EA02025

TEXAS INSTRUMENTS, INC.'S 09/10/03 LETTER TO ODI

REQUEST 9

BOX 12
PART A – O
PART L

A. R. O'Neill -Director Vehicle Service and Programs Ford Cystomer Service Ovision



Ford Motor Company P. O. Box 1904 Cearporn, Michigan 48121

May, 1999

Safety Recall 99815

Mr. John Sample 123 Main Street Anywhere, USA 12345

Your Vehicle Identification Number: 12345878901234587

This notice is sent to you in accordance with the requirements of the National Traffic and Motor Vehicle Safety Act.

Ford Motor Company has decided that a defect which relates to motor vehicle safety exists in certain 1992 and 1993 Crown Victoria, Grand Marquis, and Lincoln Town Cars with Speed Control.

SAPETY DEFECT

Some Speed Control Deactivation Switches on the affected vehicles may develop a resistive short in the electrical circuit that may potentially result in an underhood fire. A fire is possible both when the vehicle is running and when the vehicle engine is off. Also, the short may disable the speed control system or cause the brake light fuse to open.

REPARE

Repair parts may not be evaluable until mid-June, 1999. If your dealer is not able to obtain the parts needed for this recall, an interim Repair can be performed at no charge to you. However a second visit to your dealer will be required at a later date to have the permanent repair performed. We regret this inconvenience, but your safety is our primary concern.

Interim Repair: If parts are not available, the Interim Repair should be performed immediately. This repair involves disconnecting the electrical connector from the Speed Control Descrivation Switch and protecting the connector end from contamination. The Speed Control system will be inoperative until the Permanent Repair is performed; normal vehicle operation without Speed Control is not affected.

Permanent Repair: Parts for this repair are expected to become available the middle of June, 1998. This repair will involve the replacement of the Speed Control Desctivation Switch with a new switch. In addition, the switch hard-shell connector will be replaced to eliminate the acceptability of undetected heat demage to the connector.

HOW LONG WILL IT TAKE?

The time needed for either of the repairs is less than one-half day. However, due to service scheduling issues, your dealer may need your vehicle for a longer period of time. Please call your dealer for a service date.

Call your dealer without delay. Ask for a service date and whether parts are in stock for Sefety Recall 99515.

if your dealer does not have the parts in stock, they can be ordered before acheduling your service date. If available, parts would be expected to arrive within a week after ordering. If parts are not available, your dealer can perform the Interim Repair free of charge. When parts are available, your dealer will perform the Permanent Repair free of charge.

When you bring your vehicle in, show the dealer this letter. If you misplace this letter, your dealer will still do the work, free of charge.

REFUNDS

If you paid to have this service done <u>before</u> the date of this letter. Ford is offering a full refund. For the refund, please give your paid original receipt to your Ford or Lincoln Mercury dealer. To evoid delays, do not send receipts to Ford Motor Company.

CHANGED ADDRESS OR SOLD THE VEHICLE?

Please fill out the enclosed prepaid postcard and mail it to us if you have changed your address or sold the vehicle.

If the dealer descrit make the repair promptly and without charge, you may contact the Ford Customer Assistance Center, P. O. Box 6248, Dearborn, Michigan 48121. You also may send a complaint to the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S. W., Washington, D. C. 20590 or call the toll free Auto Safety Hottine 1-500-424-9393 (Washington, D. C. area residente may call 356-0123).

We regret the inconvenience this service may cause you, but we want you to have the work done for your sefety and setisfaction with your Ford or Lincoln-built vehicle.

Sincgrely,

Director

Vehicle Service and Programs



A. J. C'Hold Disputer Lightin Services and Programs Fund Computer Service Christian

Ford Monar Company P.O. Sea. 1884 Company, Mr. 48121-1884



May, 1999

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We repret the inconvenience this service may came you, but we want you to have the work done for your safety and antisfaction with your Ford or Lincoln built vehicle.

Sincerety.

A. R. O'Neill

Director

Vehicle Service and Programs

Safety Recall

From:

John Shore [jshore@ford.com]

Sents

Tuesday, May 04, 1999 8:37 AM

To:

Sharpe, Robert; McGuirk, Andy

Ce:

Cheff, A. B.; gbalint@ford.com; fporter@ford.com

Subject:

(U) Clarification

to: a-mcguirk@ti.com to: rsharpe@ti.com

Several open questions that need to be reviewed....

1. Is the level FCSD is purchasing correct for our needed application: SERVICE PART: F2VY- 9F924-A SW ASY-SPD CONT DEACT ENGINEERING PART: F2VC 9F924 AB ORIGIN:

1992-3 Town Car and 1992-3 CV/GM

- Timing to obtain 150,000 parts (schedule needed by week)
- Define plant work schedule currently. (5 days 2 shifts 10 hour shifts...)
- Identify costs to boost production (costs for tools, leased equipment, manpower, air freight, 2nd tier issues.....) that would permit TI to support 150,000 parts in 60 days.

Thank-you for your support with this issue.

Please Forward (PF5) All Responses....Thank-You John Shore - FCSD / PS&L Recall Manager Phone (734) 26-69789 FAX (734) 52-33065 NPDC - 1555C *** Forwarding note from FPORTER --DRBN007 05/03/99 17:49 *** To: JSHORE --PRBN006

FROM: F. J. Porter

USAET (UTC -04:00)

Subject: (U) Clarification

John,

Would you send a note to the folks a TI for clarification.

