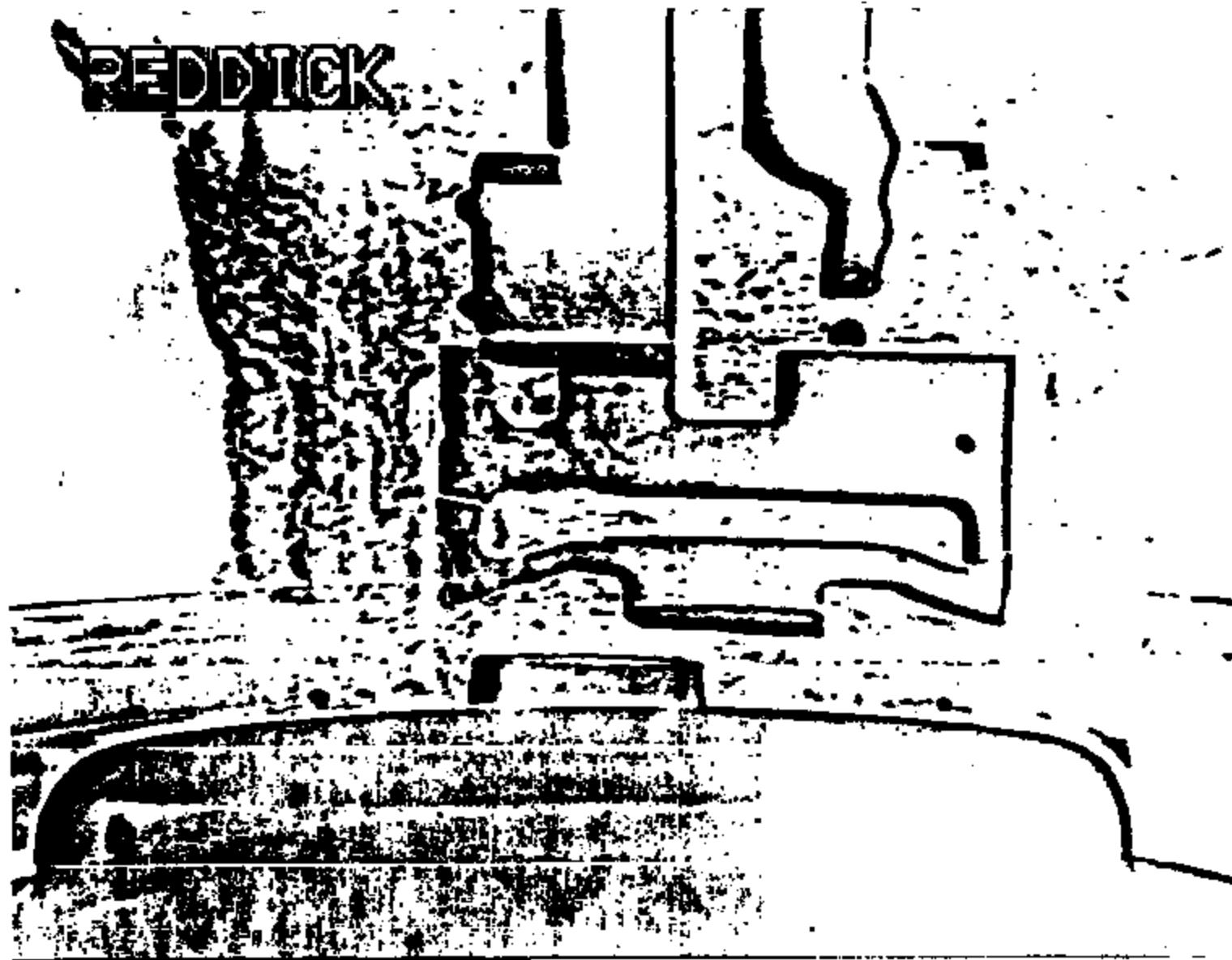
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340 PLEX



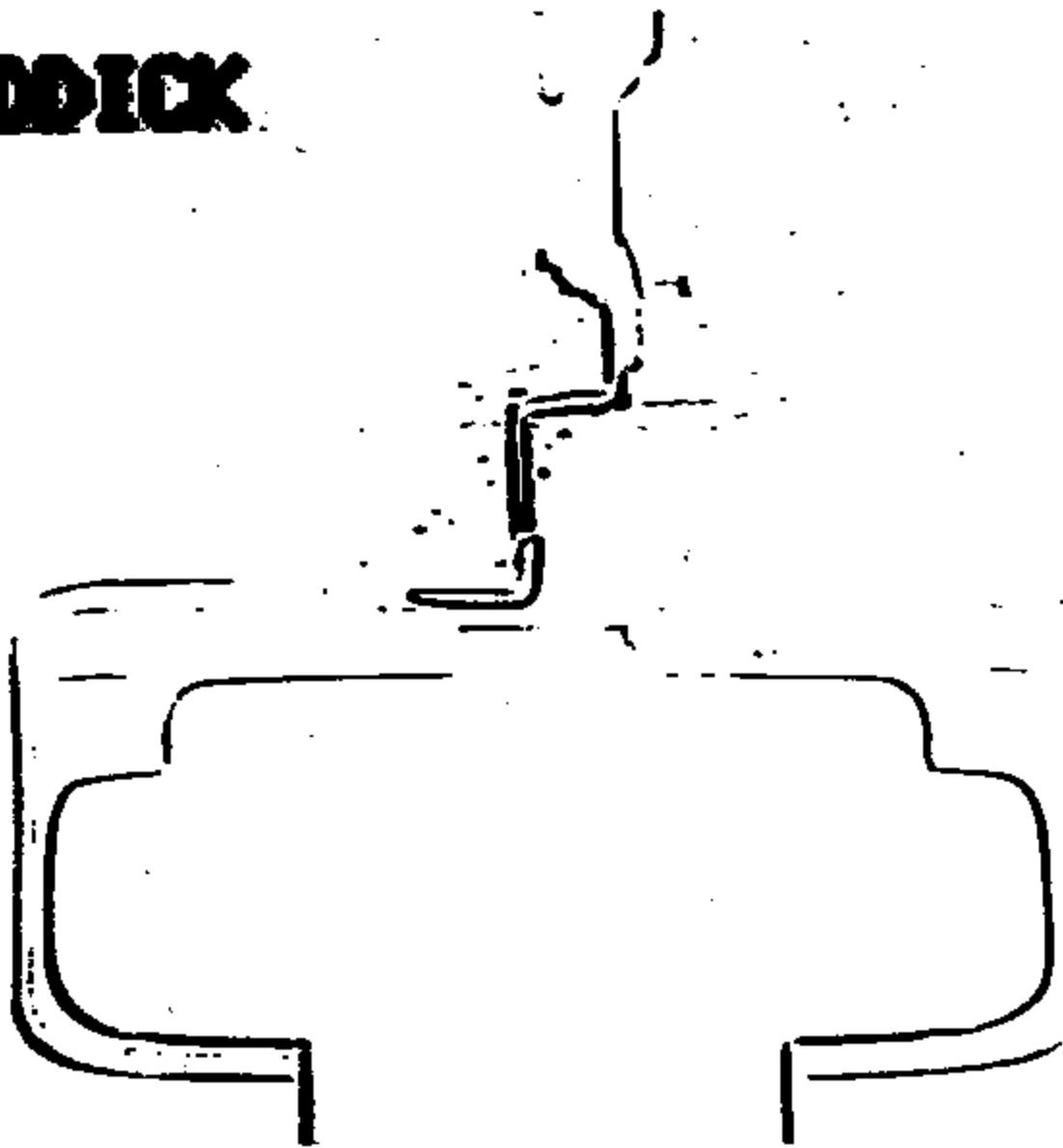
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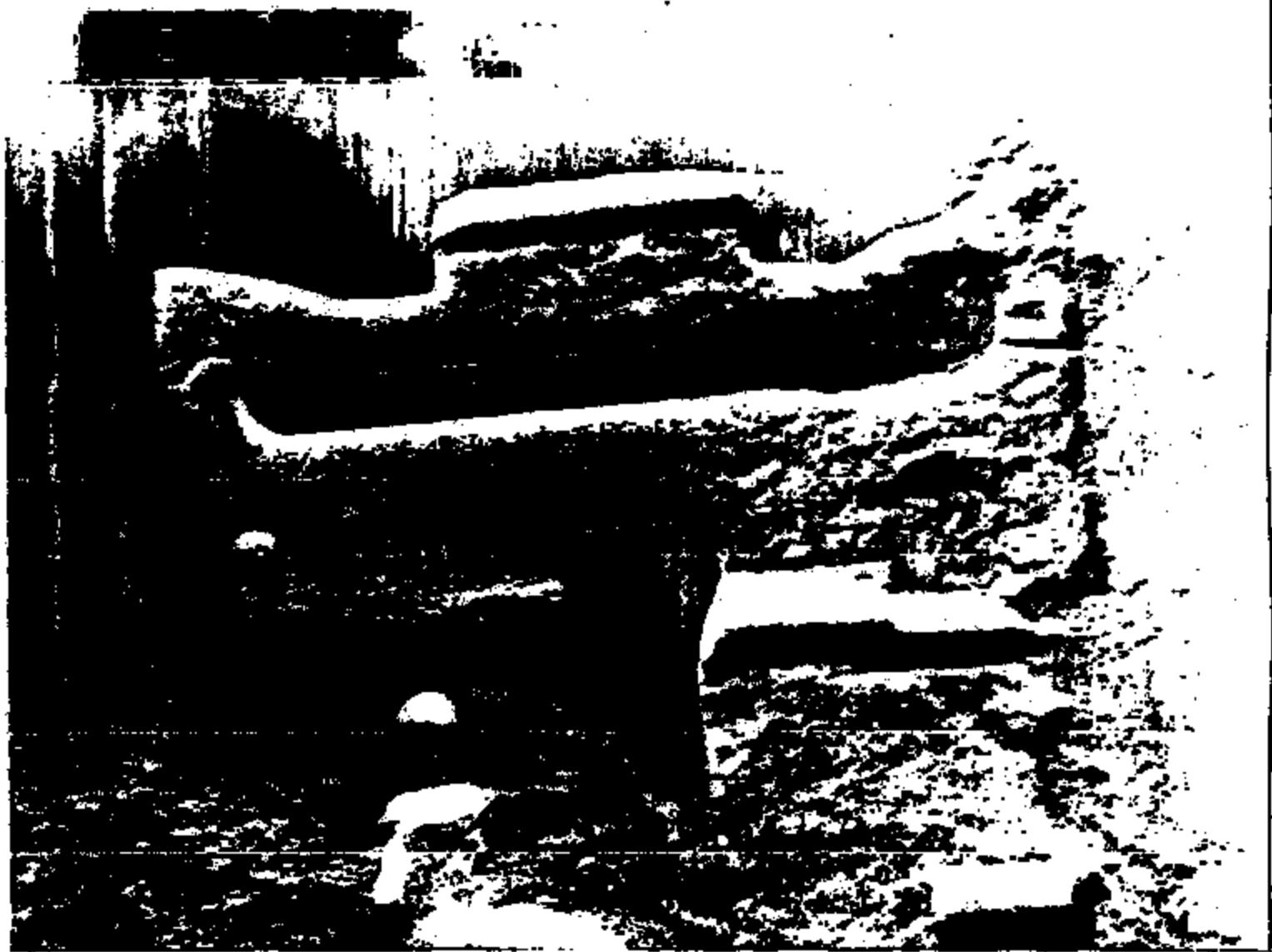


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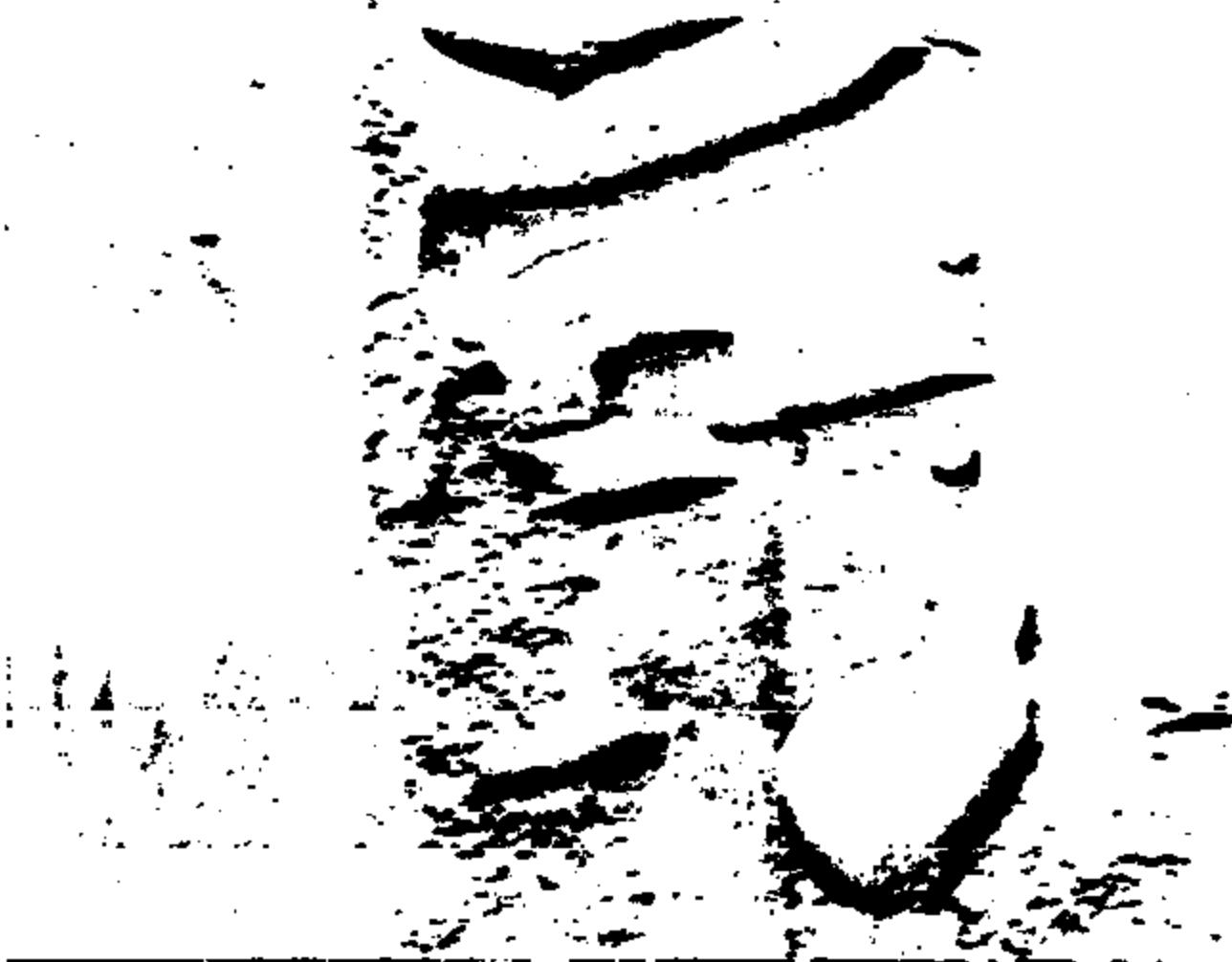
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**REDDICK**



3713 1662

**REMAX**



3713 1583

**GENIE**



9713 1534

**REDOICK**



# AWS

## STANDARD CLAIMS LIST

Cutoff Date : 30 Nov 1998

Last Load Date: 16 Dec 1998

Request Name: '92 Towncar  
Description: Vehicle repair history for '92 Towncar #1Hm81w8ny714787

Date/Time Run: 18 Dec 1998 / 07.07  
Date/Time Printed: 18 Dec 1998 / 08.36

Result ID: 48520003  
Generated By: AJANOTHI

### Data Selection Criteria:

Model Year	=	MY_92[1992]
Cost Category	=	All Vehicle Coverages / Contractual[1,*]
Region Sold	=	North America[NA]
Country Sold / Repaired [typed]	=	[USA,USA]
Vehicle Serial Number [typed]	=	714787
Vehicle Line WERS [VL]	=	TOWN CAR (FN36FN118) [91-97]C/V8

### Report Selection Criteria:

Model Year(s)	=	1992
Order By	=	Customer Concern Code
Max. Number of Claims	=	1000
Descriptions	=	YES
Claims with Contingents	=	ALL
TIS Logic	=	Corp
TIS Claims	=	ALL

### Globalization Information:

Distance Reported	=	Miles
Distance Requested	=	Miles
Currency Reported	=	USD
Currency Requested	=	USD
Currency Exchange Version	=	v2.1

NOTE: IF TIS(Corp) COLUMN HAS AN @ SIGN THEN THE CLAIM IS NOT INCLUDED IN TIS MATRIX USING THE LOGIC.

3713 1566

# STANDARD CLAIMS LIST

Cutoff Date : 30 Nov 1996

Print Date : 18 Dec 1996

Print Time : 08:36

Model Year : 1992

Vehicle repair history for '92 Towncar #11alm61w8ny714787

Distance Reported In: Miles

Date Reported In: DD-MM-YY

Result ID : 48529863

Currency Reported In: USD

Page : 2

VEHICLE INFORMATION												REPAIR INFORMATION						
VIN	VEH	MARKT	BODY	VER	DRIVE	PLANT	TRANS	ENG	PROD	WARR	SELL TO	FULL PART NUMBER	PART	NAME	SUFFIX	CCC CD	UNIT	
	LINE	DRIV	CAB	SERIES	TYPE	CODE	CODE	CODE	DATE	DATE	DEALER	CNT (Qty)	MCC PREC	NAME				
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 46	3400	F6Z	7802	ARM	PT 38	61,000
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	0.2	Labor Cost (USD):	22.00	Material Cost (USD):										60,940
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			P17 TRANS NOT SHIFTING PROPERLY NO OD WTB															
Technician Comment:			4200 38 CONVERTER WORK EXCESSIVELY BURN CLUTCHES NEED TO OVERHAUL. BOAT TEST DRAG EEC TEST 111 (0 111 KWH 111 INSTALL TRANS TESTER BOX AND ROAD TEST PRESSURE TEST DRAG 180 PSI TEST REAR TRANS OVERHAUL VALVE BODY CLEAN AND POLISH ALL VALVES FLUSH COOLER LINES DRAIN AND REPLACE CONVERTER ROAD TEST AGAIN AFTER REPAIRS JH															
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 36	3411		7803		PT 40	12,010
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	2.0	Labor Cost (USD):	102.00	Material Cost (USD):										112,410
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			P22 SEE WARREN TRANSMISSION CHATTERS FEELS LIKE GOING OVER WASHBURN INTERMITT ADVISE WTB															
Technician Comment:			DID TBS 84 2 17 ROAD TEST DRAG PRESSURE TEST DRAG 200 PSI WTB EEC TEST 111 101 111 INSTALL TRANS TESTER BOX AND ROAD R R TRANS. PAN AND REPLACE SCREEN R R CONVERTER DRAIN PLUG AND DRAIN CONVERTER ROAD TEST AGAIN AFTER REPAIRS JH															
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 36	6103		28120		N17 14	18,010
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	3.0	Labor Cost (USD):	108.00	Material Cost (USD):										204,020
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			N17 BRAKES SQUEAL WHEN APPLIED ANYTIME INTERMITT ADVISE WTB															
Technician Comment:			REAR CALIPERS STICKING TEST DRIVE FULL ALL WHEELS AND INSPECT REMOVE ALL CALIPERS OVERHAUL REAR CALIPERS AND REPLACE REAR PADS MEASURE RUNOUT OF REAR ROTORS 608 612 MACHINE REAR ROTORS OCL REAR CALIPERS STICKING CAUSING PADS TO WEAR UNEVENLY AND WARP ROTORS 14 HAS AFTERMARKET FRONT PADS JH															
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 44	3167	E6Y	E2266	A	N17 01	38,527
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	1.0	Labor Cost (USD):	16.00	Material Cost (USD):										32,700
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			N12 LOUD GRINDING NOISE COMES FROM UNDER HOOD INTERMITT AFTER STARTING POSSIBLE SUSPENSION PUMP															
Technician Comment:			30027 01 DRAG AIR SUSPENSION CODE 12 PASSED REMOVE AIR SUSPENSION COMPRESSOR TO REPLACE MOUNTING BUSHINGS BROKEN JH															
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 6	604		3804		LB8 D1	3,780
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	2.0	Labor Cost (USD):	147.00	Material Cost (USD):										308,140
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			4WD STH GEAR AND OVERHAUL PURGE SYSTEM WARBURST															
Technician Comment:			4WD STH GEAR AND OVERHAUL PURGE SYSTEM WARBURST															
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 44	7802	F6Z	11572	B	L15 41	28,527
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	0.5	Labor Cost (USD):	22.00	Material Cost (USD):										28,445
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			LOS AT TIMES AFTER STARTING WINDOWS RADIO AND FARM WELL NOT WORK ADVISE WTB															
Technician Comment:			30027 41 CM ACCESSORIES INOP AT TIMES REPLACE IGNITION SWITCH BURST															
11ALM61W8NY714787	CAN	CM	CPC	CAB	CB	SA	COK	CAN	87-04-02	02-10-92	328036	USA 36	7W12	F4V	84432A3g	B	LB7 42	22,227
AMR Claim Key: 32250140		Tra Code:	EM	Labor Hrs:	0.5	Labor Cost (USD):	16.00	Material Cost (USD):										20,430
Dir Cat-SubCat: 19827-*		Name:	FT LAUDERDALE L-M INC															
Customer Comment:			LOS CUST SAYS TRUNK AUTOMATIC LOCK IS INOP WTB ADVISE NEW															
Technician Comment:			TRUNK PULL DOWN SWITCH 42 PINPOINT TEST TRUNK PU LL DOWN NO CONTINUITY THRU SWITCH INTEST OPERATE 18 X CK JH															

