EA02-025

FORD 10/27/03

APPENDIX N

BOOK 31 OF 61

PART 4 OF 4

Ford **Facsimile Transmittal**

Date 14AUG00 No. of Pages 13 (Including this Transmittal)

To: MATT BRACH

From: FRED PORTER

Location EXPONENT Room

Location Room

FAX No. (248) 324-9199

FAX No. (313) 390-4145

Telephone No. (248) 324-9112

Telephone No. (313) 845-3722

Comments:

MATT PER MY PHONE MESSAGE, PLEASE REVIEW AND COMMENT ON THIS PROCEDURE

THANKS

FW

Ser Adm 1662

3713 9798

SCHIRRMEISTER AJAMIE
A REGISTERED LIMITED LIABILITY PARTNERSHIP
PENNZOIL PLACE - SOUTH TOWER
711 LOUISIANA, SUITE 2150
HOUSTON, TEXAS 77002
(713) 860-1600
FAX (713) 860-1699
www.schirr-aj.com

DAVID S. RYTHER
dryther@schirr-aj.com

015.12
015.13

August 10, 2000

BY FACSIMILE

Mr. Eric Mayer
Susman Godfrey, L.L.P.
1000 Louisiana, Suite 5100
Houston, Texas 77002

Mr. Jeff Manske
Brown McCarroll & Oaks Hartline, L.L.P.
111 Congress Avenue, Suite 1400
Austin, Texas 78701

Re: Cause No. 35650-S[redacted] v. *Ford Motor Company, et al.*; In the 329th Judicial District Court of Wharton County, Texas

Cause No. 9906441[redacted] v. *Ford Motor Company, et al.*; In the 68th Judicial District Court of Dallas County, Texas

Gentlemen:

Enclosed is a copy of the protocol submitted with the agreement of all defendants in the *Guerrero* case. I propose that we use this protocol as the basis of the protocol for the massive switch disassembly to take place at Exponent in Farmington Hills beginning on August 21, 2000. I am unclear as to whether there is any intent to x-ray these switches. If so, the enclosed protocol begins with an x-ray segment, followed by the disassembly segment.

In addition, I believe we need to add two steps to the disassembly segment, which were included in the actual disassembly protocol employed in our recent disassembly of the Knapp, Rauku and Payne switches:

(8a) To preserve the orientation of the Kapton diaphragm and of each layer within the Kapton diaphragm, mark the same successive corner of each layer of the Kapton diaphragm, using colored marking or paint pins, beginning with a yellow dot on the

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SCHIRRMEISTER AJAMIE L.L.P.

corner of the first Kapton layer next to the hex port side, followed by a pink/red dot on the same successive corner of the center layer closest to the hex port side, and ending with a green dot on the same successive corner of the third layer on the side closest to the hex port side;

(8b) Then with a razor blade, if possible, carefully separate the three layers of the Kapton diaphragm into its three separate layers. Lay each layer on a clean, dry photographic background and photograph each side of each layer. Then inspect each side of each layer through a binocular electronic microscope with digital imaging capability and record the images.

Please let me have your thoughts on this proposed as soon as possible as to whether we can agree to this format as the basic initial protocol. Should you have any questions, please do not hesitate to contact me at (713) 860-1600.

Sincerely,

Dana S. Speer

cc: Andrew Schirrmeister

CAUSE NO. DC-00-100

OSIEL GUERRERO	§	IN THE DISTRICT COURT
	§	
VS.	§	OF STARR COUNTY, TEXAS
	§	
M & T MOTORS, INC. and/or M & T MOTORS; FORD MOTOR COMPANY and UNITED TECHNOLOGIES AUTOMOTIVE, INC.	§	229th JUDICIAL DISTRICT

ORDER GRANTING FORD MOTOR COMPANY'S MOTION FOR FURTHER ORDER REGARDING INSPECTION OF EVIDENCE AND FOR RELIEF EXTENSION OF DEADLINE FOR EXPERTS' DEPOSITIONS IN ORDER TO CONDUCT SAME AFTER SUCH INSPECTION

CAME ON TO BE HEARD, Ford Motor Company's Motion for Further Order Regarding Inspection of Evidence and For Relief Extension of Deadline For Experts' Depositions In Order to Conduct Same After Such Inspection, and the Court, having read the Motion, finds that the Motion has merit as stated below and should be GRANTED;

IT IS, THEREFORE, ORDERED that within three days of this hearing, Plaintiffs' counsel shall provide at least three dates prior to trial on which the inspection of the component parts removed from vehicles in this case can take place at Plaintiffs' experts' facility, and dates on which Plaintiffs' experts will be available for depositions;

IT IS FURTHER ORDERED that within three days of being provided such dates, all parties shall promptly inform all other parties of their representatives' availability on those dates, and the inspection shall promptly be scheduled in writing for the first of those dates on which all of those representatives can be present;

IT IS FURTHER ORDERED that the inspections shall take place at Plaintiffs' experts' laboratory on the date scheduled and under the following conditions:

First, Plaintiffs' experts shall provide an x-ray machine to take x-rays of the parts using the following protocol:

(1) Work with X-Ray Technician to carefully remove damaged component from evidence packaging and place it on the X-Ray machine staging platform.

(2) Activate X-Ray machine and obtain initial image of component.

(3) Carefully reposition damaged component on the X-Ray machine's staging platform to achieve a view of the part which is rotated 90 degrees from its original position in the horizontal plane.

(4) Repeat Step (2), above, for this positioning of the damaged component.

(5) Carefully reposition damaged component on the X-Ray machine's staging platform to achieve a view of the part which is 90 degrees from its position in Step (3), above, in the vertical plane (i.e. set the part on its side).

(6) Repeat Step (2), above, for this positioning of the damaged component.

(7) Based on observations made up to this point, carefully reposition damaged component to other positions in order to obtain as complete and accurate rendering of the internal structures of the damaged component as possible.

(8) Repeat Step (2), above for all other positions viewed in Step (7), above.

(9) Carefully remove damaged component from the X-Ray machine staging platform and place it back in the evidence package.

(10) Confirm that x-rays as developed provide satisfactory image of internal components of part before any disassembly begins

IT IS FURTHER ORDERED that thereafter, Plaintiffs' experts conduct disassembly of the parts using the following protocol:

(1) Several steps will be taken before disassembling the switch. First, electrical resistance measurements will be taken from terminal to terminal and each terminal to the base pins. In addition, the base and pins fixing will be visually inspected for contamination. If there is any contamination present, samples will be taken and preserved for testing. At all points throughout the process described herein, samples will be taken of any observed contamination, to be preserved for later testing.

(2) Remove components from evidence packaging and use a lathe with parting tool or high speed grinder to carefully remove outer retaining ring material to a sufficient extent to allow the internal parts of the component to be removed.

(3) Remove switch body half of part with little or no disturbance of switch contact pieces.

(4) Remove coil.

(5) If it is agreed to by all parties, the pressure disc assembly can also be disassembled by the same procedure described in Section III-1 above. Separate and photograph pieces as described above.

(6) Separate outer retaining ring from lost part.

(7) Separate pressure disc assembly from test part.

(8) Separate Kapton seals from test part or pressure disc assembly (whichever pieces they are adhering to at this point).

(9) Place all pieces removed on a clean, dry photographic background space for the purpose of still photography. Try to locate all pieces in their original orientation.

(10) Perform any visual inspection required by any of the parties present. Binocular microscopes with photographic capabilities will be available.

(11) Closely package and identify each part with an evidence tag and return them to the original container of this evidence.

IT IS FURTHER SPECIFICALLY ORDERED that no disassembly may take place until and unless a readable x-ray image of the interior of each part has been obtained, or by stipulated agreement of the parties;

IT IS FURTHER ORDERED that an extension of the discovery period in this case will take place as to the depositions of the parties' experts, in order that they may take place after the inspections and when the experts are available.

SIGNED FOR ENTRY this _____ day of _____, 2000.

JUDGE PRESIDING

COMPREHENSIVE INSPECTION PROTOCOL USING X-RAY MACHINE
In the Matter of Guevara v. *Ford Motor Co.* (Part of LMMS 940-9943)

The following steps describe the equipment and procedures to collect internal structural information from damaged component parts removed from the vehicles in this matter in an attempt to verify the identity and condition of the fractured pieces of the components.

X-RAY TESTING PROCEDURE

1. Work with X-ray Technician to carefully remove damaged component from evidence packaging and place it on the X-ray machine staging platform.

2. Activate X-ray machine and obtain initial image of component.

3. Carefully reposition damaged component on the X-ray machine's staging platform to achieve a view of the part which is rotated 90° from its original position in the horizontal plane.

4. Repeat Step 2 above for this positioning of the damaged component.

5. Carefully reposition damaged component on the X-ray machine's staging platform to achieve a view of the part which is 90° from its position in Step 3 above in the vertical plane (i.e., set the part on its side).

6. Repeat Step 2 above for this positioning of the damaged component.

7. Based on observations made up to this point, carefully reposition damaged component to other positions in order to obtain as complete and accurate rendering of the internal structure of the damaged component as possible.

8. Repeat Step 2 above for all other positions required in Step 7 above.

9. Carefully remove damaged component from the X-ray machine staging platform and place it back in the evidence package.

10. Confirm that x-rays as developed provide satisfactory image of internal components of part before any disassembly begins.

DISASSEMBLY AND VISUAL INSPECTION PROCEDURE

After all X-ray inspection is complete, several steps will be taken before disassembling the switch. First, electrical resistance measurements should be taken from terminal to terminal and each terminal to the base post. In addition, the base and post fitting will be visually inspected for contamination. If there is any contamination present, samples will be taken and preserved for testing. At all points throughout the process described herein, samples will be taken of any observed contamination, to be preserved for later testing.

Next, the component parts can be disassembled using a procedure similar to the following or one determined agreeable to all parties present at the time of inspection:

1. Remove components from evidence packaging, secure the switch in a vise, and use a high speed grinder to carefully remove outer retaining ring material to a sufficient extent to allow the internal parts of the component to be removed. Two vertical slices across the outer crimp ring, 180° apart will allow the crimp ring to be removed.

2. Remove switch body half of part with little or no disturbance of switch contact pieces.

3. Remove seal.

4. If it is agreed to by all parties, the pressure disc assembly can also be disassembled by using a lathe. Separate and photograph pieces as described above.

5. Separate pressure disc assembly from base part.

6. Separate Kapton seals from base part or pressure disc assembly (whichever pieces they are adhering to at this point).

7. Place all pieces removed on a clean, dry photographic background space for the purpose of still photography. Try to locate all pieces in their original orientation.

8. Perform any visual inspection required by any of the parties present. Trinocular microscope with photographic capabilities will be available.

9. Clearly package and identify each part with an evidence tag and return them to the original container of the evidence.

[illegible]

The following steps describe the equipment and procedure to collect internal personal information from damaged component parts removed from the vehicles in this matter in an attempt to verify the identity and condition of the internal pieces of the components.

(1) [illegible]

Test indicates that x-rays are needed to document as well as possible the location of the point of time prior to disassembly of the removed parts, since in their fragile condition, disassembly may result in loss of evidence on the location of the evidence, no matter how carefully disassembly is attempted.

(2) [illegible]

(1) Work with X-Ray Technician to carefully remove damaged component from storage packaging and place it on the X-Ray machine viewing platform.

(2) Activate X-Ray machine and obtain initial image of component.

(3) Carefully reposition damaged component on the X-Ray machine's viewing platform to achieve a view of the part which is rotated 90 degrees from its original position in the horizontal plane.

(4) Repeat Step (2), above, for this positioning of the damaged component.

(5) Carefully reposition damaged component on the X-Ray machine's viewing platform to achieve a view of the part which is 90 degrees from the position in Step (3), above, in the vertical plane (i.e. tilt the part on its side).

(6) Repeat Step (2), above, for this positioning of the damaged component.

(7) Based on observations made up to this point, carefully reposition damaged component to other positions in order to obtain as complete and accurate evidence of the internal structure of the damaged component as possible.

(8) Repeat Step (2), above, for all other positions viewed in Step (7), above.

(9) Carefully remove damaged component from the X-Ray machine stage; platform and place it back in the evidence package.

(10) Confirm that x-rays as developed, provide satisfactory image of internal components of part before any disassembly begins

(XI) [illegible]

After all X-Ray inspection is complete, the component parts can be disassembled using a procedure similar to the following or one determined agreeable to all parties present at the time of inspection:

(1) Remove components from evidence packaging and use a lathe with parting tool or high speed grinder to carefully remove outer retaining ring material to a sufficient extent to allow the internal parts of the component to be removed.

(2) Remove switch body half of part with little or no disturbance of switch contact pieces.

(3) Remove seal.

(4) Separate outer retaining ring from base part.

(5) Separate pressure disc assembly from base part.

(6) Separate Kapton pads from base part or pressure disc assembly (whichever pieces they are adhering to at this point).

(7) Place all pieces removed on a clean, dry photographic background paper for the purpose of still photography. Try to locate all pieces in their original orientation.

(8) If it is agreed to by all parties, the pressure disc assembly can also be disassembled by the same procedure described in Section XI-1 above. Separate and photograph pieces as described above.

(9) Perform any visual inspection required by any of the parties, present. Microscopes will be available.

(10) Clearly package and identify each part with an evidence tag and return them to the original collection of this evidence.

3/14

CAUSE NO. C-4178-98-F

PAULINE G. GONZALEZ and JOSE NOE GONZALEZ, SR.	*	IN THE DISTRICT COURT
VS.	*	OF HIDALGO COUNTY, TEXAS
VAN BURKLEO MOTORS, INC.; FORD MOTOR COMPANY; and UNITED TECHNOLOGIES AUTOMOTIVE, INC.	*	332nd JUDICIAL DISTRICT

AGREED ORDER FOR PROTECTION AND FOR PRESERVATION OF EVIDENCE

COME NOW the Parties to this matter and have agreed as to the following conditions for protection and for preservation of evidence.

IT IS THEREFORE ORDERED: THE FOLLOWING PROVISIONS APPLY TO THIS VEHICLE AS OF TODAY'S DATE.

1.

The vehicle at issue in this lawsuit, a 1993 Lincoln Town Car, VIN #1LNLM81W3PY646376. ("the Ford vehicle") is currently located the warehouse owned by Plaintiffs' counsel Ramon Garcia at 3801 North Business 281, Edinburg, Texas. Each party agrees not to engage in any activities or to give consent for any activities which would result in the loss of any parts of the vehicle, specifically including but not limited any destructive inspections and/or testing, except as set out in the terms of this Agreed Order.

2.

All removed parts will remain at the warehouse location set out above absent written notice to all parties. No parts will be removed from the vehicle in a way that damages the vehicle's overall integrity (i.e., by cutting, tearing, etc.) without notice to all parties as stated in paragraph 4 below. ANY PART WHICH HAS BEEN REMOVED BY ANY PARTY SHALL BE MADE AVAILABLE AND PROTECTED AS AGREEABLE WITH THE TERMS OF THIS ORDER.

3.

If expert witnesses are retained by any party in the litigation, they shall be allowed reasonable access to any parts removed from the vehicle for non-destructive

inspections and testing upon reasonable notice. The parties shall agree as to the location/method of delivery to that location, and any other terms of the inspection and/or testing.

4.

If any party desires to perform any testing or destructive handling of any part of or of the overall vehicle, such testing or destructive handling will take place upon a reasonable date and time after sufficient time to allow the filing and hearing of any motions to postpone or modify the parameters for such activities. All other parties will be given notice of the date of the testing and/or destructive handling and will receive a reasonably timed invitation to have a representative present. At least seven (7) days prior to the activity, the party performing same will produce in writing a description of the activities to be performed, and the equipment to be used. The testing or destructive handling will take place at a place and time that will permit documentation by photographs and/or video recording. No party shall use audio recording devices, separately or as a part of video recording, absent court order.

5.

If the parties cannot agree upon circumstances under which the vehicle should be tested or destructively handled, the parties must seek a clarifying Order before any unilateral attempt test or destructively handle the vehicle.

SIGNED this the 14 day of Feb, 2000.

JUDGE PRESIDING

Matthew Brach

From: Reimers, Steve (S.J.) [sreimers@ford.com]
Sent: Wednesday, September 13, 2000 1:17 PM
To: 'Matthew Brach'
Subject: FW: Sample Vials

fyi
> -----Original Message-----
> From: LaRouche, Steve (S.)
> Sent: Wednesday, September 13, 2000 12:37 PM
> To: Reimers, Steve (S.J.)
> Subject: Sample Vials
>
> Steve: I got your phone message about a source for sample vials. We buy
> them from Fisher Scientific (order line: 1-800-766-7000).
> We use 20 ml borosilicate scintillation vials with urea caps that have
> cone shaped plastic liners (these cap liners won't react with brake
> fluid). The Fisher catalog number is 03-337-7. They cost approximately
> $150 for a case of 500.
>
>
>
> Steve LaRouche
> North American Materials Engineering and Testing
> Metallurgy Section, Central Laboratory, Room N410
> Phone: (313) 845-4876 FAX: (313) 322-1614
> Internet: mailto:slarouch@ford.com
> Central Lab Web Page: http://www.dearborn3.ford.com/met/north.htm
>

Exponent
Failure Analysis Associates

Exponent
39100 Country Club Drive
Farmington Hills, MI 48331

telephone 248-324-9180
facsimile 248-324-9199
www.exponent.com

FAX COVER SHEET

To: Steve Reimers — Name
313 390 4145 — Fax
Ford Motor Co. — Company
3/7/00 — Date

From: Rob Panek — Name
248 324 9112 — Telephone

Title
Fax
Olympus Quote - F/T — Subject

Total pages including this page.
E-mail

If you do not receive all of the pages indicated, please call _____
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INDUSTRIAL PRODUCTS GROUP
2 Corporate Center Drive
Melville, NY 11747
1-800-798-5782 Fax: 1-516-844-5626

Quotation

ROB PANECK
EXPONENT FAILURE ANALYSIS INC
39100 COUNTRY CLUB DR
FARMINGTON HILL, MI 48331
Phone: [1] 248-324-9112
Fax: [1] 248-324-9199

Questions? Please call Andy Kopec, Sales Rep (248) 698-6070

Quotation Number: 541030011
Date 03/02/2000
Quote Expires on: 03/31/00

Model	Item #	Description	Price	Qty	Extend
K27-18-15-60	2917D	Mini Borescope 2.7mm diameter (.106"), working length 7.32", DOV 60 degrees, Fore-oblique	$3,451.00	1	$3,451.00
MC-R45F	8315C	C mount adapter for K27, K17, SES-1711S-2, K12 Miniborescopes (focusing).	$659.00	1	$659.00
SONY PVM-97	4598	9" Diagonal, High Resolution Black & White Monitor; 800 TVL (H) Resolution; audio: line in/out; size: 8.6"x9"x9.5"; wgt: 12.1 lbs; power: 120VAC, 50/60 Hz.	$464.00	1	$464.00

Please forward with your Purchase Order to:
Olympus America Inc. - IPG
2 Corporate Center Drive
Melville, NY 11747
(800) 798-5782
(516) 844-5626 F.A.
Attn: Bryan Dell, K

TOTAL $4,574.00

Terms: Net 30 Days
Delivery: 24-48 Days ARO
FOB: Origin. We will ship via Federal Express Day 3 unless you request otherwise at time of order. Federal Express Priority 1 and UPS Ground are also available.