After the meeting, Andy McGuirk and Rob Sharpe were still unsure of their direction.

Please send them a note which outlines the number of pieces we are looking for (I believe 150,000 to start) and to what extent we (ford) are backing up any commitment TI may make. I thought you said up to \$1M between now and Friday but you may want to modify that.

I would appreciate your help.

Their email addresses are:

a-mcguirk@ti.com rsharpe@ti.com

Thank you.

Regards, Fred Porter

OV - fporter

fporter@ford.com

Chassis E/E Systems Applications (313)845-3722 Bldg 5 - Mail Drop 5030 - Cubicle 3E004 fax: 390-4145

Epologic, Sally

Frame To; Ct:

McGlurk, Andy (s-moguris@email.mo.s.com)
Tuesday, May 04, 1988 11 12 AM
Haymas, John; Douglas, Charles; Pachema, John
Dagve, Sryan; Equivann, Russ; Sharpe, Robert; Rowland, Thomas
PM: (U) Clarifogica

Sublect:

SEVERAL KEY POINTS HERE......

FORD MANTS THE EXACT SAME SWITCH AS WAS IN '92-'93 TOWN CARS... I THINK THAT WAS OUR BY SWITCH.

THEY ARE GETTING ALL CONFUSED BECAUSE THEY 'SEE' THE BART ON PROPORTIONAL VALVES AND AP LOST IN THE PARTS TRANSLATIONS.

CHARLIE, PLS CONTIRM TO JOHN WITHE PART MUMBERS AND REV LEVEL SO WE GO DOWN THIS 'RIGHT PATH AND THEN THE TEAM CAN MAKE THEIR DELIVERY PLANS.

AUTOMOTIVE SENEGRS AND CONTROLS ORA MANAGER 34 FOREST ST M/8 23-05 ATTLEBORG, MA 02703 TEL: (508) 236-3080 FAX : (508) 236-3745 MOBILE: (508) 208-6119 PAGE: (800) 467-3700 PIN 604-2044

Fromi John Shore(SMTP:jshoreEford.com) Tuesday, May 04, 1999 9:36 AK Sent: To: rsharpe@ti.com/ a-moguirk@ti.com Cheff, A. B.; gbalint@ford.com; fporter@ford.com ct: (U) Clarification Ccı Subjecti

to: a-mcquick@ti.com to: rsharpedti.com

Several open questions that need to be reviewed

Is the level PCSD is purchasing correct for our needed application: SERVICE BART: 72VY- 9F924-A____ SW ASY-5FD CORT DEACT ENGINEERING PART: 98924 AB PZVC ORIGINA

1992-3 Town Car and 1992-3 CV/Q4

- 2. Timing to obtain 150,000 parts (adhedule needed by week)
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Thank-you for your support with this issue. 1

Siease Forward PF5. All Responses.....Thank-You John Shore - FCSD / PS41 Recall Manager Phone (734) 26-69789 FAK (734) 52-33065 NPDC - 15550 TV Forwarding note from FFORTER --DRBNGG7 05/03/99 17:49 TO: JSHORE --DRBNGG6

FROM: F. J. Porter Subject: (U) Clarification USAET (UTC -04:00)

John,

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I would appreciate your help.

Their email addresses are:

a-meguizk@ti.od@ rehezpe@ti.com

Thank you.

Regards,
Fred Porter OV - Sporter Sporter@Sord.com
Chassis E/E Systems Applications (313)845-3722
Sldg 5 - Mail Drop 5030 - Cubicle 32004 Sex: 390-4145 *

Contain, Salty

Frent Seriti

John Store Behare@ford.com| Trainder, Ney DA, 1988 8:57 AM Sharpe, Robert, McGuert, Andy Cheff, A. B.; glasint@ford.com; sporter@ford.com (U) Classication

Tot

to: a-mcguisk@ti.com to: rsharpe@t1.com

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1. Is the level FCSD is purchasing correct for our needed applications SERVICE PART: 9E924-A FZVY-SW ASY-SPD CONT DEACT ENGINEERING PART: F2VC 9P924 A CRIGIN:

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FROM: F. J. Poster

USART (UTC -04:00)

Subject: (U) Clarification

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Their email addresses are:

a-meguirk@ti.com reherpedti.com

Thank you.

Regarde.

OV - Sporter Frad Postas Chassis E/E Systems Applications Bldg 5 - Mail Drop 5030 - Cubicle \$8004

fporter@ford.com (313) 845-3722 fax: 390-4145

1

and wires. I hope to have that completed by Tuesday next week. In addition to the Equilibration already deported on the fundings apreadenant you already have.

<<chklist.xls>> <<SwitchLog.xls>>



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

Attachments sent separately:

Date Type	File Name
BINARY	CHKLIST.KL5_PC
BINARY	SWITCKLO.KLB_PC

From:

Foster, Barbara [bfoster@email.mc.ti.com]

Sent:

Tuesday, May 04, 1999 3;13 PM

To:

Milkey, Mary-Joan

Cc:

Haynes, John; McGuirk, Andy; Douglas, Charles; Walsh, Thomas; Kotch, Paul;

O'Neill, Ed; Spencer, John; Walsh, Thomas; Mendonca, Helio; Gildea, Robert;

Nicholls, Winston

Subject:

77PSL2-1 (F2VY 9F924 A) Ford Service Part

Mary,

I have spoke with Ford Service. They have scheduled 50,000 devices to be shipped week of 5-10-99. I told them that we have all the players in place, and we are expecting to have all the devices ready to ship by Friday 5-14-99. She did not know at this time what the requirements will be after this 50K. She is thinking it will be 25-50K per week, but will probably not know until Friday, 5-14. Amy did mention that the total number of devices that will be ordered may reach 300K before all is done.