Total Number of Repairs to this point = 7

# STANDARD CLAIMS LIST

Cutoff Date : 30 Nov 1996

Print Date : 15 Dec 1996  
Print Time : 08:36

Distance Reported In: Miles  
Currency Reported In: USD

Dates Reported In: DD-MM-YY

Result ID : 48920083  
Page : 3

Model Year : 1992

## VEHICLE INFORMATION

## REPAIR INFORMATION

VIN	MARKT	BODY	VER	DRIVE	PLANT	TRANE	ENG	PROD	MARR	SELLER	TIR	FULL PART NUMBER				DRY			
												WCC	PREFIX	BASE	SUFFIX	CCC CD	(USD)		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	44	8308	FIVY	1992	A	102 81	30,327
AMS Claim Key: 32742980	Tech Code: E84	Labor Hrs: 0.3	Labor Cost (USD): 10.82	Material Cost (USD): 22.38	Total Cost (USD): 45.61														
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		1022008
Comments: Consumer Comment: Tech Advice Comment:	LIB IGNITION KEY CAN BE PULLED OUT WHEN KEY IS NOT FULLY IN OFF POSITION ADVISE W/BUMP																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	13	1033	F2AZ	8820	A	102 06	10,212
AMS Claim Key: 12344058	Tech Code: E87	Labor Hrs: 0.3	Labor Cost (USD): 10.82	Material Cost (USD): 13.80	Total Cost (USD): 28.21														400004
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	PS BANDS THRU WATER TEST DRIVE NEED TO REPLACE BELT																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	28	1034	F2AZ	8820	A	102 42	22,237
AMS Claim Key: 23444748	Tech Code: E84	Labor Hrs: 0.3	Labor Cost (USD): 20.84	Material Cost (USD): 237.73	Total Cost (USD): 264.57														500001
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	H22 CUST STATES WHEN GOING THROUGH PUDDLE OF WATER POWER STEERING CUTS OUT/WOTS ADVISE NEW SEE PATV																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	44	2040	F1AZ	90334	A	021 42	30,421
AMS Claim Key: 32742985	Tech Code: S97	Labor Hrs: 2.2	Labor Cost (USD): 121.16	Material Cost (USD): 13.86	Total Cost (USD): 134.26														1022008
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	D22 CAR STALLS CUTS RIGHT OFF IN SPUTTER WHEN SITTING IN DRIVE AT IDLE AC ON RESTARTS RIGHT																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	44	2040	F1AZ	90334	A	021 42	30,421
AMS Claim Key: 32742986	Tech Code: S97	Labor Hrs: 2.2	Labor Cost (USD): 121.16	Material Cost (USD): 13.86	Total Cost (USD): 134.26														1022008
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	3822742 INOPERATIVE ROAD TEST 28006 START UP DIAG TEST 88006 ECC TEST 111 10 111 88006 DCL DISPLAY 28006 FUEL PRESSURE TEST 24-PIN 88006 LEAKDOWN 8806 INJECTOR FLOW TEST 88006 POWER BALANCE TEST 88006 SEPA 88K DURATION 88006 ENGINE RUNNING TEST 111 88006 IDLE DATA DISPLAY REPLACE PCV HOSE ROAD TEST RETEST 111 10 111																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	41	7108	FIVY	1992	A	C86 01	30,421
AMS Claim Key: 32742984	Tech Code: E84	Labor Hrs: 4.4	Labor Cost (USD): 242.36	Material Cost (USD): 164.16	Total Cost (USD): 406.77														500001
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	C05 AIR COND BLOWING WRONG AIR ADVISE W/BUMP																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	28	1033	F2AZ	8820	A	A06 08	10,010
AMS Claim Key: 12344057	Tech Code: S97	Labor Hrs: 0.3	Labor Cost (USD): 10.82	Material Cost (USD): 13.80	Total Cost (USD): 28.21														400001
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	X04 POWER STEERING STOPS WORKING AFTER GOING THROUGH PUDDLE ADVISE W/BUMP																		
J1LMLTHTYR	CVB	CAB	CFC	CAB	CAB	BA	COK	CVN	07-94-92	02-10-92	325038	USA	41	7108	FIVY	1992	A	C86 01	30,421
AMS Claim Key: 32742985	Tech Code: S97	Labor Hrs: 0.3	Labor Cost (USD): 10.82	Material Cost (USD): 13.80	Total Cost (USD): 28.21														500001
DR-CD-SUB-C4: 11027-	Name: FT LAUDERDALE L-M INC																		
Comments: Consumer Comment: Tech Advice Comment:	85 NOISY BELT ROAD TEST CAR REPLACE SERPENTINE BELT																		

Total Number of Repairs for Model Year 1992 = 13

END OF REPORT

Total Number of Repairs to this point = 13

6713 1528

# AWS

## DATABASE SUMMARY - YTD

Cutoff Date: 30 Nov 1998  
Last Load Date: 16 Dec 1998

Request Name: '92 Towncar  
Description: Vehicle repair history for '92 Towncar #48520003

Date/Time Run: 18 Dec 1998 / 07:07  
Date/Time Printed: 18 Dec 1998 / 08:36

Result ID: 48520003  
Generated By: AJANOTH

### Data Selection Criteria:

Model Year	=	MY_92[1992]
Cost Category	=	All Vehicle Coverages / Contractual[1,1]
Region Sold	=	North America[NA]
Country Sold / Repaired [typed]	=	[USA,USA]
Vehicle Serial Number [typed]	=	714787
Vehicle Line WERS [M.]	=	TOWN CAR (FN38/FN118) [91-97][CWS]

### Report Selection Criteria:

Model Year(s)	=	1992
Rank	=	Cost
Page By	=	
Order By	=	CPSC-4 (Reported)
Minimum Repairs	=	0
Minimum Cost	=	0
Report Option	=	YTD (Claims)
Descriptions	=	Yes

### Globalization Information:

Distance Reported	=	Miles
Distance Requested	=	Miles
Currency Reported	=	USD
Currency Requested	=	USD
Currency Exchange Version	=	v2.1

# DATABASE SUMMARY - YTD

Cutoff Date: 30 Nov 1996

Vehicle repair history for '92 Towncar #111m11w1ny714787

Currency Reported In: USD

Result ID: 48530083

Page: 2

Print Date: 18 Dec 1996

Print Time: 08:34

Model Year: 1992

Page By:

CPSC-6 (Reported)

	REPAIRS	% Repair	COST (USD)	% Costs	COST/PR
070103 - Automatic Transmission/Transaxle - Cu	3	21.82	6,311.80	37.35	2,037.00
MAN400A - Not Available	3	24.22	3,289.04	18.91	1,096.00
100401 - Control Module	4	30.81	1,825.04	13.04	456.25
130003 - Headlight/Marker Assembly	2	8.41	911.54	0.36	455.77
27010X	1	2.70	628.00	0.45	628.00
280002 - Front Caliper And Attached Parts	1	2.70	264.02	2.00	264.02
280002 - Rear Caliper And Attached Parts	1	2.70	264.02	2.00	264.02
100403 - Brake And Sustent	1	2.70	264.02	2.00	264.02
08000X	1	2.70	264.02	2.00	264.02
030009 - Other Accessory Drive Pulley	1	2.70	264.02	1.94	264.02
110200 - Power Steering Subsystem	1	2.70	189.14	1.31	189.14
030001 - Engine Assemblies - Front Production -	1	2.70	129.20	0.87	129.20
040001 - Suspension Leveling Power Source	1	2.70	82.78	0.58	82.78
030007 - Drive Belt	2	6.41	68.42	0.41	34.21
100401 - Steering Column And Shaft	1	2.70	68.42	0.39	68.42
011401 - Lock Set And Keys	1	2.70	48.61	0.32	48.61
011403 - Rear Door, Deck Lid, Liftgate & Ta	1	2.70	28.43	0.20	28.43
1803 (Report Grand Total:	27		14,326.00		527.48

**END OF REPORT**

8713-1870

# AWS

## STANDARD CLAIMS LIST

Cutoff Date : 30 Nov 1998  
Last Load Date: 16 Dec 1998

Request Name: '93 Towncar  
Description: Vehicle repair history for '93 Towncar #11nm82w0py622977

Date/Time Run: 18 Dec 1998 / 07:05  
Date/Time Printed: 18 Dec 1998 / 08:35

Request ID: 48520002  
Generated By: AJANOTI1

### Data Selection Criteria:

Model Year	=	MY_93[1993]
Cost Category	=	All Vehicle Coverages / Contractual[1,1]
Region Sold	=	North America[NA]
Country Sold / Required [typed]	=	USA[USA]
Vehicle Serial Number [typed]	=	[REDACTED]
Vehicle Line WERS [M]	=	TOWN CAR (FN36/FN116) [81-97][CVB]

### Report Selection Criteria:

Model Year(s)	=	1993
Order By	=	Customer Concern Code
Max. Number of Claims	=	1000
Descriptions	=	YES
Claims with Comments	=	ALL
TIS Logic	=	Corp
TIS Claims	=	ALL

### Globalization Information:

Distance Reported	=	Miles
Distance Requested	=	Miles
Currency Reported	=	USD
Currency Requested	=	USD
Currency Exchange Version	=	v2.1

NOTE: IF TIS(Corp) COLUMN HAS AN @ SIGN THEN THE CLAIM IS NOT INCLUDED IN TIS MATRIX USING THE LOGIC.

3713-1571

# STANDARD CLAIMS LIST

Cutoff Date : 30 Nov 1998

Print Date : 18 Dec 1998  
Print Time : 08:35

Distance Reported In: Miles  
Currency Reported In: USD

Date Reported In: DD-MM-YY

Result ID : 49520002  
Page : 2

Model Year : 1993

VIN	VEHICLE INFORMATION											REPAIR INFORMATION							
	LINE	MARKET	BODY	VER	DRIVE	PLANT	TRANS	ENG	PROD	WARR	SELLING	SELL TRS	FULL PART NUMBER			CCC	CD	DIST	
	DEMOV	CAB	SERIES	TYPE	CODE	CODE	CODE	DATE	DATE	DEALER	CNT (Cap)	WCC	PREFIX	NAME	SUFFIX				
1LNLM2240P1000000	CWB	CRM	CFC	CBR	C8	SA	COK	CVN	10-08-92	08-02-93	322863	USA	6	5V02	PAZ	2001	A	M17 30	6,644
AMRS Claim Ref: 7857233	Tire Code:	1	Labor Hrs:	1.2	Labor Cost (USD):	6.24						Material Cost (USD):	173.00	Total Cost (USD):					238.24
Dir. Ctr/Ref/Cat: 12006-*	Manuf:	SCHILLING UM MENDENHALL/URAC	Pl:	901-7944000	St:	AR	City/Cte:	USA	Reg Cat:	NA	Reg Date:	08-07-93	Doc #:	495401					
Technicians Comments:	BRAKES VERY NOISY; EXCESSIVE BRAKE DUST																		
1LNLM2240P1000001	CWB	CRM	CFC	CBR	C8	SA	COK	CVN	10-08-92	08-02-93	322863	USA	8	7A01		19854	D02 08	11	
AMRS Claim Ref: 7857232	Tire Code:	1	Labor Hrs:	0.8	Labor Cost (USD):	51.20						Material Cost (USD):	560.00	Total Cost (USD):					560.00
Dir. Ctr/Ref/Cat: 12006-*	Manuf:	SCHILLING UM MENDENHALL/URAC	Pl:	901-7944000	St:	AR	City/Cte:	USA	Reg Cat:	NA	Reg Date:	08-07-93	Doc #:	495402					
Technicians Comments:	DBI-CX CHARGING SYSTEM HAVING TO JUMP START																		
1LNLM2240P1000002	CWB	CRM	CFC	CBR	C8	SA	COK	CVN	10-08-92	08-02-93	322863	USA	58	5V02		2001	ABP PP	6,644	
AMRS Claim Ref: 7857234	Tire Code:	1	Labor Hrs:	0.0	Labor Cost (USD):	0.00						Material Cost (USD):	0.00	Total Cost (USD):					0.00
Dir. Ctr/Ref/Cat: 12006-*	Manuf:	SCHILLING UM MENDENHALL/URAC	Pl:	901-7944000	St:	AR	City/Cte:	USA	Reg Cat:	NA	Reg Date:	08-07-93	Doc #:	495402					

Total Number of Repairs for Model Year 1993 = 3

END OF REPORT

3719 1572

Total Number of Repairs to this point = 3

# AWS

## DATABASE SUMMARY - YTD

Cutoff Date: 31 Nov 1998  
Last Load Date: 18 Dec 1998

Request Name: '93 Towncar  
Description: Vehicle repair history for '93 Towncar #WERNER@WERNER

Date/Time Run: 18 Dec 1998 / 07:05  
Date/Time Printed: 18 Dec 1998 / 08:36

Result ID: 48620002  
Generated By: AJAMOTI1

### Data Selection Criteria:

Model Year	=	MY_93[1993]
Cost Category	=	All Vehicle Coverages / Contractual[1,1]
Region Sold	=	North America[NA]
Country Sold / Repaired [typed]	=	[USA,USA]
Vehicle Serial Number [typed]	=	[REDACTED]
Vehicle Line WERS [VL]	=	TOWN CAR (FN38/FN116) [B1-B7][CNE8]

### Report Selection Criteria:

Model Year(s)	=	1993
Rank	=	Cost
Page By	=	
Order By	=	CPSC-6 (Reported)
Minimum Repairs	=	0
Minimum Cost	=	0
Report Option	=	YTD (Claims)
Descriptions	=	Yes

### Globalization Information:

Distance Reported	=	Miles
Distance Requested	=	Miles
Currency Reported	=	USD
Currency Requested	=	USD
Currency Exchange Version	=	v2.1

# DATABASE SUMMARY - YTD

Cutoff Date: 30 Nov 1998

Vehicle repair history for '93 Towncar #11sm#2wopy622577

Currency Reported In: USD

Result ID: 4652602

Page: 2

Print Date: 18 Dec 1998

Print Time: 08:38

Model Year: 1993

Page By:

CPAC-4 (Reporting)	REPAIRS	% Repair	COST (USD)	% Costs	COST %
0000001 - Not Available	2	40.00	276.00	38.45	138.10
0000002 - Front Caliper And Attaching Parts	2	40.00	203.00	29.87	121.42
0000001 - Front Rotor (Spec)	1	20.00	202.00	29.85	106.00
1000 Report Grand Total:	5		779.00		465.52

END OF REPORT

3713 1574

\*\*\*\*\*  
\* Note printed by FPORTER on 18 Dec 1998 at 14:10:41 \*  
\*\*\*\*\*

From: PEGFAPIX--EXTERNAL Date and time 12/18/98 10:39:33  
To: FPORTER --FORDMAIL Porter, Fred (Ford  
cc: CTFWOGYK--EXTERNAL Sharpe, Robert  
  
From: Douglas, Charles  
Subject: Usage Matrix - Speed Control Deactivation Pressure Switch  
  
From: "Douglas, Charles" <c-douglas2@mail.mc.ti.com>  
cc: "Sharpe, Robert" <crsharp@email.mc.ti.com>

Fred,

The following represents a rough usage matrix over time:

MY92	MY93	MY94	MY95	MY96
MY97	MY98			
Econoline	Econoline	Econoline	Econoline	Econoline
Econoline	Econoline			
Club Wagon				
Club Wagon	Club Wagon			
Town Car				
Town Car				
Crown Vic				
Crown Vic				
Grand Marquis				
Grand				
Marquis				
F Series				
	Bronco	Bronco	Bronco	Bronco
	SVO Taurus	SVO Taurus	SVO Taurus??	
		Capri	Capri	
Win88	Win88	Win88	Win88	Win88
			Falcon	Falcon
Falcon	Falcon			
Explorer	Explorer			Explorer??
Ranger	Ranger			Ranger??
Expedition	Expedition			
	Navigator			

To be quite honest, I think we actually have more of a grasp on the application matrix in the MY92 - MY95 timeframe than MY96 on. Where you see ??, this means the actual starting or ending model year for a program may be +/- 1 model year. Also, it is conceivable that as of the MY98 timeframe, we are actually released on more platforms than what is shown above. I say this because our actual shipped volumes which are in the 2MU range, would indicate either 100% penetration for cruise control on all of the platforms listed or we are on more than the listed platforms.

One additional note, during our discussion yesterday, you talked about the switch being hot on the Town Car. I think I misunderstood the context of your statement. At the time of our discussion, I was thinking thermal hot but upon further reflection believe you may have meant wired hot. If this is the case, I am pretty sure the switch is wired hot in virtually all of the above applications. This issue can be discussed further on Tuesday as we will be prepared to provide a brief overview on our understanding of how the switch is electrically plumbed into the system.

Any additional questions, please let me know at your convenience. Also, if the above application matrix does not come across legible, please let me know and I will have this faxed to your attention.

Regards,

Charlie

Charlie Douglas  
(508) 236-3657 (P)  
(508) 236-1592 (F)  
c-douglas2@ti.com

3713 1576

\*\*\*\*\*  
\* Note printed by FPORTER on 18 Dec 1998 at 17:04:53 \*  
\*\*\*\*\*

From: FPORTER --DRBN007  
To: WABRANCEZ--DRBN005  
RENGLISI--DRBN005  
DGOEL --DRBN005  
KGRIBLE--DRBN005  
SLAROUCH--FORDNAI  
JNEME --DRBN005  
GSTEVEN1--DRBN005  
HWELPER3--DRBN006

Date and time 12/18/98 17:04:06  
BEGEN --DRBN007  
JEVANS8 --DRBN005  
JGREGOIR--DRBN005  
NLAPPOINT--DRBN005  
JMCINERN--DRBN005  
JNEVI --DRBN005  
CTHOMAS5--DRBN005

FROM: F. J. Porter  
Subject: 9F924 Update (19981218)

USAET(UTC -05:00)

#### 1992-1993 Town Car F2VC-9F924-A Brake Pressure Switch Investigation

##### TEAM:

AVT E&SE Chassis Electronics:	Fred Porter	x84-53722	fporter
AVT Chassis Engineering:	Joe Evans	x32-23832	jevans8
	Barry Egen	x32-39512	begen
AVT E&SE E&S:	Rob English	x33-73225	renglisi
AVT Design Analysis:	Norm LaPointe	x39-42686	nlapoint
AVT E&SE O&E:	Jim Gregoire	x33-79962	jgregoix
E&SE Prod. Veh. Safety:	William Abramczyk	x32-23284	wabrancez
	Ray Nevi	x59-47688	rnevi
Large Luxury VC Safety:	John McInerny	x32-10276	jmcinern
	Joe Name	x39-08133	jname
AVT Materials Engineering:	Greg Stevens	x32-36686	gsteven1
	Ken Gribble	x32-38658	kgribble
	Clark Thomas	x59-41313	cthomass5
Central Lab Services:	Steve LaRouche	x84-54876	slarouch

##### INFORMATION:

NHTSA letter: PE98-055

Vehicles identified: 21 initially identified.  
20 additional vehicles reported since publication of  
the investigation.

Warranty: A total of 89 warranty claims are identified in AWS on the  
F2VY-9F924-A for 1992 and 1993 Town Cars.

Two CQIS reports (WJIAA135 & VDAAA322) mention underhood fire  
in connection with the brake pressure switch.  
WJIAA135 occurred at 51,500 miles.  
VDAAA322 occurred at 56,802 miles.

Supplier: The pressure switch was manufactured by Texas Instruments. The  
switch was purchased in assembly with the brake proportioning  
valve bought from Surfaces.

Contacts: Surfaces - Mike Thomas (248)543-6520 HILITE Industries  
TI - Rob Sharp (248)305-5729

TI - Russ Baumann (508) 236-3314  
TI - Charlie Douglas (508) 236-3657

Function: The brake pressure switch is a redundant switch for turning off the speed control function.

X-Rays: Taken by Steve LaRouche, Norm LaPointe & Clark Thomas on 12/17/1998. Original photographs and part are in Steve LaRouche's possession.

ON-GOING ACTIVITY:

-----  
2 service parts have been ordered from Fairlane Ford for X-ray and other testing by Central Lab Services.

Meeting with representatives of TI is planned for 12/22/1998 to discuss intended operation of the switch. The meeting will be at the Central Laboratory Conference room off of the lobby.

QUESTIONS: (in no particular order)

-----  
1) What is the normal current in the brake pressure switch?

2) Was cruise control standard on Town Car in 1992 and 1993?

3) Under what circumstances is brake fluid flammable?

According to Clark Thomas & Mary Haga, brake fluid is flammable at approximately 300 degrees F.

4) What is the repair history for vehicles that have exhibited a problem? Repair history for the two CQIS vehicles are being gathered by Fred Porter.

5) What other vehicles use this brake pressure switch? What are their electrical configurations?

MODEL YEAR	92	93	94	95	96	97	98
Town Car	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[ ]
Crown Vic	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[ ]
Grand Marquis	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[ ]
Econoline	[xxxx]						
Club Wagon	[xxxx]						
F-Series	[ ]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]
Bronco	[ ]	[xxxx]	[xxxx]	[xxxx]	[ ]	[ ]	[ ]
Taurus SHO	[xxxx]	[xxxx]	[---]	[ ]	[ ]	[ ]	[ ]
Capri	[ ]	[ ]	[xxxx]	[xxxx]	[---]	[ ]	[ ]
Windstar	[ ]	[ ]	[xxxx]	[xxxx]	[xxxx]	[xxxx]	[xxxx]
Falcon	[ ]	[ ]	[ ]	[xxxx]	[xxxx]	[xxxx]	[xxxx]
Explorer	[ ]	[ ]	[ ]	[ ]	[---]	[xxxx]	[xxxx]
Ranger	[ ]	[ ]	[ ]	[ ]	[---]	[xxxx]	[xxxx]
Expedition	[ ]	[ ]	[ ]	[ ]	[ ]	[xxxx]	[xxxx]
Navigator	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[xxxx]

[xxxx] = used in model year

[---] = may have been used in model year

3713 1578

6) Is this switch still in use? If not, why not? If so, what design changes have been implemented since 1992/1993?

Charlie Douglas of TI is investigating the design changes that may have been implemented on the brake pressure switch beginning in 1992.

7) What fault codes are stored if the brake pressure switch fails?