All prices quoted are U.S. list prices and pertain to equipment intended for use in the U.S. and warranty support from Olympus America Inc. Prices are not valid for overseas support. Please notify your Olympus representative should this

* * * COMMUNICATION RESULT REPORT (MAR. 7.2000 4:42PM) * * *

TTI EXPONENT

FILE MODE	OPTION	ADDRESS (GROUP)	RESULT	PAGE
852 MEMORY TX		13133904145-9859	OK	P. 2/2

REASON FOR ERROR
E-1) HANG UP OR LINE FAIL
E-2) BUSY
E-3) NO ANSWER
E-4) NO FACSIMILE CONNECTION

03/02/00 THU 15:24 FAX 516 844 5626 OLYMPUS REGION 2 002

OLYMPUS AMERICA INC.
INDUSTRIAL PRODUCTS GROUP
2 Corporate Center Drive
Melville, NY 11747
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Quotation

ROB PANECK
EXPONENT FAILURE ANALYSIS INC
39100 COUNTRY CLUB DR
FARMINGTON HILL, MI 48331
Phone: [1] 248-324-9112
Fax: [1] 248-324-9199

Questions? Please call Andy Kopec, Sales Rep (248) 888-8070

Quotation Number: 541030011
Date 03/02/2000
Quote Expires on: 03/31/00

Model	Item #	Description	Price	Qty	Extend
K27-18-15-90	2917;D	Mini Borescope 2.7mm diameter (.105"), working length 7.32", DOV 90 degrees, Fore-oblique	$3,461.00	1	$3,461.00
MO-R46F	5911/C	C mount adapter for K27, K17, 5E5-17118-2, K12 Miniborescopes (housing).	$869.00	1	$869.00
SONY PVM-97	4681	9" Diagonal, High Resolution Black & White Monitor; 800 TVL (H) Resolution; audio: line in/out; size: 8.9"x9"x9.8"; wgt: 12.1 lbs; power 120VAC, 60/50 Hz.	$464.00	1	$464.00

3713 9814

OLYMPUS

OLYMPUS AMERICA INC. TWO CORPORATE CENTER DRIVE TEL (516) 844 5000
ENDOSCOPE DIVISION MELVILLE, NEW YORK FAX (516) 844 5629
INDUSTRIAL PRODUCTS GROUP 11747-9157

03/02/2000

ROB PANECK
EXPONENT FAILURE ANALYSIS INC
39100 COUNTRY CLUB DR
FARMINGTON HILL, MI 48331
Phone: [1] 248-324-9112
Fax: [1] 248-324-9199

Quotation # 541030011

Dear Mr. Paneck:

Thank you for providing Olympus with the opportunity to quote our Industrial Imaging products as listed on the enclosed quotation.

As a service to our customers, we provide set-up, maintenance and training at no additional cost. To request this service, please call when all your equipment has been received.

We look forward to having you as a valued customer. Please feel free to contact me if you have any questions.

Sincerely,

Andy Kopec

Andy Kopec
Olympus America Inc.

OLYMPUS

OLYMPUS AMERICA INC. TWO CORPORATE CENTER DRIVE TEL (516) 844 8626
ENDOSCOPE DIVISION MELVILLE, NEW YORK FAX (516) 844 8629
INDUSTRIAL PRODUCTS GROUP 11747-9187

1/13/2000

MR. ROB PANECK
COMPONENT FAILURE ANALYSIS
9100 COUNTRY CLUB DR.
FARMINGTON HILL, MI 48331
Phone: 248-324-9112
Fax: 248-324-9199

Quotation # 541010047

Dear Mr. Paneck:

Thank you for providing Olympus with the opportunity to quote our Industrial imaging products as listed on the enclosed quote.

As a service to our customers, we provide set-up, maintenance and training at no additional cost. To request this service, please call when all your equipment has been received.

We look forward to having you as a valued customer. Please feel free to contact me if you have any questions.

Sincerely,

Andy Kepec
Olympus America Inc.

3713 9816

OLYMPUS AMERICA INC.
INDUSTRIAL PRODUCTS GROUP
2 Corporate Center Drive
Melville, NY 11747
1-800-798-5782 Fax: 1-516-844-5626

Quotation

MR. ROB PANECK
EXPONENT FAILURE ANALYSIS
39180 COUNTRY CLUB DR
FARMINGTON HILL, MI 48331
Phone: 248-324-9112
Fax: 248-324-9199

Questions? Please call Andy Kopec, Sales Rep (248) 696-9070
Quotation Number: 641010047
Date 01/14/2000
Quote Expires on: 03/14/2000

Item #	Model	Description	Price	Qty	Extend
K12-09-15-53	2917G	Mini Borescope 1.2mm diameter (.47"), working length 3.78", DOV 53 degrees, Foto-Oblique	$3,626.00	1	$3,626.00
MC-R45F	6315C	C mount adapter for K27, K17, SES-17118-2, K12 Miniborescopes (focusing).	$659.00	1	$659.00
SONY PVM-97	4595	9" Diagonal, High Resolution Black & White Monitor; 900 TVL (H) Resolution; audio: line in/out; dim: 8.6"x9"x9.8"; wgt: 12.1 lbs; power: 120VAC, 50/60 Hz.	$464.00	1	$464.00
XC-75	4593CA	XC-75 Low-light B&W camera body set; 1/2" CCD; C-mount; 570 TVL (H) X 485 TVL (V) resolution: Size: 1.8" X 1.2" X 3.6", Wt 5 oz; Power; 12VDC	$1,324.00	1	$1,324.00

Please fax and mail your Purchase Order to:
Olympus America Inc.
2 Corporate Center Drive
Melville, NY 11747
(516) 798-5782
(516) 844-5626 Fax
Attention: Dolish
Net 30 Days
30-60 Days ARO
Origin. We will ship via Federal Express Day 2 unless you

otherwise at time of order. Federal Express Priority 1 and UPS Ground are also available.

TOTAL $6,073.00

All prices quoted are U.S. list prices and pertain to equipment intended for use in the U.S. and warranty support from Olympus America Inc. Prices are not valid for overseas support. Please notify your Olympus representative should this

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3713 9810

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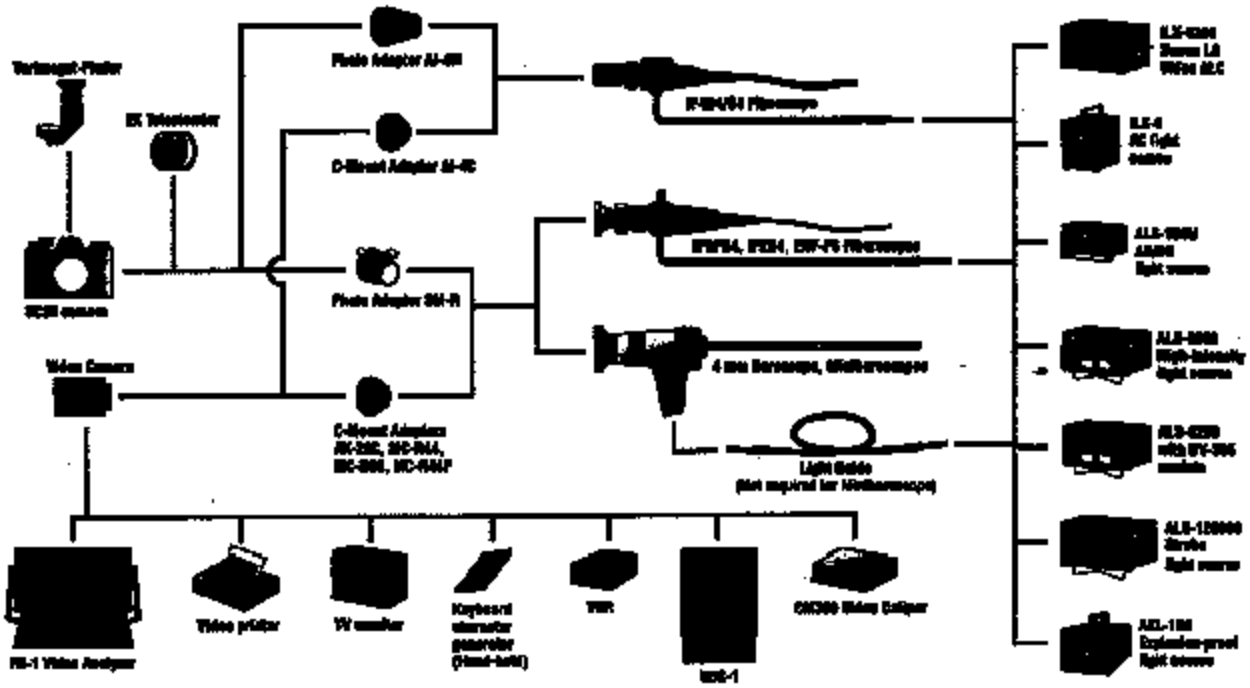
INDUSTRIAL

Small-diameter fiberscopes and borescopes



Need access ports as small as these...

A wide range of Olympus flexible fiberscopes and borescopes are available in small diameters – 4 mm and under – as small as 0.64 mm for Ultra Thin fiberscopes and 1.2 mm for Miniborescopes. Their availability in many different sizes, working lengths, directions of view, fields of view, and magnification offer a flexibility to inspect the tightest, most cramped and difficult worksites.

Ultra Thin fiberscopes. These compact, high-resolution instruments range in diameters from 0.64 mm to 4.1 mm, with working lengths from 254 mm (10 in.) to 1280 mm (50.4 in.). Flexibility and two-way articulation (in all but the 0.64 mm diameter model) make it easy to snake the insertion tube around obstacles. Unlike larger fiberscopes, Ultra Thin fiberscopes have a moisture-proof outer covering of PVC instead of a metallic sheath, for smooth access and flexibility in these small diameters.

Ultra Thin fiberscopes and ILK-5 light source.

Creating the Vision

Olympus line of small-diameter rigid borescopes consists of 4 mm diameter borescopes and 2.7 mm, 1.75 mm, 1.2 mm diameter Miniborescopes.

Small-diameter 4 mm borescopes have hybrid rod and convex lens systems for the brightest possible images, with a decided spatial effect that approaches "3-D."

New, improved light guide bundles bathe the subject in a brilliant flood of light despite the compact size. Directions of view are forward and side. Side-viewing scopes have an orbital scan of 260 degrees, which gives the inspector quick access to a large area at the turn of a control.

Miniborescopes have a patented single-fiber Selfoc® rod lens. They produce brilliant, highly magnified images. They have an excellent depth of field with good focus from 1 mm to 40 mm. Working lengths for Miniborescopes range from 96 to 188 mm (3.8 to 7.4 in.).

Miniborescope K27-18-80-62 used with a video system.

SPECIFICATIONS – Ultra Thin Fiberscopes

Model	Max. outer diam.	Working length	Direction of view DOV	Field of view FOV	Depth of field DOF	Articulation: up, down/ right, left
IF4D4-15	4.1mm (0.161in)	1270mm (49.9in)	Direct	65°	5-80mm	120°/NA
IF4B4-15	4.1mm (0.161in)	1280mm (50.4in)	Side	65°	4-40mm	120°/NA
EMF-P3	3.6mm (0.140in)	255mm (10.0in)	Direct	65°	5-50mm	130°/NA
IF2D4-8	2.4mm (0.094in)	610mm (24.0in)	Direct	75°	2-50mm	120°/NA
IF2D4-14	2.4mm (0.094in)	1170mm (46.0in)	Direct	75°	2-50mm	120°/NA
IF6PD4-6	0.64mm (0.025in)	490mm (19.2in)	Direct	68°	1-50mm	NA
IF6PD4-11	0.64mm (0.025in)	990mm (39.0in)	Direct	58°	1-50mm	NA

Insertion tube.....Stainless steel braid; PVC outer cover, waterproof
IF6PD4: PTFE outer cover, waterproof
Focus.....Fixed

SPECIFICATIONS – 4 mm Borescopes

Model	Working length	Direction of view DOV	Field of view FOV*	Depth of field DOF
D040-007-000-50	70mm(2.8in)	Direct	50°	4mm-∞
D040-015-000-50	150mm(5.9in)	Direct	50°	4mm-∞
D040-024-000-50	240mm(9.4in)	Direct	50°	4mm-∞
D040-032-000-50	320mm(12.6in)	Direct	50°	4mm-∞
D040-011-090-50	110mm(4.3in)	Side	50°	2mm-∞
D040-020-090-50	200mm(7.9in)	Side	50°	2mm-∞
D040-028-090-50	280mm(11.0in)	Side	50°	2mm-∞
D040-037-090-50	370mm(14.6in)	Side	50°	2mm-∞

Maximum outer diameter.....4.10mm (0.161in)
Orbital scan.....260°, not available on direct models
Insertion tube.....Stainless steel, waterproof
Light guide.....Separate light guide is required
* FOV.....50° (direct only) and 30° FOV optionally available

SPECIFICATIONS – 2.7 mm Miniborescopes

Model	Working length	Direction of view DOV	Field of view FOV	Depth of field DOF
K27-18-00-62	188mm(7.32in)	Direct	62°	1-40mm
K27-18-15-60	188mm(7.32in)	Fore-obl. (15°)	60°	1-40mm
K27-18-90-62	188mm(7.40in)	Side	62°	1-40mm

Maximum outer diameter.....2.70mm (0.106in)
Insertion tube.....Stainless steel, waterproof
Light guide.....Integral light guide

SPECIFICATIONS – 1.75 mm Miniborescopes

Model	Working length	Direction of view DOV	Field of view FOV	Depth of field DOF
K17-18-00-62	188mm(7.32in)	Direct	62°	1-40mm
K17-18-15-60	188mm(7.32in)	Fore-obl. (15°)	60°	1-40mm
K17-18-90-62	188mm(7.40in)	Side	62°	1-40mm
SES-17113-2*	105mm(4.13in)	Side	55°	1-40mm

Maximum outer diameter.....1.75mm (0.069in)
Insertion tube.....Stainless steel, waterproof
Light guide.....Integral light guide
* Special application scope—For applications that require minimum parallax between the objective lens window and the illumination window

SPECIFICATIONS – 1.2 mm Miniborescopes

Model	Working length	Direction of view DOV	Field of view FOV	Depth of field DOF
K12-09-00-45	96mm(3.78in)	Direct	45°	1-40mm
K12-09-15-63	96mm(3.78in)	Fore-obl. (15°)	63°	1-40mm

Maximum outer diameter.....1.20mm (0.047in)
Insertion tube.....Stainless steel, waterproof
Light guide.....Integral light guide

OLYMPUS
INDUSTRIAL

Olympus Corporation, Industrial Fiberoptics Division
4 Nevada Drive, Lake Success, N.Y. 11042-1179
Tel: 516-488-5888, 800-446-5580 FAX: 516-488-3979
Regional Offices:
Los Angeles, Tel. 714-870-6500 • Cleveland, Tel. 216-779-9855
Atlanta, Tel. 404-428-1678 • Dallas, Tel. 214-556-0697
Canadian Distr: Canam Industrial, Toronto, Tel: 416-479-4100

Printed in USA. SM 702. Specifications subject to change without notice.

Ford **Material Move Request** FOR INTRA-COMPANY MOTOR VEHICLE SHIPMENTS ONLY (Not to Be Used by Common Carrier)

0549503

FROM: BLDG 5	TO: EXPORT FAILURE ANALYSIS
Department:	Department No.: T402
Building: AVT5	Department:
Check One: ☐ Room ☐ Bay ☐ Crib Number:	Department No.:
For Information, Contact: Phone:	Building:
	Check One: ☐ Room ☐ Bay ☐ Crib Number:
	Date: 11/10/99

Haz. Mat'l *	Qty.	Part Number	Description **(For Hazardous Materials: Description and Classification)	Purpose (E.J.A., Test, Build, Job, Etc.)
	50	F19G652-AA	D2AC. SWITCH & CONNECTOR FROM RECALL 99S15	FAILURE ANALYSIS
	2	BOXES	BOX #9179488 & BOXED	
		9181375	9176873 5 BOXES	
		9181289	9182157	

Any hazardous [illegible] in accordance with the requirements of Title 49 Code of Federal Regulations.

NOTE: * An "X" MUST be placed in this column when shipping hazardous materials.
** List all hazardous materials first — do not abbreviate.

Signature of Requester: Steve Reiner

H.M.T.C.R. Specialist:

MAY 1982 3258

5713 9820

Material Move Request

FOR INTRA-COMPANY MOTOR VEHICLE SHIPMENTS ONLY
(Not to Be Used by Common Carrier)

0549514

FROM: Steve Reimers	TO: EXPANENT FAILURE ANALYSIS
Department: TAP	Department No.
Building: AVCS	Department: FARMINGTON HILLS
Classification: ☐ Rush ☒ Reg ☐ Oth	Department No.
Number	Building
For Information, Contact	Phone
Check One: ☐ Room ☐ Bay ☐ Oth	Date: 11/18/99
Number	

Haz. Mat'l	Qty.	Part Number	Description **(For Hazardous Materials: Description and Classification)	Purpose (E.I.A., Test, Build, Job, Etc.)
		24 Boxes	XW7Z 96652 AA	FAILURE ANALYSIS
			9181448 (14 Boxes)	

Any hazardous article listed above must be properly described, classified, packaged and labeled in accordance with the requirements of Title 49, code of Federal Regulations.

NOTE: "In-Bond" must be printed in this column when shipping hazardous materials. Check all hazardous materials box — do not abbreviate.

Signature of Requestor: S J Reimers

H.M.T.C.R. Approval: SJR

MAY 1982 3268

3713 9821

Steve Reimers

Product Design Engineer
Core Suspension and Steering
Chassis Electronic Systems
Advanced Vehicle Technology
PROFS: SREIMERS
Email: [redacted]

20000 Rotunda Drive
Dearborn, MI 48121
Bldg. #6, 3C005, MD #6020
Telephone: 313/390-3296
Fax: 313/390-4145

D = NO APPROPRIATE ADJUSTMENT REQUIRED. ORIFICE HAS CAPABILITY TO RELEASE AT L.D. LIMIT.
N.A. = NOT APPLICABLE, MASTER RODS HAS NOT CAPABILITY TO ADJUSTED TO L.D. LIMIT.
= SERVICE PEDAL TRAVEL LIMIT ARE FOR REPAIR USED ONLY.

1. **BRAKE System Assembly Test**
THE BRAKE TO BE PERFORMED HERE. Check PEDAL TRAVEL AS TO BE MEASURED MANUALLY. TO THE STEERING BALANCE "A". THE BRAKE PEDAL FOR HAVE AN PROPERLY INSTALLED. THE PUSHING BRAKE CABLE HAVE NOT BE TENSIONED. PRIOR TO TRAVEL CHECK THE CABLE IS TO BE APPLIED AND RELEASED AS APPLICATION. AFTER THE FINAL APPLICATION, THE CABLE IS TO ACHIEVE BE INSTALL PEDAL HEIGHT PROPERLY AND A FULL A BRAKING CHECKS TRAVEL WHEEL CHANGE. TRAVEL MEASUREMENTS TO THE BRAKE AT THE BRAKE PEDAL PEDAL REPORT ON THE POINTED THE PEDAL ASSEMBLY REST AND PRESS OF LESS APPLIED TO THE PEDAL TO THE PROPERLY BEFORE BRAKE APPLIED CHECKS.

VEHICLE PEDAL TRAVEL MAY NOT EXCEED THE LIMITS AS SHOWN ON THIS CHART SPECIFICATIONS except AS SHOWN Ⓒ, Ⓓ, AND Ⓔ.

TENSILE BRAKE TESTED IN THE OFF LINE CABLE ARE TO BE ASSEMBLED TO THE SPECIFICATIONS SHOWN FOR CHECK LEVEL TO THE SPECIFICATIONS SHEET. PARKING BRAKE CABLE IS TO BE TENSIONED TO SPECIFICATION AT THIS TEST BUT SHOT OF AS THE CHARGED POSITION. Any CABLE THAT HAVE TO REPAIR SPECIFICATIONS SHOULD ARE TO HAVE BE-MADE SPECIFICATIONS IN ABOVE TABLE.