I have checked with Julie on the 3 components that she is short on, and she has confirmed that all the material will be in house to meet our goal. The three pert numbers are 27713-1, 46515-2, and 74078-143.

Julie and I contacted the disc department and gave them a "heads up" that you will be piloting tonight, and ordering the discs tonight or tomorrow.

Just to ease the tension. I did ask if we would be hit for late deliveries if

we did not get the whole 50% out the door next Friday. The answer was, no. Because of this being for a recall, it will not effect our performance.

Please keep me advised on your progress, in order to help me keep Ford updated.

Thanks, Barbara

Epstein, Belly

Frant: Berti: To:

McCalele, Araly (a-moguringermal.com) Tuesday, May Od, 1 (600 3:30 Ped Transmot J. Porter

Sharps, Robert FW: 77781.2-1 (PZVY 87824 A) Ford Service Flat

FYI

WE SHIPPED 6900 PCS YESTERDAY

AUTOMOTIVE SENSORS AND CONTROLS ORA MANAGER 34 FOREST ST M/8 23-05 ATTLEBORO, NA 02703 TEL : (508) 236-3080 FAX : (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

Ezoni Foster, Barbara

Senti Tuesday, May 04, 1999 4:13 PK

Taı Milkey, Mary-Jean

Haynes, Johns McGuirk, Andys Douglas, Charless Walsh, Thomass Kotch, Pauls O'Heill, Cc: Ed; Spencer, John; Walsh, Thomas; Mandonca, Helio; Gildea, Robert; Michalle, Winston Subject: 779512-1 (F2VY 9F924 A) Ford Service Part

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Please keep me advised on your progress, in order to help me keep Ford updated.

Thanks. Barbara

From:

Douglas, Charles [c-douglas2@email.mc.tj.com]

Seat:

Tuesday, May 04, 1999 4:36 PM

To:

Haynes, John; Pechonis, John; McGuirk, Andy

Ce:

Dague, Bryan; Baumann, Russ; Sharpe, Robert; Rowland, Thomas

Subject

RE: (U) Clarification

Team,

This is to confirm that the 92-93 Town Car used our 77PSL2-1 which was / is a snep switch.

Regards,

Charlie

Charlie Douglas (508) 236-3657 (P) (508) 236-1598 (F) c-douglas20ti.com

From:

McGulrk, Andy

Senti

Tuesday, May 04, 1999 12:12 PM

To: Haynes, John; Douglas, Charles; Fechonis, John Co: Dague, Bryan; Baumann, Ruse; Sharpe, Robert; Rowland, Thomas Subject: FW: (U) Clarification

SEVERAL KEY POINTS HERE.....

FORD WANTS THE EXACT SAME SWITCH AS WAS IN '92-'93 TOWN CARS... I THINK THAT WAS OUR SNAP SWITCH.

THEY ARE GETTING ALL CONFUSED BECAUSE THEY 'SEE' THE PART ON PROPORTIONAL VALVES AND ARE LOST IN THE PARTS TRANSLATIONS.

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AUTOMOTIVE SENSORS AND CONTROLS ORA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703 TEL: (508) 236-3080

FAX: (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

From:

John Shore[SMTP:jshore@ford.com]

TI-NHTSA 016944

Sent: Tuesday, May 04, 1999 9:36 AM To: raharpeSti.com; a-mcguirkSti.com

Cc: Cheff, A. B.; gbalint@ford.com; fporter@ford.com

Subject: (U) Clarification

to: a-mcguirk@ti.com to: rsharpe@ti.com

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Thank-you for your support with this issue.

Please Forward (PF5) All Responses....Thank-You John Shore - FCSD / PS&L Recall Manager Phone (734) 26-69789 FAX (734) 52-33065 NPDC - 1555C *** Forwarding note from FPORTER --DRBNO07 05/03/99 17:49 *** To: JSEORE --DRBNO06

FROM: F. J. Porter Subject: (U) Clarification USAET (UTC -04:00)

John,

\$1H

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I would appreciate your help.

Their smail addresses are:

a-moguirk@ti.com rsherpe@ti.com

Thank you.

Regards,
Fred Porter OV - fporter
Chassis E/E Systems Applications
Bldg 5 - Mail Drop 5030 - Cubicle 3E004

fporter@ford.com (313)845-3722 fax: 390-4145

From:

McGuirk, Andy [a-mcguirk@exnail.mc.ti.com]

Sent:

Wednesday, May 05, 1999 6:51 AM

To:

Porter, Fred

Subject:

FW: 77PS

WE ARE EVEN BUILDING THE RIGHT STUFF 111!!!

AUTOMOTIVE SENSORS AND CONTROLS ORA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703 TEL : (508) 236-3080 FAX: (508) 236-3745

MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

From Foster, Barbara

Tuesday, May 04, 1999 5:10 PM Sent:

Dague, Bryan; Gildea, Robert; Milkey, Mary-Jean; Haynes, John;

Pombo, Julie; Martin, Scott

Cc: McGuirk, Andy; Pechonis, John

RE: 77P8 Subject:

Team,

This is to confirm that the 92-93 Town Car used our 77PSL2-1 which was / is a snap switch.