Regards,

Fred Porter                    OV - fporter                    fporter@ford.com  
Chassis E/E Systems Applications                    (313)843-3722  
Bldg 5 - Mail Drop 5030 - Cubicle 3E004                    fax: 390-4145

3713 1579

\*\*\*\*\*  
\* Note printed by FPORTER on 26 Jan 1999 at 17:26:08 \*  
\*\*\*\*\*

From: FPORTER --DREN007  
To: MLAPPOINT--DREN005

Date and time 01/26/99 17:25:48  
SLAROUCH--PORDMAIL

FROM: F. J. Porter  
Subject: (U) Brake Pressure Switch Material

USAET(UTC -05:00)

The following is from TI drawings

Part	Material	Comments
Modified SAE J512 Bumper	C10L10 Steel	Zinc Plating .0003 min thk w/yellow dichromate
Converter	1008 or 1010 C.R. Steel	Zinc Plating .0002-.0004 thk may have rust inhibitor
Washer	1050 CRS	Zinc Plate .0002-.0006 thk Heat treat austemper Rockwell 40-60
Cup	1010 or 1006 C.R.S.	Zinc Plating w/yellow chromate .0002-.0004 thk
Spring	Beryllium copper C17200	Mill hardened (Brush Wellman alloy 190 hm)
Kapton	Dupont 500 PW1313L	1 mil Teflon FEP 3 mil Kapton Type K 1 mil teflon FEP
Movable Contact	Copper	Finish: DMC-133 OFHC Silver DMC-10 fine silver

Environmental Seal Silicon JBL S7519

Transfer Pin	L-3 Grade Steatite (DC-16ES) or L-3 Grade Steatite (DC-144E)	
Switch Rivet	CDA 260 Brass	
Gasket	Ethylene Propylene JBL Compound E-7104-70 JBL Part No. 6197E	
Spacer	Dupont Kapton 200X	.0017-.0023 thk
Crimp Ring	Aluminum 5052	
Thread Cap	LDPE	

Regards,

Fred Porter OV - fporter  
Chassis E/E Systems Applications fporter@ford.com  
Bldg 5 - Mail Drop 5030 - Cubicle 3E004 (313) 845-3722  
fax: 390-4145

Brake Pressure Switch  
Review

12/21/98

NAME	ORGANIZATION	PHONE
FRED PORTER	FORD AVT EEE&E	(313) 84-53722
JOLA LOTT	AVT MATILS ENGINEERING	(313) 24-83641
ZANDRA DEERING	LVC - SAFETY EEE&E	(313) 57-41063
Tim Gregoire	AVT EEE&E OPD	(313) 33-79962
Steve LeRouche	Ford Control Lab	313 8454876
Norman LaPointe	AVT-Des. Div.	313 57-42686

3713 1581

Mini-FAX Transmitted		Date _____	Page <u>1</u>
To: ROB SHAW		From: PREOY@erols.com	
NAME:	TEL#:	NAME:	FAX#:
TELEPHONE: 248 345 5734	TEL#:	TELEPHONE:	FAX#:
FAX NO. 71931582			

January 15, 1999

The cup is partially covered with a greenish residue. Residue appears to be primarily an oxide of the brass contact material with possibly a sulfur compound. This suggests transfer of oxide or corrosion product from the brass contacts to the cup.

The stationary contact exhibits intergranular cracks which indicate stress corrosion cracking (SCC). SCC is caused by combination of a specific corrosive environment and a sustained tensile stress (can be localized). Ammonia, ammonia compounds, sulfur compounds, and moisture are known to cause SCC in brass. The contact material has been reported to be 360 brass, which is highly susceptible to SCC.

The presence of brake fluid on the switch side of the diaphragm has been determined. Black residues in the hex port and on the cup, converter, and disc appear to be compounds which may have formed from a reaction between decomposition products (acids) of the polyester base, the brake fluid, and metals in the switch. This suggests that the brake fluid was present on both sides of the diaphragm during the thermal event.

All three diaphragms exhibit what appears to be mechanical damage. The damage does not match up with any mating parts of the switch. This suggests that damage may have occurred prior to assembly. The diaphragm has become brittle and cracked in the vicinity of the damage. Brake fluid has become entrained between the layers (Teflon and captor) of the diaphragms.

The post of the movable contact melted back into the bulkhead between the switch and terminal cavities of the base. There is also arc damage (localized melting) to one corner of the bridge of the stationary contact. This damage appears fresh (surfaces bright and shiny) which suggests that it may have occurred in the later stages of the thermal event.

The terminals exhibit deposits which appear to be primarily sulfur compounds of the terminal material (tin plated brass). Although these deposits appear visually similar to the deposit found on the cup, they appear to be of different composition.

The white residue found in the connector cavity contains elements found in dry chemical fire extinguishers (Muscovite and phosphorus)

Steve LaRouche

3713 1582

## Brake Pressure Switch Table:

### Definitions:

Resistance Measurement #1 = Resistance reading between connector terminals (NC switch)

Resistance Measurement #2 = Resistance reading between sensor case and threaded fitting.

Resistance Measurement #3 = Resistance reading between both connector pins and sensor case.

Sensor	Id Code	Date	Zip Code	Rsn. #1	Rsn. #2	Rsn. #3	
#1	PY [REDACTED]	3-93	[REDACTED]	0.2 Ohm	167.0 Ohms	Inf. Resistance	
#2	NY [REDACTED]	6-92	[REDACTED]	0.3 Ohm	0.3 Ohms	Inf. Resistance	
#3	PY [REDACTED]	1-93	NA	0.3 Ohm	4.48 M Ohms	Inf. Resistance	
#4	PX [REDACTED]	11-92	[REDACTED]	0.2 Ohm	1.5 Ohms	Inf. Resistance	
#5	PY [REDACTED]	10-92	[REDACTED]	0.2 Ohm	1.7 Ohms	Inf. Resistance	
#6	PX [REDACTED]	12-92	[REDACTED]	0.3 Ohm	17 K Ohms	Inf. Resistance	
#7	PX [REDACTED]	4-93	[REDACTED]	0.3 Ohm	2.9 Ohms	Inf. Resistance	
#8	PX [REDACTED]	12-92	[REDACTED]	0.2 Ohm	0.4 Ohms	Inf. Resistance	
#9	PX [REDACTED]	10-92	[REDACTED]	0.2 Ohm	24 M Ohms	Inf. Resistance	
#10	PY [REDACTED]	1-93	[REDACTED]	0.2 Ohm	11.30 M Ohms	Inf. Resistance	
E	#11	NX [REDACTED]	7-92	[REDACTED]	0.2 Ohm	6.79 M Ohms	Inf. Resistance
#12	BV [REDACTED]	9-93	[REDACTED]	0.2 Ohm	0.2 Ohms	Inf. Resistance	
C	'Leaking sensor' VIN 2FALP71W1VX [REDACTED]			0.4 Ohm	1.1 Ohms	4.80 M Ohms	
	New sensor #1			0.2 Ohm	0.4 Ohm	Inf. Resistance	
	New sensor #2			0.2 Ohm	1.1 Ohm	Inf. Resistance	

F 186-11

3713 1683

\*\*\*\*\*  
\* Note printed by FPORTER on 22 Jan 1999 at 09:46:35 \*  
\*\*\*\*\*

From: CTHOMAS5--DRBN005  
To: MIRAGA --FORDNA1  
cc: FPORTER --DRBN007  
KGRIEBLE--DRBN005

Date and time 01/21/99 17:26:27  
CGULLIN --FORDNA1  
GSTEVEN1--DRBN005

FROM: Clark Thomas USAET(UTC -05:00)

Subject: (U) Brake Fluid Questions  
Dayle/Mazy: Can you comment on this? It is in reference to the issue of fires possibly caused by the Texas Instrument Cruise Control Switch being locked at by NHTSA and our Legal Staff. Thanks.

Regards, Clark Thomas  
AVT Materials (Plastics/Blastomars)  
313-89-41313 (Bldg5); 313-32-23186 (POKE)  
\*\*\* Forwarding note from FPORTER --DRBN007 01/21/99 10:13 \*\*\*  
To: CTHOMAS5--DRBN005 GSTEVEN1--DRBN005

FROM: F. J. Porter USAET(UTC -05:00)  
Subject: (U) Brake Fluid Questions

Two questions:

Is brake fluid conductive? How much?

Will brake fluid react with copper or brass? Will an electric field or current cause a reaction?

Regards,  
Fred Porter OV - fporter fporteraford.com  
Chassis E/E Systems Applications (313)845-3722  
Bldg 5 - Mail Drop 5030 - Cubicle 3H004 fax: 390-4145

3713 1584

\*\*\*\*\*  
\* Note printed by FPORTER on 22 Jan 1999 at 09:47:47 \*  
\*\*\*\*\*

From: KGRIBBLE--DRBN005  
To: FPORTER --DRBN007

Date and time 01/22/99 07:31:48

FROM: Ken Gribble  
Subject: (U) Brake Fluid Questions

USAET(UTC -05:00)

Copper and brass have been used in brake systems for years and I'm not aware of any concerns.

Regards,  
Kenneth Gribble  
Chassis Engineering  
Materials & Corrosion Engineering Section  
\*\*\* Forwarding note from CTHOMAS5--DRBN005 01/21/99 17:26 \*\*\*  
To: MHAGA --FORDMA1  
cc: FPORTER --DRBN007  
KGRIBBLE--DRBN005  
GUILLEN --FORDMA1  
GSTEVEN1--DRBN005

FROM: Clark Thomas USAET(UTC -05:00)

Subject: (U) Brake Fluid Questions

Gayle/Mary: Can you comment on this? It is in reference to the issue of fires, possibly caused by the Texas Instrument Cruise Control Switch being looked at by NHTSA and our Legal Staff. Thanks.

Regards, Clark Thomas  
AVT Materials (Plastics/Elastomers)  
313-59-41313 (Bldg), 313-32-23188 (POKE)  
\*\*\* Forwarding note from FPORTER --DRBN007 01/21/99 10:13 \*\*\*  
To: CTHOMAS5--DRBN005  
GSTEVEN1--DRBN005

FROM: F. J. Porter USAET(UTC -05:00)  
Subject: (U) Brake Fluid Questions

Two questions:

Is brake fluid conductive? How much?

Will brake fluid react with copper or brass? Will an electric field or current cause a reaction?

Regards,  
Fred Porter OV - fporter fporter@ford.com  
Chassis E/E Systems Applications (313) 645-3722  
Bldg 5 - Mail Drop 5030 - Cubicle 1E004 fax: 390-4145

433 Johnson  
JOHNSON AVE  
BLUE follow CRB Harbor 18  
2 of Stein TEE ART  
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TO 528 east  
in uno express  
Motor connector  
AIA 1 mile south  
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C-Davens2@T1.com

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weather + rain  
TYPE FIRE EXTINGUISHER

MATIG Connector Supplier  
92 gasoline v. power same?

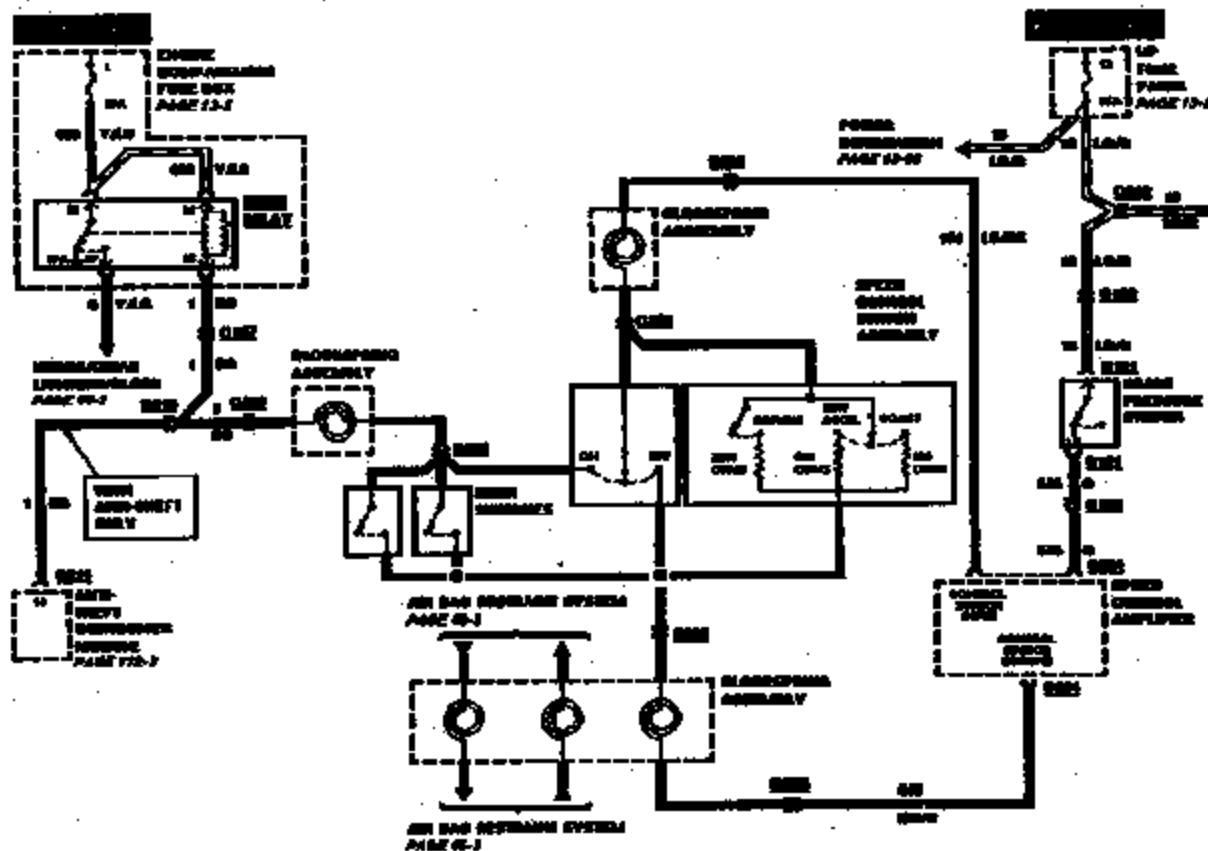
X 82358  
KEVIN KIMBALL  
ULLA CASSER  
FIG 408 136  
LBB-B642

3713 1886

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### 31-1 Speed Control

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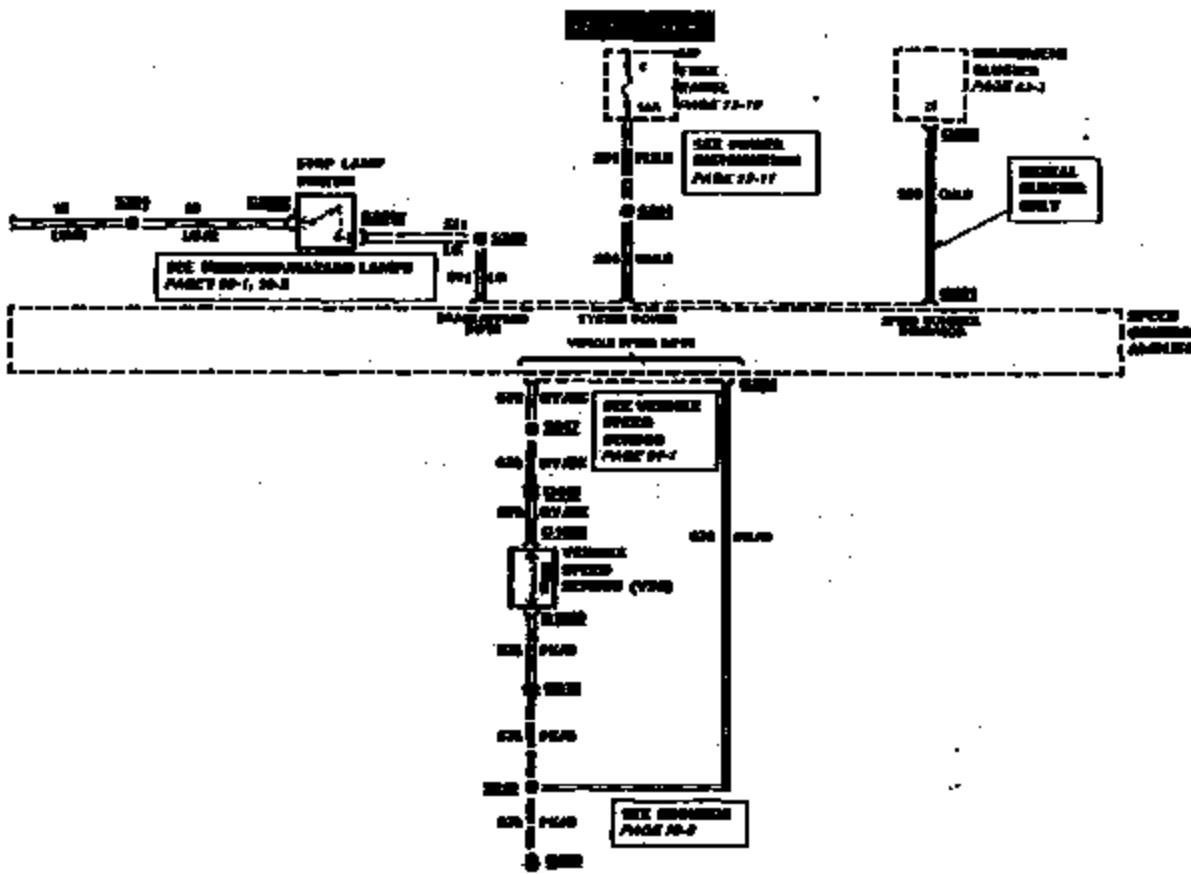


- Component
- Connector
- Page
- Harness

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### 31-2 Speed Control

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Component

Connector

Ground

Splice

Page

Harness

\* How The Circuit Works

\* Troubleshooting Hints

---

**Brake Pressure Switch 28284**

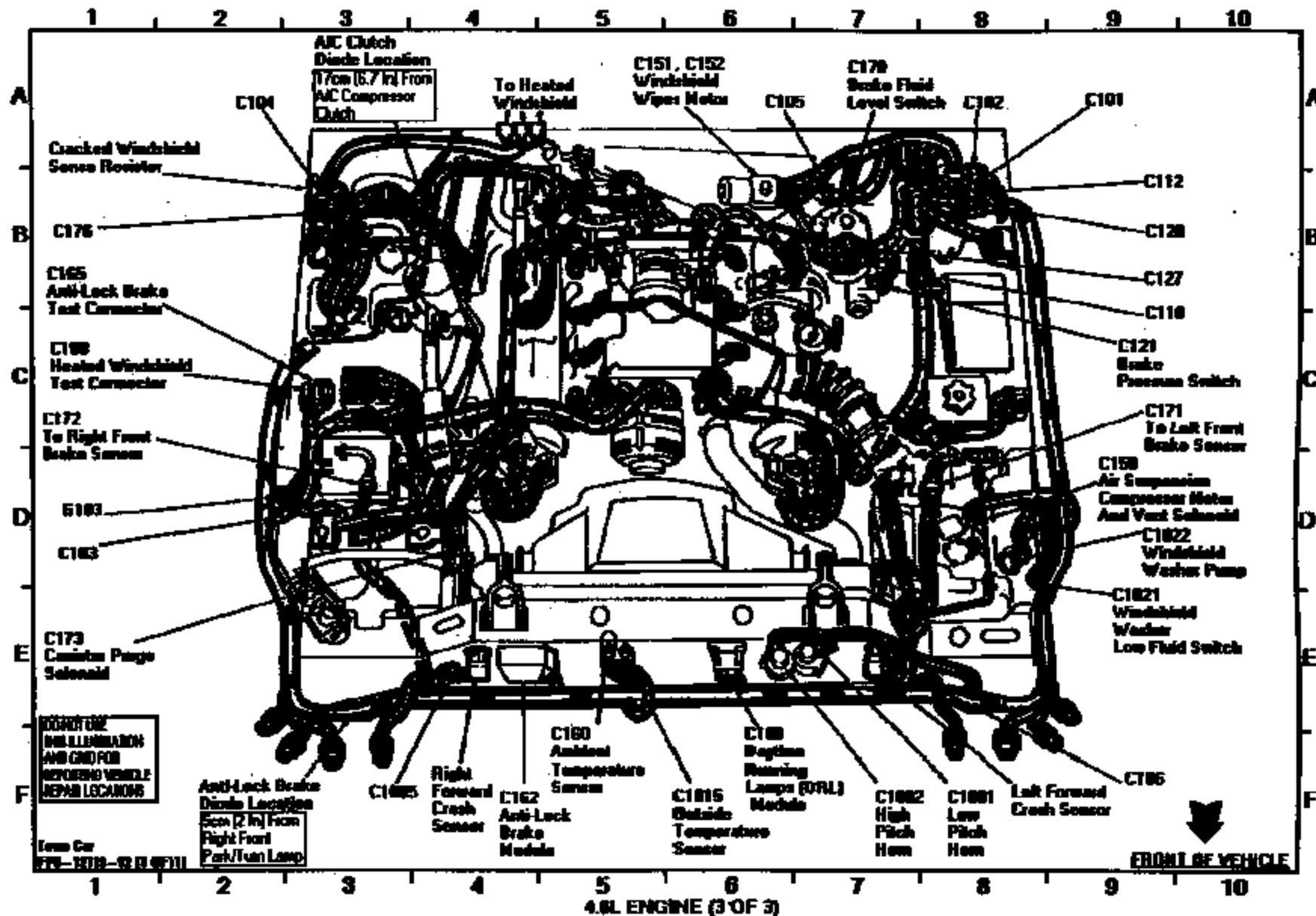
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C121

\* Power Distribution 13-16

\* Speed Control 31-1

Lower LH rear of engine compartment, on hydraulic brake lines (C9)