2. **Test Adjust**
APPLY THE TO LO. STATE, CHANGE IN COMPLIANCE SHOWN Ⓐ), A CABLE WHEN THERE IS TO BE APPLIED TO THE PEDAL PRESSURE Ⓑ) AND THEN FOR A FINAL TIME CHANGE Ⓒ). AFTER THE PEDAL TIME HAS ELAPSED, PEDAL HAS BEEN ADJUSTED IS TO BE MEASURED TO SEE WHETHER THE BRAKE IS RELEASE Ⓓ WITHIN ONE TIME INTERVAL. REPEAT IS CHANGE Ⓔ.

3. **BRAKE ADJUST**
BRAKE TEST ADJ is ensure AN ASSEMBLY POWER BRAKING UNIT BE APPLIED TO THE BRAKE BOOSTER. ALL PROPER QUANTITIES ARE TO BE SUPPLIED WHEN BLADE WHEN THE MASTER AS THAT BRAKING WHEEL UNIT. ALL ARE CHARTERED ARE TO BE SUPPLIED WHEN CHANGE TO THE BRAKE ASSOCIATED SYSTEMS. VEHICLES WHEN TESTED IN THE OFF-LINE REPAIR AREA HAVE HAVE THE WHEELS TOGETHER POWER ENGINEERING AND ASSEMBLY BOOSTER VACUUM CHANGE OF 15-22 INCHES APPLIED.

4. **BRAKE PEDAL RESPONSE FREE HEIGHT ADJUST TEST**
REFER TO APPROPRIATE BRAKE SYSTEM INSTALLATION MANUAL FOR DETAILED PROCEDURE. THE BRAKE PEDAL FREE HEIGHT RESPONSE SHALL BE checked AS A MINIMUM OF TWO TIMES: ONE SHIFT AT EACH ASSEMBLY PLANT. THESE MEASUREMENTS SHALL BE RECORDED IN A PART THE DAY TO VEHICLE PART IS TO BE ASSOCIATED OR HAVE ONE LOG OF PROVISIONS TO THE PLANT ASSEMBLY TOWING OF MANY CHANGES HAS LOG.

5. **Installation & Adjust Brake Operation • Fill**
1. **BRAKE SYSTEM CHARACTERISTICS SERVICE**

a Pedal, Combination Valve ..... to minimum reading
b Brake Pedal Lash Check ..... to specification
c Adjust Lash Master Relief Test ..... to specification
d Pull Test @ 60 lbs. Min. ..... to specification
e Hold Off ..... to specification

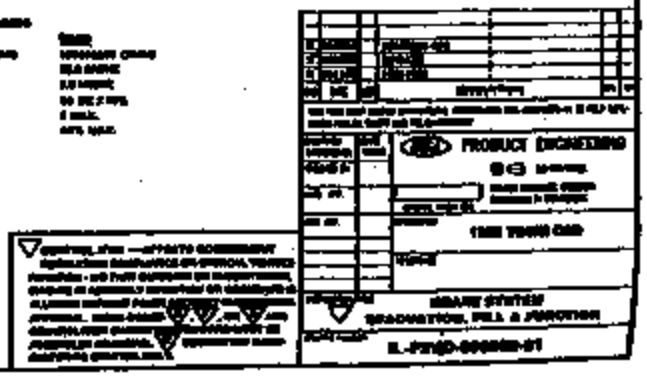
6. **SHALL LEAK CHECK LEVEL** ..... to specification

7. **Operational Test Level**
- All Adjustments of to specification
- Assembly shall not release to specification

8. **Adjustments and Test Values**
TO BE to specification OR to specification
OF PARAMETER WITH CHANGED APPLICATION.

9. **Test Equipment Special Test Notes**

Quantities	Check	Test
1 Unit	Unit Check	Unit Check
1 Set	Set Check	Set Check
1 Set	Check	Check
Check	Check to Test	Check to Test
Check	1 Test	1 Test
Variance	20% Max.	20% Max.



3713 9823

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ALL	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]											

[illegible]

PRODUCT ENGINEERING

CROWN VICTORIA & GRAND MARQUIS

BRAKE SYSTEM EVACUATION, FILL & FUNCTION

[illegible]

3713 9824

PROCESS SHEET - ASSEMBLY SYSTEMS RUN DATE: 09/03/92 PAGE 001 CONT ON 002

PLANT/PROCESSOR CODE : AGO C29
NAME : BRENDTKE, C.
PHONE : 3133375685

KEY PROCESS :
KEY ELEMENT : -
KEY TOOL : -
REQUEST LANG : E
STANDARD LANG :

REPEAT OPPOSITE SIDE:
PSO/AGI
LINE/SUB-ASSEMBLY :
CER NUMBER :

HEADER CHANGE : ADD
DATE : 05/22/1992

EFFECTIVE DATE PLANT: AGO

IN DATE/POINT : 05/22/1992
OUT DATE/POINT :

ISSUE DATE ORIGINAL: 11/13/1991
LATEST : 05/22/1992

ELEMENT CHANGE : Y
PART CHANGE : N
TOOL CHANGE : N
USAGE CHANGE : N

REPLACES PROCESS : CJ7010 00101 AGO ILLUSTRATION DATE : ** N/A **
REPLACED BY PROCESS : NO. OF ILLUSTRATIONS : 00

CPSCS	VEHICLES	PLANTS
060900 060000 060606	CVB	WIX

INSTALLATION MANUAL REFERENCES

IL-F3LC-060000-01

REVISIONS

REVISION-DATE	REVISION-ID	REVISION-CER-NUMBER	REVISION DESCRIPTION
05/22/1992	C29		REPLACES CVBCJ7010D00101AGO
05/22/1992	C29		ELEMENT 110 REVISED
05/22/1992	C29		ELEMENT 110 MAND ITEM CHANGED FROM Y TO N
05/22/1992	C29		ELEMENT 100 REVISED
05/22/1992	C29		ELEMENT 100 MAND ITEM CHANGED FROM Y TO N
05/22/1992	C29		ELEMENT 070 REVISED
05/22/1992	C29		ELEMENT 070 MAND ITEM CHANGED FROM Y TO N
05/22/1992	C29		ELEMENT 060 REVISED
05/22/1992	C29		ELEMENT 060 MAND ITEM CHANGED FROM Y TO N
05/22/1992	C29		ELEMENT 030 REVISED
05/22/1992	C29		ELEMENT 030 MAND ITEM CHANGED FROM Y TO N
05/22/1992	C29		ELEMENT 010 REVISED
05/22/1992	C29		ELEMENT 010 MAND ITEM CHANGED FROM Y TO N
05/22/1992	C29		UPDATE
05/22/1992	C29		COPY -CVB-CJ7010-00101-AGO-

3713 9025

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

PROCESS TITLE	* MAND * FAM	PROCESS ELVL/SFX	PLT	COPY	-- STUDY --	ALT C/N
EVACUATE AND FILL BRAKE SYSTEM	* *	CVB CJ7010	001	02	AGO	

** Thanks

ELEMENTS

ELEMENT: 010 PART REFS: CHG 05/22/1992
TEXT===> REMOVE MASTER CYLINDER CAP. E01 STANDARD LANGUAGE: VALIDATED

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 020 PART REFS: 05/22/1992
TEXT===> CONNECT (BRAKE CONSOLE) (TOW) ROPE TO VEHICLE E01 STANDARD LANGUAGE: VALIDATED

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 030 PART REFS: CHG 05/22/1992
TEXT===> PLACE MASTER CYLINDER CAP(TOPSIDE DOWN) ON CONL. E01 STANDARD LANGUAGE: VALIDATED

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 040 *MANDATORY * PART REFS: 05/22/1992
TEXT===> CONNECT ABS POWER SUPPLY ADAPTER TO ABS HYDRAULIC CONTROL UNIT PIGTAIL. E01 STANDARD LANGUAGE: VALIDATED
E02

TOOLS==> CTL: DESC: ADAPTER - 10-PIN ANTI-LOCK TYP: Z 05/22/1992
TOOL NUMBER: 56ZF 20372 QTY: 001

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 050 PART REFS: A CHG 05/22/1992
TEXT===> ALIGN-AND-SEAT FILL HEAD ADAPTOR TO MASTER CYLINDER. E01 STANDARD LANGUAGE: VALIDATED

TOOLS==> CTL: DESC: BRAKE EVAC & FILL EQUIPMENT (DEB-315) TYP: C 05/22/1992
TOOL NUMBER: CONN QTY: 001

TOOLS==> CTL: DESC: BRAKE FILL ADAPTOR TYP: Z 05/22/1992
TOOL NUMBER: 56ZF 20606 QTY: 001

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 060 *MANDATORY * PART REFS: 05/22/1992
TEXT===> DEPRESS CYCLE START BUTTON. E01 STANDARD LANGUAGE: VALIDATED
ADAPTER WILL CLAMP AND EVAC/FILL CYCLE WILL START. R01
R02
IF A LARGE OR SMALL LEAK IS DETECTED DURING THE CYCLE, THE R03
EQUIPMENT WILL ABORT THE CYCLE. IF TIME PERMITS, THE CYCLE R04
CAN BE RESTARTED BY DEPRESSING THE START BUTTON AGAIN. R05
R06
RECOMMENDED MACHINE SETTINGS: R07
TOTAL VACUUM 35 SEC R08
VACUUM I 20 SEC R09

3713 9826

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE *******

PROCESS TITLE * MAND * FAN PROCESS ELVL/SFX PLT CPY -- STUDY -- ALT C/N

EVACUATE AND FILL BRAKE SYSTEM * * CVS CJ7010 001 02 AGD

**

ELEMENTS

	SMALL LEAK DECAY	5 SEC	R10
	(VACUUM DECAY NOT TO EXCEED 3MBAR DROP-OFF)		R11
	VACUUM #2	10 SEC MINIMUM	R12
	FILL	INITIAL PRESSURE - 150 PSI	R13
		FINAL FILL PRESSURE - 135 PSI	R14
	UNCLAMP DELAY	1.5 SEC	R15
	TOP-OFF (HIGH SCAV.)	5 SEC	R16
	HIGH VACUUM PURGE	8 SEC	R17
	LARGE LEAK CHECK 8 MBAR ABSOLUTE IN 15 SEC.		R18
	SMALL LEAK CHECK 8 MBAR ABSOLUTE IN 5 SEC.		R19
	CLAMP PRESSURE 900-1000 PSI		R20

TOOLS==> CTL: DESC: BRAKE EVAC & FILL EQUIPMENT (DEB-315) TYP: C 05/22/1992
TOOL NUMBER: COMM QTY: 001

TOOLS==> CTL: DESC: BRAKE FILL ADAPTOR TYP: Z 05/22/1992
TOOL NUMBER: 56ZF 20696 QTY: 001

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 070 PART REFS: CH0 05/22/1992
TEXT===> REMOVE FILL HEAD ADAPTER FROM MASTER CYLINDER RESERVOIR AT THE CONCLUSION OF THE CYCLE. E01 STANDARD LANGUAGE: VALIDATED R01

TOOLS==> CTL: DESC: BRAKE EVAC & FILL EQUIPMENT (DEB-315) TYP: C 05/22/1992
TOOL NUMBER: COMM QTY: 001

TOOLS==> CTL: DESC: BRAKE FILL ADAPTOR TYP: Z 05/22/1992
TOOL NUMBER: 56ZF 20696 QTY: 001

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 080 *MANDATORY * PART REFS: 05/22/1992
TEXT===> DISCONNECT ABS POWER SUPPLY ADAPTER FROM HCU PIGTAIL. E01 STANDARD LANGUAGE: VALIDATED

TOOLS==> CTL: DESC: ADAPTER - 10-PIN ANTI-LOCK TYP: Z 05/22/1992
TOOL NUMBER: 56ZF 20272 QTY: 001

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

ELEMENT: 090 *MANDATORY * PART REFS: 05/22/1992
TEXT===> OBTAIN RESERVOIR CAP FROM COWL TOP E01 STANDARD LANGUAGE: VALIDATED
R01
NOTE: FLUID LEVEL IN RESERVIOR MUST BE 0-4MM BELOW R02
MAX FILL LINE ON SIDE OF RESERVOIR. R03

CONTROL USAGE==> LINCOLN TOWN CAR 05/22/1992

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

PROCESS TITLE	* MAND *	FAM PROCESS	ELVL/SFX	PLT	CPY	-- STUDY --	ALT C/N
EVACUATE AND FILL BRAKE SYSTEM	* *	CVB CJ7010	001	02	A00		

ELEMENTS

ELEMENT: 100 PART REFS: CHG 08/22/1992
TEXT===> POSITION CAP TO BRAKE RESERVOIR E01 STANDARD LANGUAGE: VALIDATED
CONTROL USAGE==> LINCOLN TOWN CAR 08/22/1992

ELEMENT: 110 PART REFS: CHG 08/22/1992
TEXT===> SEAT CAP TO RESERVOIR E01 STANDARD LANGUAGE: VALIDATED
CONTROL USAGE==> LINCOLN TOWN CAR 08/22/1992

ELEMENT: 120 PART REFS: 08/22/1992
TEXT===> REMOVE TOW ROPE FROM VEHICLE E01 STANDARD LANGUAGE: VALIDATED
CONTROL USAGE==> LINCOLN TOWN CAR 08/22/1992

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

PROCESS TITLE	* MAND * FAM	PROCESS	ELVL/SFX	PLT	CPY	-- STUDY --	ALT C/N
EVACUATE AND FILL BRAKE SYSTEM	* *	CVB CJ7010	001	02	ABD		

**

PROCESS SHEET - ASSEMBLY SYSTEMS RUN DATE: 09/14/92 PAGE 001 CON. ON 002

PLANT/PROCESSOR CODE : AGO C29
NAME : BRENDTKE, C.
PHONE : 3133775685

KEY PROCESS :
KEY ELEMENT :
KEY TOOL :
REQUEST LANG : E
STANDARD LANG :

REPEAT OPPOSITE SIDE:
PSD/ADI
LINE/SUB-ASSEMBLY :
CER NUMBER :

EFFECTIVE DATE PLANT: AGO

HEADER CHANGE : ADD
DATE : 05/02/1992

IN DATE/POINT : 05/09/1992
OUT DATE/POINT :

ISSUE DATE ORIGINAL: 11/13/1991
LATEST : 05/09/1992

ELEMENT CHANGE : Y
PART CHANGE : N
TOOL CHANGE : Y
USAGE CHANGE : Y

REPLACES PROCESS : NONE
REPLACED BY PROCESS :

ILLUSTRATION DATE : ** N/A **
NO. OF ILLUSTRATIONS : 00

CPSCS	VEHICLES	PLANTS
060600 080000 080606	CFB	STH

INSTALLATION MANUAL REFERENCES

IL-F3LC-060000-01

REVISIONS

REVISION-DATE	REVISION-ID	REVISION-CER-NUMBER	REVISION DESCRIPTION
05/09/1992	C29		REPLACES CFBNONE
05/09/1992	C29		ELEMENT 030 UCC HAS BEEN PHYSICALY DELETED
05/09/1992	C29		ELEMENT 030 UCC ADDED
05/09/1992	C29		ELEMENT 070 UCC HAS BEEN PHYSICALY DELETED
05/09/1992	C29		ELEMENT 070 UCC ADDED
05/09/1992	C29		ELEMENT 030 UCC HAS BEEN PHYSICALY DELETED
05/09/1992	C29		ELEMENT 030 UCC ADDED
05/09/1992	C29		ELEMENT 080 UCC ADDED
05/09/1992	C29		ELEMENT 030 UCC ADDED
05/02/1992	C29		ELEMENT ALL UCC ADDED
05/02/1992	C29		PROCESS WAS PREVIOUSLY CJ310D
05/02/1992	C29		COPY -CFB-CJ7010-00000-AGO-1
05/02/1992	C29		UPDATE
05/02/1992	C29		COPY -CLB-CJ7010-00108-AGO-

******* MANDATORY COMPLIANCE ******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

PROCESS TITLE	* MAND	* FAM PROCESS	ELVL/SFX	PLT	CPY	-- STUDY --	ALT C/N
EVACUATE AND FILL BRAKE SYSTEM	*	* CFB CJ7010	001	00	AGO		

**

PAGE 001 CONT ON 002

3713 9829

ELEMENTS

ELEMENT: 010 *MANDATORY *
TEXT===> REMOVE MASTER CYLINDER CAP
PART REFS:
E01 STANDARD LANGUAGE: VALIDATED
ADD 05/02/1992

CONTROL USAGE==> CROWN VICTORIA

ELEMENT: 020 *MANDATORY *
ADD 05/02/1992
TEXT===> PLACE MASTER CYLINDER CAP(TOPSIDE DOWN) ON COWL
PART REFS:
E01 STANDARD LANGUAGE: VALIDATED
ADD 05/02/1992

CONTROL USAGE==> CROWN VICTORIA

ELEMENT: 030 *MANDATORY *
ADD 05/02/1992
TEXT===> CONNECT ABS POWER SUPPLY ADAPTER TO ABS HYDRAULIC CONTROL UNIT PIGTAIL (ABS UNITS ONLY)
PART REFS:
E01 STANDARD LANGUAGE: VALIDATED
E02
ADD 05/02/1992

TOOLS==> CTL: DESC: ADAPTER - 19-PIN ANTI-LOCK TYP: 2
TOOL NUMBER: 502F 28372 QTY: 001
ADD 05/02/1992

CONTROL USAGE==> CROWN VICTORIA ANTI-SPIN TRACTION BRAKES

ELEMENT: 040 *MANDATORY *
ADD 05/09/1992
TEXT===> ALIGN-AND-SEAT FILL HEAD ADAPTOR TO MASTER CYLINDER
PART REFS:
E01 STANDARD LANGUAGE: VALIDATED
ADD 05/02/1992

TOOLS==> CTL: DESC: BRAKE EVAC & FILL EQUIPMENT (DEB-315) TYP: C
TOOL NUMBER: COMM QTY: 001
ADD 05/02/1992

TOOLS==> CTL: DESC: BRAKE FILL ADAPTOR TYP: 2
TOOL NUMBER: 502F 28896 QTY: 001
ADD 05/02/1992

CONTROL USAGE==> CROWN VICTORIA

ELEMENT: 050 *MANDATORY *
ADD 05/02/1992
TEXT===> DEPRESS CYCLE START BUTTON
ADAPTER WILL CLAMP AND EVAC/FILL CYCLE WILL START
PART REFS:
E01 STANDARD LANGUAGE: VALIDATED
ADD 05/02/1992

IF A LARGE OR SMALL LEAK IS DETECTED DURING THE CYCLE, THE EQUIPMENT WILL ABORT THE CYCLE. IF TIME PERMITS, THE CYCLE CAN BE RESTARTED BY DEPRESSING THE START BUTTON AGAIN

RECOMMENDED MACHINE SETTINGS:
TOTAL VACUUM 40 SEC
VACUUM 1 25 SEC
SMALL LEAK DECAY 5 SEC
(VACUUM DECAY NOT TO EXCEED 3MBAR DROP-OFF)
VACUUM #2 10 SEC MINIMUM
FINAL FILL PRESSURE - 145 PSI
UNCLAMP DELAY 1.5 SEC

R01
R02
R03
R04
R05
R06
R07
R08
R09
R10
R11
R12
R13
R14

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

---------- PROCESS TITLE ---------- * MAND * FAM PROCESS ELVL/SFX PLT CPY -- STUDY -- ALT C/N

EVACUATE AND FILL BRAKE SYSTEM * * CFB CJ7010 001 00 A00

ELEMENTS

TOP-OFF (HIGH SCAV.) 3 SEC
HIGH VACUUM PURGE 10 SEC
LARGE LEAK CHECK 6 MBAR ABSOLUTE IN 15 SEC.
SMALL LEAK CHECK 8 MBAR ABSOLUTE IN 6 SEC.
CLAMP PRESSURE 800-1000 PSI
R15
R16
R17
R18
R19

TOOLS==> CTL: DESC: BRAKE EVAC & FILL EQUIPMENT (DEB-316) TYP: C ADD 05/02/1992
TOOL NUMBER: CONN QTY: 001

TOOLS==> CTL: DESC: BRAKE FILL ADAPTOR TYP: Z ADD 05/02/1992
TOOL NUMBER: 502F 20696 QTY: 001

CONTROL USAGE==> CROWN VICTORIA

ELEMENT: 060 *MANDATORY * ADD 05/02/1992
TEXT==> REMOVE FILL HEAD ADAPTER FROM MASTER CYLINDER RESERVOIR AT THE CONCLUSION OF THE CYCLE. PART REFS: ADD 05/02/1992
E01 STANDARD LANGUAGE: VALIDATED
R01

TOOLS==> CTL: DESC: BRAKE EVAC & FILL EQUIPMENT (DEB-316) TYP: C ADD 05/02/1992
TOOL NUMBER: CONN QTY: 001

TOOLS==> CTL: DESC: BRAKE FILL ADAPTOR TYP: Z ADD 05/02/1992
TOOL NUMBER: 502F 20696 QTY: 001

CONTROL USAGE==> CROWN VICTORIA

ELEMENT: 070 *MANDATORY * ADD 05/02/1992
TEXT==> DISCONNECT ABS POWER SUPPLY ADAPTER FROM HCU PIGTAIL ANTI-LOCK UNITS ONLY PART REFS: ADD 05/02/1992
E01 STANDARD LANGUAGE: VALIDATED
R01

TOOLS==> CTL: DESC: ADAPTER - 19-PIN ANTI-LOCK TYP: Z ADD 05/02/1992
TOOL NUMBER: 502F 20372 QTY: 001

CONTROL USAGE==> CROWN VICTORIA ANTI-SPIN TRACTION BRAKES

ELEMENT: 080 *MANDATORY * ADD 05/09/1992
TEXT==> OBTAIN RESERVOIR CAP FROM CONL TOP PART REFS: ADD 05/02/1992
E01 STANDARD LANGUAGE: VALIDATED
R01
R02
R03

NOTE: FLUID LEVEL IN RESERVOIR MUST BE 0-4MM BELOW MAX FILL LINE ON SIDE OF RESERVOIR.