Regards,

Charlie

Charlie Douglas (508) 236-3657 (P) (508) 236-1598 (F) c-douglas28ti.com

> McGuirk, Andy From:

Sent: " Tuesday, May 04, 1999 12:12 PM

To:

Raynes, John; Douglas, Charles; Pechonis, John Dague, Bryan; Baumann, Russ; Sherpe, Robert; Rowland, Thomas ct: FW: (U) Clarification Ce:

Subject:

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THEY ARE GETTING ALL CONFUSED BECAUSE THEY 'SEE' THE PART ON PROPORTIONAL VALVES AND ARE LOST IN THE PARTS TRANSLATIONS.

Scott.

Ford has confirmed they still want 77PSL2-1 and are putting 50K on schedule for week of 5-10 ship. They are using their existing purchase order. You should see the requirement in the AM, once the EDI Feed runs.

From: Martin, Scott

Sent: Tuesday, May 04, 1999 3:01 FM

To: Dague, Bryan; Gildea, Robert; Milkey, Mary-Jean; Baynes,

John; Pombo, Julie

Cc: Foster, Barbara; McGuirk, Andy, Pechonis, John

Subject: RE: 77FS

All,

Bryan would like to refer to the PO for this snawer, I agree with him.

John H.,

Have we received the PO yet? What part number(s) should we be building?

Regarde,

Scott

phone: (508) 236-3434

pager: (508) 236-1010 #0929 fax: (508) 236-2328 e-mail: smartin1@ti.com

From: Martin, Scott.

Sent: Tuesday, May 04, 1999 2:09 PM

To: Dague, Bryan

Cc: Gildea, Robert; Milkey, Mary-Jean; Raynes, John; Pombo,

Julie: Pechonis, John Subject: 77PS Bryan,

In regards to the 7798 rebuild, is it the 7798L2-1's we should be rebuilding? Please confirm.

Thanks-

Regards,

Scott

phone: (508) 236-3434

pager: (508) 236-1010 #0929 fax: (508) 236-2328 e-mail: emartinl8ti.com

From:

McGuirk, Andy [a-mcguirk@email.mc.ti.com]

Sent

Wednesday, May 05, 1999 10:45 AM

To:

Demers, Richard

Ce: Subject: Sundaram, Sundar; Lier, Lester; Hey, D; Martin, Scott FW: 77PSL2-1 (F2VY 9F924 A) Ford Service Part

WE ARE QUICKLY BUILDING UP A 150,000 PCS RUN OF 77 PS SWITCHES FOR FORD SERVICE FARTS.

I WANT US TO TAKE EXTRA PRECAUTIONS DURING THIS BUILD FOR LEAKERS AND DAILY IMPULSE TESTING.

RICE, PLS CLOSE WITH SUNDAR AND LES AND IMPLEMENT A PLAN ASAP TO ASSURE WE SPEND MORE AUDIT TIME IN THAT LINE WHILE WE BUILD THESE UNITS.

SEND ME A DAILY VOICE MAIL OF OUR RESULTS.

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AUTOMOTIVE SENSORS AND CONTROLS QRA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703 TEL: (508) 236-3080 FAX: (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

From:

Milkey, Mary-Jean

Sent: Wednesday, May 05, 1999 11:31 AM

To: Foster, Barbara, Pombo, Julie

Co: Haynes, John; McGuirk, Andy; Douglas, Charles; Walsh, Thomas; Kotch, Paul; O'Neill, Ed; Spencer, John; Walsh, Thomas; Mendonca, Helio; Gildes,

Robert; Nicholle, Winston; Martin, Scott

Subject: RE: 77PSL2-1 (F2VY 9F924 A) Ford Service Part

Julie,

With the first 50K due next Friday, we obviously need to turn our focus on the 77PSSL2-1 as much as we can along with running the scheduled requirements. Also, keep in mind that we need to pilot the lots (sometimes taking up to 16 hours) prior to producing. In order to manage this process efficiently, it is important that you keep us updated as to when we will see deliveries of those components we do not have in inventory. Since these components are also used in other devices, what we don't want happening is to work overtime using up our inventories, while leaving us dry during the week.

According to Marga, the pins that we use in ATTL are within -141 through -145 category. In looking at an IC41 there are a lot of these pins in

TI-NHTSA 016949

Mexico. Marga indicates that Mexico does not use these pins, if at all rarely. Can we get these pins back to help with this demand instead of ordering new ones?

Also, what is the status on the bases, the washers and the cups? Thanks.

Regards,

Mary Milkey

phone: (508) 236-3424

pager: (508) 236-1010 #0299 fax: (508) 236-2328

email: mjmilkey@email.mc.ti.com

From: Foster, Barbara

Sent: Tuesday, May 04, 1999 4:13 PM

To: Milkey, Mary-Jean

Cc: Raynes, John; McGuirk, Andy; Douglas, Charles; Walsh, Thomas; Kotch, Paul; O'Neill, Ed; Spencer, John; Walsh, Thomas; Mendonca, Helio; Gildes, Robert; Nicholls, Winston

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number of devices that will be ordered may reach 300K before all is done.