3713 1590

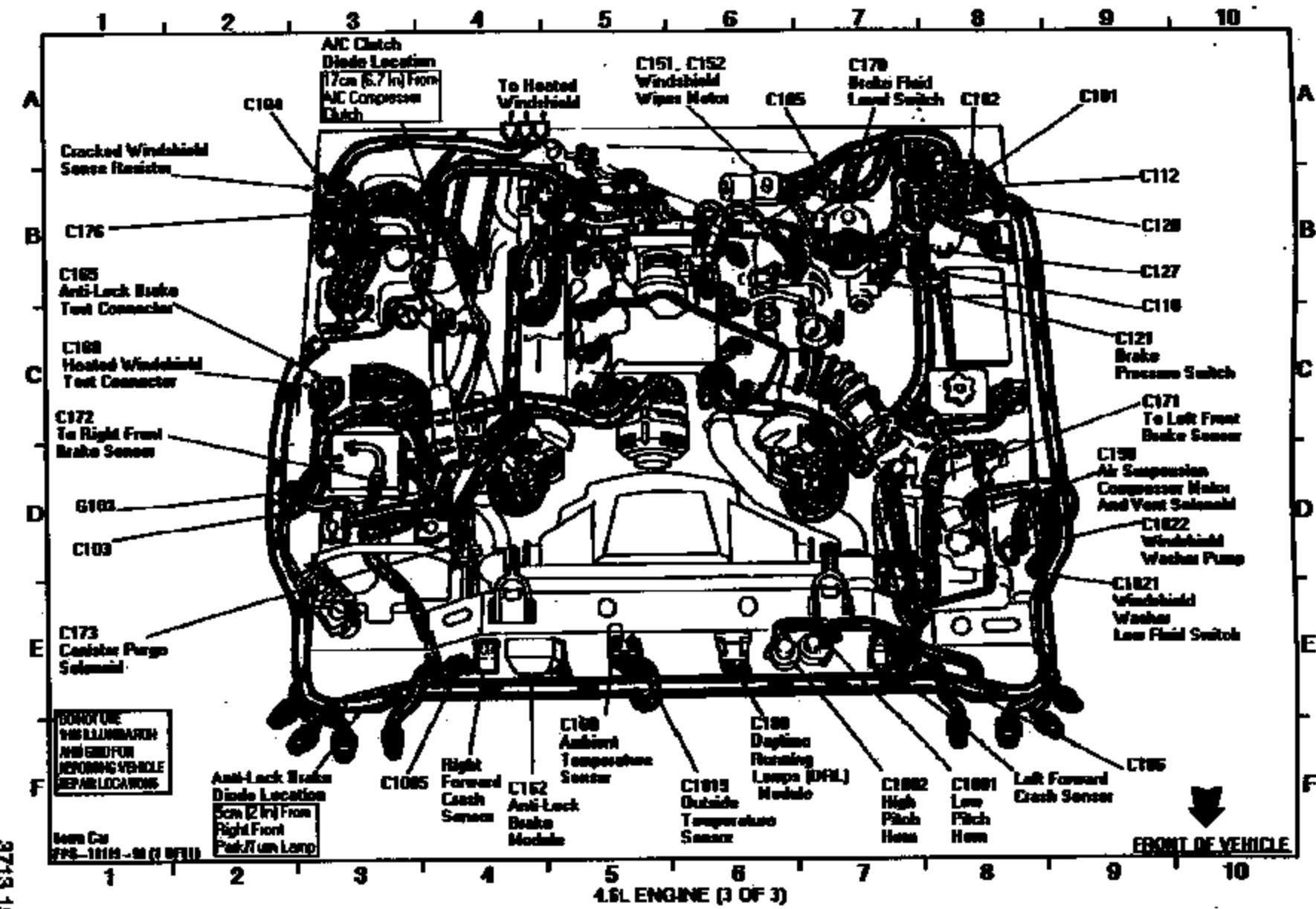
3713 1591

C121

LH rear of engine compartment, on brake pressure switch (C8)

Terminal: 02      Color:

3713 1582



3713-1563

4.6L ENGINE (3 OF 3)

3713 1584



1992 Crown Victoria/Grand Marquis/Town Car Service Manual Table of Contents  
«Group 10: FUEL SYSTEM»  
«Section 10-03A: Speed Control System—Lincoln Town Car (Late Production Vehicles)»  
«REMOVAL AND INSTALLATION»

---

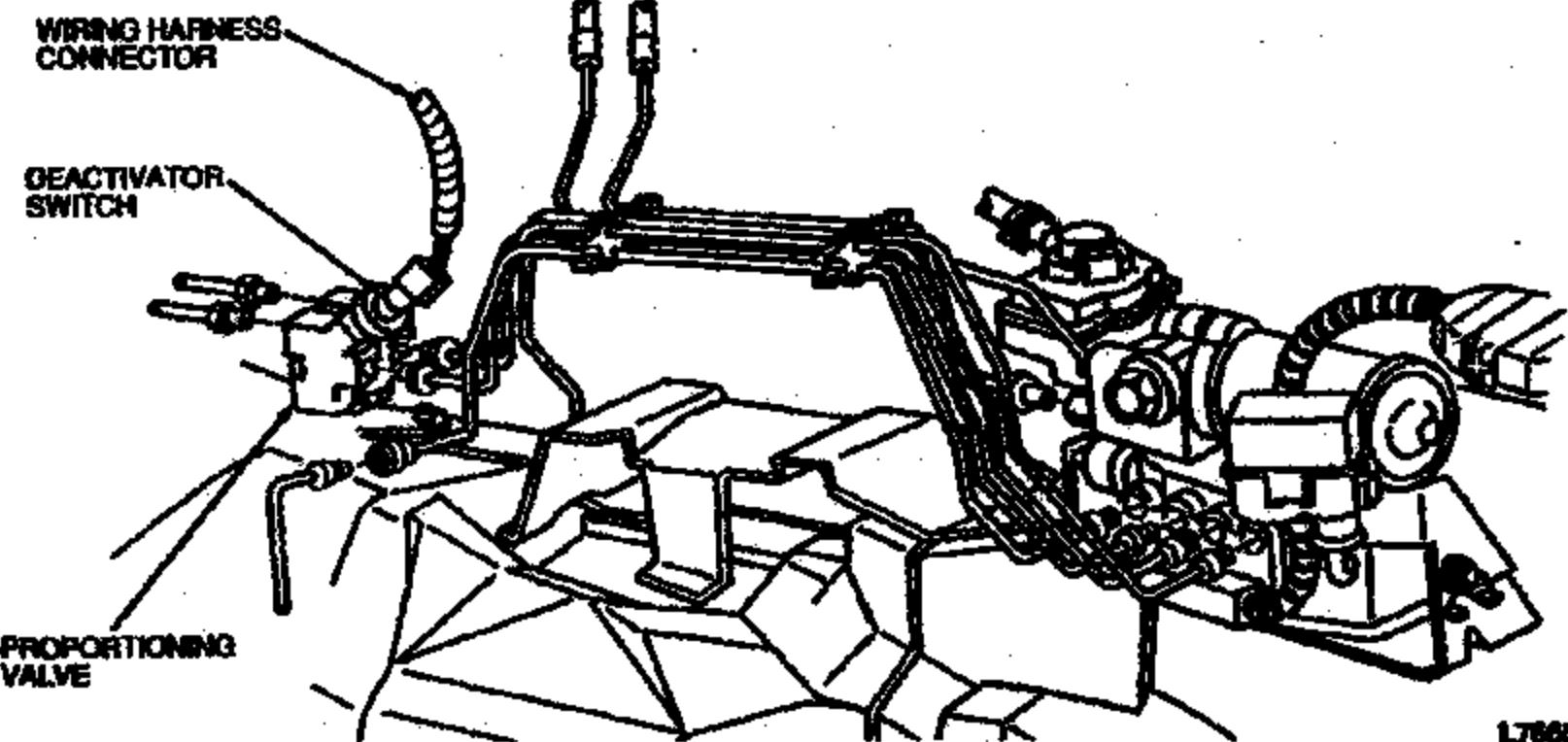
## Deactivator Switch

### Removal

1. Remove electrical connector from switch.
2. Unscrew switch and remove from brake proportioning valve.

### Installation

1. Screw switch into proportioning valve. Tighten to 15-20 N·m (12-14 lb·ft).
2. Attach electrical connector.
3. Bleed brake lines as outlined in «Section 06-09».



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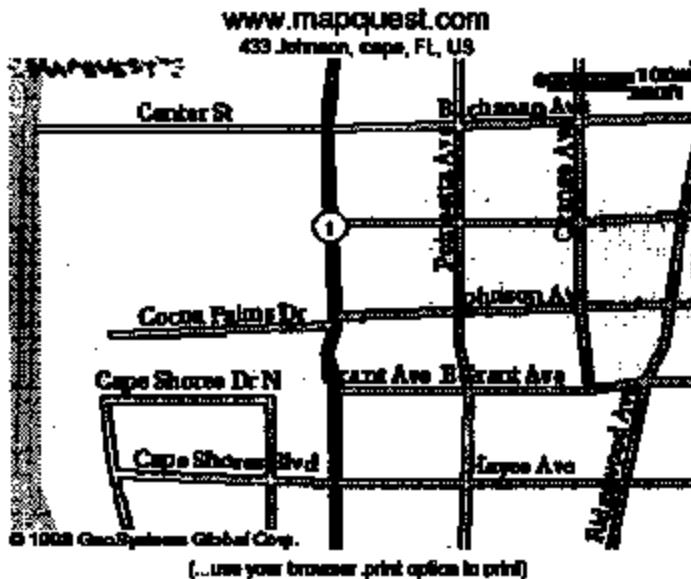
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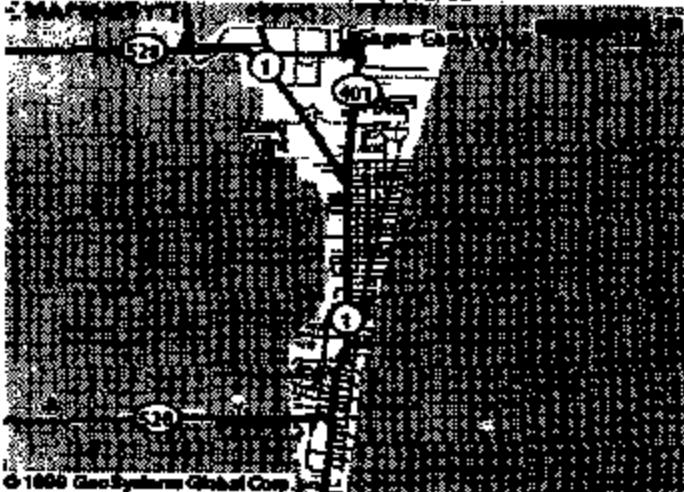


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Fred,

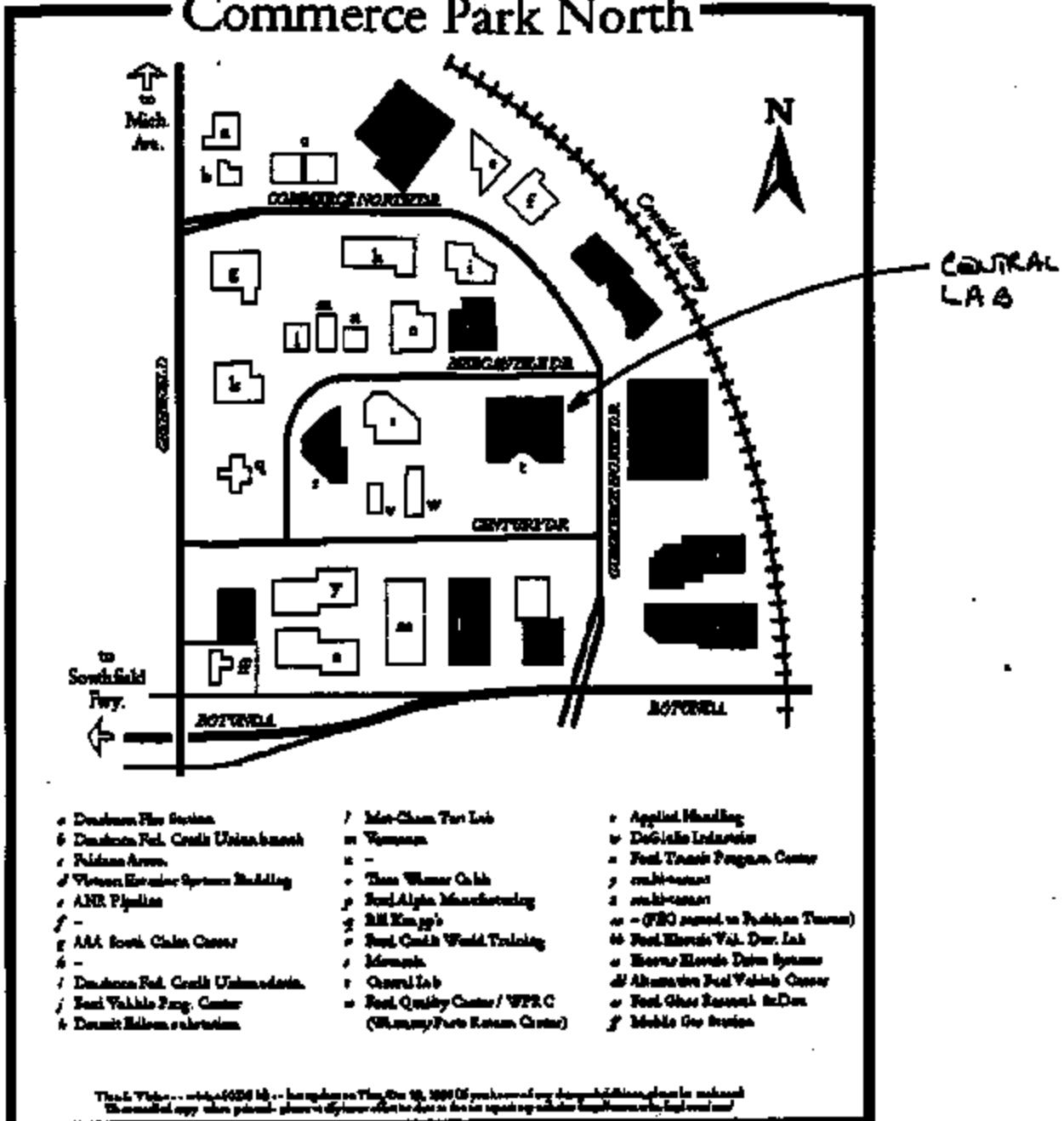
I believe that your list includes some service part numbers, older rev levels, as well as pre-production or prototype part numbers. Overall, including Ford Australia, there are eight different production parts. Differences from part to part are fairly minor and include, actuation calibration, release pressure, hexport style, position tab / color of connector base, thread style, and snap notes associated with the pressure disc. The following matrix, helps summarize this information:

Part Number	Actuation	Release Bias	Hexport	Thread	S or Q
F2VC 9F924 AB 90-160 (1)	20 min	Brown / pos 2	J512	3/8-24M	Snap
F6LC 9F924 AA 200-300 (2)	40 min	Black / pos 1	J512	3/8-24M	Snap
F2AC 9F924 AA 90-160 (3)	20 min	Natural / pos 2	J512	3/8-24M	Quiet
F58A 9F924 AA 90-160 (4)	20 min	Grey / pos 1	J512	3/8-24M	Quiet
F3TA 9F924 CA 200-300 (5)	40 min	Red / pos 1	J512	3/8-24M	Snap
94DA 9F924 AA 90-160 (6)	20 min	Natural / pos 2	o-ring	M10x1.0M	Quiet
F3DC 9F924 AA 90-160 (7)	20 min	Natural / pos 2	Sealbar	3/8-24M	Quiet
94JA 9F924 AB 90-160 (8)	20 min	Grey / pos 1	o-ring	3/8-24M	Quiet

Vehicle - Part Number Correlation

- (1) Crown Vic, Grand Marquis, Mark, Town Car
- (2) Econoline, Club Wagon
- (3) Crown Vic, Grand Marquis, Mark, Town Car
- (4) Windstar
- (5) Bronco, F-Series, Ranger, Explorer, Navigator, Expedition, Econoline, Club Wagon
- (6) Falcon
- (7) SHO Taurus
- (8) Contour

# Commerce Park North



Mini-FAX Transmittal Date 12/18 Page 1

To:	MIKE THOMAS	From:	FRED PORTER
Date:	12/18	Date:	12/18
Telephone:	MARU KOLER	Telephone:	
Fax No.:		Fax No.:	

11/20 1998 248-543-0743

3713 1602

12/18/1998 1:44 PM

1/19/99 MCTW

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

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

JAN 11 1999

**CERTIFIED MAIL**  
**RETURN ENVELOPE REQUESTED**

W. J. Bohan, Manager  
Automotive Safety Office  
Ford Motor Company, Suite 500  
330 Town Center Drive  
Dearborn, MI 48126

NDA-12/0  
FEB 2-055

Dear Mr. Bohan:

As you know, Ford's response to the Office of Defect Investigation's (ODI) Information Request (IR) letter dated November 24, 1998, is due January 15, 1999. Question 3 of the IR requests Ford to identify other vehicles that "have engine compartment [sic] configurations (i.e., components and component location, wiring harnesses and harness location) the same as the subject vehicle" and respond to Question 2 (providing incident/fire information etc.) for those identified other vehicles. Mr. Nevi called me to discuss the scope of questions 2 and 3. As a result of that discussion, I am modifying the IR letter.

I understand that while the Lincoln Town Car shares the same platform with the Ford Crown Victoria and Mercury Grand Marquis, specific components under the hood may be shared with many other Ford vehicles. In Mr. Nevi's opinion, if Ford were to answer questions 2 and 3 at this time, without focusing in on certain components, the resulting response would contain a very complex array of vehicles and components, take valuable resources and time from obtaining the information for ODI on the Lincoln Town Car vehicles, and would not likely provide more certainty to the identification of a specific component that may be responsible for the potential defect trend. Therefore, in the interest of providing a timely response to the IR letter, we agreed that Ford shall provide all information requested as it relates to the subject vehicles (the 1992 and 1993 Lincoln Town Cars) by the due date of January 22, 1999. We request that the additional information, in response to Question 2 as it relates to other identified vehicles, be provided by February 15, 1999 and focus on specific components to be identified by ODI following our examination of fire damaged vehicles. This shall allow ODI to identify potential components that may exhibit a defect trend contributing to the risk of engine compartment fires.



AUTO SAFETY HOTLINE  
(800) 414-0294  
WEB: O.D. AT&T 262-0721

JAN 11 '99 11:53

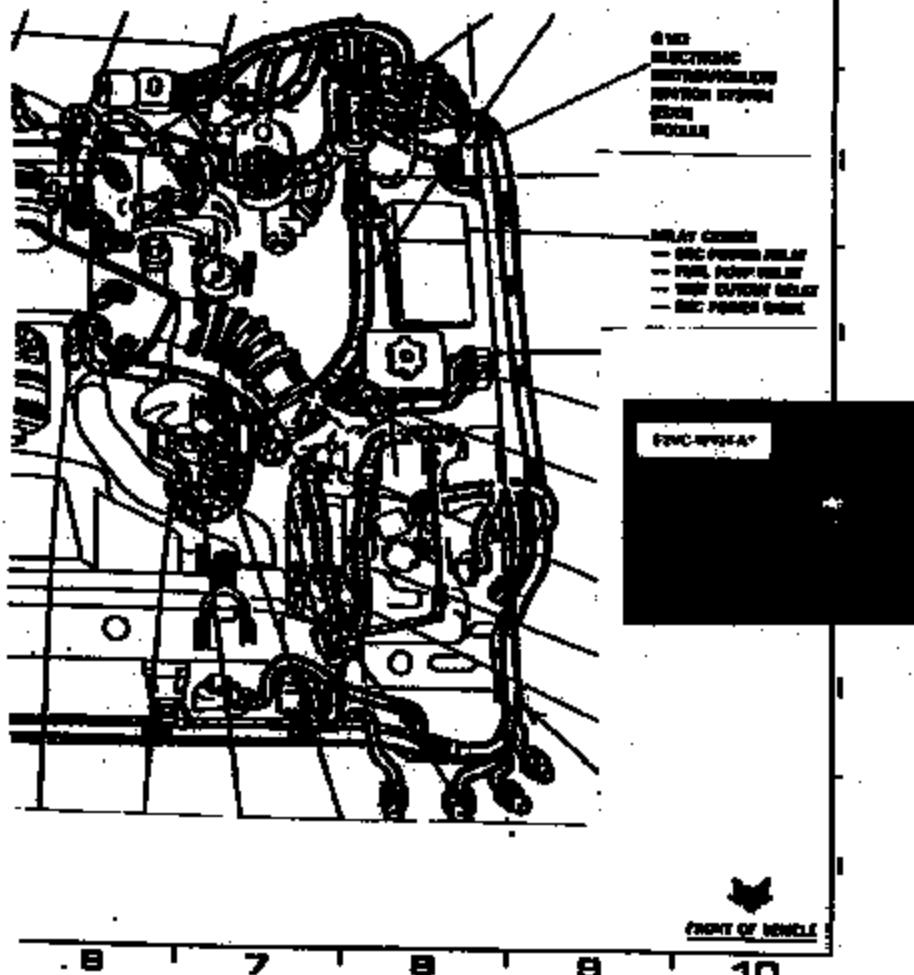
PAGE 31

3713 1803

41099

# PE98-055 1992-1993 Lincoln Town Car

\*\*Jan-93



## Components

1. Speed control assembly switch F2VC-WP24-A
2. Electronic transaxle assembly (option option 2000) model
3. Relay center:
  - a. ESC power relay
  - b. Fwd pump relay
  - c. FWD cutout relay
  - d. ESC power diode
4. Wiring assembly 12A301

3713 1604

12/17/98

NOV 24 1998

**CERTIFIED MAIL  
RETURN RECEIPT REQUESTED**

L. W. Camp, Director  
Automotive Safety and Engineering Standards Office  
Ford Motor Company  
330 Town Center Drive  
Dearborn, MI 48126

NSA-125a  
PE98-055

Dear Mr. Camp:

This letter is to advise you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) is conducting a Preliminary Evaluation concerning engine compartment fires in certain Lincoln Town Car vehicles manufactured by the Ford Motor Company.

This office has received 21 reports of engine compartment fires in 1992 and 1993 Lincoln Town Cars. The fires in these vehicles are reported to have started while the vehicles were parked and the engines not running. Ten of the reports indicate a fire at the left front fender wheel well area (see photograph, page 6), two indicate a fire at the master cylinder, which is adjacent to the left front fender wheel well area, and the remaining nine reports indicate a fire in the engine compartment. Additionally, five of the reports indicate the vehicle owner's carport, garage, or home, was also damaged as a result of the fire.

A copy of each of the reports is enclosed for your information.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles:** all 1992 and 1993 Lincoln Town Car vehicles.
- **Ford:** Ford Motor Company, all of its past and present officers, employees, whether assigned to its principal offices or to 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 by or under the control of Ford Motor Company (including all business units and persons previously referred to) who are or were involved in any way with (a) design, analysis, modification or production; (b) testing, assessment or evaluation; or (c) record-keeping, claims, or lawsuits relating to the alleged defect in the subject vehicles.