CONTROL USAGE==> CROWN VICTORIA

ELEMENT: 090 *MANDATORY * ADD 05/02/1992
TEXT==> POSITION CAP TO BRAKE RESERVOIR PART REFS: ADD 05/02/1992
E01 STANDARD LANGUAGE: VALIDATED

CONTROL USAGE==> CROWN VICTORIA

ADD 05/02/1992

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

PROCESS TITLE * MAND * FAN PROCESS ELVL/SFX PLT CPY -- STUDY -- ALT C/N
EVACUATE AND FILL BRAKE SYSTEM CFB CJ7010 001 00 AGO

PAGE 003 CONT ON 004

ELEMENTS

ELEMENT: 100 *MANDATORY * PART REFS: ADD 05/02/1992
TEXT===> SEAT CAP TO RESERVOIR (BY TURNING) E01 STANDARD LANGUAGE: VALIDATED

CONTROL USAGE==> CROWN VICTORIA ADD 05/02/1992

******* MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ********** MANDATORY COMPLIANCE ******

PROCESS TITLE * NAMO * FAM PROCESS ELVL/SFX PLT CPY -- STUDY -- ALT C/N

EVACUATE AND FILL BRAKE SYSTEM * * CPB CJ7010 001 00 AGO

Central Laboratory
16000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 03023

November 8, 2000

To: S. Reimers (313) 39-03286 (313) 39-04145 FAX

From: S. LaRouche (313) 84-54876

Subject: Brake Pressure Switch
Part Number: F2VC-9F924-AB
Specification: Not Provided
Supplier: Texas Instruments

Received: One brake pressure switch, identified as #2, was received on September 12, 2000. The switch developed a short circuit during electrical testing with brake fluid injected into the switch cavity.

Object: Determine the cause of the short-circuit.

Conclusion: The short-circuit was caused by a buildup of copper-rich material on the face of the cup, which formed a bridge between the cup and movable contact. The buildup of copper-rich material most likely resulted from electrolytic deposition of movable contact material on the cup. A cell was probably set up in which the contact acted as the anode, the cup acted as the cathode, and the brake fluid served as the electrolyte.

Data and Analysis:

Surface Analysis
(Visual Examination, Scanning Electron Microscopy (SEM), and Energy Dispersive X-ray Spectroscopy (EDS))

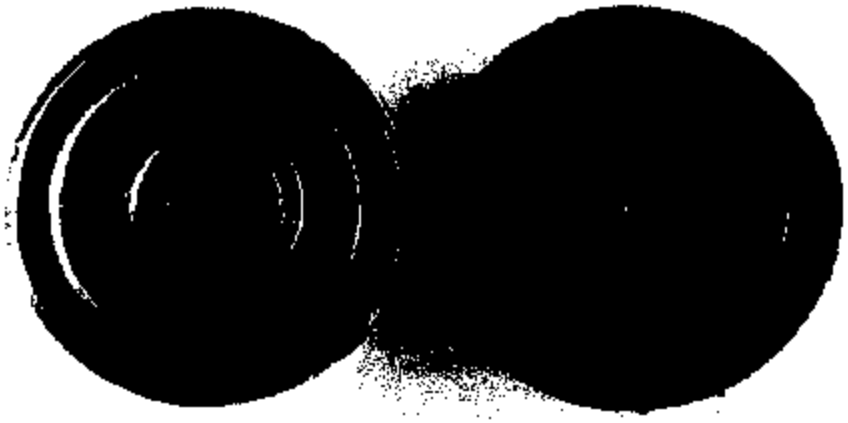
The switch cavity was opened by removing the aluminum crimp ring and separating the base from the cup (Figure 1). This revealed a buildup of material that bridged the gap between the movable contact (Figure 2) and the face of the cup (Figures 3 and 4). The movable contact is made of brass, while the cup is made of zinc-plated steel. The buildup consisted of a dark greenish sludge (assumed to be brake fluid) and hard deposits that formed a bridge between the contact and cup. This bridge appears to have been the cause of the short-circuit in the switch. Two samples of the hard deposits were scraped away from the face of the cup and analyzed with SEM/EDS. The deposits were found to contain copper (Figures 5 and 6). The surface of the movable contact shows evidence of pitting attack (Figure 7). The presence of copper in the deposits, and evidence of attack in the surface of the contact, indicate that the deposits are most likely contact material that was transferred on the face of the cup. This suggests that an electrolytic cell was set up in the switch, in which the movable contact acted as the anode, the cup acted as the cathode, and the brake fluid served as the electrolyte.

Contributor: C. Stevenson

Concur: _____
P. Klaas, Supervisor
Metallurgy Section

By: _____
Steven LaRouche (SLAROUCH)

Enclosures: Figures 1 through 7



~2X

Figure 1: Digital photograph showing switch cavity after cup and base were separated.

~7.5X

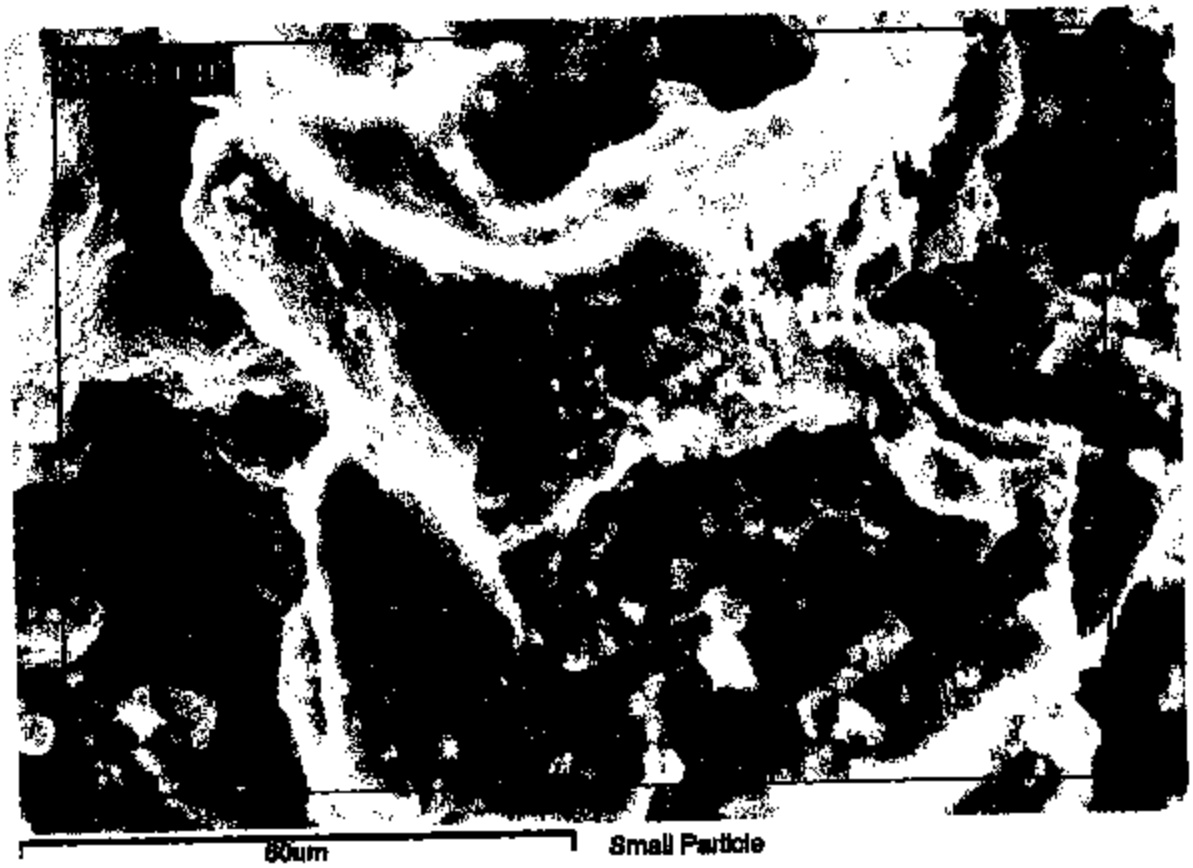
Figure 2: Digital photograph showing buildup of material on movable contact.

~6.4X

Figure 3: Digital photograph showing buildup on face of cup.

~7.1X

Figure 4: Digital photograph showing side view of buildup of material on face of cup where it would have formed bridge between cup and contact.



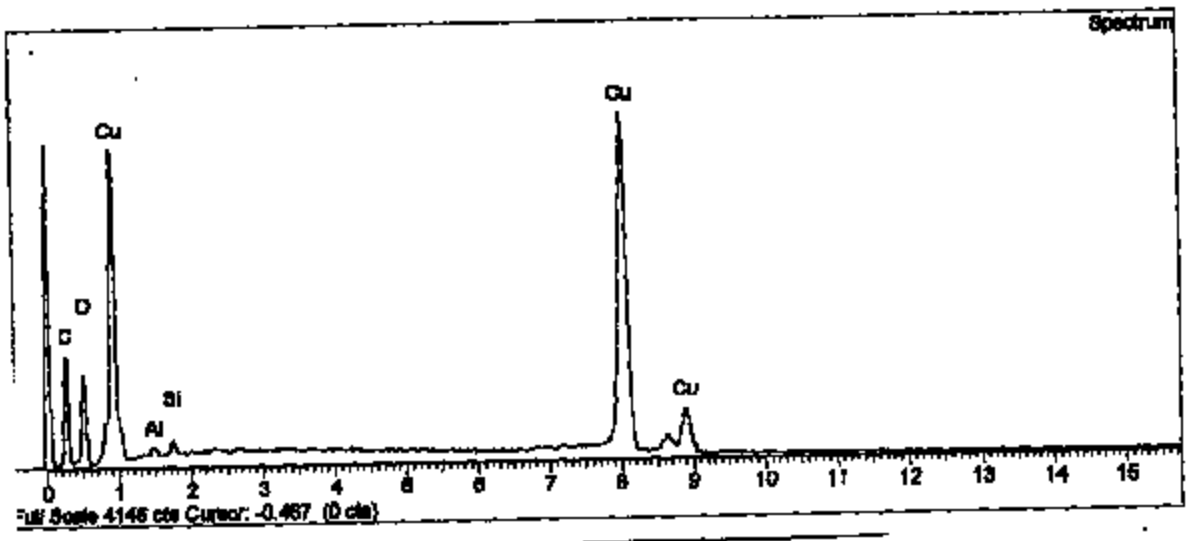
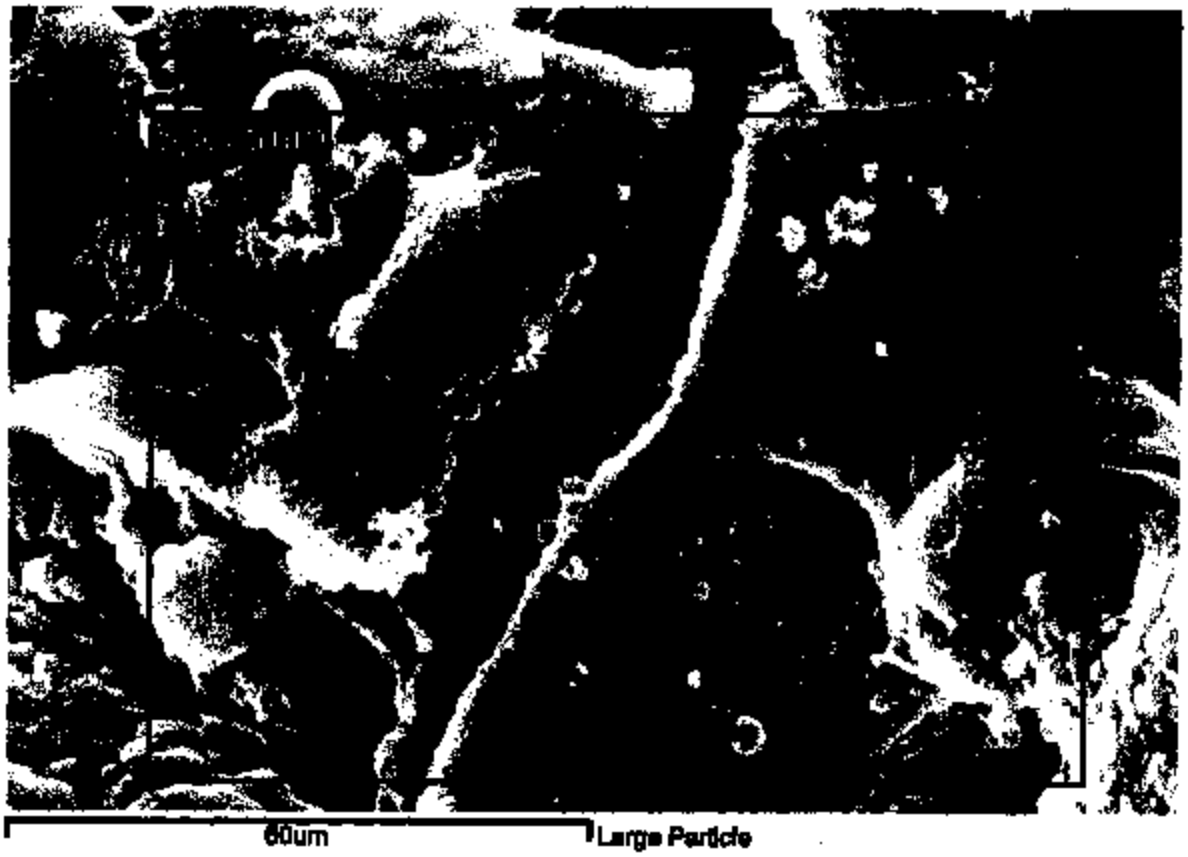


Figure 6: SEM photomicrograph and EDS spectrum of deposit removed from face of cup.

Note: Nominal magnifications given for photomicrographs.

03023 [redacted]



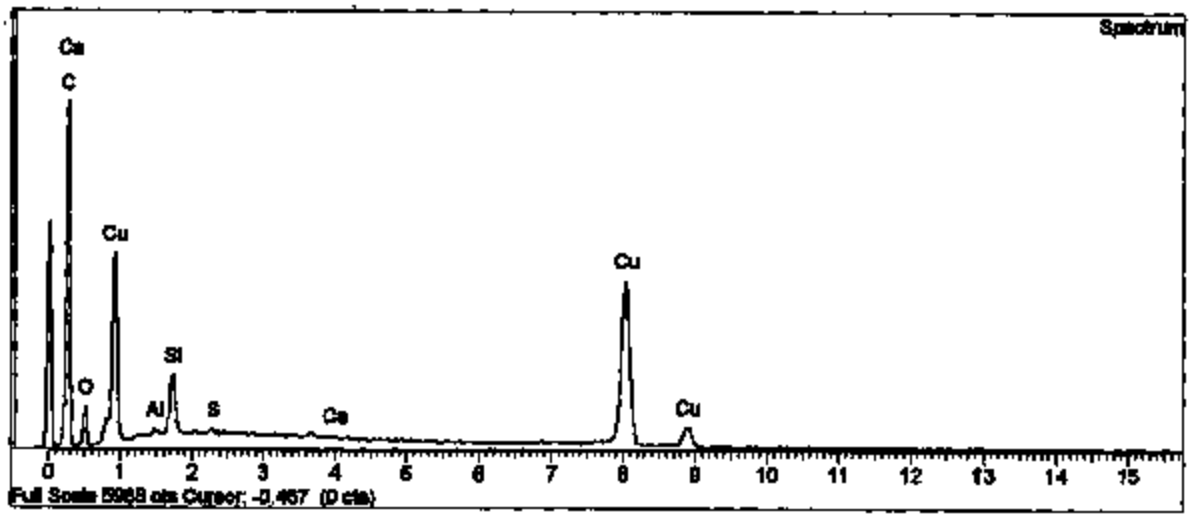


Figure 6: SEM photomicrograph and EDS spectra of deposit removed from face of cup.

Note: Nominal magnifications given for photomicrographs.