I have checked with Julie on the 3 components that she is short on, and she has confirmed that all the material will be in house to meet our goal.

The three part numbers are 27713-1 (gold cup), 46515-2 (base), and 74078-143 (transfer pin).

Julie and I contacted the disc department and gave them a "heads up" that you will be piloting tonight, and ordering the discs tonight or tomorrow.

Just to ease the tension, I did ask if we would be hit for late deliveries if

we did not get the whole 50K out the door next Friday. The answer was.

no. Because of this being for a recall, it will not effect our performance.

Please keep me advised on your progress, in order to help me keep Ford updated.

Thanks.

Thanks, Barbara

From:

Fred Porter (#0186587@dabmail.itg.ti.com)

Sest:

Wednesday, May 05, 1999 6:31 PM

Ter

McGuirk, Andy

Subject:

77**PS**

Old you send this to me by mistake? I don't recognize this part number.

Regards, Fred Porter - DFAS Planning f-parterSti.com 972-995-9306 (office) 972-598-4111 (pager)

----Original Message----

From: McGuirk, Andy (mailto:a-mcguirk@email.sc.ti.com)

Sent: Wednesday, May 05, 1999 6:51 AM

To: Porter, Fred Subject: FW: 77PS

WE ARE EVEN BUILDING THE RIGHT STUFF !!!!!!

AUTOMOTIVE SENSORS AND CONTROLS ORA MANAGER 34 FOREST ST W/9 23-05 ATTLEBORG, MA 02703 TEL : (508) 236-3080 FAX : (508) 236-3745 MOBILE: (508) 208-6119 PAGE: (800) 467-3700 PIN 604-2044

From: Foster, Barbere

gent: Tuesday, May 04, 1999 5:10 PM

To: Dague, Bryan; Gildes, Robert; Milkey, Mary-Jean; Haynes, John;

Pombo, Julie: Martin, Scott Cc: McGuirk, Andy: Fechonia, John

Subject: 77P8

This is to confirm that the 92-93 Town Car used our 77PSL2-1 which was / is a snap switch.

ļ

Regards,

Charlie

Charlie Douglas (508) 236-3657 (P) (508) 236-1596 (F) c-douglas28ti.com

From: McGuirk, Andy Sent: Tuesday, May 04, 1999 12:12 PM

To: Xaynes, John: Douglas, Charles: Fechonis, John Cc: Dague, Bryan; Saumann, Russ; Sharpe, Robert; Rowland, Thomas Subject: FW: (U) Clarification

SEVERAL KEY POINTS HERE.....

FORD WANTS THE EXACT SAME SWITCE AS WAS IN '92-'93 TOWN CARS... I THINK THAT WAS OUR SHAP SHITCH.

THEY ARE GETTING ALL CONFUSED BECAUSE THEY 'SEE' THE PART ON PROPORTICIAL VALVES AND ARE LOST IN THE PARTS TRANSLATIONS.

Scott,

Ford has confirmed they still want 779912-1 and are putting 50% on schedule for week of 5-10 ship. They are using their existing surchase order. You should see the requirement in the AM, once the EDI feed runs.

from: Martin, Scott

Sent: Tuesday, May 04, 1999 3:01 PM To: Dague, Bryan: Gildea, Robert: Milkey, Mary-Jean: Saynes,

John; Pombo, Julie

Cc: Toster, Barbara: McGuirk, Andy: Pechonis, John

Subject: RE: 77PS

Bryan would like to refer to the PO for this enswer, I agree with him.

John H.,

Have we received the PO yet? What part number(s) should we be TI-NHTSA 016952 building?

Regards,

Scott

phone: (508) 236-3434

pager: (50%) 236-1010 #0929 (508) 236-2328 fax: 4-mail: smartiniSti.com

From: Martin, Scott Sent: Tuesday, Hay 04, 1999 2:09 PM

To: Daque, Bryan Cc: Gildea, Robert: Milkey, Mary-Jean; Haynes, John: Pombo,

Julie: Pechonis, John Subject: 77PS

Bryan,

In regards to the 7795 rebuild, is it the 77PSL2-1's we should be rebuilding? Please confirm.

Thanks-

Regards.

Soott

phone: (508) 236-3434 pager: (508) 236-1010 90929 fax: (508) 236-2322 (508) 236-2329 fax: e-mail: smartinleti.com

Epstein, Salty

Fram:

Beringhause, Steven [sberinghause@email.mc.ti.com]

Sont:

Tuesday, May 11, 1999 2:46 PM

To: Subject: Rowland, Thomas FW: 77P8L2-1

FYI. This may continue to be a battle with Ford.

Steve

From: Martin, Scott

Sent: Tuesday, May 11, 1999 3:44 PM

To: Baringhause, Steven Subject: FW: 77P3L2-1

fyi...

Regards, Soott

phone: (508) 236-3434

pager: (508) 236-1010 #0929 fax: (508) 236-2328 e-mail: emertini@ti.com

From: Foster, Barbare

Sent: Tuesday, May 11, 1999 10:35 AK

To: Martin, Scott

Cc: Milkey, Mary-Jean; Yombo, Julie; Spencer, John; Kotch, Paul; Douglas, Charles; McGuirk, Andy; Mendonca, Helie; Micholls, Winston; Pechenis, John; O'Meill, Ed

Subject: 777812-1

" Scott,

Far our telephone discussion, Ford service has increased the quantity of subject part # to 200%. I have checked with Julie for material availability to support this order. She feels there will not be a problem. She has everything either in house, or on order coming in this week. We contacted Winston end Helio together for the disc and base evailability. They both have indicated that they can support us.