3713 1605

- **Alleged defect:** all under hood fires, or other thermal anomalies, from any source or origin, of any description, level, degree, or magnitude, occurring in the left, or drivers side, of the engine compartment. This would include fires in the area of the left front wheel, or left front fender.
- **Documents:** in the broadest sense of the word, shall mean all written, printed, typed, recorded or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, including but not limited to, papers, records, letters, correspondence, memoranda, communications, electronic mail messages (existing in hard copy and/or in electronic storage), faxes, notes, annotations, working papers, drafts, minutes, records, resolutions, books, pleadings, response to discovery, administrative and judicial filings, all transcripts and other recordings of any kind, affidavits, materials and things produced in discovery, statements, summaries, interviews, opinions, reports, newspaper articles, studies, analysis, evaluations, interpretations, applications, agreements, jottings, agendas, bulletins, notices, announcements, instructions, designs, specifications, blueprints, as-builts, manuals, brochures, publications, schedules, journals, statistical data, lists, tabulations, computer printouts, data processing input, data in storage, and data output, microfilm, microfiche, data from optical scanning or recording, photographs, tangible things, and all records kept by electronic, photographic, or mechanical means, any drafts or revisions pertaining to any of the foregoing, and all other things similar to any of the foregoing however denominated and any other data compilations from which information can be obtained, translated if necessary, into reasonably usable form and any other documents.

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 questions. Please repeat each question verbatim before the response. If you have previously furnished ODI with information that is responsive to any item(s) in this request, you need not resubmit that information, but your response must cross-reference (by date of response and question number) the earlier submission. If Ford cannot answer any specific question, please state the reason why it is unable to do so. If you claim that any information or material responsive to the following items need not be divulged to the NHTSA because it is privileged, or the work product of an attorney, state the nature of that information or material and identify any document in which it is found by, date, subject or title, name and position of person from and person to whom it was sent, and name and position of any other recipient. You must also describe any privilege that you claim, and explain why you believe it applies.

1. State the total number of subject vehicles sold in the United States by model year.
2. State the number incidents, known to Ford, in which the alleged defect has been reported to have occurred in the subject vehicles. Furnish copies of all documents, from any and all sources, including documents which may not originally have been submitted to Ford, which

are in Ford's possession or control, or of which it is otherwise aware, that pertain, in any way, to any of these incidents. This should include, but is not limited to, all documents possessed by Ford, or of which it is otherwise aware, pertaining to the reports included with this letter. Furnish all documents whether or not Ford has verified the validity of each document. For each incident in this response please provide the vehicle owner's name, address, and telephone number; and identify all vehicles by vehicle identification number, model year, date of manufacture, date of retail sale, date of incident, mileage at the time of the incident, and problem description. For all incidents involving lawsuits please identify the caption, court, docket number, and filing date of each lawsuit and a copy of the complaint document initiating the lawsuit. Sort all incidents by cause and area or component of origin.

3. State the total number vehicles sold in the United States by model name and model year that have engine compartment configurations (i.e., components and component location, wiring harnesses and harness location) the same as the subject vehicles. Provide a response to question number two for all vehicles identified in your answer to this question.
4. State the number of all warranty claims, including extended warranty claims, and "goodwill," field or zone adjustments received by Ford that relate to the alleged defect in the subject vehicles by calendar year, calendar month, and problem identification. Identify all owners by name, address, and telephone number, and all vehicles by vehicle identification number, model name, model year, date of manufacture, date of retail sale, date of incident, mileage at the time of the incident, and problem description.
5. Identify all electrical circuits by name, number, and wire color, located in the left side of the engine compartment that are, or remain, energized by the battery when the ignition key is in the off position. For all circuits identified, provide a schematic drawing which identifies the harness(es) in which they reside, the harness location(s), and the components to which power is supplied.
6. Identify and describe all inspections, tests or other analyses conducted by Ford, its contractors, suppliers, or by any other entities, regarding the inspection of any subject vehicles that relate to the alleged defect, to date. Identify, by name and address, the entity that conducted each such test or analysis. Furnish copies of all reports, surveys, notes, tables, graphs or other documents that pertain to each such test or analysis. State when each test or analysis was initiated and concluded, or whether it is still in progress. Include in your response a description of a worst case scenario.
7. If Ford has issued any bulletins, advisories, or other communications to distributors, retailers, consumers, or any other entity pertaining to the alleged defect in the subject vehicles, provide a copy of each such document. If no such documents have been issued, so state.

8. Identify and describe all significant modifications or changes made by or on behalf of Ford in the manufacture, design, or material composition of all components in the subject vehicles that may relate to the alleged defect. The following information must be included for each such modification or change:
  - a. the approximate date on which the modification or change was incorporated into production;
  - b. a description of the modification or change;
  - c. the reason for the modification or change; and
  - d. whether the modified or changed components can be interchanged with earlier production components.
9. Provide Ford's assessment of the alleged defect in the subject vehicles, including:
  - a. all causal or contributory factors;
  - b. the failure mode;
  - c. the risk to occupant safety it poses; and
  - d. whether there are any circumstances that would provide the vehicle owner or others with warning of its existence.

Your response to this letter, in duplicate, must be submitted to this office by January 6, 1999. Please include in your response the identification codes referenced on page 1 of this letter. If you find that you are unable to provide all of the information requested within the time allotted, you must request an extension from Mr. Thomas Z. Cooper not later than five days from the due date. If you are unable to provide all of the information requested by the original deadline, you must submit a partial response by that date with whatever information you have available, even if you have received an extension.

This letter is being sent to your company 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, U.S. Code. Your failure to respond promptly and fully to this letter could subject Ford 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.

If you consider any portion of your response to be confidential information, include that material in a separate enclosure marked "CONFIDENTIAL." In addition, you must submit a copy of all such material to the Office of Chief Counsel (NCC-30), National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590, and comply with all other requirements for the submission of confidential business information stated in 49 CFR Part 512.

PE98-053  
page 5

If you have any technical questions concerning this matter, please contact Mr. John Abbott of my staff at (202) 366-5221.

Sincerely,

Thomas Z. Cooper, Chief  
Vehicle Integrity Division  
Office of Defects Investigation

Enclosures: 12 VOQ's; 813241, 824016, 806265, 821567, 979634, 521137, 804418, 541041  
820316, 536206, 819621, 823462; 5 fire department reports; 2 internet reports; and  
2 fire investigator reports

3713 1609

1992 Lincoln Town Car (1LNLM81W2N) [REDACTED]



63 image 1024x768 pixels

VILLA CASSEL 408 134

G:\VC\My Documents\Programs\EN\PN\PIC00003.jpg



5743 1611

# AWS

## DATABASE SUMMARY - YTD

Cutoff Date: 31 Dec 1998  
Last Load Date: 22 Jan 1999

Request Name: '92 Towncar

Description: Vehicle repair history for '92 Towncar #1lnlm61w0ny714787

Date/Time Run: 28 Jan 1999 / 07:05  
Date/Time Printed: 03 Feb 1999 / 13:11

Request ID: 48620015

Generated By: AJANOT11

### Data Selection Criteria:

Model Year = MY\_92[1992]  
Cost Category = All Vehicle Coverages / Contractual[1.1]  
Region Sold = North America(NA)  
[USA,USA]  
Country Sold / Repaired [typed]  
Vehicle Serial Number [typed] = 714787  
Vehicle Line WERS [VL] = TOWN CAR (FN36/FN116) [91-97][CAVE]

### Report Selection Criteria:

Model Year(s) = 1992  
Rank = Repairs  
Page By =  
Order By = CPSC-4 (Reported)  
Minimum Repairs = 0  
Minimum Cost = 0  
Report Option = YTD (Claims)  
Descriptions = Yes

### Globalization Information:

Distance Reported = Miles  
Distance Requested = Miles  
  
Currency Reported = USD  
Currency Requested = USD  
Currency Exchange Version = v.2.1

# DATABASE SUMMARY - YTD

Cutoff Date: 31 Dec 1998

Vehicle repair history for '92 Towncar #1haind1w8ny714787

Currency Reported In: USD

Result ID: 48526915

Page: 2

Print Date: 03 Feb 1999

Print Time: 13:11

Model Year: 1992

Page By:

CPAC-4 (Reported)	REPAIRS	% Repairs	COST (USD)	% Costs	COST/RPR
0701 - 4-Automatic Transmission/Torque	0	24.32	0,180.72	42.81	733.42
080A - 4-Fire Arrestor	0	24.32	0,200.04	23.97	833.34
1001 - 4-Anti-Roll Bar/Steering Subsystems	0	12.51	2,241.86	55.84	442.37
420B - 4-Auxiliary Drive Subsystems	0	8.11	322.75	2.25	107.69
0119 - 4-Brakes, Lamps, Lights And Mache	2	9.41	66.04	0.59	42.02
1203 - 4-Radiopropagator/Conditioning Sys	2	5.61	911.64	6.35	456.77
040B - 4-Engine System	1	2.70	130.20	0.97	130.20
0405 - 4-Suspension/Land Leveling Control	1	2.70	82.76	0.75	82.76
1104 - 4-Steering Column Subsystem	1	2.70	80.40	0.73	80.40
1102 - 4-Power Steering Subsystems	1	2.70	100.14	1.21	100.14
0805 - 4-Front Disc Brake Subsystems	1	2.70	200.02	2.00	200.02
0804 - 4-Rear Disc Brake Subsystems	1	2.70	200.02	2.00	200.02
000Z	1	2.70	200.02	2.00	200.02
1992 Repair Grand Total:	27		44,205.00		167.48

END OF REPORT

3713 1613

## DETAILED CONCERN ANALYSIS REPORT

14D Number:	14D Title:	92-93 Town Car F2VC-9FB24-A Brake Pressure Switch		
Plant/Activity:	Open Date:	12/15/1998	Close Date:	Status: Open
<b>D1. PROBLEM DESCRIPTION:</b>				
NHTSA letter PELB-055 identifies "...21 reports of engine compartment fires in 1992 and 1993 Lincoln Town Cars." One of the insurance reports included with the letter states "...that the fire originated in the area of the brake system pressure switch located below the master cylinder..."				
<b>D2. DEFINE ROOT CAUSE:</b>				
<b>D3. PROBLEM INVESTIGATION/VERIFICATION DATA:</b>				
One sensor which exhibited a melted cavity was analyzed by Texas Instruments (the supplier) showing corrosion in the switch cavity. All three layers of the 'topper' membrane were blistered and perforated.				
Two sensors from suspected incidents were analyzed by Ford's Central Laboratory. The plastic housing and switch mechanism were gone and the other components damaged too greatly to identify a leak path.				
Two sensors (1 1993 Town Car and 1 1997 Crown Victoria Police Vehicle) replaced for being 'leaky' are under investigation by Ford's Central Laboratory. Initial information showed fluid in the switch cavity and corrosion from copper migration. There were no clear perforations in the 'topper' membrane but further analysis is being conducted at Central Laboratory.				
Six sensors randomly removed from 1992 and 1993 Town cars showed no evidence of leaking fluid or corrosion in the switch cavity.				
<b>D4. ACTIONS TAKEN IN PRODUCTION: INTERIM (CONTAINMENT) AND/OR PERMANENT</b>				
<b>D5. VERIFICATION OF CORRECTIVE ACTIONS:</b>				
<b>D6. ESTIMATED PRODUCTION AND PROBLEM STATISTICS:</b>				
<b>D7. AFTERMARKET PARTS/VEHICLES AFFECTED:</b>				
The F2VC-9FB24-A has been released on the 1992-1997 Town Car, 1992-1997 Crown Victoria, 1992-1997 Grand Marquis, 1993-1996 Mark VII.				
See attached for list of vehicles with similar sensors based on WERS notice releases.				
<b>D8. ASSESSMENT OF EFFECT ON VEHICLE OPERATION:</b>				
The speed control function may erroneously disengage or be inoperative as the switch corrosion increases.				
<b>D9. DESCRIPTION OF CONCERN SOLUTION AND PARTS REQUIRED (FIELD ACTIONS):</b>				
PROPOSAL 1 (maintenance functionality): Install a 1 amp in-line fuse in the brake pressure switch circuit. This reduces the energy available to the switch.				
PROPOSAL 2 (elimination of function): Disconnect the brake pressure switch. This leaves the speed control function inoperative.				
<b>D10. PROGRAM PARTS SIGN-OFF/AVAILABILITY:</b>				
<b>D11. VENDOR INVOLVEMENT:</b>				

FEB. -03' 99 (WED) 10:00 LW CAMP - ASEB

TEL:313 594 9770

P. 001

Inter Office

Environmental and  
Safety Engineering  
Ford Automotive Operations

## FACSIMILE TRANSMITTAL SHEET

February 3, 1999

To: Chris Mages FAX: 87141

From: L. W. Camp/  
Automotive Safety Office  
Suite 400 - Fairlane Plaza South  
330 Town Center Drive  
Dearborn, MI 48126  
FAX: 313/594-9770  
Phone: 313/845-4320

Number of sheets transmitted, including cover sheet: 3

### Message:

Per our telephone conversation.

Lou

### Attachment:

3713 1616

\*\*\*\*\*  
\* Note printed by EMEV1 on 2 Feb 1999 at 15:18:55 \*  
\*\*\*\*\*

From: WARRENCE--DLEM005  
To: JEWADLY7--DLEM006

Date and time 02/03/99 10:27:51  
EMEV1 --DLEM005

FROM: William Abramczyk  
Subject: SF924 Update (19981218)  
PE98-055 Information regarding usage of F2VC-SF924-A\*

William M. Abramczyk  
Automotive Safety Office-Mail: 500 Fairlane Plaza South (FBS)  
Car Safety Investigations Dearborn, MI  
Phone (313) 923-5354 Fax (313) 594-2368  
\*\*\* Forwarding note from F9007 --DLEM007 12/16/98 17:04 \*\*\*  
To: WARRENCE--DLEM005 DLEM005 --DLEM007  
HMKL81--DLEM005 JEVADLY7 --DLEM005  
DOOML --DLEM005 JEWADLY7--DLEM005  
HMKL81--DLEM005 KELAPOINT--DLEM005  
SLAROOCK--F9007 JMCNINN1--DLEM005  
JMCNINN --DLEM005 KEMVT --DLEM005  
GTEVENT1--DLEM005 CTRENGA5--DLEM005  
ENGLPERL1--DLEM005

FROM: P. J. Porter  
Subject: SF924 Update (19981218)

TRAVET (UTC -05:00)

#### 1992-1993 Town Car F2VC-SF924-A Brake Pressure Switch Investigation

##### TEAM:

AVT EMEC Chassis Electronics:	Fred Boycar	x44-51732	spart04c
AVT Chassis Engineering:	Joe Evans	x12-23812	jevans04
	Berry Egan	x12-39512	began
AVT EMEC EDI:	Rob English	x12-73225	renglish
AVT Design Analysis:	Norm LaPointe	x12-42486	nla point
AVT EMEC O&E:	Jim Gregoire	x12-79942	jgregoirx
SAFE Prod. Veh. Safety:	William Abramczyk	x12-23264	wahrmance
	Ray Nevi	x59-47688	nevi
Large Luxury VC Safety:	John McNaughton	x12-20276	jmcnaum
	Joe Wenz	x12-08133	jwenz
AVT Materials Engineering:	Greg Stevens	x12-36684	gsteven04
	Ken Grindle	x12-39488	kgrind04
Central Lab Services:	Clark Thomas	x12-41313	cthomas04
	Steve Lalouche	x64-54874	slarouch

##### INFORMATION:

-----  
MEVTA letter: PE98-055

Vehicles identified: 21 initially identified.  
20 additional vehicles reported since publication of  
the investigation.

Warranty: A total of 89 warranty claims are identified in AMS on the  
F2VC-SF924-A for 1992 and 1993 Town Cars.

3713-1616



DISPATCHED 03/03/99	
10:00 Standard Time	
RECEIVED Remote Copy	
10:00 Standard Time	20:1
Schedule Number	27.03

L. W. Camp  
Director  
Automotive Safety Office  
Environment And Safety Engineering

Ford Motor Company  
320 Town Center Drive  
Dearborn, Michigan 48132

January 22, 1999

Mr. Thomas Z. Cooper, Chief  
Vehicle Integrity Division  
Office of Defects Investigations  
National Highway Traffic  
Safety Administration  
400 Seventh Street, S. W.  
Washington, DC 20590

Dear Mr. Cooper:

Subject: PE98-055:N9A12jfa

Attached is Ford's response to your letter dated November 24, 1998 concerning 1992 and 1993 model year Lincoln Town Car under hood fires. We expect to submit additional information responsive to this inquiry on February 3, and on February 15, 1999.

*C:to 3 \$500*

As the Agency is aware, Ford investigations of under hood fires on these Lincoln Town Cars is continuing.

If you have any questions concerning this response please contact me.

Very truly yours,

3713 1617

Attachment

www:camp/PE98-055.doc  
www:camp

Windstar		xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Falcon		xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Explorer			----	xxxxx	xxxxx	xxxxx
Ranger			----	xxxxx	xxxxx	xxxxx
Expedition				xxxxx	xxxxx	xxxxx
Navigator				xxxxx	xxxxx	xxxxx

xxxxx = used in model year

---- = may have been used in model year

- 6) Is this switch still in use? If not, why not? If so, what design changes have been implemented since 1992/1993?

Charlie Douglas of TI is investigating the design changes that may have been implemented on the brake pressure switch beginning in 1993.

- 7) What fault codes are stored if the brake pressure switch fails?

Regards,

Fred Porter              OV - Sportax              spporter@prodigy.net  
 Chassis E/E Systems Applications              (212) 945-3732  
 Bldg 5 - Mail Drop 5030 - Vehicle 32004              fax: 386-4145

S713  
1618  
01618

17 Feb 99 mtg  
w/MTT3A

Two CGRS reports (NOTAMAL35 & VOTRA323) mention underhood fire in connection with the brake pressure switch.  
 NOTAMAL35 occurred at 51,500 miles.  
 VOTRA323 occurred at 56,802 miles.

**Supplier:** The pressure switch was manufactured by Texas Instruments. The switch was purchased in assembly with the brake proportioning valve bought from Surfaces.

**Contacts:** Surfaces - Mike Thomas (348)543-6620 (MILITE Industries)  
 TI - Rob Sharp (348)305-5729  
 TI - Russ Macman (800)236-3314  
 TI - Charlie Douglas (800)236-3457

**Function:** The brake pressure switch is a redundant switch for turning off the speed control function.

**X-Rays:** Taken by Steve LaRouche, Marc LaPointe & Clark Thomas on 12/17/1998. Original photographs and part are in Steve LaRouche's possession.

#### ON-BOXES ACTIVITY:

3 service parts have been ordered from Fairlane Ford for X-ray and other testing by Central Lab Services.

Meeting with representatives of TI is planned for 12/22/1998 to discuss intended operation of the switch. The meeting will be at the Central Laboratory Conference room off of the lobby.

#### QUESTIONS: (in no particular order)

- 1) What is the normal current in the brake pressure switch?
- 2) Was cruise control standard on Town Car in 1992 and 1993?
- 3) Under what circumstances is brake fluid flammable?

According to Clark Thomas & Mary Zaga, brake fluid is flammable at approximately 180 degrees F.

- 4) What is the repair history for vehicles that have exhibited a problem? Repair history for the two CGRS vehicles are being gathered by Fred Porter.
- 5) What other vehicles use this brake pressure switch? What are their electrical configurations?

MODEL YEAR	92	93	94	95	96	97	98
Town Car	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
Crown Vic	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
Grand Marquis	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
Mercury	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
Club Wagon	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
P-Series	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
Bronco	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	
Taurus 990	xxxx	xxxx	xxxx	----			
Cougar		xxxx	xxxx	----			

3713 1619

<i>gold = silver grey gold gold</i>	F3TB-12A581-AC E9EB-14A464-AA	F4TB-12A581-AN F4ZB-14A464-MA	F5TB-12A581-AZ F4ZB-14A464-MA	F6TB-12A581-AJ F4ZB-14A464-MA	F7TB-12A581-BJ F4ZB-14A464-MA				
<i>gold = silver grey gold</i>	93	94	95	96	97	98	99		
<i>green = silver grey gold</i>	18Gn . AZ	<del>XXXXXXXXXX</del> SHORTING BAR	<del>XXXXXXXXXX</del> SHORTING BAR	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>		
<i>gold = silver grey gold</i>	93	94	95	96	97	98	99		
<i>CROWN VICTORIA GRAND MARQUIS</i>	F3AB-14401-AS F2AB-14A464-ADA	F4AB-14401-AE F2AB-14A464-ADA	F5AB-14401-AZ F2AB-14A464-ADA	F6AB-14401-AL F2AB-14A464-ADA	F7AB-14401-AL F2AB-14A464-ADA			XW3T-14401- F60B-14A464-AA F60B-14A464-AA	
<i>GREEN</i>	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>	<del>XXXXXXXXXX</del>	18Gn . AZ	18Gn . AZ		
<i>ECONOLINE</i>	F3UB-12A581-CB E9EB-14A464-AA	F4UB-12A581-GZ F4ZB-14A464-MA	F5UB-12A581-BZ F4ZB-14A464-MA	F6UB-12A581-CZ F4ZB-14A464-MA	F7UB-12A581-LY F4ZB-14A464-MA				
<i>shorting bar</i>	92	93	94	95	96	97	98		
<i>shorting bar</i>	<del>XXXXXXXXXX</del> SHORTING BAR								
<i>EXPEDITION</i>									
	92	93	94	95	96	97	98	XL14-12A581-AT F4ZB-14A464-MA	99
								18Gn . AZ	

9713 1620

**EXPLORER**92 93 94 95 96 97 98 99  
F57B-12A581-EZ F67B-12A581-EV F77B-12A581-AAB F87B-12A581- XL24-14398-AB

[REDACTED]

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

**F-SERIES**92 93 94 95 96 97 98 99  
F65B-12A581-KC F75B-12A581-AV F85B-12A581-AK XL34-12A581-AR  
[REDACTED] [REDACTED] [REDACTED] [REDACTED]  
F42B-14A484-MA F42B-14A484-MA F42B-14A484-MA F42B-14A484-MA

[REDACTED]

[REDACTED] [REDACTED] [REDACTED]

**FALCON**92 93 94 95 96 97 98 99  
[REDACTED] [REDACTED] [REDACTED] [REDACTED]**MARK VIII**92 93 94 95 96 97 98 99  
F3LB-14290-CX F4LB-14290-AM F5LB-14290-BK F6LB-14290- F7LB-14290-AR F8LB-14290-AE  
F2AB-14A484-ADA F2AB-14A484-ADA [REDACTED] [REDACTED] F42B-14A484-MA F42B-14A484-MA

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

**NAVIGATOR**92 93 94 95 96 97 98 99  
[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

XL74-12A581-AS

F42B-14A484-MA

[REDACTED]

Date Printed: 4/7/99

3719 1621

RANGER

92 93 94 95 96 97 98 99  
XL54-14290-CA  
██████████  
██████████

TAURUS

F30B-12A581-CX F40B-12A581-CM F50B-12A581-ED  
92 93 94 95  
E9EB-14A464-AA E9EB-14A464-AA F42B-14A464-MA  
██████████ 18GA, AZ ██████████ XF1T-12B637  
96 97 98 99  
██████████ F42B-14A464-MA

WINDSTAR

92 93 94 95 96 97 98 99  
F50B-14290-AZ F50B-14290-FZ F70B-14290-PY F60B-14290-FG XF2T-14290-KH  
██████████ ██████████ ██████████ ██████████ ██████████ F42B-14A464-MA  
██████████ ██████████ ██████████ ██████████ ██████████ ██████████

TOWN CAR

124581 ?  
92 93 94 95 96 97 98 99  
F2AB-14A464-ADA F2AB-14A464-ADA F2AB-14A464-ADA F3VB-14A464-AA ██████████ ██████████  
██████████ F2AB-14A464-ADA  
██████████ 18GA, AZ ██████████ ██████████

AB  
AZ ESB-M1L85-B  
ESB-M1L123-A

\*\*\*\*\*  
\* Note printed by FPORTER on 20 Apr 1999 at 09:59:33 \*  
\*\*\*\*\*

From: SLAROUCHE--FORDMAIL  
To: FPORTER --FORDMAIL Porter, Fred (F.J.  
cc: SLAROUCHE--FORDMAIL LaRouche, Steve (S  
  
From: LaRouche, Steve (S.)  
Subject: RE: Brake Switches

Date and time 04/20/99 08:05:14

Fred: You are correct for the Reddick switch. The damage was most severe on the washer side of the seal pack, which indicated that was where the cracking initiated. I don't think we can make a general statement about where the cracking/damage initiated for all the samples as it appears to have initiated at different locations in different samples (The cracking appears to have initiated on the fluid side of the seals in the two oasis samples; the initiation point could not be determined in the other samples).