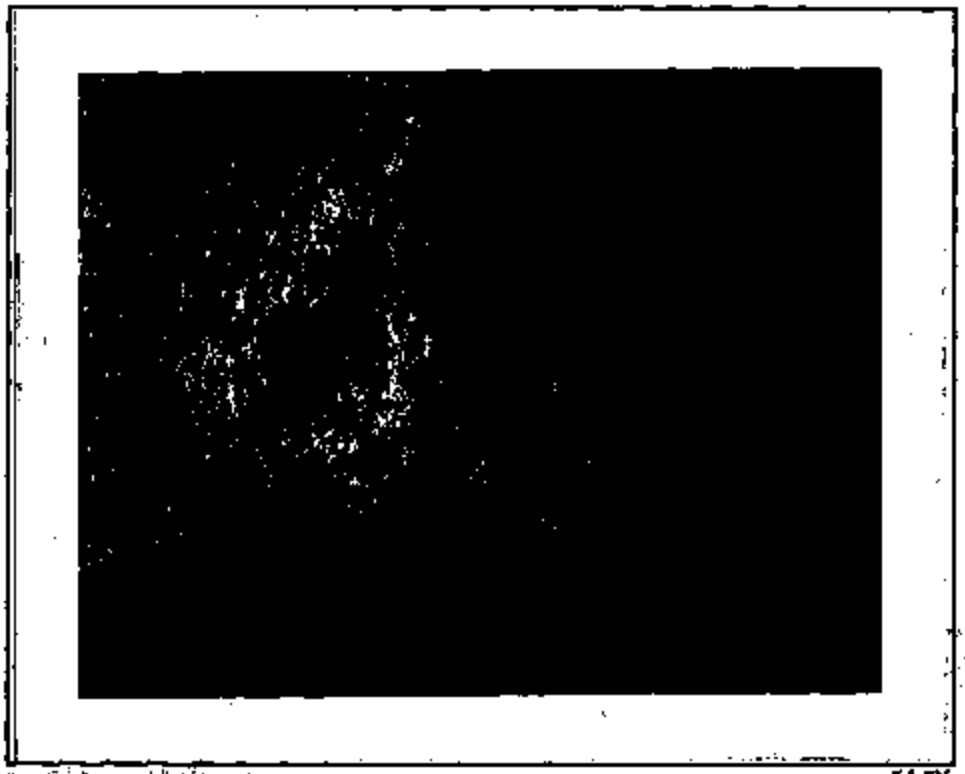
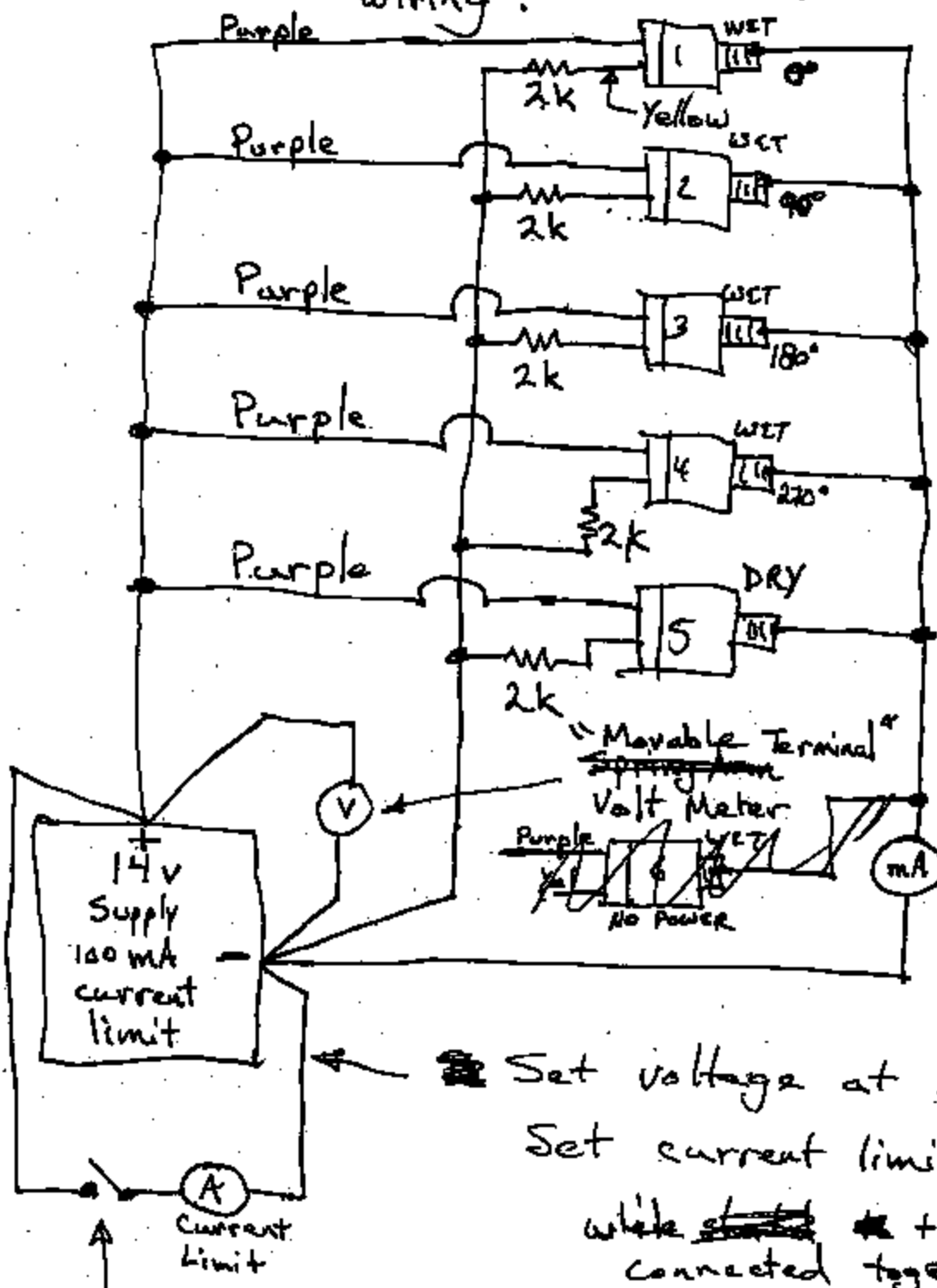


Figure 7: SEM photomicrograph showing pitting attack in surface of movable contact.

Note: Nominal magnifications given for photomicrographs.

wiring : switches w/connector



WET / POWERED
DRY / POWERED
WET / NO POWER
? DRY / NO POWER

Set voltage at 14 ± 0.1 volt

Set current limit to 100 ± 10 milliamps while + & − are connected together.

3713 9835

ExperimentData

Date & Time	supply volts	supply current	supply current Limit	Switch number	Leak microAmps Moving Terminal	Leak microAmps Stat Terminal	Open Circuit volts	Switch Resistance mov to stat	Resistance mov to hex	Resistance stat to hex	Switch mAmps	Connector voltage yellow wire	Connector voltage purple wire	Fluid added milli Liters	comments
															cal resistance = 0.1 ohms
8/1/00 2:54 PM	13.97	31.00	101	1				0.1	>40M	>40M	6.2	14	14		elbow @ 6 o'clock
8/1/00 3:30 PM	13.97			3				0.2	>40M	>40M	6.2	14	14		Elbow at 6 o'clock
8/1/00 3:30 PM	13.97			3					10M					1.5	flooded til came out of terminals
8/1/00 3:33 PM	13.97			4					22M					0.8	added DOT3 to dry switch.
8/1/00 3:35 PM	13.97			4				0.2	>40M	>40M	6.2	14	14		Elbow at 6 o'clock
8/1/00 3:35 PM	13.97			5					27M					0.7	added DOT3 to dry switch.
8/1/00 3:35 PM	13.97			5				0.2	>40M	>40M	6.2	14	14		Elbow at 4 o'clock
8/1/00 5:05 PM	13.97			2				0.2	>40M	>40M	6.2	14	14		Elbow at 8o'clock
8/1/00 5:05 PM	13.97			2					30M					0.5	added DOT3 to dry switch
8/2/00 7:50 AM	13.96			1				0.1	>40M	>40M	6.2	13.96	13.96		cal resistance = 0.1
8/2/00 7:50 AM	13.96			2				0.2	>40M	>40M	6.3	13.96	13.96		
8/2/00 7:50 AM	13.96			2					>20M					0.1	
8/2/00 7:50 AM	13.96			3				0.2	>40M	>40M	6.3	13.96	13.96		
8/2/00 7:50 AM	13.96			3					>40M					0.5	reflooded
8/2/00 7:50 AM	13.96			4				0.2	>40M	>40M	6.3	13.96	13.96		
8/2/00 7:50 AM	13.96			4					>20M					0.1	
8/2/00 7:50 AM	13.96			5				0.2	>40M	>40M	6.3	13.96	13.96		
8/2/00 7:50 AM	13.96			5					>20M					0	
8/3/00 8:47 AM	13.96			1	0.1			0.2	>40M	>40M	6.2	13.96	13.96		
8/3/00 8:47 AM	13.96			2	32			0.2	>40M	>40M	6.3	13.96	13.96		
8/3/00 8:47 AM	13.96			3	30			0.2	>40M	>40M	6.3	13.96	13.96		
8/3/00 8:47 AM	13.96			4	31			0.2	>40M	>40M	6.2	13.96	13.96		
8/3/00 8:47 AM	13.96			5	40			0.2	>40M	>40M	6.3	13.96	13.96		
8/4/00 9:09 AM	13.93			1	0.1	0.1	.0	0.2	>40M	>40M	6.2	13.96	13.96		
8/4/00 9:09 AM	13.93			2	25	25	1.174	0.2	>40M	>40M	6.3	13.96	13.96		
8/4/00 9:09 AM	13.93			3	31	31	1.2	0.2	>40M	>40M	6.3	13.96	13.96		
8/4/00 9:09 AM	13.93			4	32	32	1.117	0.2	>40M	>40M	6.2	13.96	13.96		
8/4/00 9:09 AM	13.93			5	28	28	1.083	0.2	>40M	>40M	6.3	13.96	13.96		
8/7/00 8:41 AM	13.95			1	0.1	0.1	0	0.2	>40M	>40M	6.2	13.95	13.95		
8/7/00 8:41 AM	13.95			2	14	14	1.04				6.3	13.95	13.95		
8/7/00 8:41 AM	13.95			3	22	22	1.17	0.2	>40M	>40M	6.3	13.95	13.95		
8/7/00 8:41 AM	13.95			4	24	24	1.08	0.2	>40M	>40M	6.2	13.95	13.95		
8/7/00 8:41 AM	13.95			5	176	176	0.33	0.2	>10M	>10M	6.4	13.95	13.95		
8/7/00 8:41 AM	13.95			2	50	50		0.2	>24M	>24M				0.1	
8/8/00 8:46 AM	13.95			1	0.2	0.2	0	0.2	>40M	>40M	6.2	13.95	13.95		
8/8/00 8:46 AM	13.95			2	23	27	0.82	0.2	>20M	>20M	6.3	13.95	13.95		
8/8/00 8:46 AM	13.95			3	22	22	1.19	0.2	>40M	>40M	6.2	13.95	13.95		
8/8/00 8:46 AM	13.95			4	28	28	1	0.2	>40M	>40M	6.3	13.95	13.95		
8/8/00 8:46 AM	13.95			5	3400	3400	0.007	0.2	9300	9300	9.9	13.95	13.95		

8/9/00 9:43 AM	13.95			1	0.1	0	0	0.2 >40M	>40M	6.2	13.95	13.95	
8/9/00 9:43 AM	13.95			2	1560	1560	0.15	0.2 >2M	>2M	7.3	13.95	13.95	
8/9/00 9:43 AM	13.95			3	11.7	11.7	1.2	0.2 >40M	>40M	6.3	13.95	13.95	
8/9/00 9:43 AM	13.95			3	57	57							0.1
8/9/00 9:43 AM	13.95			4	17	17	1	0.2 >40M	>40M	6.3	13.95	13.95	
8/9/00 9:43 AM	13.95			5	3083	3083	0.007	0.2 >7000	>7000	9	13.95	13.95	
8/9/00 9:43 AM	13.95			4	48	48							0.1
8/10/00 8:24 AM	14.00			1	0.1	0	0	0.2 >40M	>40M	6.3	14	14	
8/10/00 8:24 AM	14.00			2	585	585	0.15	0.2 >10M	>10M	6.6	14	14	
8/10/00 8:24 AM	14.00			3	640	640	1.2	0.2 >40M	>40M	6.7	14	14	
8/10/00 8:24 AM	14.00			4	85	85	1	0.2 >40M	>40M	6.4	14	14	
8/10/00 8:24 AM	14.00			5	1759	1759	0.008	0.2 >10M	>10M	8.1	14	14	
8/11/00 10:06 AM	13.99			1	0.2	0.2	0	0.2 >40M	>40M	6.4	13.99	13.99	
8/11/00 10:06 AM	13.99			2	1990	1990	0.02	0.2 1642	1500	21.4			max= 8040, min = 1440 uAmp
8/11/00 10:06 AM	13.99			3	3000	3000	0.5	0.2 >2.4M	>2.4M	6.5			max= 28880, min = 240 uAmp
8/11/00 10:06 AM	13.99			4	966	966	0.2	0.2 >0.7M	>0.7M	7.1			max= 2076, min = 904 uAmp
8/11/00 10:06 AM	13.99			5	2790	2790	0	0.2 5620	5620	9.2			max= 2816, min = 2740 uAmp
8/12/00 1:40 PM	3.08			1	0.1	0.1	0.001	0.2 >40M	>40M	6.3	13.99	13.99	
8/12/00 1:40 PM	3.08			2	360	360	0.5	0.2 1400	1400	6.8	13.99	13.99	leak mAmps max = 14.08, min = 0.28, avg 0.36.
8/12/00 1:40 PM	3.08			3	2840	2840	0.3	0.2 >1M	>1M	6.9	13.99	13.99	mA max 9.64 , min 2.24.
8/12/00 1:40 PM	3.08			4	3350	3350	0.03	0.2 26000	26000	8.6	13.99	13.99	mA max 18.0, min 3.2
8/12/00 1:40 PM	3.08			5	510	510	0.01	0.2 27000	27000	6.8	13.99	13.99	mA are stable
8/13/00 8:56 AM	14.00			1	0.1	0.1	0.01	0.2 >12M	>12M	6.4	13.99	13.99	0
8/13/00 8:56 AM	14.00			2	30420	30420	0.001	0.2 >2.5M	>2.5M	6.5	13.99	13.99	0 33.2 to 29.0 m Amp leak
8/13/00 8:56 AM	14.00			3	3900	3900	0.004	0.2 2900	2900	10.8	13.99	13.99	0 1.16 to 29.08 mA leak
8/13/00 8:56 AM	14.00			4	9760	9760	0.004	0.2 5400	5400	13.3	13.99	13.99	0 8.0 to 14.84 mA leak
8/13/00 8:56 AM	14.00			5	420	420	0.014	0.2 52000	52000	6.8	13.99	13.99	0
8/14/00 8:00 AM	8.95	197.00	200	1	0.2	0.2	0.103	0.1 >40M	>40M				0 supply still in current limit mode
8/14/00 8:00 AM	8.95	197.00	200	2	145000	145000	0.087	0.2 >0.6M	>0.6M	7	14.03	14.03	supply still in current limit mode This happened at 315 mAmp. The current then dropped to 88 mAmp. The drop in current may have occurred because the conducting path was destroyed by the extra
8/14/00 8:05 AM	14.00	88.00	315	2	2870	2870	0.12	0.1 3030	3170	11	14.03	14.03	0 current. leak max 7.92 mA min 2.68 mA
8/14/00 8:05 AM	14.00			3	6320	7340				12	14.03	14.03	0 avg 6.32 mA leak max – 17.84 mA min – 15.84 mA
8/14/00 8:05 AM	14.00			4	16770	16770	0.002	0.2 2230	2330	25	14.03	14.03	0 avg = 16.77 mA
8/14/00 8:05 AM	14.00			5	314	314	0.021	0.2 81100	95700	6	14.03	14.03	0 stable leak current
8/14/00 9:20 AM	14.00	55.00	100	2									0 Add second power supply for switch number 2.
8/15/00 9:01 AM	1.00			1	0.2	0.2	0.015	0.2 >40M	>40M	6	14.09	14.09	0
8/15/00 9:01 AM	1.00			2	6770	6780	0.002	0.2 3780	3800	6.2			0
8/15/00 9:01 AM	14.00			3	17620	15980	0.006	0.2 1540	1690	21	14.09	14.09	0 leak mAmp range 35.44 to 10.48 m:h, 26.2 to 12.72 s:h.

8/15/00 9:01 AM	14.00		4	1410	1380	0.018	0.2 41100	13690	8	14.09	14.09	0
8/15/00 9:01 AM	14.00		5	286	287	0.032	0.2 92800	414000	8	14.09	14.09	0
8/16/00 10:30 AM	14.00		1	0.2	0.2	0.201	0.2 >40M	>40M	6	14.06	14.06	0
8/16/00 10:30 AM	14.00		2	4590	4280	0.011	0.2 3590	3292	8	13.98	13.97	0 leak mAmps range m:h 30.4 to 44.8
8/16/00 10:30 AM	14.00		3	35700	44700	0.006	0.2 845	10470000	7	11.46	11.22	0 s:h 38 to 50.8
8/16/00 10:30 AM	14.00		4	4100	4100	0.013	0.2 2523	2140	14	9.15	9.23	0
8/16/00 10:30 AM	14.00		5	300	300	0.051	0.2 422000	88900	7	8.39	8.44	0
8/17/00 12:00 PM	1.50		1	0.3	0.3	0.045	0.2 >40M	>40M	6	14.08	14.08	0
8/17/00 12:00 PM	1.50		2	2300	2140	0.025	0.1 1580	910		14.08	14.08	0 leak mA range m:h 31.16 to 37.44
8/17/00 12:00 PM	1.50		3	35370	36880	0.011	0.1 4670	4590	24	14.08	14.08	0 s:h 37.92 to 36.68
8/17/00 12:00 PM	1.50		4	47800	47700	0.039	0.1 19720	19580		14.08	14.08	0
8/17/00 12:00 PM	1.50		5	100	90	0.13	0.1 23560	24100	7	14.08	14.08	0
8/18/00 12:30 PM	14.00		1	0.3	0.3	0.032	0.1 >40M	>40M	6	14.01	14.01	0
8/18/00 12:30 PM	14.00		2	2820	4300	0.04	0.1 10320	10500	11	14.01	14.01	0 leak mAmps range m:h 1.36 to 5.36 s:h 2.32 to 5.80
8/18/00 12:30 PM	14.00		3	1000000	33120	0.003	0.1 1066	1068	36	14.01	14.01	0 leak mAmp range m:h 31.24 to >1000 s:h 31.16 to 39.48
8/18/00 12:30 PM	14.00		4	2280	1530	0.011	0.1 8770	1005	8	14.01	14.01	0
8/18/00 12:30 PM	14.00		5	624	627	0.017	0.1 50900	52100	7	14.01	14.01	0
8/21/00 9:00 AM	1.90		1	0.5	0.5	0.068	0.2 >40M	>40M	6	14.15	14.15	0
8/21/00 9:00 AM	1.90		2	0.2	0.2	0.08	0.2 3.4	3.3	3.245	14	14	0 sep. power supply
8/21/00 9:00 AM	1.90		3	2850	2780	0.009	0.2 51600	51500	12	14.15	14.15	0 leak mAmp range m:h 1.88 to 11.84 s:h 2.0 to 6.6
8/21/00 9:00 AM	1.90		4	11670	12860	0.004	0.2 3937	4250	13	14.15	14.15	leak mAmp range m:h 8.24 to 16.88 s:h 8.68 to 15.72
8/21/00 9:00 AM	1.90		5	250	250	0.089	0.1 476000	582000	6	14.15	14.15	0
8/22/00 7:30 AM	14.00		1	0.2	0.2	0.035	0.2 >40M	>40M	6	14.01	14.01	0
8/22/00 7:30 AM	14.00	6.24	2	3500	4110	0.042	0.1 10530	10610	6.242	14	14	0 leak mAmp range m:h 2.03 to 4.98 s:h 2.59 to 5.63
8/22/00 7:30 AM	14.00		3	10470	10560	0.016	0.2 1140	1130	16	14.01	14.01	leak mAmp range m:h 9.32 to 14.52 0 s:h 9.2 to 13.16
8/22/00 7:30 AM	14.00		4	9730	9220	0.002	0.2 9010	9840	23	14.01	14.01	leak mAmp range m:h 9.32 to 11.28 0 s:h 8.64 to 11.84