I have again spoke with Amy at Ford service. I have told her that we have worked very hard to support her request of 50% for this week, and we might (didn't promise) make that delivery in full. I did tell her, that in order to do this, other jobs were pushed out that we have to catch up on after this first 50%. I also told her because of being at full capacity we could not promise more than 30% per week for the balance of the 200%. She asked if they paid tooling or premium if we could do better, to which I responded "no". I told her we were running three shifts, 7 days a week, and were at full capacity. She seemed c.k. with that for now, but asked that even though we were only promising 30% to try to push to go over that for them.

Act the could be a meed for a conference call this afternoon. I think that Amy knows now that we are doing everything possible to work with Ford with their situation, and has thanked us for being in continues contact with them to keep

Regards, Sazbara

them updated.

TI-NHTSA 016954

1

From:

Foster, Barbara [bfoster@email.mc.ti.com]

Sent:

Tuesday, May 11, 1999 5:11 PM Martin, Scott: Foster, Barbara

To: Ce:

Milkey, Mary-Jean; Pombo, Julie; Spencer, John; Kotch, Paul; Douglas, Charles;

McGuirk, Andy; Mendonca, Helio; Nicholls, Winston; Pechonis, John; O'Neill, Ed:

Sharpe, Robert

Subject:

RE: 77PSL2-1

Good news, I have just spoke with the person that is placing the purchase order for 200K devices. I asked her to write the purchase order 50K now and 30K per week for balance (explaining to her that

we

would do better if we could). She agreed to write it that way. I should

have that agreement in writing tomorrow A.M. Barb

From:

Foster, Barbers

Tuesday, May 11, 1999 10:35 AM Sent:

Martin, Scott To:

Milkey, Mary-Jean; Pombo, Julie; Spencer, John; Kotch, Faul; Douglas, Charles; McGuirk, Andy; Mendonca, Helio; Nicholls, Winston; Pechonis, John, C'Neill, Ed

Subject:

77PSL2-1

Scott.

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of subject part # to 200K. I have checked with Julie for material availability

to support this order. She feels there will not be a problem. has

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that for them.

Scott, I do not see a need for a conference call this afternoon. I

think that

Amy knows now that we are doing everything possible to work with

Ford

with their situation, and has thanked us for being in continuos contact with them to keep them updated.

Regards,

Barbara

From:

Foster, Barbara [bfoster@email.mc.ti.com]

Sent:

Wednesday, May 12, 1999 7:46 AM

To:

Martin, Scott

Ce:

Milkey, Mary-Jean; Pombo, Julie; Spencer, John; Kotch, Paul; Douglas, Charles; McGuirk, Andy; Mendonea, Helio; Nicholls, Winston; Pechonis, John; O'Neill, Ed:

Sharpe, Robert

Subject:

RE: 77PSL2-1

Scott,

As per our telephone conversation, I have received P.O. #15642 for 200K of subject part . They have split the order into six increments. 50K this wack, and 30K per wack for 5 weeks thereafter. I have faxed you a copy and will enter the order today. Barb

From: Foster, Barbara

Tuesday, May 11, 1999 6:11 PM Sent: Martin, Scott; Foster, Barbara

Milkey, Mary-Jean; Pombo, Julie; Spencer, John; Kotch, Paul; Douglas, Charles; McGuirk, Andy; Mendonca, Helio; Nicholls, Winston; Pechonis, John; O'Neill, Ed; Sharpe, Robert

Subject: RE: 77PSL2-1

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purchase order for 200K devices. I asked her to write the purchase

order 50K now and 30K per week for balance (explaining to

her that we would do better if we could). She agreed to write it that

I should have that agreement in writing tomorrow A.M.

Barb

From: Foster, Barbara

Tuesday, May 11, 1999 10:35 AM Sent:

Martin, Scott To:

Co: Milkey, Mary-Jean; Pombo, Julie; Spencer, John; Kotch, Paul; Douglas, Charles; McGuirk, Andy; Mendonca, Relio; Nicholls, Winston; Pechonis, John; O'Neill, Ed

Subject: 77PSL2-1

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of subject part # to 200K. I have checked with Julie for material availability

to support this order. She feels there will not be a

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Amy knows now that we are doing everything possible to work with Ford

with their situation, and has thanked us for being in continuos contact with them to keep them updated.

Regards, Barbera

From:

DeMattia, Mike (m-demattia@amail.mc.ti.com)

Sent

Thursday, May 13, 1999 3:53 PM

To:

Tourangeau, Ray; McGuirk, Andy; Bredikin, Ted; Chemburkar, Yogen;

Greenbaum, Arnold: Johnson, Alan

Subject:

FW: Ford

more info Regards

Michael De Mattia

e-mail: demattia@s-mail.mc.ti.com

Phone: 508-236-5226

Fax: 508-236-5246

From: Sharpe, Robert

Sent: Thursday, May 13, 1999 3:13 PM

To: DeMattia, Mike Subject: FW: Ford

(FYI)

Best Regards,

Rob Sharpe Texas Instruments Phone (248) 305-5729 Fax (248) 305-5734 rsharpe@fti.com

----Original Message----

From: Sharpe, Robert

Sent: Thursday, May 13, 1999 2:53 PM To: Pawlowski, Robin; Hall, Alison

Cc: Spencer, John; C'Neill, Ed; Foster, Barbara; McGuirk, Andy; Perry.