Steve LaRouche (SLAROUCHE)  
Metallurgy Section, Central Laboratory, Room N410  
(313) 845-4876 (313) 232-1614 FAX

-----Original Message-----

From: Frederick J. Porter mailto:fporter@gw.ford.com  
Sent: Monday, April 19, 1999 6:17 PM  
To: slarouch@mail.ford.com  
Cc: sreimers@gw.ford.com  
Subject: RE: Brake Switches

At today's Technical Review Committee meeting, the question was asked "Can we tell which direction the brittleness and cracking is happening on the kapton switches?" We noted that in your chart the Reddick vehicle said that it started on washer side. I think this means that the cracking started on the electrical side and progressed to the hydraulic side of the kapton.

- 1) Please confirm that I am correct.
- 2) Can we make a statement in regards to which kapton layer started to crack first on the other leaky switches?

Regards,

Fred Porter OV - fporter fporter@ford.com  
Chassis E/B Systems Applications (313) 845-3722  
Bldg 5 - Mail Drop 5030 - Cubicle 3B604 fax: 390-4145  
\*\*\* Forwarding note from SLAROUCHE--FORDMAIL 04/19/99 07:57 \*\*\*  
To: FPORTER --FORDMAIL Porter, Fred (F.J.

From: LaRouche, Steve (S.)  
Subject: RE: Brake Switches

Fred: We are currently investigating this. I hope to have an answer this week.

Steve LaRouche (SLAROUCH)  
Metallurgy Section, Central Laboratory, Room N410  
(313) 845-4876 (313) 322-1614 FAX

-----Original Message-----

From: Frederick J. Porter mailto:fporter@gw.ford.com  
Sent: Friday, April 16, 1999 8:15 PM  
To: slarouch@mail.ford.com  
Cc: nlapoint@gw.ford.com; sreimers@gw.ford.com; pklass@mail.ford.com  
Subject: Brake Switches

For clarification:

When you are done with the testing, do the switches from EAA show signs of a cell being formed?

Is there, or could there be, evidence of corrosion occurring on the EAA switches similar to the junkyard switches.

Regards,

Fred Porter OV - fporter fporter@ford.com  
Chassis E/E Systems Applications (313) 845-3722  
Bldg 5 - Mail Drop 5030 - Cubicle 3E004 fax: 390-4145  
\*\*\* Forwarding note from SLAROUCH--FORDMAIL 04/16/99 17:14 \*\*\*  
To: FPORTER --FORDMAIL Porter, Fred (F.J.  
cc: NLAPOINT--FORDMAIL LaPointe, Norman (PKLASS --FORDMAIL Klass, Pete  
(P.P.)  
SLAROUCH--FORDMAIL LaRouche, Steve (S

From: LaRouche, Steve (S.)  
Subject: Brake Switches

Fred: I had a meeting this afternoon with two gentlemen (one was Roc Carter) from Scientific Research Laboratories to discuss brake switches. I showed them the results I have so far, and they felt that our testing was pretty comprehensive and that there was really not any more that they could contribute in terms of testing. We tried to come up with possible scenarios that would tie our findings to a cause of fire, but couldn't come up with anything. Here is a quick summary of our findings at Central Lab:

There appear to be two modes of failure occurring: One involving leakage of brake fluid through the Kapton seal and an apparent cell being set up between the contacts and steel cup. The other involving ingress of water into the switch cavity, with no brake fluid leakage, and no evidence of a cell:

The Memphis switch and all of the leakers analyzed so far show a leak path through the Kapton seals. The cup faces show transfer of the brass contact material to them which suggests that a cell has occurred between the hot contacts and the grounded cup. In addition to brake fluid, the Memphis switch shows evidence (desiccification of the brass contact) that some moisture may have also been present. We found no evidence that road salt had entered the switches.

The completely burned switches also show probable transfer of contact material to the cups, indicating a possible cell. No evidence of road salt detected. Could not determine if brake fluid leakage occurred.

Three of the junk yard switches (including the one analyzed by SRL) showed corrosion of the cups suggesting ingress of water into the switch cavities. This appears to be a different mode of failure in that there was no evidence of a cell occurring between the contacts and cup. Again, there was no evidence of road salt in the switch cavities. Although there is some damage to the Myton seals, there appears to have been no leak path or leakage of brake fluid.

I have received two switches from the OASIS which were both leakers. Testing is pretty much complete on these switches and so far we have found nothing different from the other leakers we analyzed.

I have also received three switches from EPA which were completely burned. These switches are in various stages of analysis, but so far do not appear to be different from the completely burned switches we analyzed previously.

The brake fluids in the Memphis switch and all the leakers (including those from the OASIS) contain oxalates. The brake fluid from the car you have out at MPG does not. The guys from SRL suggested that we analyze brake fluids from old vehicles for oxalates and other contaminants, as well as measure conductivity. So far, we have received no brake fluid samples for this.

This is what we have so far: We have found several conditions which may have contributed to a fire, but have not been able to link any of them to a definite cause. I don't think that additional testing on switches is going to be beneficial. I would like to complete the testing that is in progress and wrap this up. Let me know how you want us to proceed.

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3713 1626

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NUMBERING ERROR

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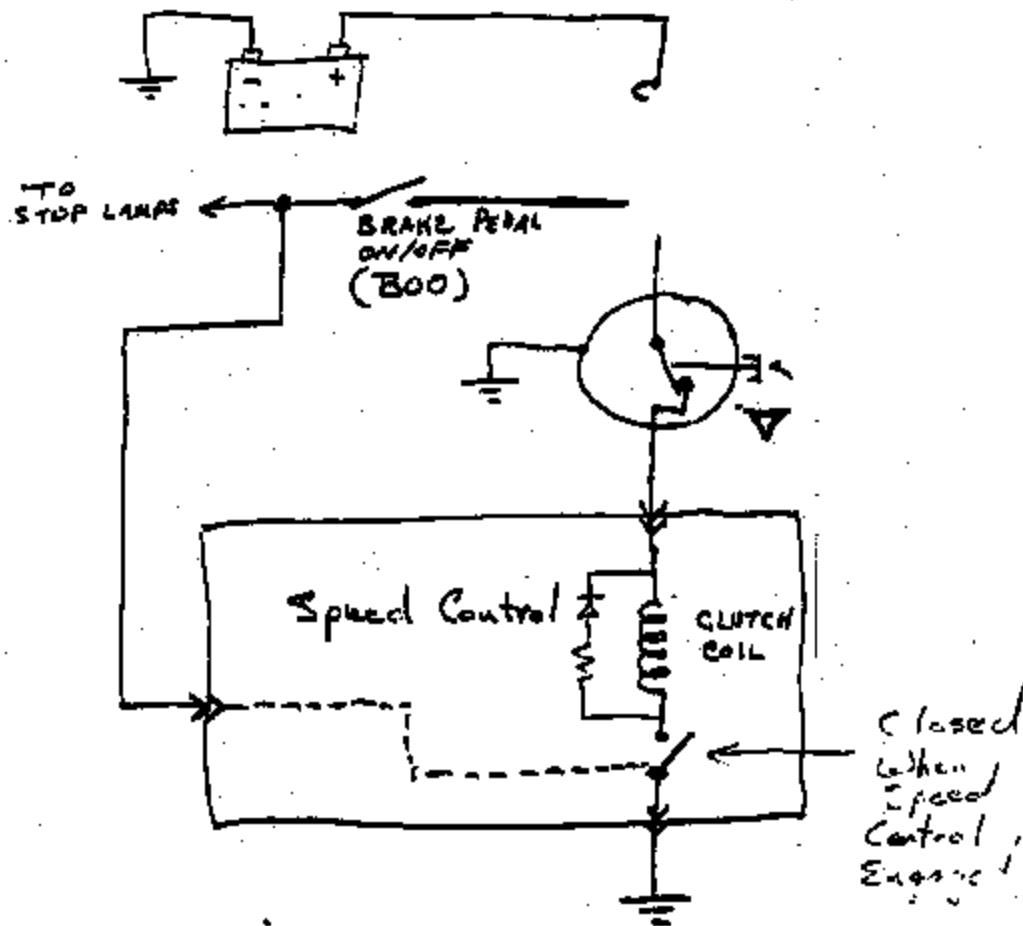
- A - Dogs, Schem., Harness, Process, Weibull  
FMEA
  - B - Switch Usage
  - C - Work Plan
  - D - ~~Poisson's~~ Gaussian Theory
  - E - Meeting Notes
  - F - Testing Materials  
- Test Vehicle Process  
- Test Vehicle Pressure
  - G - DATA - Survey Log  
- COL analysis
  - H - WARRANTY PARBING
  - I - NGSC AREA
  - J - 93 SCADS + DCT + CLAIMS PLOTS
  - K - DUPONT
  - L - Test Vehicle INFO
  - M - Potential Fixes
  - M<sub>c</sub> - MATERIALS
  - N - Tanti-Tunes ABS Pressure Data
  - O - Fishbone
  - P - QUESTIONNAIRE } OASIS
  - Q - SIT
  - R - ODI (FAX)
  - S - PILOT RELAY
  - T - ABS ~~+~~ PEDAL POSITION SIGNAL
  - U - DECISION MATRIX
  - V - Service Recall Bulletin
- Z  
Y  
W Reddick Report
- 3713 1829

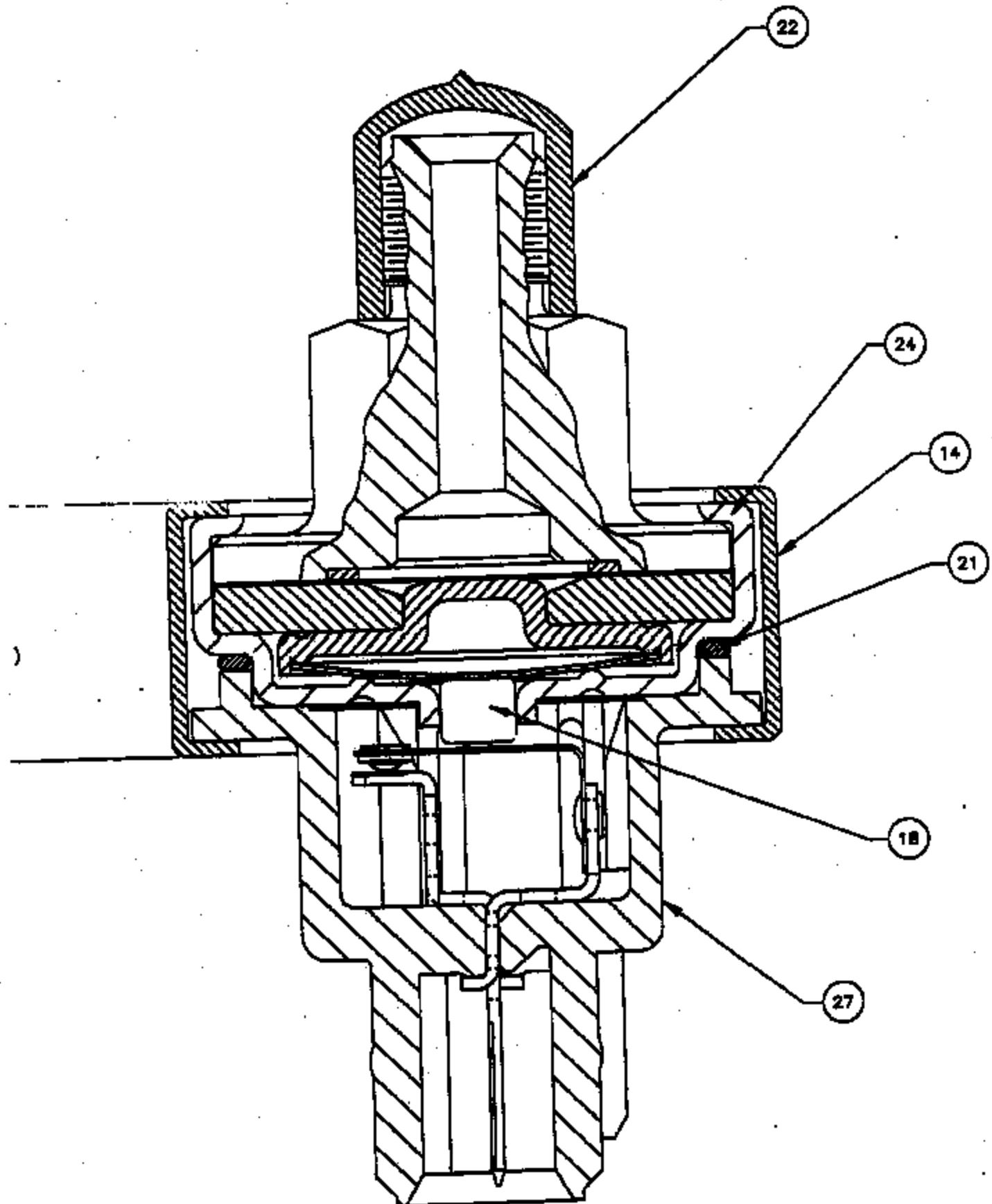
A

3713 1630

## Brake Pressure Switch Function-

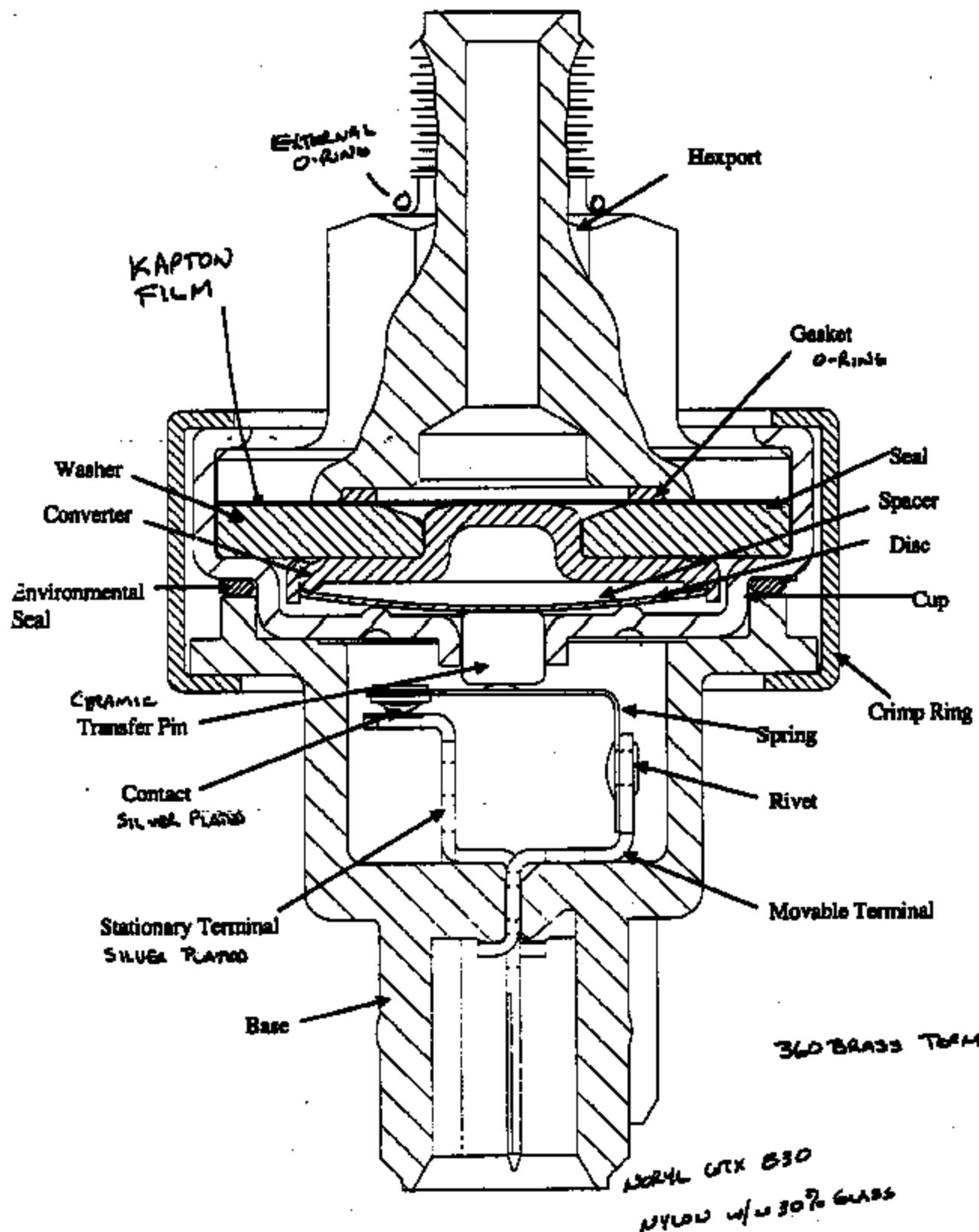
- Provide power to Speed Control Clutch circuit.  
Clutch engages servo-motor to pull throttle cable.
- Provide redundant sensing of brake application independent of the primary system deactivation mode by disconnecting power to clutch circuit causing servo-motor to release throttle cable.
  - Under Hard Braking only
  - Stop lamp signal is primary (normal braking)





3713 1632

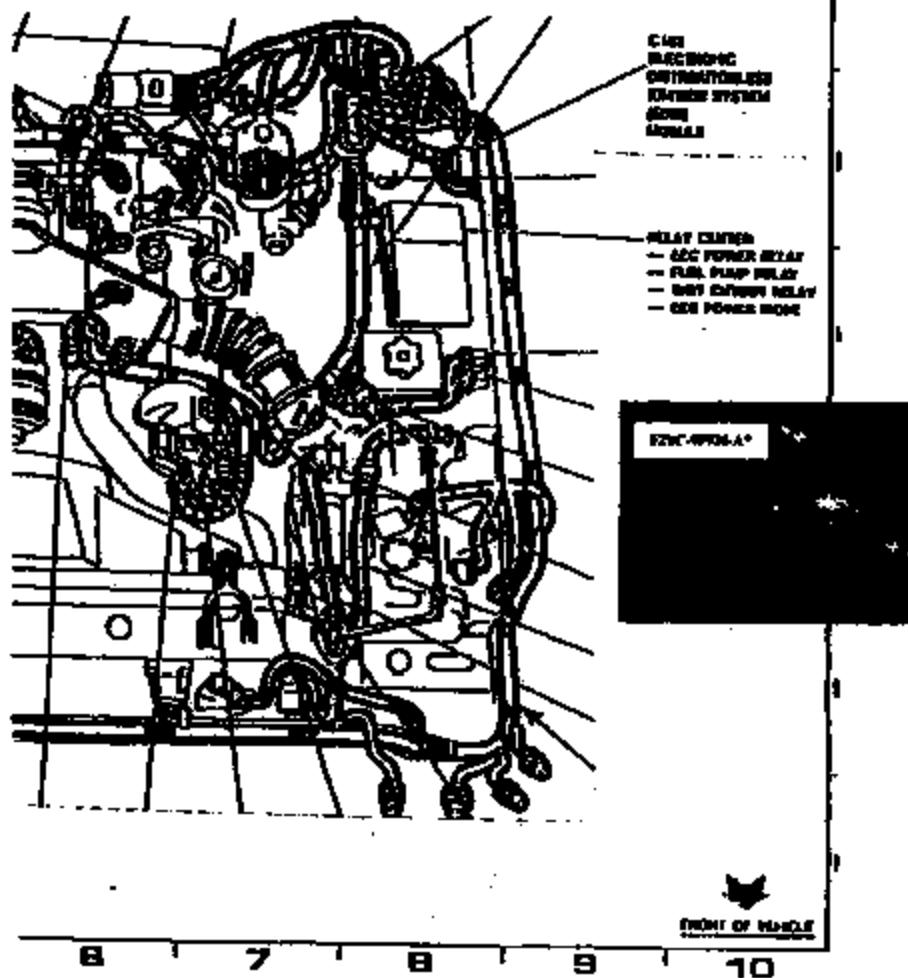
### Hydraulic Pressure Switch Cross Section