ExperimentData

8/22/00 7:30 AM	14.00			5	280	270	0.026	0.2	53700	52900	7	14.01	14.01	0
8/23/00 7:00 AM	4.80			1	0.2	0.2	0.031	0.2	>40M	>40M		14	14	0
8/23/00 7:00 AM	4.80			2	112200	112100		0.2	4.8	4.7		14	14	0
8/23/00 7:00 AM	4.80			3	255900	256900	0.0002	0.1	5.8	5.8		14	14	0.1 switch is slightly warm to the touch
8/23/00 7:00 AM	4.80			4	634000	630000	0.0001	0.2	3.3	3.5		14	14	0.1
8/23/00 7:00 AM	4.80			5	2.7	2.6	0.134	0.1	2650000	2540000		14	14	0
8/24/00 12:00 AM	4.20			3										1 white vapor seen rising through entry hole when syringe was removed. stopped conducting after approximately 10minutes at 8 maps and 12 volts.
8/24/00 2:30 PM	12.00	8000.00		4										0 Switch is now disconnected.
8/25/00 12:00 AM	14.00	6.25	100	1	0.5	0.5	0.46	0.2	>40M	>40M		14.05	14.05	0 open circuit > 40Meg leak mAmps range m:h 3.16 to 6.04 s:h 3.36 to 15.96
8/25/00 12:00 AM	0.50	100.00	100	2	4570	5150	0.12	0.2	173000	151000		0.511	0.516	0 set power supply to 14.0v
8/25/00 12:00 AM	0.20	100.00	100	3	208	216	0	0.2	3.7	3.7		0.258	0.257	0 set supply to 14.0v
8/25/00 12:00 AM	14.00	6.22	100	5	0.1	0.1	0.042	0.2	179000	178000		14.03	14.03	0 cal = 0.1
8/28/00 10:00 AM	14.00		100	1	0.2	0.2	0.0221	0.1	>40M	>40M	6.24	14.05	14.05	0 open circuit >40M
8/28/00 10:00 AM	1.00		100	2	108100	108100	0	0.5	13.9	13.9	0.66	1.039	0.995	0 o.l. condition
8/28/00 10:00 AM	0.40		100	3	108500	108700	0	0.1	4	4	0.1314	0.41	0.41	0 switch resistance range m:h 146k to 217 k
8/28/00 10:00 AM	14.00		100	5	180	180	0.033	0.2	186800	268500	6.23	14.03	14.03	0 s:h 230k to 302k open circuit >40M
8/29/00 10:00 AM	14.00	6.24	100	1	0.2	0.2	0.0153	0.2	>40M	>40M		14.05	14.05	0 cal = 0.1 over oad condition. Actual voltage set to 14.0 vdc when
8/29/00 10:00 AM	0.30	0.17	100	2	112400	112300	0	0.2	11.2	11.2		0.82	0.82	0 not current limited. overload condition. Actual voltage is 14v when not
8/29/00 10:00 AM	0.20	0.13	100	3	100900	100900	0	0.2	3.2	3.2		0.3	0.3	0 current limited. switch resistance range m:h 156K to 224K
8/29/00 10:00 AM	14.00	6.25	100	5	180	180	0.031	0.2	183100	265900		14.03	14.03	0 s:h 244k to 282k
8/30/00 10:00 AM	14.00	6.24	100	1	0.2	0.2	0.018	0.2	>40M	>40M		14.05	14.05	0
8/30/00 10:00 AM	0.50	0.34	100	2	114600	114600	0	0.2	8.4	8.4		0.666	0.666	0
8/30/00 10:00 AM	0.00	0.02	100	3	100800	100800	0	0.2	.6	.6		0.043	0.043	0
8/30/00 10:00 AM	14.00	6.25	100	5	17.8	17.8	0.377	0.2	>6M	>6M		14.07	14.07	0
8/30/00 2:20 PM				3				0.2	.7	.7				0 before moving to hi current fixture.

8/30/00 2:20 PM	13.50	0.00	14500	3				0.2 0.6	0.7				This switch was removed from the fixture and mounted on a bracket for video taping. The supply was adjusted to 13.5 volts and the current limit set to 14.5 amps. A thermo couple was extenally mounted on the base near 0 the moving terminal.
8/30/00 2:21 PM		15100.00	14500	3	15100000							2.38	0 Dense white smoke issueing from hole in base.
8/30/00 2:21 PM				3				0.2 .6	.7				0 Now on hi current fixture.
8/30/00 2:22 PM		14500.00	14500	3	14500000							1.77	0
8/30/00 2:26 PM		14500.00	14500	3	14500000							1.48	0
8/30/00 2:31 PM		14500.00	14500	3	14500000							1.37	0
8/30/00 2:36 PM		14500.00	14500	3	14500000							1.27	0
8/30/00 2:41 PM		14500.00	14500	3	14500000							1.18	0
8/30/00 2:46 PM		14500.00	14500	3	14500000							1.19	0
8/30/00 2:51 PM		14500.00	14500	3	14500000							1.28	0
8/30/00 2:56 PM		14500.00	14500	3	14500000							1.63	0
8/30/00 2:57 PM		14500.00	14500	3	14500000							1.92	0
8/30/00 2:58 PM		14500.00	14500	3	14500000							2.16	0 very bright glow inside switch cavity.
8/30/00 2:58 PM		14500.00	14500	3	14500000							2.22	0
8/30/00 2:58 PM		14500.00	14500	3	14500000							2.22	0 Flame begins
8/30/00 2:58 PM		14500.00	14500	3	14500000							2.32	0
8/30/00 2:58 PM		14500.00	14500	3	14500000							2.52	0
8/30/00 2:58 PM		2400.00	14500	3	2400000							6.96	0
8/30/00 2:58 PM		200.00	14500	3	200000							11.63	0
8/30/00 3:03 PM		1000.00	14500	3	1000000							12.29	0
8/30/00 3:04 PM		900.00	14500	3	900000							12.24	0
8/30/00 3:05 PM		100.00	14500	3	100000							9.44	0 Flame has gone out.
8/30/00 3:05 PM		0.00	14500	3	0.1							4.24	0 Switch removed from fixture.
8/31/00 9:00 AM	14.00	6.24	100	1	0.1	0.1	0.016	0.2 >40M	>40M		13.96	13.96	0
8/31/00 9:00 AM	0.60	0.30	100	2	114600	114600	0	0.2 6.4	6.4		0.694	0.697	0 back on test after disconnected on 8/24/2000. Thermo couple on base @ 9:15 AM 91.6 F
8/31/00 9:00 AM	2.70	1.22	2120	4	2108000	2109000	0.067	0.2 2.0	2.0		2.793	2.793	1 @10:30 AM 149 F
8/31/00 9:00 AM		6.23	100	5	31.5	31.5	0.203	0.2 >2M	>2M		13.99	13.99	0 cal + 0.1 ohm
9/1/00 9:03 AM	14.00		105	1	0.5	0.5	0.13	0.2 >21M	>21M	6	14.04	14.04	0 open ckt > 40M
9/1/00 9:19 AM	0.51		104	2	104	104	0	2 5	4.9	0.23	0.443	0.444	0
9/1/00 9:28 AM	0.28		109	4	109	109	0	0.2 2.4	2.4	0.13	0.208	0.208	0
9/1/00 9:37 AM	14.03		102	5	0.6	0.6	0.09	0.2 1.5M	1.5M	6.23	14.03	14.03	0
9/1/00 9:45 AM	14.03			5	168	168	0.55						0.2 Removed from test fixture and moved to Hi current
9/1/00 10:30 AM				2									0 supply fixture.

9/1/00 12:15 PM				2			0	0.1	5.7	5.7				0 On Hi current fixture. Set current limit to 18 amps. The plug for the hole in the base has fallen inside the
9/1/00 12:24 PM	13.53		18000	2										0 switch cavity. The leakage current indicates that the 5.7 ohm short to ground has changed to
9/1/00 12:31 PM	13.52	6.54	18000	2	500									0 27000 ohms.
9/1/00 12:56 PM	13.52	6.91	18000	2	850									0
9/1/00 1:15 PM	13.52	6.45	18000	2	460									0
9/1/00 1:43 PM	13.53	6.45		2										0
9/1/00 1:54 PM	13.52	6.64	18000	2	700									0 Switch is being returned to test fixture.
9/1/00 2:05 PM	0.19		109	4	109100	109100	0	0.2	2	1.9	0.08	0.183	0.183	0 Switch is being moved to hi current fixture.
9/1/00 2:16 PM	13.50	6.24	18000	4	220									0 Short to ground has chnaged from 2 ohms to 61,000.
9/1/00 2:20 PM	14.02		109	2	800	800	0	0.2	1975	1975	6.24	14.02	14.02	0 Switch is now back on low current fixture.
9/1/00 2:35 PM	13.53	6.11		4										0
9/1/00 3:20 PM	13.53	6.07		4	70									0
9/1/00 4:00 PM	13.53	6.07		4	70									0 current limit reduced to 100 mA for overnight
9/1/00 4:24 PM	13.53	6.06	210	4	70									0 unsupervised exposure.
9/5/00 2:00 PM	14.00	6.23	100	1	0.2	0.2	0.041	0.2	>40M	>40M		14.06	14.06	0
9/5/00 2:00 PM	0.80	16.83	100	2	108600	108600	0	0.2	50000	50000		14.02	14.02	0 contaminated with plug
9/5/00 2:00 PM	13.51	6.14	100	4	13530	13530	0.401	0.4	3.1M	3.1M		13.5	13.5	0
9/5/00 2:00 PM	8.70	15.89	100	5	98000	98000	0.0001	0.2	87.5	87.4		5.15	5.15	0
9/6/00 12:05 AM	13.50	6.30	14000	4	300									0
9/6/00 8:41 AM	14.00		104	1	0.2	0.2	0.029	0.2	>40M	>40M	6.23	14.06	14.06	0
9/6/00 8:41 AM	1.36		109	2	109000									0 current limit condition ended before measurement.
9/6/00 8:41 AM	14.02		109	2	1760	1760	0.06	0.2	15000	15000	6.23	14.02	14.02	0 leak current range 1.40 to 6.28.
9/6/00 8:59 AM	7.23		99	5	98000	98000	0	0.2	236	236	3.25	7.23	7.23	0
9/6/00 9:40 AM	13.53	6.51	206	4	415	394		0.1	1.4M	1.4M		13.53	13.53	0
9/6/00 9:50 AM	13.53		14000	4										0 increased current limit to 14 amps
9/6/00 10:15 AM	13.50	6.30	14000	4	300									0
9/6/00 2:12 PM	13.50	6.30	200	4	300									0 set current limit back to 200 mA for unsupervised
9/7/00 12:45 AM	13.50	6.26	200	4	280									0
9/7/00 10:00 AM	14.00	6.24	100	1	0.09	0.09	11.5	0.3	>40M	>40M		14.06	14.06	0
9/7/00 10:00 AM	0.90	9.86	100	2	7430	7430	0.0431	0.2	108700	106400		14.03	14.03	0
9/7/00 10:00 AM	13.51	6.34	100	4	114800	114800	0.1641	0.3	1530000	1530000		13.5	13.5	0
9/7/00 10:00 AM	14.00	2.55	100	5	99000	99000	0.0112	0.2	4530	4580		14.11	14.11	0
9/8/00 1:00 PM	14.00	6.23	1	1	0.15	0.15	0.0101	0.3	>40M	>40M		14.06	14.06	0
9/8/00 1:00 PM	2.00	104.40	100	2	3370	3370	0.0011	0.3	128200	128200		14.08	14.08	0
9/8/00 1:00 PM	13.50	6.01	100	4	550	550	0.11	0.3	990000	990000		13.5	13.5	0
9/8/00 1:00 PM	1.80	12.52	100	5	99250	99250	0.00001	0.3	12.5	12.5		1.61	1.61	0
9/8/00 4:49 PM	14.00			5	8400									0 leakage current range 3 to 12.1 mAmp
9/8/00 4:54 PM	14.00			5	128000									0 leakage current range 7.2 to 74.4 mAmps.
9/8/00 5:00 PM	13.50	7.60	200	4	1640									0

ExperimentData

9/11/00 10:51 AM	0.30	0.00	100	5	106900								0
9/11/00 10:53 AM	3.40	0.00	2000	5	2000000								0
9/11/00 10:53 AM	2.70	0.00	1000	5	1000000								0
													short to ground was capable of sustaining 2.144 amps.
9/11/00 10:55 AM		2144.00	2144	5	2144000								0 Switch got warm to touch.
9/11/00 2:53 PM	0.60	200.00	200	5	200000		0.0001	0.3 3.83	3.83		0.652	0.652	0
9/11/00 3:09 PM	14.00			1	0.05		0.015	0.2 >40M	>40M	6.21	14.05	14.05	0
9/11/00 3:15 PM	0.90	100.00	100	2	100000		0.0001	0.3 8.5	8.6	0.43			0
9/11/00 3:30 PM	3.00	2112.00	2112	2	2112000								0 short to ground capable of sustaining 2.11 amps
9/11/00 3:35 PM	0.30	100.00	100	2	100000								0 reset current limit to 100 mA.
9/11/00 3:37 PM	13.52	8.65	100	4	2730		0.0002	0.16 23350	23350		13.41	13.41	0
9/11/00 4:17 PM				2				4.5	4.5				0 measured before moving to hi current fixture.
													now on hi current fixture.
													Short to ground capable of 5 amps. Warm to touch.
													Internal pressure pushed out the wire grommet. Some
9/11/00 4:30 PM	3.80	5000.00	5000	2	5000000								0 white vapor observed coming out of connector.
													Power removed from switch to prevent burning until
9/11/00 4:40 PM	0.00	0.00	0	2									0 video equipment is in place.
9/11/00 4:45 PM	14.00		100	4									0 moved back to test fixture in #2 position.
9/12/00 10:15 AM	0.00	0.00	0	5				0.6 3.8	3.6				0 Removed from fixture for X-rays
9/12/00 10:15 AM	0.00	0.00	0	2				0.2 1	1				0 removed from fixture for Xrays.
9/12/00 11:00 AM	0.00	0.00	0	5				0.3 4	4				0 measured while mount in xray booth
													measured while in xray booth.
													This switch was left with central lab for determination of
9/12/00 11:00 AM	0.00	0.00	0	2				0.2 1	1				0 short circuit cause.
													placed on HI current fixture after xrays.
													Low ohms short is gone and grommet has popped out.
9/12/00 12:41 PM	13.52	16.50	125	5	9700		0.0001	0.2 3048	3060		13.48	13.48	0 Pushed grommet back in.
9/12/00 1:00 PM	14.00	6.21	100	1	0.19	0.19	0.0561	0.3 >40M	>40M		14.06	14.06	0
9/12/00 1:00 PM	14.00	7.79	100	4	0.28	0.28	0.0242	0.3 13800	14170		14.09	14.09	0
9/12/00 1:00 PM	13.52	15.48	100	5	0.21	0.29	0.0001	0.3 2730	2730		13.48	13.48	0
9/13/00 11:15 AM	5.20	100.00	100	4	100								0
9/13/00 11:15 AM	4.50	200.00	200	4	200								0
9/13/00 11:15 AM	4.60	300.00	300	4	300								0
9/13/00 11:15 AM	4.70	500.00	500	4	500								0
9/13/00 11:15 AM	4.70	400.00	400	4	400								0
9/13/00 11:15 AM	4.90	600.00	600	4	600								0
9/13/00 11:15 AM	4.80	700.00	700	4	700								0
9/13/00 11:20 AM	4.80	800.00	800	4	800								0
9/13/00 11:25 AM	3.80	2000.00	2000	4	2000								0
9/13/00 11:35 AM	0.20	100.00	100	4	100								0
9/13/00 4:38 PM	0.40	100.00	100	4	100								0
9/13/00 4:39 PM	3.70	2000.00	2000	4	2000								0
9/13/00 4:40 PM	0.40	100.00	100	4	100								0

9/13/00 4:43 PM	14.00	0.00	0	1	0.19					0
9/13/00 4:43 PM	0.40	0.00	0	4	100000					0
9/13/00 4:51 PM	13.52	0.00	0	5	21000					0
9/14/00 8:20 AM	1.70	100.00	100	4	100000					0
9/14/00 8:25 AM	2.70	1000.00	1000	4	1000000					0
9/14/00 8:30 AM	3.70	2000.00	2000	4	2000000					0 moved to HI current fixture
9/14/00 8:35 AM				5						0 moved to test fixture from HI current fixture.
9/14/00 2:05 PM	14.00			5	22000					0
9/14/00 2:05 PM	14.00			1	0.14					0
9/15/00 8:51 AM	14.00			1	0.13					0
9/15/00 8:53 AM	2.80		4000	5	4000000					0
9/15/00 8:54 AM	13.52			4	4600					0
										leakage current range 1.84 amps to 0.16 A.
										The current limit was increased about 48 minutes ago (
										9:42 AM)
										The current range capture was reset at 10:31 AM.
9/15/00 10:30 AM	13.95		14500	5	520000					0 Grommet seal was ejected since the previous reading.
										leakage range 2.6 amps to 0.16 amps.
										The 2.6 amp surge resulted in the current dropping to >
										0.001 amps.
9/15/00 10:45 AM	13.80		14500	5	640000					0 Range capture function reset at 10:46.
9/15/00 11:00 AM	14.13		14500	5	600					0 leakage range .008 to .000 amps
9/15/00 11:05 AM	14.13			5	800					0.1 added more 00T3.
9/15/00 3:00 PM	14.00	5.53	100	1	0.1	0.1			14.06	14.06 0
9/15/00 3:00 PM	14.00	5.53	100	4					14.13	14.13 0
9/15/00 3:00 PM	14.00	0.00	100	5					14.09	14.09 0
9/15/00 9:40 PM	0.00	0.00	0	1						0
9/15/00 9:40 PM	0.00	0.00	0	4						0
9/15/00 9:40 PM	0.00	0.00	0	5						0
9/18/00 8:33 AM	14.00	0.00	100	1						0
										Switch developed short M:H that would carry >15 amps.
										Switch was exposed to 14.5 amps for several hours.
9/18/00 8:33 AM	0.00	0.00	0	4						0 The plastic base melted and the switch fell apart.
9/18/00 8:33 AM	14.00	0.00	100	5						0
9/28/00 10:46 AM	14.00	0.00	104	1	0.1	0.1	0.2 >40M	>40M		0
										this switch has developed a short M:H that will draw more
										than 15 amps.
										The M:S contact resistance also very high. The switch has
9/28/00 10:46 AM	14.00	0.00	104	5	104000	0.1	14.4 0.4	14		0 been exposed to 14.5 amps for more than 2 hours.
9/28/00 10:46 AM	0.00	0.00	0	1						0
9/28/00 10:46 AM	0.00	0.00	0	5						0
9/28/00 3:30 PM	0.00	0.00	0	1						0
9/29/00 10:00 AM	14.00	0.00	0	1						0
9/29/00 10:53 AM	14.00	0.00	0	1			0.2 >40M	>40M		0

9/29/00 4:50 PM	0.00	0.00	0	1		0
10/2/00 8:53 AM	14.00	0.00	100	1		0
10/2/00 4:56 PM	0.00	0.00	0	1		0

Reimers, Steve (S.J.) Hi-Stat Test Supervision

From: Reimers, Steve (S.J.)
Sent: Friday, October 13, 2000 11:39 AM
To: Bob Melenovsky (E.) (E-mail)
Cc: Porter, Fred (F.J.); LaPointe, Norman (N.R.)
Subject: Test Detail Questions

Bob,

Here are some questions for the teleconference on 10/16/2000 at 10 AM.