Lorraine

Subject: RE: Ford

Hi Robin,

I sat with John Rentis this morning and discussed some of his concerns. John provided me with details of our scorecard performance for A9H2E and K9L1E (Robin, I will fax these to you this afternoon for your reference) and yes, I also agree that their appears to be some issues. The K9L1A scorecard looks good and is not a concern to John at this time. I explained to John that we are currently investigating these ratings and would have answers svailable for him next week. John seemed content with this and we have scheduled a meeting for next Friday 5/21 6 10:00 a.m. in Dearborn. I plan on giving John a TI "overview" as well as discuss recent "hits" occurred to our scorecard (highlighted in Alison's E-Mail). Alison, I'll need some TRS samples to show John if you are not available.

We also discussed John's desire to understand our procedures for Q1 Site Code management. I stated that this would best be accomplished by a site visit to Attleboro/Mansfield and scheduled a 7/20 (yes, July) visit. Andy, do we have any "high level" documents/flowcharts that summarize our management procedures ?? This would help John, up to the time of our visit in July.

For our discussions next Friday with John, I will need to conference with

Attlehoro to review our scorecards. Robin/Barb, can we schedule a call for Tuesday ??

> Tel: (313) 337-5627 Fax: (313) 390-3449 jrentis@ford.com

Best Regards,

Rob Sharpe Texas Instruments Phone (248) 305-5729 Fax (248) 305-5734 rsharpe@ti.com

----Criginal Message-----From: Pawlowski, Robin

Sent: Wednesday, May 12, 1999 1:20 PM To: Hall, Alison; Sharpe, Robert

Cc: Spencer, John; O'Neill, Ed; Foster, Barbara; McGuirk, Andy

Subject: Ford

Rob/Alison

Rob per your phone message to me this morning regarding the conference call with you and Alison. Yesterday I sent a message to John Spencer telling him that you would get back to me today regarding exactly what it was the new STA was looking for.

I did some research yesterday afternoon on all of our supplier codes. Yes there were some issues.

I want to wait until Barb and I have a change to sit together. I can see what is going on and if we need to submit something to this gentleman at Ford we do not want to do anything hasty.

Further, John Spencer would like to sit with Barbara to go over what has been going on and what is going on at this time. In his message yesterday he asked that he have time to review the information before he speaks with Alison and Ford.

In short I would be more than happy to speak with you and Alison but, I think that you should wait until John has a chance to sit with Barbara and discuss this issue before going off and speaking to Ford.

Regards Robin

From:

Foster, Barbara [bfoster@email.mc.ti.com]

Sent:

Monday, May 17, 1999 8:01 AM

Ta:

Milkey, Mary-Jean; Isaacsen, Bill; Gueye, Laudelina; Martin, Scott

Ce:

Pechonia, John: Proia, Stephen; Gildea, Robert; McGuirk, Andy; Beringhause,

Steven; Douglas, Charles; Spencer, John; O'Neill, Ed; Rowland, Thomas

Subject:

RE: 77PSL2-1 Requirement

Ford just called again (John Shore) and reitterated the urgency for these devices. Re did not know that Sybil called earlier. Re told me that dealer notification is going out today, because of the leak to the

Owner notification next week.

Regards, Barb

From:

Martin, Scott

Monday, May 17, 1999 B:43 AM

Milkey, Mary-Jean; Isaacsen, Bill; Gueye, Laudelina Pechonis, John, Prois, Stephen; Gildes, Robert; Foster,

Barbera; McGuirk, Andy; Beringhause, Steven

Subject:

77PSL2-1 Requirement

fyi,

Ford called this morning informing us that they needed to have 80ku's in the pipeline prior to the recall announcement they will be making shortly. Since shipping 50ku on Friday 5/14, they asked for an additional 30ku of the 77PSL2-1's to ship today. We were able to meet this request as the devices were in finished goods. Please thank your support team for their expedient service to our customer, I will also do myself. Let's continue to shoot for 150km by 5/31.

Regards,

Bcott

phone: (508) 236-3434

pager: (508) 236-1010 \$0929 (508) 236-2328 fax: e-mail: smartin18t1.com

Morrie, Irene

From:

Seni:

Wellman, Stacey Monday, May 17, 1999 11:12 AM

To:

Beringhause, Steven: Dague, Bryan; Mulligan, Sean; Wett, Jim; Sundaram, Sundar; Pechonia, John Rowland, Thomas; Saumann, Russ; McGuirk, Andy

Cc:

Subject:

Ford Audit

This message is being sent on behalf of Andy McQuirk:

Ford is inviting themselves to a Supplier Fechnical Assistance Audit of our Pressure Switch line possibly as early as May 21st or as labs as May 26th or 26th.

Please initiate proper preparations.

More details to follow tomorrow.

Regards, Stacey for Andy McGuirk

Agent en en seu se

From:

Foster, Barbara [hfoster@email.mc.ti.com]

Sent:

Tuesday, May 18, 1999 9:20 AM

To:

Douglas, Charles

Ce: .