3713 1633

**PE98-055 1992-1993 Lincoln Town Car**

Vol. 1, pg. 28



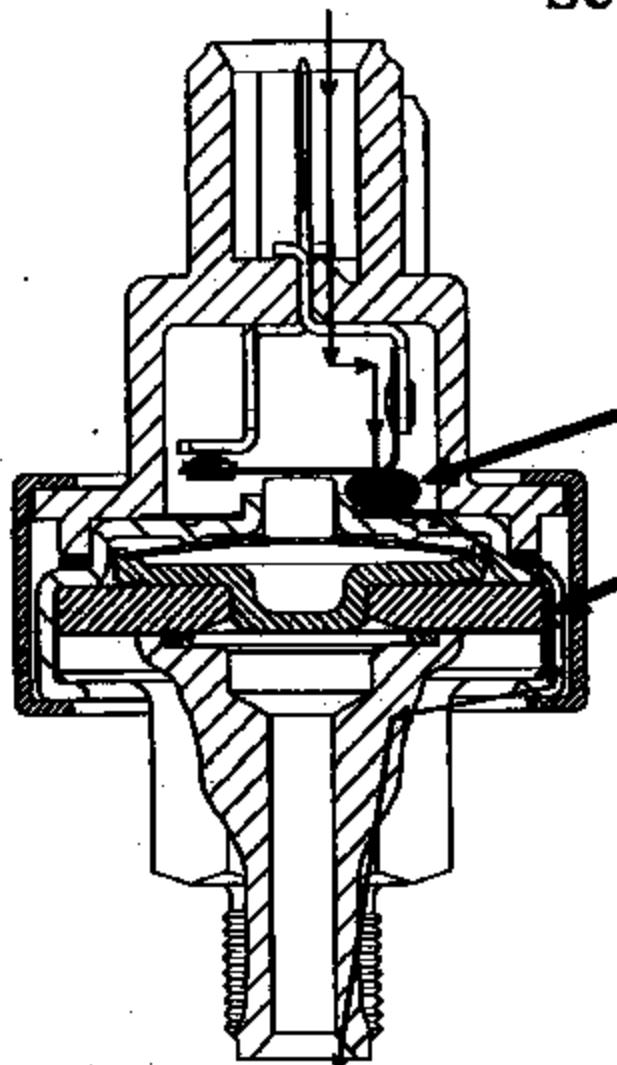
3713-1624



**Components**

1. Signal control desactivation switch E2MC-9F324-A
2. Electronic Distribution Ignition System (EDIS) module
3. Relay center
  - a. EGR power relay
  - b. Fuel pump relay
  - c. WOT cutback relay
  - d. EGR power diode
4. Wiring assembly (2A38)

## Scenario

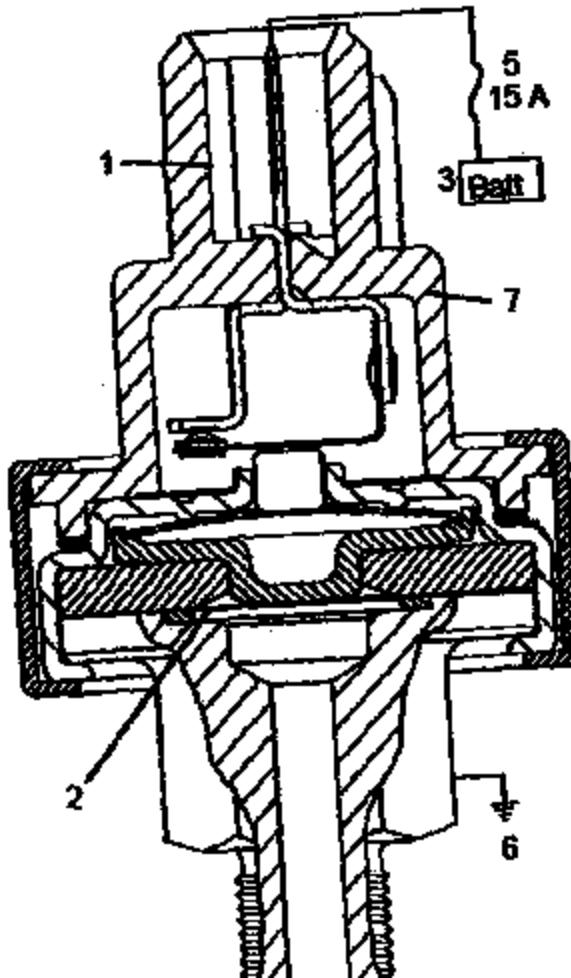


1. Contamination enters switch cavity through perforated kapton seal or connector seal.
2. Switch components and cup corrode with aid of electric field and contamination.
3. Current path forms between battery and ground.
4. Current increases as material builds until heat is generated to melt plastic.
5. When plastic melts enough to open the switch cavity to external air, the plastic ignites consuming the switch housing and connector.

## **TI Test**

- 1. 5% salt water injected into switch cavity.**
- 2. 12 volts applied across switch contacts until salt water boils off. (Draws 10 amps. This is not a normal condition.)**
- 3. Repeat steps 1 and 2 two more times.**
- 4. After third time, switch spring generates enough heat to melt and ignite switch housing.**

# Contributing Factors



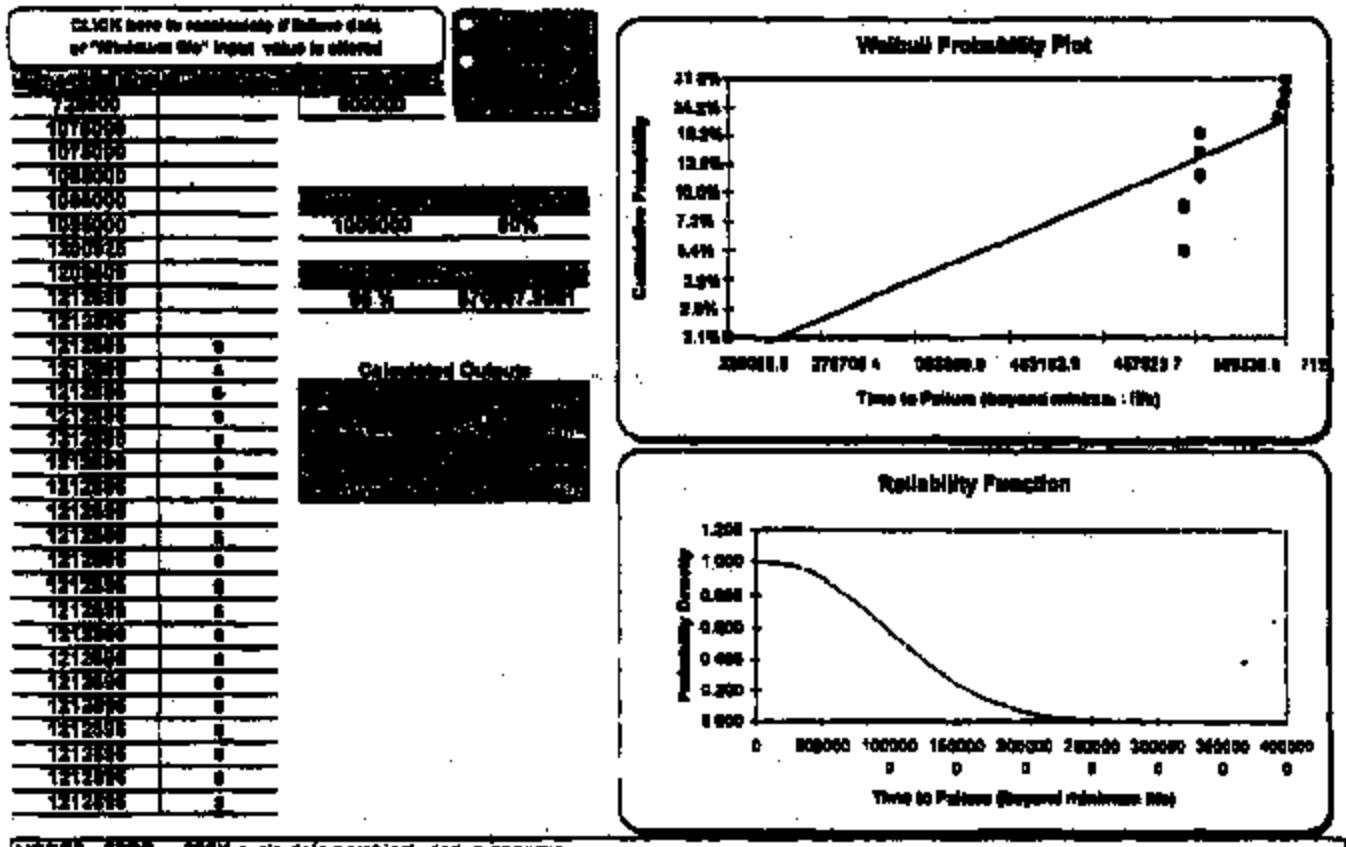
1. Connector Seal
2. Kapton Life
3. Continuous Power
4. Switch Orientation
5. Current Capability
6. Grounded Hex-Port
7. Plastic Parameters

# Potential Actions

	Improve connector seal	Re-orient connector	Re-locate switch to brake pedal	Improve kevlar diaphragm	Insert in-line fuse with switch	Add power off switch	Re-locate switch to ground side	Re-locate switch to RUN circuit	Insulate switch from prop valve	Use flame retardant plastic
Connector Seal	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>							
Kevlar Lite			<input checked="" type="checkbox"/>	<input type="checkbox"/>						
Continuous Power					<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Switch Orientation		<input type="checkbox"/>	<input checked="" type="checkbox"/>						<input type="checkbox"/>	
Current Capability					<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Grounded Hex-port			<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Plastic Personnel										<input type="checkbox"/>

= fixed  
 = improved

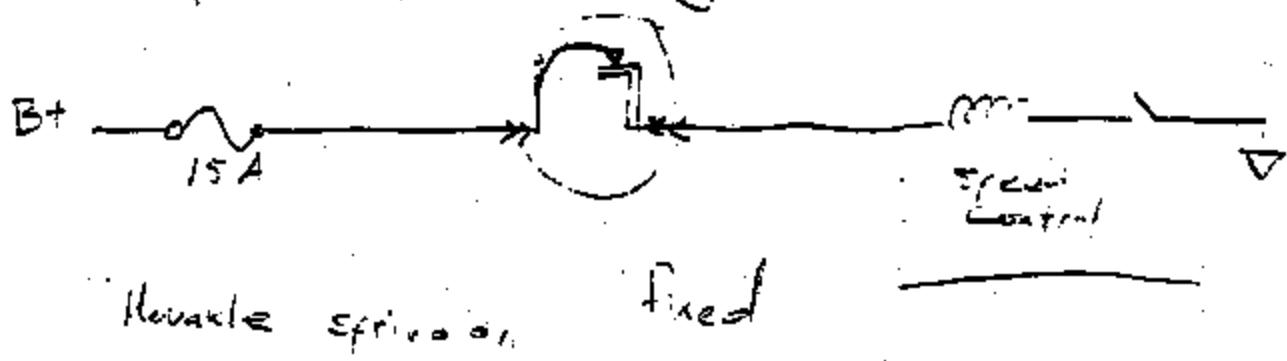
## 2 and 3 parameter WEIBULL FAILURE ANALYSIS



2/16/77

Electrical Config.

per Harness dwg F2VB-12A581-AK



3713 1640

12

13

HOT-ALL-TIME (F)  
15 AMP FUSE

ES-042B-14A099-A4  
95 MM LONG

MOVABLE  
CONTACT

TO  
BRAKE  
PRESSURE  
SWITCH

D

101101  
6361101



STATIONARY  
CONTACT

F2AB-14A164-ADA  
E9EB-14A468-0A

To SPEED CONTROL SWITCH.

SERIAL NO.

130

F23B-14A624-EA

F2AB-14A468-0A

16  
7C078

— FS-F101

CIRCUIT NUMBER	COLOR	WIRE SIZE	CAT #	CIRCUIT LENGTH	CONN		LOC		TERM	
					FROM	TO	CONN	LOC	TERM	
270	OG-N	18	AB	780	17	C 22	32	25	C 18	35
368	T-LB	20	AB	928	12	C 22	32	8	C 2	40
967	LB-R	20	AB	928	12	C 22	32	8	C 2	40
328A	PX	20	AB	290	6	D 14	50	3	C 16	40
528	PX	20	AB	145	12	C 22	32	3	C 16	40
928A	LB-S	20	AB	775	16	A 3	41	17	A 3	40
926	LB-S	20	AB	330	17	A 3	40	12	C 22	52
925	W-Y	18	AB	280	12	C 22	32	25	C 18	35
924	BR-B	18	AB	280	12	C 22	32	25	C 18	35
923	G-OF	18	AB	280	12	C 22	32	25	C 18	35
915A	PX-LB	20	AB	1 340	16	A 3	39	27	D 16	35
915	PX-LB	20	AB	105	16	A 3	39	12	C 22	52
914A	T-S	20	AB	1 340	27	D 19	35	16	A 3	39
914	T-S	20	AB	805	16	A 3	39	12	C 22	52
785	OG	18	AB	325	84	C 18	--	29	D 16	35
787	PX-BK	14	AB	300	17	A 3	45	25	R 14	38
749	GY	18	AB	810	1	C 2	54	12	C 22	52
687	GY-Y	18	AB	765	20	D 19	35	27	D 16	35
6758	GY-BK	20	AB	340	12	C 22	32	\$10	D 20	--
6754	GY-BK	20	AB	315	811	D 20	--	27	D 16	35
678	GY-BK	18	AB	820	810	D 20	--	25	C 18	35
678C	PX-S	18	AB	445	23	C 18	35	63	A 20	--
6768	PX-S	20	AB	620	27	D 19	35	63	A 20	--
6766	PX-S	20	AB	310	63	A 20	--	17	C 22	52
676	PX-S	20	AB	345	63	A 20	--	25	M 18	35
6904	PX-LB	20	AB	1 340	16	A 3	39	27	D 16	35
690	PX-LB	20	AB	805	12	C 22	32	16	A 3	39
636	W	18	AB	800	18	D 19	34	27	D 16	35
5708	BK-W	14	AB	110	12	C 22	35	66	C 18	--
570E	BK-W	14	AB	310	66	C 18	--	12	C 22	52
570B	BK-W	14	AB	420	20	D 19	30	66	C 18	--
570A	BK-W	18	AB	810	80	C 18	--	8	C 2	40
570	BK-W	14	AB	220	80	C 18	--	17	A 8	45
582	LB	20	AB	235	20	D 19	35	12	C 22	52
361	T-R	20	AB	235	12	C 22	32	25	D 16	35
360	LB-S	20	AB	235	11	D 19	35	12	C 22	52
539	T-BK	20	AB	235	12	C 22	32	25	D 16	35
538	BR-LB	20	AB	235	20	D 19	35	12	C 22	52
557	BR-Y	20	AB	235	20	D 19	35	12	C 22	52
556	W	20	AB	235	20	D 19	35	12	C 22	52
533	T	18	AB	235	20	D 19	35	12	C 22	52
534A	Y-BK	16	AB	920	12	C 22	38	17	R 8	47
534	Y-BK	14	AB	300	17	A 3	47	25	A 14	38
546	BB-Y	16	AB	100	17	A 3	45	17	A 8	45
521	LB	18	AB	495	27	D 19	35	12	C 22	52
269	GY-B	18	AB	325	12	C 22	32	6	D 14	30
361H	R	18	AB	230	85	C 14	--	25	C 18	35
361G	R	18	AB	30	85	C 14	--	12	C 22	52
361F	R	18	AB	30	85	C 14	--	12	C 22	52
361E	R	18	AB	175	6	D 14	51	65	C 24	--

124581-AZ

10159336

F2VB-12A5

CIRCUIT NUMBER	COLOR	WIRE SIZE	WT.	CIRCUIT LENGTH	SPRN	LNG	10X80	SPRN	LNG	TERN	
361A	R	18	.09	350	55	C 19	--	28	C 19	38	
361C	G	14	.08	290	17	R 8	45	35	C 14	--	
361D	R	14	.08	280	17	R 9	45	35	C 14	--	
361E	R	14	.08	370	8	C 2	45	35	C 14	--	
361F	R	16	.09	310	83	C 24	--	17	R 8	45	
360	BR-PK	20	.06	245	20	R 28	35	12	C 22	37	
359L	BY-E	18	.09	225	14	C 24	--	20	C 18	35	
359C	BY-E	16	.08	725	34	C 18	--	17	C 2	34	
359C	BY-E	19	.09	950	34	R 15	35	--	16	R 8	41
360B	BY-E	18	.08	270	9	C 18	40	34	C 18	--	
359L	BY-E	19	.09	315	84	C 18	--	20	R 18	35	
359L	BY-E	18	.08	75	14	C 11	--	12	C 22	32	
359L	BY-E	20	.08	255	29	R 30	35	39	C 28	37	
354	LY-B	20	.05	295	12	C 22	37	16	R 30	35	
352	RE-15	20	.07	215	20	R 30	35	12	C 22	32	
351	RE-H	16	.09	235	25	R 31	35	12	C 22	32	
350	BY	20	.09	925	29	R 30	35	6	R 14	30	
341	BY	20	.08	915	6	R 24	30	39	R 18	35	
341	P	18	.08	635	17	C 27	32	22	R 10	15	
347	RE-T	18	.09	620	10	R 16	35	17	R 8	46	
341	RE-T	20	.08	310	12	C 22	32	17	R 8	46	
313	P-C	18	.09	210	12	C 22	32	25	C 19	35	
352	RE-H	20	.08	235	12	C 22	32	21	R 18	35	
350	RE-H	20	.08	235	12	C 22	32	21	R 18	35	
350	BY-C	18	.08	225	12	C 22	32	1	C 24	35	
342	BY	20	.08	205	3	C 18	46	32	C 22	37	
351A	RE-Y	14	.08	305	17	R 8	47	27	R 18	35	
351	RE-Y	18	.09	310	17	C 27	31	17	R 8	47	
351	RE-Y	18	.08	205	12	C 22	32	23	C 27	31	
351	R-F	20	.08	615	12	C 22	32	19	R 8	42	
353	RE-LH	20	.08	455	27	R 10	35	17	C 22	31	
353	LY-Y	18	.09	260	23	R 28	35	17	C 22	31	
353	RE-S	18	.08	785	27	R 10	35	17	R 8	41	
351	BY-T	20	.08	755	20	R 18	35	17	C 22	37	
351	Y-LH	18	.08	555	6	R 14	35	29	R 18	35	
351	Y-LH	18	.08	575	6	R 14	35	19	R 18	35	
351	Y-LH	18	.08	595	6	R 14	35	19	R 18	35	
351	T-H	18	.09	355	20	R 18	35	8	R 18	35	
351	P-H	20	.08	235	12	C 22	32	20	R 18	35	
70	BY-LH	20	.08	235	12	C 22	32	20	R 18	35	
50	RE-LH	18	.08	555	6	R 14	35	29	R 18	35	
51	Y-LH	18	.08	575	6	R 14	35	19	R 18	35	
51	Y-LH	18	.08	595	6	R 14	35	19	R 18	35	
351	Y	18	.08	20	32	R 18	35	32	R 18	--	
351	RE	18	.09	15	35	R 18	35	19	R 18	--	
351C	RE	18	.08	345	16	C 16	--	23	C 28	35	
351D	RE	18	.08	210	16	C 16	--	9	R 18	34	
351D	RE	20	.08	415	--	R 18	34	32	C 22	35	
351	RE	18	.08	515	19	R 18	35	60	C 14	--	
410	RE	18	.08	235	65	C 16	--	40	C 14	--	
400		18	.08	435	27	R 20	--	30	R 14	--	
351		18	.08	500	60	C 24	--	53	R 14	--	
351	P-H	20	.08	205	27	R 18	35	20	R 18	35	
311	P-H	20	.08	205	20	R 18	35	27	R 18	35	
351	Y-LH	18	.08	430	17	R 8	48	38	C 21	--	
351	Y-LH	18	.08	435	19	C 21	--	37	R 18	35	
351	Y-LH	18	.08	435	19	C 21	--	37	R 18	35	
351	Y-LH	18	.08	435	19	C 21	--	30	R 18	35	
311	Y-LH	18	.08	435	19	C 21	--	30	R 18	35	
311	I-T	20	.08	215	6	R 24	58	12	C 27	58	
410	I-H	18	.08	895	27	R 20	58	19	R 12	46	

CIRCUIT NUMBER
----------------

FRAME 3 OF 11

F2VB-12A581-AK

A1 WIRE SHALL BE IN ACCORDANCE WITH  
APPLICABLE SPECIFICATION

WIRE SPECIFICATION

LETTER

MARK:

D

~~06SB-14A390-BA~~ (AB)      06SB-14A390-BA (AG)

Wire Spec.

A2 ASSEMBLY SHALL BE IN ACCORDANCE WITH  
SPECIFICATION ES-COAF-14A121-A.

A31 ASSEMBLY SHALL BE IN ACCORDANCE WITH  
SPECIFICATION ES-FOTB-1274-AA

A17 ASSEMBLY MUST BE PLAINLY MARKED WITH  
IDENTIFICATION TAPE TAG PER FORD  
SPECIFICATION E - [REDACTED]

# Engineering Specification

PART NAME SERVO AMPLIFIER - ARMED CONTROL DEACTIVATOR				PART NUMBER ▽ 28-P270-27924-AA	
LIT					
PR					
LIT					
PR					
DATE	LIT	PR	REVISIONS	OR	OK
			AMENDED DATA 10/24/87/88		
			SPYR 6 20/1/87/88		
1677.02			NC02A10072779G02		
				APPROVED BY	
				W. J. Price Jr.	10-03-10
				DEPARTMENT	DESIGN
				CONTRACTUAL/OPERATIONAL SPECIFICATIONS	
				MANUFACTURING SPECIFICATIONS	
				TESTING SPECIFICATIONS	
				PACKAGING SPECIFICATIONS	
				QUALITY ASSURANCE	
				C&R	
				MANUFACTURING DIVISION	
				NC02A10072779G02	
<b>▼ CONTROL ITEM - SEE ▽ 28-P270-27924-AA</b>					
DRAWINGS, PROCESS, AND NOTES, CRITICAL DIMENSIONS, AND ADDITIONAL CHECK CHECKS DETAILED IN ▽ 28-P270-27924-AA APPLICABLE TO THIS ITEM ARE REQUIRED FOR PRODUCTION APPROVAL					
FRAME 1 OF 18 REV		▽ 28-P270-27924-AA			

TPD 3947-81 PREVIOUS EDITIONS MAY NOT BE USED

3713 1645

## Engineering Specification

### REVISED APPROVAL - SPEED CONTROL SWITCHES

#### I. General

This specification covers the test requirements for the speed control switch - 97924 - used in the electronic speed control system. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum test data necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

QI suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by QI.