(1) How was the switch contact function monitored? counter } differences recorded available.
(2) How were pressure cycle counts recorded? cycle box – no }
(3) How was pressure applied? ~~1950~~ could spike.s occur frequency ?
(4) Where was pressure measured? at MC & at Manifold (temporary)
(5) Was pressure recorded? how? review? — between set-ups (only @ set-up) correlated pulse.

What switch connector part number was used? no connectors

Did all connectors have red face seal and wire grommet (gray seal)?

Did leaking fluid appear at the top of the connector wire grommet (gray seal)? MC structure / Connector body collected fluid

Was the wire grommet forced out by the leaking fluid?

What wire part number and manufacturer was used to make electrical connection to switch?

What brake fluid was used? DOT 3 NAPA-brand (new).

Was air purged from switches? Yes. hypo injected

What was orientation of switch (vertical with base on top, ...)? connector up

Was the temp of the fluid recorded? Monitor by controller ±0.5°C (no record)

Where was fluid temp measured? In Manifold (no circulation). Cartridge heaters heats manifold to 85°C

Was the temp of the switch ambient recorded? Yes. circular chart

Where was ambient temp measured? / in chamber 1 foot in air stream (16 ft³ chamber)

Did the cycling run continuously without interruption? to failure (yes). (New parts from Service)

How much current was going through the switch? — must check 742mA @ 14V

Was the current level recorded? — no

Was the applied voltage recorded? — must check.

regards,
Steve Reimers
RV&T EESE Chassis E/E Systems
313 39 03286, fax 313 39 04145

Photos of failed seals.

~~Rise time~~
~~Fall time~~

3713 9849

3 — master cylinder (Chrysler Neon) 50 cc/chamber
1.5 M cycle capable
(pneumatically driven)

— 3/16" brake line (auto) to manifold
@ 1.5 hz (@2 hz, could not get cycle below 40 psi).

— Manifold had x150 cc include # air bleeds.

— Injected hypo to bleed air from switch.

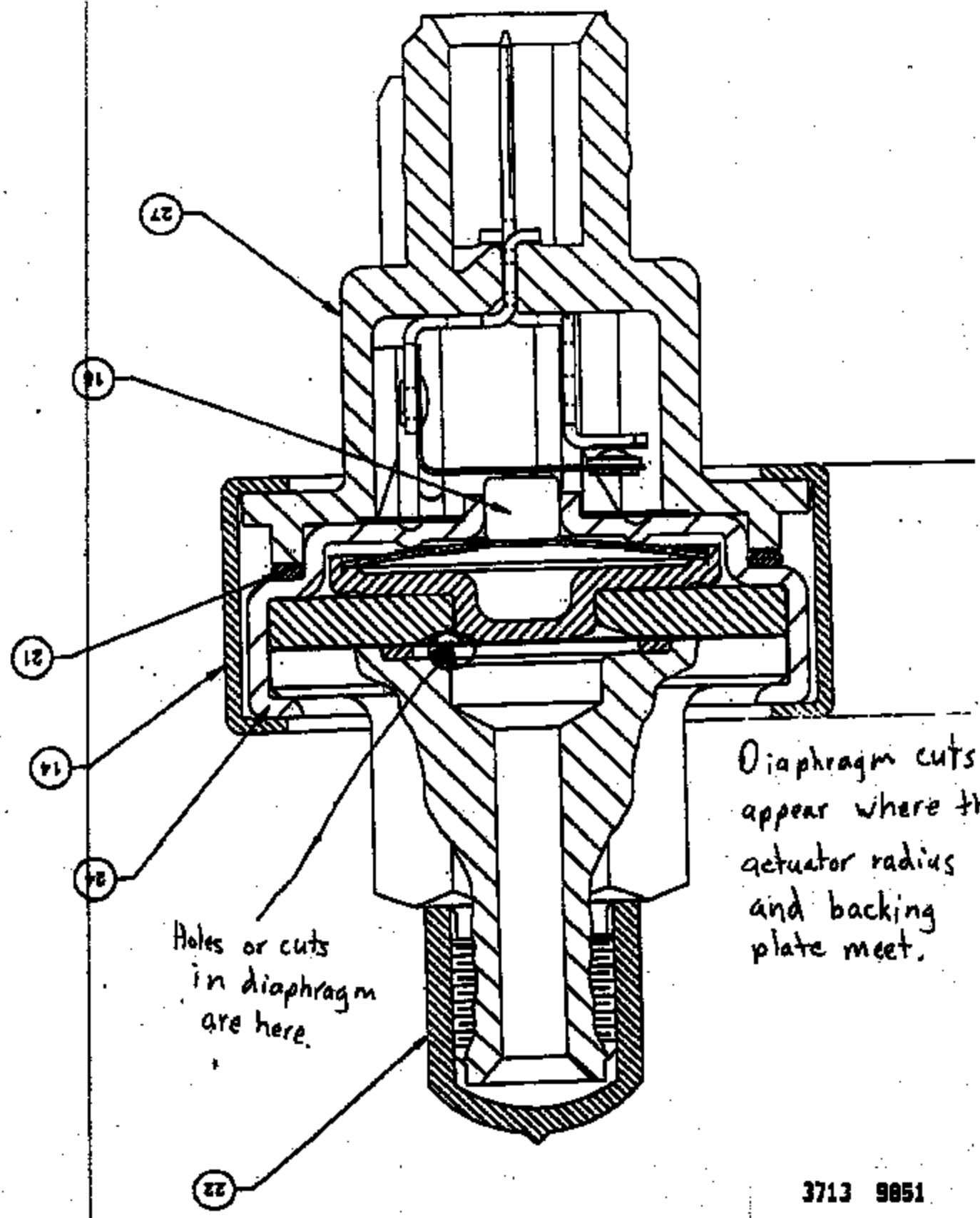
4 — 3000 psi range X Ducer
Signal Bandwidth to be checked.

Manifold Sketch —

Pressure Rise Time 1/10 [redacted] second

0.7 seconds dwell

Profile of a cycle


27
16
21
14
24
22
Holes or cuts in diaphragm are here.
Diaphragm cuts appear where the actuator radius and backing plate meet.

3713 9851

Reimers, Steve (S.J.)

From: Porter, Fred (F.J.)
Sent: Wednesday, March 01, 2000 5:18 PM
To: Reimers, Steve (S.J.)
Subject: FW: Speed Control Deactivation Switch

—Original Message—
From: Sheffield, Drew (D.L.)
Sent: Wednesday, March 01, 2000 3:29 PM
To: Porter, Fred (F.J.)
Subject: RE: Speed Control Deactivation Switch

Fred,

fyi I spoke with Bob of HI-Stat and gave him the name and numbers for our M/C suppliers – Bosch, Tokico, TRW, and Conti.

Sincerely,

Drew Sheffield

Purchasing Specialist, Front and Rear Suspension Modules
Chassis & Electrical Commodity Management
(313)337-8408, fax (313)317-4260, OMP MD 665

—Original Message—
From: Porter, Fred (F.J.)
Sent: Thursday, February 24, 2000 4:47 PM
To: Sutter, Lawrence (L.D.); Sheffield, Drew (D.L.)
Cc: Melenovsky, Bob (B.); Reimers, Steve (S.J.)
Subject: Speed Control Deactivation Switch

Need your help to identify vehicle volumes.

We are moving forward with developing a new source for the switch. We have been working with Bob Melenovsky of HIStat as an alternative.

HIStat has provided an engineering estimate as follows:

Piece Price	$2.29 @ 2M/year
	$2.43 @ 1M/year
	$2.59 @ 500k/year
Tooling	$302,000
Capital	$1,100,000

For our next steps, we need to accurately identify which vehicle lines are using this part and the volumes. This will help HIStat develop a more accurate business plan.

Then we need to identify the timing for implementing the new brake pedal clevis design so that we can coordinate a change to a brake pedal travel switch for this function. I understand the first implementation is scheduled for the '03 Windstar.

Do you know who we can contact for this information?

Regards,

Fred Porter
Supervisor, Chassis E/E Systems Applications Engineering
Phone: (313)84-53722 Fax: (313)39-04145
E-mail: fporter@ford.com

Reimers, Steve (S.J.)

From: Porter, Fred (F.J.)
Sent: Tuesday, June 06, 2000 5:10 PM
To: Reimers, Steve (S.J.)
Subject: FW: RPS Form from sreimers

FYI.

Regards,

Fred Porter
Supervisor, Chassis E/E Systems Applications Engineering
Phone: (313)84-53722 Fax: (313)39-04145
E-mail: fporter@ford.com

-----Original Message-----
From: Thomas, Sharon (S.C.)
Sent: Tuesday, June 06, 2000 5:10 PM
To: Porter, Fred (F.J.)
Subject: RE: RPS Form from sreimers

This note is sufficient.

-----Original Message-----
From: Porter, Fred (F.J.)
Sent: Tuesday, June 06, 2000 4:49 PM
To: Thomas, Sharon (S.C.)
Subject: RE: RPS Form from sreimers

I approve this order. Do I need to enter this somewhere or is this note sufficient?

Regards,

Fred Porter
Supervisor, Chassis E/E Systems Applications Engineering
Phone: (313)84-53722 Fax: (313)39-04145
E-mail: fporter@ford.com

-----Original Message-----
From: Thomas, Sharon (S.C.)
Sent: Saturday, June 03, 2000 12:40 PM
To: Porter, Fred (F.J.)
Subject: FW: RPS Form from sreimers

Fred, please approve.

-----Original Message-----
From: wwwadm@b5store.pd8.ford.com [mailto:wwwadm@b5store.pd8.ford.com]
Sent: Thursday, June 01, 2000 3:26 PM
To: sthoma38@ford.com
Subject: RPS Form from sreimers

New Order
Requested by: sreimers
Telephone: 1-313-3903286
Building: 402834, ou
Room Number: 3E008
Ship to:
345 S MILL ST
LEXINGTON, Ohio
44904
Attn:David Schaefer,
phone 419-884-4156
Total Part Cost: 40,000
Total Service Cost: 0
Total Tooling Cost: 0
Combined Cost: 40,000
Buyer: Trueblowski, Dan
Supplier Code: F903
Supplier Name: Hi-Stat
Supplier Address:
2350 Franklin Road
Suite 200
Bloomfield Hills, Michigan 48302
Supplier Contact: Bob Melenovsky
Supplier Phone: 248-332-2280
Supplier Fax: 248-332-2296
Required Date: 6/30/2000
Worktask/Project: J00
Department Code: T402
Purpose:
We are working with Hi-Stat to develop them as a Brake Pressure switch supplier.
Base part number is 9F924.
50 proto-type BrakePressure Switch 800
40000

All shaded areas must be filled in to process your request.

Ford

Request for Central Laboratory Service

15000 Century Dr., Dearborn, MI 48120-1267 FAX (313) 32-21614

Administrative Use Only	
Laboratory Number	Date
03072	9-12-00

[redacted]

Secondary Contact	Telephone	CD6 ID	FAX
FRED Porter			

Send Report To	Bill To
[redacted]	[redacted]

Must

Sampling

Material	Sample Handling	Source	TOX/CAS #
[redacted]	X Return after test ___ Dispose after test		

Part/Assembly Number (Continued)				Supplier
F2VC-9F924-AB Brake Pressure Switch	#2, #5, SEMPLAR	N/A	WHT	TI

Specification

[redacted]

Requester Info. Box [Requester Use]

Stop testing upon failure?

___ No ___ Yes

Specific Testing Requirements/Additional Sample Information

X RAY (PHOTOS) of Samples.
Completed and Samples returned,
Photos taken with Sample,
Samples in Lab

Report *(A signed hard copy final report will be mailed.)*

Date you would like report: 9-15-00

Date you must have report: 9-15-00

[Check any others that apply.]

___ Transmit preliminary results ___ FAX final report X Send photographs only

___ Phone preliminary results ___ No typed report [results/data]

Administrative Use Only *Initial Routing*		
___ Chemistry (313) 33-78277	X Metallurgy & Mechanical (313) 32-21613	___ Polymers, Coatings & Corrosion (313) 99-46698

For information about services or assistance in completing this form, refer to the Central Laboratory WEB page. [www.dearborn3.ford.com/met/northamer/central.htm]
Laboratory number and date cannot be assigned without receipt of samples.
Samples will be disposed of 30 days after report completion, unless otherwise requested.

CL-Form #CLF07_02

3713 9855

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 03022

September 13, 2000

To:	S. Reimers	(313) 3-03286	(313) 39-04146 FAX
From:	A. Zinkosky	(313) 59-41444	

Subject: Brake Pressure Switch
- Part Number: F2VC-9F924-AB
- Specification: Not provided
- Supplier: Texas Instruments

Received: The brake pressure switch assemblies were received on September 12, 2000 and were identified as: Exemplar; #2 and #5

Object: Provided radiographic service per request.

Data and Analysis:

The sample and documentary photographs were taken by the requester upon completion of the radiographic examination.

X-ray Film	___	
X-ray Video Tapes	___	
X-ray Photographs	x	were provided to the requester for his/her interpretation.[1]

[1] Corporate records retention policy requires that all negatives, tapes, and photographs be retained for three years from date of issue and then be properly disposed of. If your office does not wish to maintain the records as required, please return the radiographs for our file.

Concur: _____
P. F. Klaas, Supervisor
Metallurgy & Mechanical Section

By: _____
Alex Zinkosky (AZINKOSK)
Laboratory Specialist

AZ/acj

3713 9856

Central Laboratory
15000 Century Drive
Dearborn, MI 48120-1267
FAX (313) 322-1614

Report 03022

September 13, 2000

To:	S. Reimers	(313) 3-03286	(313) 39-04145 FAX
From:	A. Zinkosky	(313) 59-41444	

Subject: Brake Pressure Switch
- Part Number: F2VC-9F924-AB
- Specification: Not provided
- Supplier: Texas Instruments

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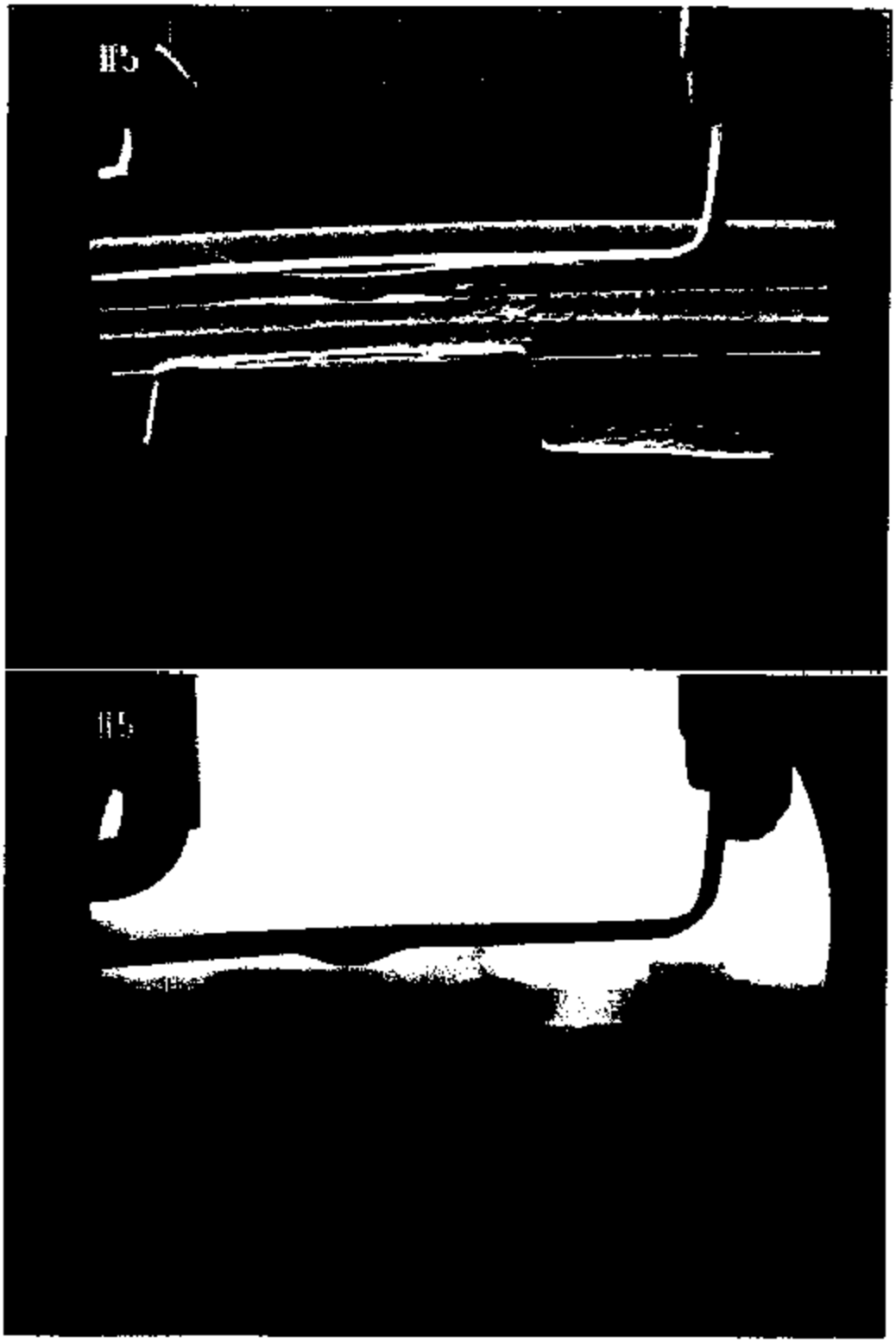
Concur: _____
P. F. Klaas, Supervisor
Metallurgy & Mechanical Section

By: _____
Alex Zinkosky (AZINKOSK)
Laboratory Specialist

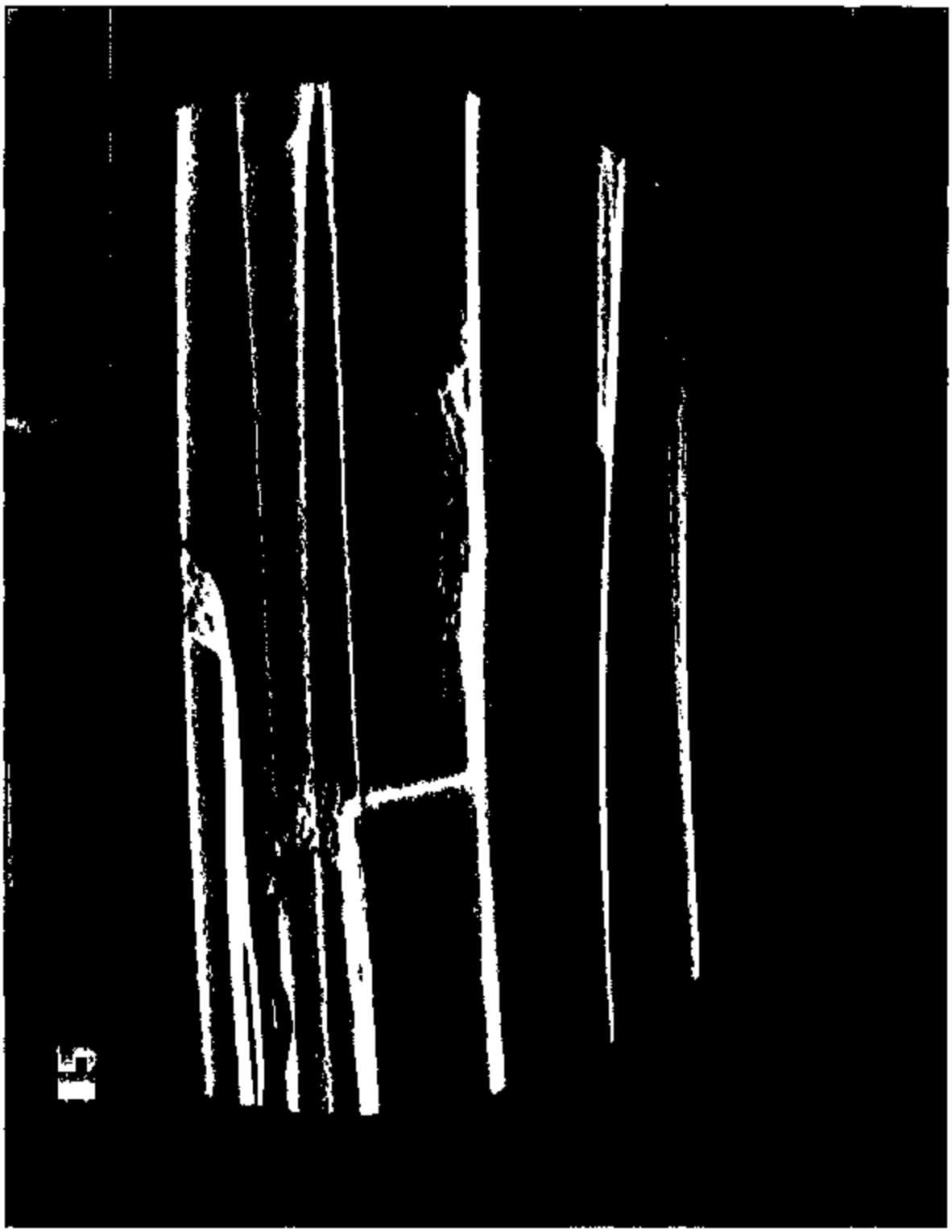
AZ/acj

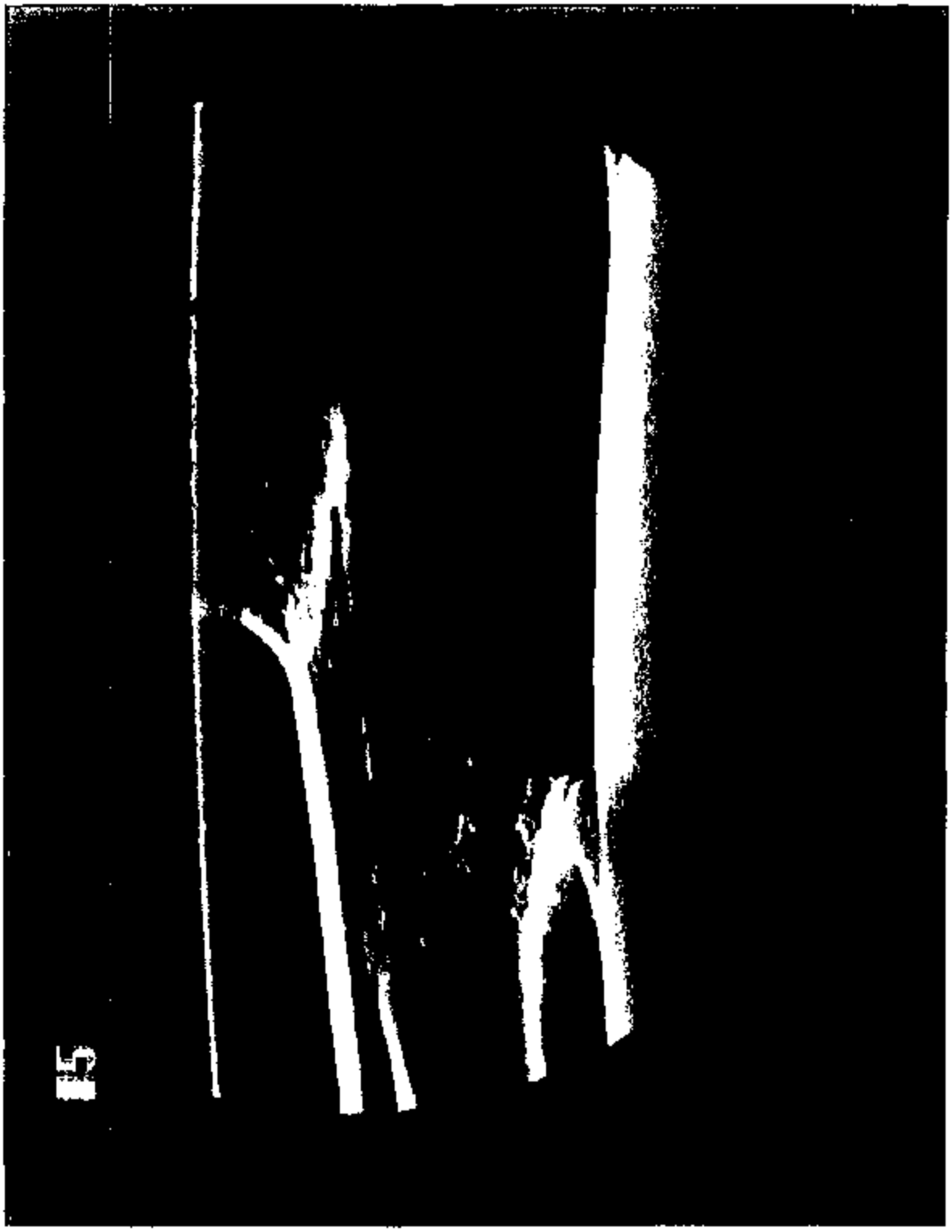
3713 9857



3713 9658

PRODUCED BY FORD

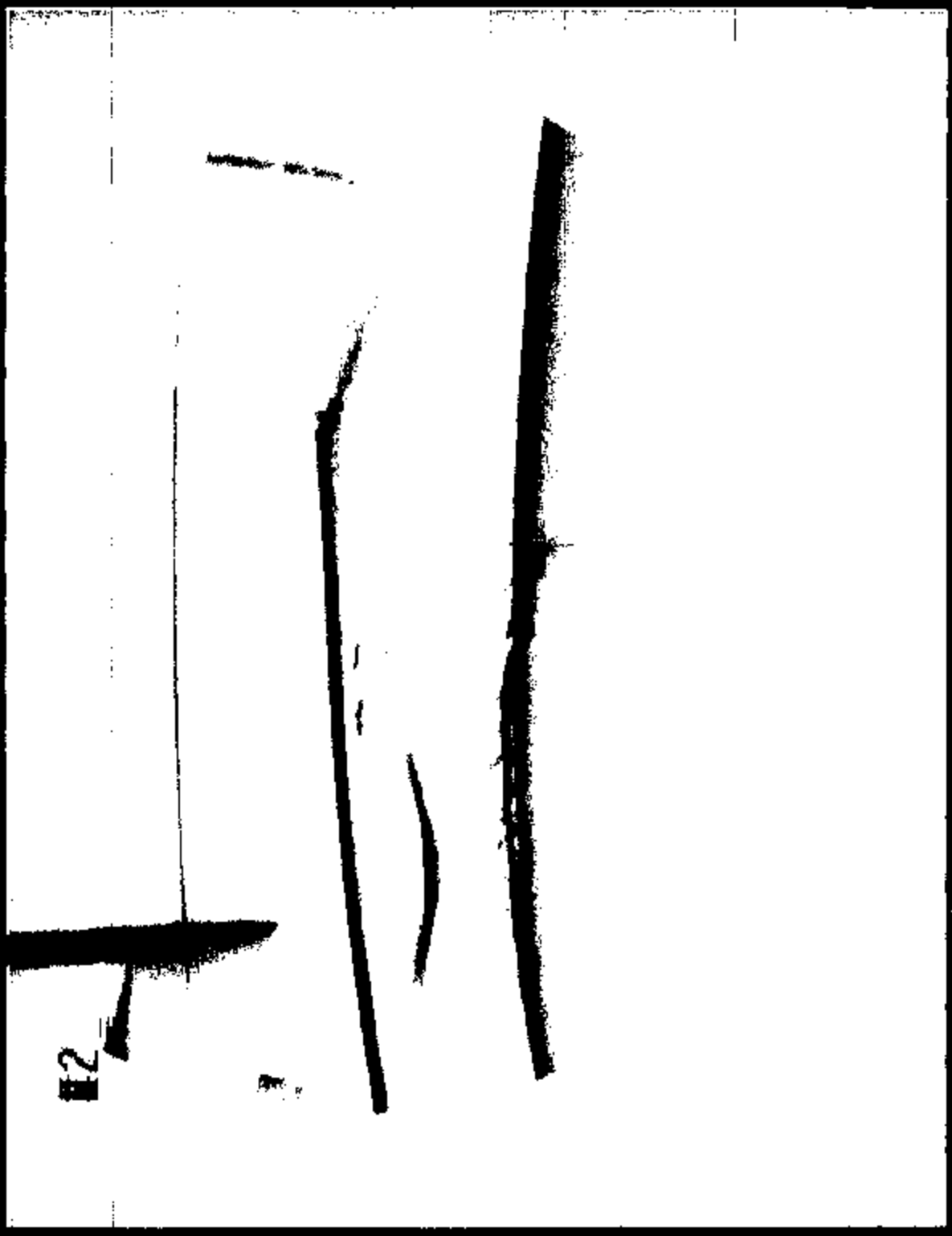


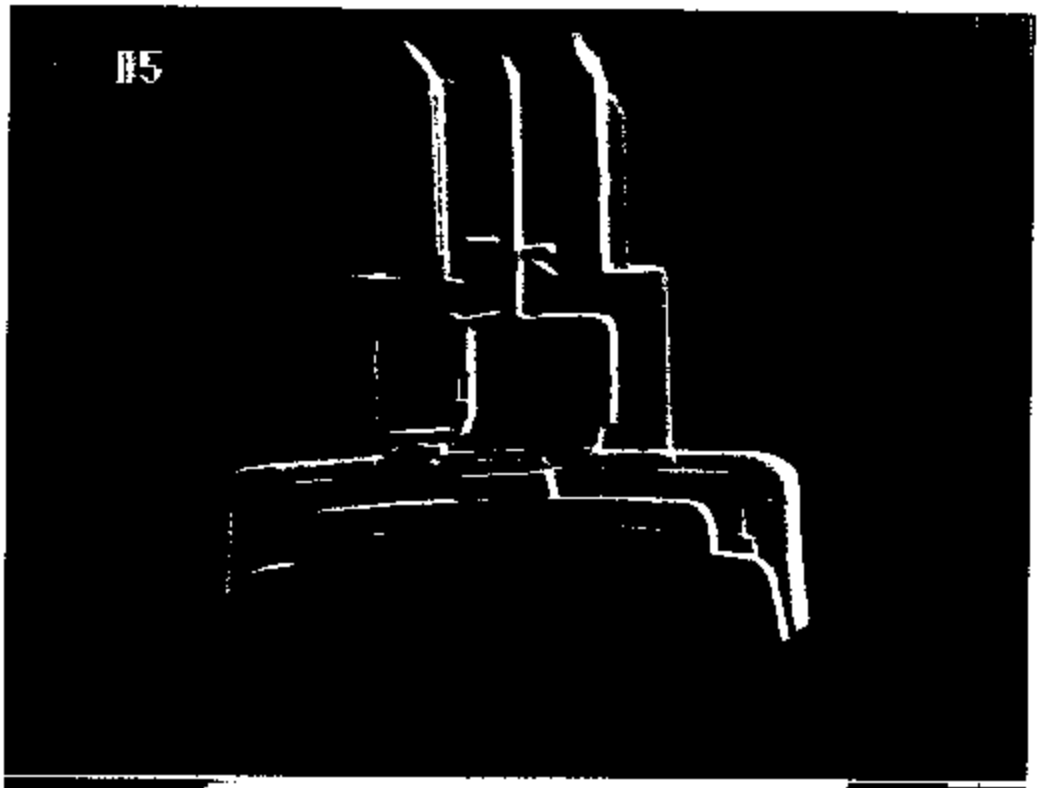


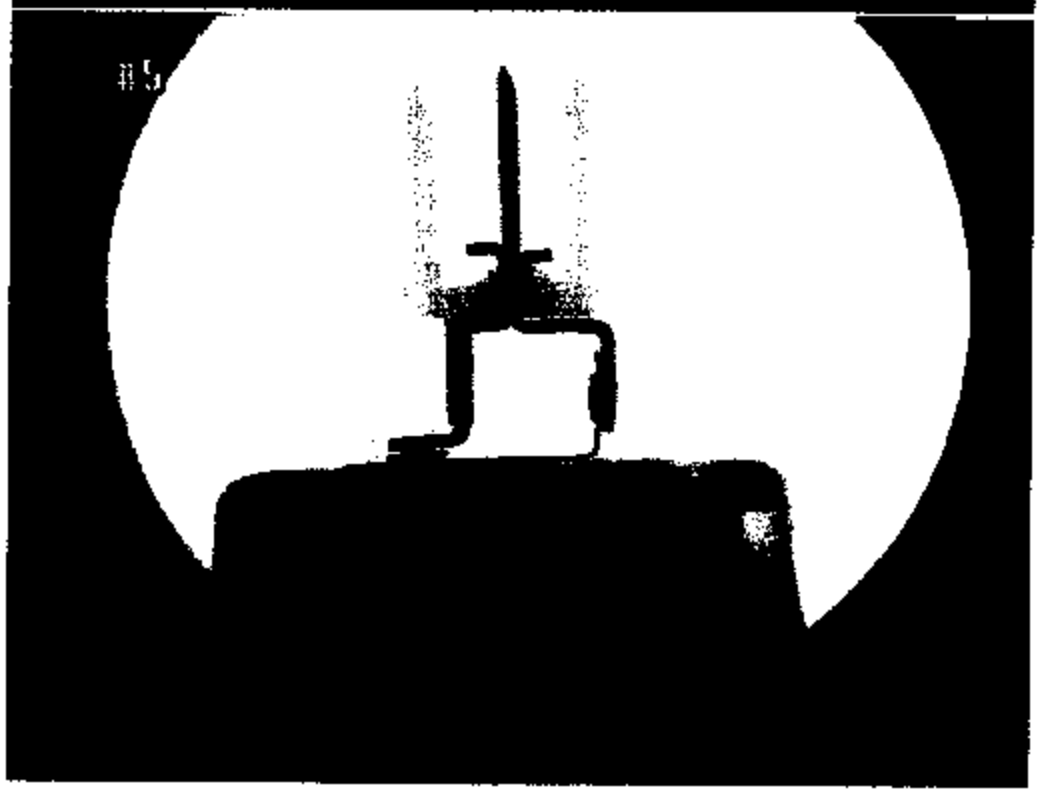
3713 9960

PRODUCED BY FORD


#2







Number of 1992 and 1993 Lincoln Town Car vehicles sold with Traction Control

	1992 Lincoln Town Car vehicles sold with traction control	1993 Lincoln Town Car vehicles sold with traction control
Alabama	95	80
Alaska	13	11
Arizona	152	74
Arkansas	70	129
California	1581	1820
Colorado	231	330
Connecticut	348	434
District of Columbia	85	92
Delaware	43	41
Florida	358	417
Georgia	154	255
Hawaii	52	7
Idaho	51	39
Illinois	1914	2058
Indiana	392	620
Iowa	144	187
Kansas	253	394
Kentucky	122	160
Louisiana	156	230
Maine	32	42
Maryland	638	709
Massachusetts	486	681
Michigan	1360	2606
Minnesota	203	316

Number of 1992 and 1993 Lincoln Town Car vehicles sold with Traction Control

	1992 Lincoln Town Car vehicles sold with traction control	1993 Lincoln Town Car vehicles sold with traction control
Mississippi	14	6
Missouri	765	830
Montana	33	32
Nebraska	111	120
Nevada	76	80
New Hampshire	67	63
New Jersey	1895	2709
New Mexico	60	53
New York	2599	3301
North Carolina	168	202
North Dakota	41	51
Ohio	817	1136
Oklahoma	344	1248
Oregon	98	121
Pennsylvania	1430	1704
Rhode Island	11	3
South Carolina	84	85
South Dakota	28	44
Tennessee	204	341
Texas	527	807
Utah	63	105
Vermont	19	26
Virginia	654	728
Washington	180	219

Number of 1992 and 1993 Lincoln Town Car vehicles sold with Traction Control

	1992 Lincoln Town Car vehicles sold with traction control	1993 Lincoln Town Car vehicles sold with traction control
West Virginia	68	102
Wisconsin	310	407
Wyoming	27	27

- All 1992 and 1993 Lincoln Town Car vehicles are equipped with speed control and anti-lock brakes

Number of 1992 and 1993 Grand Marquis vehicles sold with Speed Control, Anti-Lock Brakes and Traction Control

	1992 Mercury Grand Marquis vehicles sold with anti-lock brakes and traction control	1992 Mercury Grand Marquis vehicles sold with speed control	1993 Mercury Grand Marquis vehicles sold with anti-lock brakes and traction control	1993 Mercury Grand Marquis vehicles sold with speed control
Alabama	400	426	548	260
Alaska	29	7	9	1
Arizona	463	211	355	138
Arkansas	122	189	210	110
California	2822	751	1860	372
Colorado	379	122	226	50
Connecticut	438	258	464	172
District of Columbia	292	0	282	0
Delaware	157	114	133	100
Florida	4298	5925	5804	3401
Georgia	1079	814	920	512
Hawaii	25	5	19	5
Idaho	67	79	45	46
Illinois	3330	2308	2161	1181
Indiana	686	616	508	287
Iowa	242	245	216	88
Kansas	363	151	269	65
Kentucky	319	294	293	150
Louisiana	410	580	488	282
Maine	75	214	94	89
Maryland	1155	515	963	316
Massachusetts	1128	1717	1370	1130
Michigan	3037	2310	1960	973

Number of 1992 and 1993 Grand Marquis vehicles sold with Speed Control, Anti-Lock Brakes and Traction Control

	1992 Mercury Grand Marquis vehicles sold with anti-lock brakes and traction control	1992 Mercury Grand Marquis vehicles sold with speed control	1993 Mercury Grand Marquis vehicles sold with anti-lock brakes and traction control	1993 Mercury Grand Marquis vehicles sold with speed control
Minnesota	512	523	555	314
Mississippi	157	207	226	139
Missouri	812	1137	648	605
Montana	89	9	73	3
Nebraska	151	137	121	57
Nevada	85	130	137	81
New Hampshire	120	281	186	165
New Jersey	2845	2330	3106	1339
New Mexico	148	57	150	59
New York	3331	2169	3223	1331
North Carolina	644	638	659	391
North Dakota	78	15	84	24
Ohio	1324	1613	1301	839
Oklahoma	265	283	3018	180
Oregon	152	23	140	7
Pennsylvania	2300	1529	2003	687
Rhode Island	10	24	23	14
South Carolina	382	336	412	207
South Dakota	62	8	52	1
Tennessee	421	473	446	272
Texas	1991	2071	1727	1111
Utah	102	23	107	37
Vermont	13	33	41	20
Virginia	994	500	969	333

Number of 1992 and 1993 Grand Marquis vehicles sold with Speed Control, Anti-Lock Brakes and Traction Control

	1992 Mercury Grand Marquis vehicles sold with anti-lock brakes and traction control	1992 Mercury Grand Marquis vehicles sold with speed control	1993 Mercury Grand Marquis vehicles sold with anti-lock brakes and traction control	1993 Mercury Grand Marquis vehicles sold with speed control
Washington	282	32	253	26
West Virginia	192	126	132	91
Wisconsin	639	571	552	205
Wyoming	74	39	54	18

- anti-lock brakes and traction control were sold as a package