#### II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

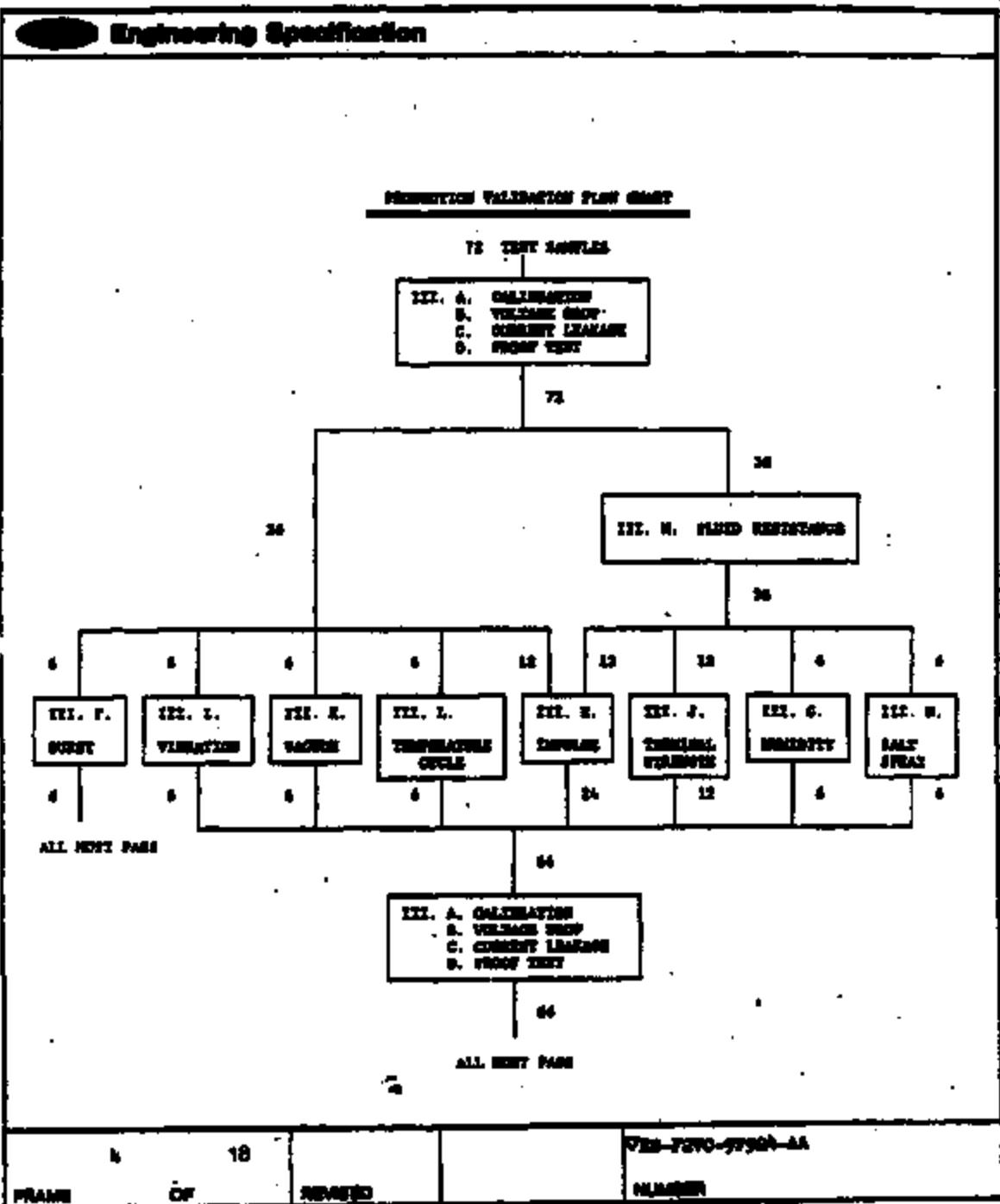
- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before IAE approval and authorization for shipment of production parts can be effected. Parts must be revalidatied completely, or per Section V whenever any change is made which could possibly affect part function or performance.
- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.
- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the revision plan specified in Ford Q101 Sect. J.3, "Engineering Specification (ES) Test Performance Requirements" shall be invoked.

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TESTS		SECTION III. TESTS OF THIS						Engineering Specification	
		TESTS		TESTS		TESTS		TESTS	
TEST	TEST	Statistical	Statistical	Statistical	Statistical	Statistical	Statistical	Test	Acceptance
Name	Date Name Prepared Date	Minimum Sample Size	Acceptance Criteria	Minimum Sample Size	Acceptance Criteria	Minimum Sample Size	Acceptance Criteria	Test	Acceptance Criteria
III.									
	▽ A Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass	All Must Pass	
	▀ Voltage Drop	72	P90-.96	12/lot	P90-.96	4/lot	✓	✓	✓
	□ Current Leakage	72	P90-.96	3/lot	P90-.96	4/lot	✓	✓	✓
	■ Proof Test	72	P90-.96	12/lot	P90-.96	4/lot	✓	✓	✓
	F Burnt	4	P90-.72	3/lot	P90-.72	4/lot	✓	✓	✓
	I Vibration	6	P90-.72	3/lot	P90-.72	6/6 lot	P90-.72		
	J Terminal Strength	12	P90-.96	6/lot	P90-.72	4/lot	All Must Pass		
	K Vacuums	6	P90-.72	3/lot	P90-.72	4/6 lot	P90-.72		
	L Temperature Cycle	6	P90-.72	3/lot	P90-.72	6/6 lot	P90-.72		
	M Fluid Resistance	24	P90-.96	36/120%	P90-.96	36/180%	P90-.96		
	<u>Reliability Tests</u>								
III.									
	▀ Impulse	24	P90-.96	12/lot	P90-.96	3/3 lot	P90-.96		
	□ Humidity	6	P90-.72	3/lot	P90-.72	6/6 lot	P90-.72		
	■ Salt Spray	6	P90-.72	3/lot	P90-.72	6/6 lot	P90-.72		

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TM PD 3047-62 Previous editions may still be used.

3713 1648

## Engineering Specification

### III. TEST PROCEDURE AND REQUIREMENTS

#### ▽ a. Calibration

##### 1. Test Requirements

- a. Switch calibration is to be checked at room temperature ( $25^{\circ}\text{C}$ - $35^{\circ}\text{C}$ ) using ambient air or equivalent.
- b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting  $750 \pm 50$  millamps while  $13.0 \pm 1.0$  volts D.C. is applied. The cut-in point is to be checked with increasing pressure.
- c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

##### 2. Acceptance Requirements

- a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

#### 3. Voltage Drop

##### 1. Test Requirements

- a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent from 0 to  $10,000 \pm 172$  KPa ( $1450 \pm 25$  PSI) while conducting  $750 \pm 50$  millamps and  $13.0 \pm 1.0$  volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interface at terminals to be less than 10 millivolts.

##### 2. Acceptance Requirements

- a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

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# Engineering Specification

## II. TEST PROCEDURES AND REQUIREMENTS (cont'd)

### C. Current Leakage

#### 1. Test Requirements

- a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.
- b. Current leakage is to be checked:
  - (1) Between the switch leads with the contacts open.
  - (2) Between the lead and the switch housing with contacts closed.
  - (3) Between either lead and switch housing with the contacts open.

#### 2. Acceptance Requirements

- a. Nonconformance is defined as any leakage current in excess of one hundred (100) microamperes.

### D. Proof Test

#### 1. Test Requirements

- a. Subject sample switches to Section A to establish their initial switching pressures.
- b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 30 seconds.
- c. Recheck the switches to Section A.

#### 2. Acceptance Requirements

- a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 430 KPa.(62 PSI) is permitted.
- b. A change in cut-in and cut-out pressures greater than  $\pm 5\%$  from the initial value is not permitted.
- c. The test samples must be destroyed after testing.

## II. TEST PROCEDURES AND REQUIREMENTS (cont'd)

### Impulse

#### 1. Test Requirements

- a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 MPa (0-40 psi) and (high) 10,000  $\pm$  345 MPa (1450  $\pm$  50 psi).
  - 1) 0 - 475,000 cycles: 13  $\pm$  1 volts, trace current to monitor function.
  - 2) 475,001 - 500,000 cycles: 13  $\pm$  1 volts D.C., 750  $\pm$  50 ms., per figure 4.
- b. Brake fluid temperature to be 135  $\pm$  14°C and ambient temperature to be 107°C min.
- c. Cycle rate is to be 110-130 cycles per minute.
- d. Switch must open and close each cycle.

#### 2. Acceptance Requirements

- a. After impulse test check to sections A, B, C, & D using the procedure established in each section.
- b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.
- c. Samples used for this test must be destroyed after all testing is completed.

### Burst

#### 1. Test Requirements

- a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.
- b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

#### 2. Acceptance Requirements

- a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

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## Engineering Specification

III. Environmental Test Requirements (cont'd)

### G. Humidity

#### 1. Test Requirements

- a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.
- b. Subject the switch to ten (10) continuous humidity cycles as follows:
  - (1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.
  - (2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.
  - (3) Lower temperature to 23 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

#### 2. Acceptance Requirements

- a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.
- b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

### H. Salt Spray

#### 1. Test Requirements

- a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.
- b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

#### 2. Acceptance Requirements

- a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.
- b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

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## Engineering Specification

### II. TEST PROCEDURES AND REQUIREMENTS (cont'd)

#### 1. Vibration

##### 1. Test Requirements

- a. Mount the switch in the test port and attach the currently released rating electrical connector before start of test.
- b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.
- c. Internal pressure shall be maintained at 0 KPa G. when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.
- d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.
- e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

##### 2. Acceptance Requirements

- a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.
- b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

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## **Engineering Specification**

**III. TEST REQUIREMENTS AND METHODS (cont'd)**

### **J. Terminal Strength**

#### **1. Test Requirements**

- a. Mount the switch in the test port.
  - (1) Apply a  $89 \pm 9$  N axial force to each terminal.
  - (2) With a pendulum apply a  $43 \pm 5$  N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 2 for force application point and direction.

#### **2. Acceptance Requirements**

- a. Check the switch to sections A, B, C, and D using the procedures established in each section.
- b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

### **K. Vacuum**

#### **1. Test Requirements**

- a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.
- b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-6 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

#### **2. Acceptance Requirements**

- a. Check the switch to sections A, B, C, and D using the procedures established in each section.
- b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

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## Engineering Specification

### III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

#### L. Temperature Cycle

##### 1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000  $\pm$  345 KPa.G (1450  $\pm$  50 PSI).  
Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

##### 2. Acceptance Requirements

a. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

#### M. Fluid Resistance

##### 1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23  $\pm$  2 °C, for 3  $\pm$  1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

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# Engineering Specification

## III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

<u>Fluid</u>	<u>Brain Time</u>	<u>Storage Time</u>
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (same) ESS-M2C136-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C. ASTM D471 with Methyl Alcohol 45/15 by Volume	24 ± 1 hour	none

d. For the Flow Chart, subject the prescribed number of immersed switches to the post immersion tests specified below:

- III. E. Impulse
- III. G. Humidity
- III. H. Salt Spray
- III. J. Terminal Strength

### Acceptance Requirements

- a. Switches must fully meet the requirements of the specified post immersion test.
- b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

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## IV. STATISTICAL ANALYSIS METHOD

- A. For PV, IP-1 and IP-2 tests, all samples tested must pass. Having all the required sample size pass will provide data to support the conclusion that the switch has a minimum reliability R, at a given confidence of C. The notation Pe-R is interpreted as minimum reliability equal to R, at a confidence C; thus P90-.80 means a minimum reliability of 80% at 90% confidence.
- B. All samples must pass is the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

## V. REVALIDATION REQUIREMENTS

- A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

### MINIMUM CHANGE REVALIDATION

<u>Component</u>	<u>Process or Material Change or New Supplier</u>
1. Terminals, Contacts, or Connector	III, B, C, E, G, H,I, J, L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A,D,E,F,I,K,L
4. Fitting or Fluid Connection	III, D, E, F, H, I, K,
5. Annual revalidation is not required on carryover switches.	

## VI. LOT DIVISION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

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# Engineering Specification

## VII. RECORD RETENTION

- A. Recording and record retention shall conform with Ford Q-101.
- B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.
- C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

## VIII. INSTRUCTIONS AND NOTES

All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 3.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III, B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III, G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

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# Engineering Specification

## IX. COMPILED REFERENCES DOCUMENTS

ASTM B-117, Salt Spray Testing

Ford Q-101, Quality System Standard - 1990 Edition

ES-PQEB-14A464-AA, Specification - SLV Assy - Wire Connector

ES-F2VC-9C735-AA, Specification - Servo Assembly Speed Control

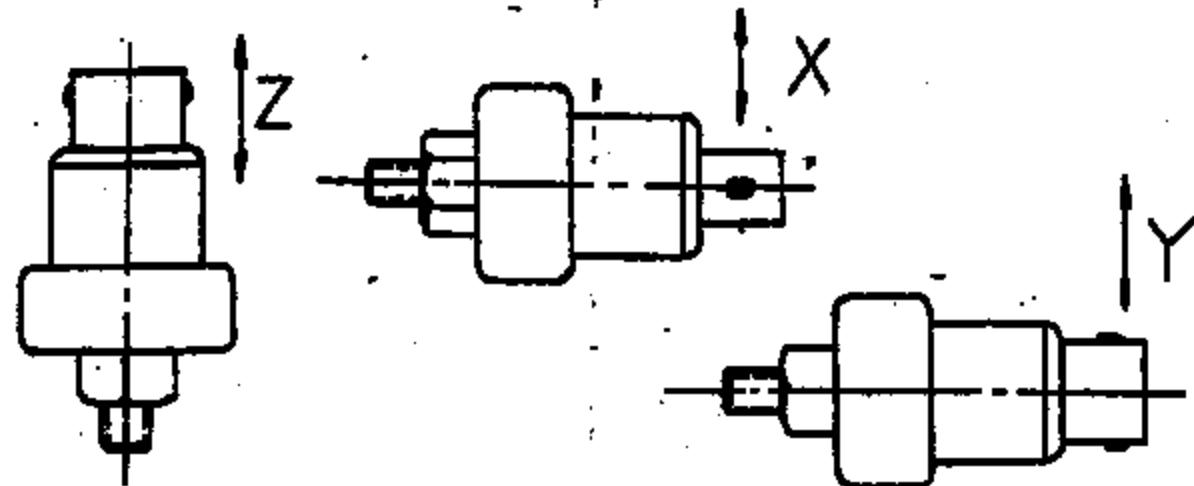
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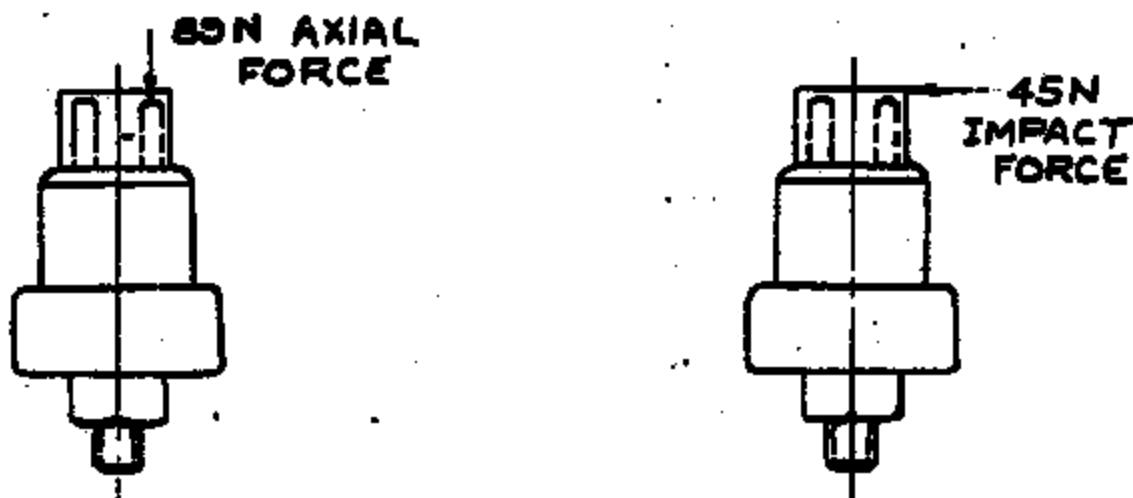
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**VIBRATION TEST - SWITCH ORIENTATION**

**FIGURE 1.**



**TERMINAL STRENGTH - LOAD ORIENTATION**

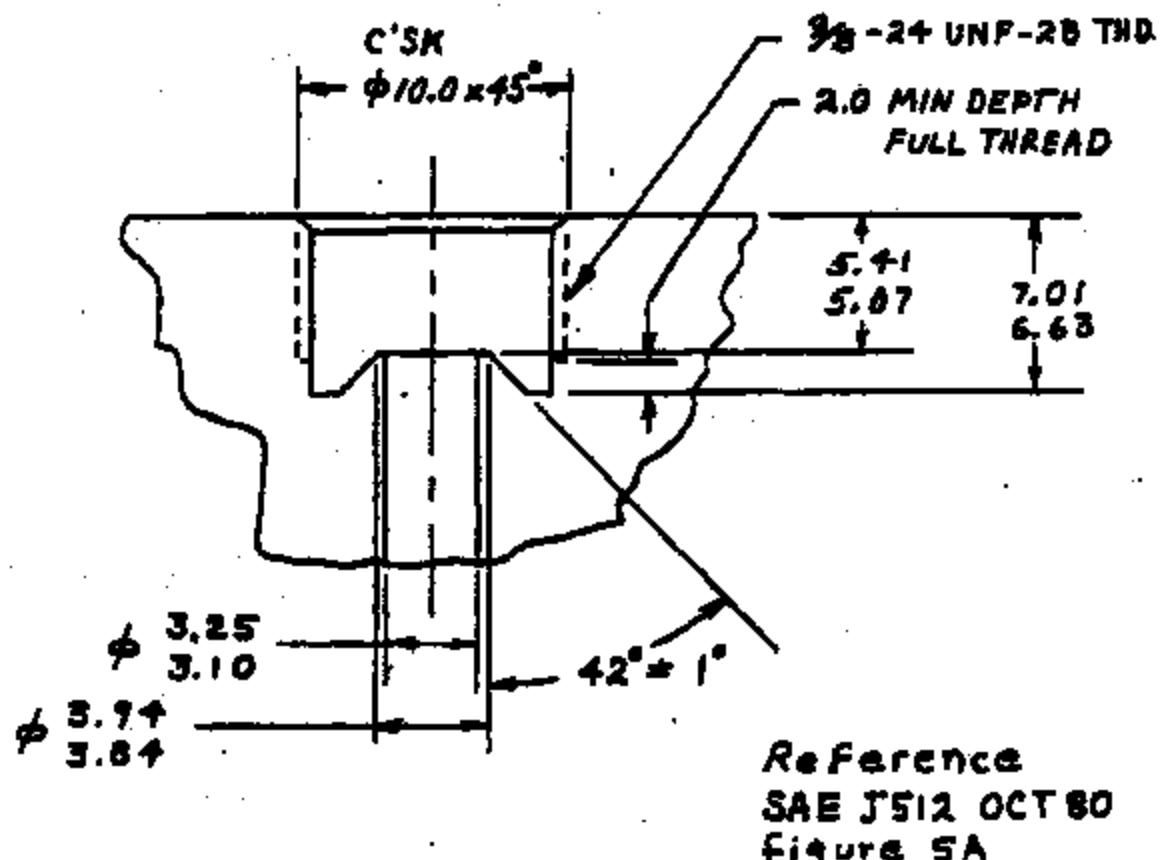
**FIGURE 2.**

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Engineering Specification



TEST FIXTURE PORT CONFIGURATION

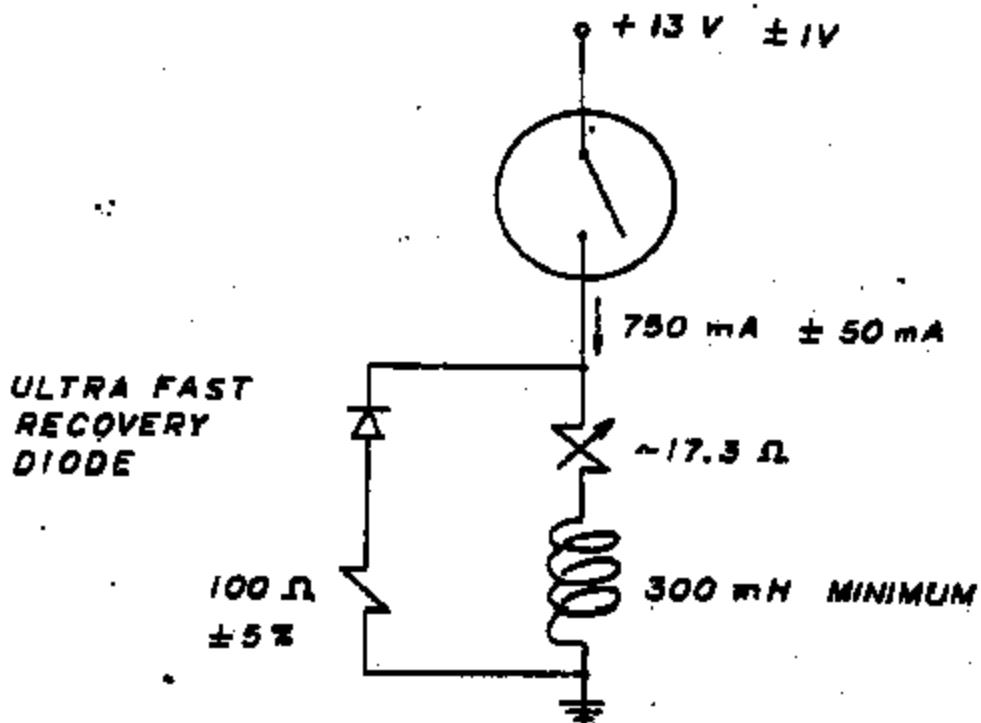
FIGURE 3

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Engineering Specification



DEACTIVATE SWITCH  
TEST SET UP

FIGURE 4

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