Pombo, Julie; McGuirk, Andy; Spencer, John; O'Neill, Ed; Martin, Scott; Milkey,

Mary-Jean; Walsh, Thomas; Nicholls, Winston; Pechonia, John

Subject:

Another increase to 77PSL2-1

Ford Service has just called, and faxed to me, an increase to their existing purchase order. They want an additional 25K added to the 200K they have already ordered. Again, they reminded me that they want product as fast as we can build it. I am adding the increase to ship 6-25-99, but please build to an easp date.
Regards, Barb

Carrey, Pet

Front

McGuirk, Andy [a-meguirk@email.mc.ti.com]

Seat:

Tuesday, May 18, 1999 1:42 PM

To: Sabject

Baumann, Russ FW: 77PS

AUTOMOTIVE BENSORS AND CONTROLS ORA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 32703 TEL : '5081 236-3080 FAX : ,508) 236-3745 MOBILE: (508) 208-6119 PAGE: (300) 467-3700 PIN 604-2044

Eson:

Sharpe, Robert Sent: Tuesday, May 18, 1999 2:22 PM

McGuirk, Åndy To: Cc: Bezinghauss, Steven

77PS Subject:

Hi Andy.

I just spoke with Fred and confirmed tomorrow's 2pm meeting. I will attend and would like you/Steve available via phone conference (please confirm the phone? which we should call). Fred Stated today that we should be prepared to discuss the status of our investigation regarding manufacturing as this is the path that Ford "has really sattled into".

fred has also requested that STA John Rentis visit Attleboro to audit/review Ford's manufacturing concerns. I also spoks with John Rentis and he confirmed that he had spoken with fred but did not seem to have much background into this issue. John asked me to meet with him at 1:00pm this Thursday (5/20) to help fill in the gaps. I'm 0.%. with the background up to the point where Ford's focus went to a manufacturing issue. I will want to talk to you directly either tomorrow afternoon or Thursday a.m. in preparation for my meeting at 1:00 with Mr.Rentis. (I also have another meeting scheduled with John on Friday, 5/21, to discuss TI supplier ratings and give a TI "overview" - This meeting was scheduled last week, prior to Fred contacting the STA group, as Mr. Rentis is new to TI).

for your reference.

John S. Rentis Engineer Supplier Technical Assistance Ford Automotive Operations

Quality, Manufacturing, & Purchasing 17101 Rotunda Drive, MD610 Dearborn, MI 48121

Tel: (313) 337-5627 Fax: (313)390-3449 jrentis@ford.com

Best Regards.

Rob Sharpe Texas Instrutents Phone (248) 305-5729 Fax (248) 305-5734 rsharpe@ti.com

ķ

From:

McGuirk, Andy [e-mcguirk:@email.mc.ti.com]

Sent:

Tuesday, May 18, 1999 1:45 PM

Ta:

Sharpe, Robert

Subject:

FW: 77PSL2-1 Requirement

AUTOMOTIVE SENSORS AND CONTROLS GRA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORG, MA 02*03 TEL : (508) 236-3080 FAX : [538] 236-3745 MOBILE: (508) 208-6119 PAGE: (800) 467-3700 PIN 604-2044

From: Martin, Scott

From: Martin, Scott Sent: Monday, May 17, 1999 8:43 AM To: Milkey, Mary-Jean: Isaacsen, Bill: Gueye, Laudelina Co: Perhonis, Johns Prois, Stephen; Gildea, Robert; Foster, Barbaya; McGuirk, Andy: Beringhause, Steven Subject: 77PSLZ-1 Requirement

fyi,

Ford called this morning informing us that they needed to have 80km's in the pipeline prior to the recall announcement they will be making shortly. Since shipping 50km on friday 5/14, they asked for an additional 30km of the 7795LZ-1's to ship today. We were able to meet this request as the devices were in finished goods. Please thank your support team for their expedient service to our customer, I will also do myself. Let's continue to shoot for 150km by 5/21 150km by 5/31.

Regards,

SCOLL

phone: (506) 236-3434

pager: (508) 236-1010 #0929 (508) 234-2329 fax: o-mail: smartini@ti.com

Morris, irene

From:

McGuirk, Andy

Sent:

Wedneeday, May 19, 1999 10:53 AM

To:

Rowland, Thomas: Pechanis, John; O'Neill, Ed.

Cc:

Baymenn, Russ

Subject:

FW: Another increase to 77PSL2-1

i believe we still must better our delivery plan for this part.

let me suggest we take some on-time-delivery 'hits' (without 'shuldown' to dustomer(si)) ag we gan build this reting faster and/or air shipments.

Ford would like to avoid a 2 visit recall in this situation.....which they might be able to do if we deliver faster II any event, i suggest we never be the 'cours' of delay in their field action. I fully understand we should negative our delivery commitment so we do not get not-on-time hits.....so let us have an internal delivery commitment that is much more aggressive then ford ourchasing req?. (say, 225,000 by 6/2 II (i passume we are working thru the holiday weekend (se well as our suppliers) should we not be done by then)

4

ALTOMOTIVE PRESCRE AND CONTROLS QUA MANAGER 14 PERSOT OT M/S 33-85 ATTEMOSO, MA 62763 TRL : (186) 324-2806 PAE : (406) 324-2764 MORICE: (540) 305-0126 PAGS: (180) 457-3700 PER 604-2644

Freeze

Foster, Burbara

Tuesday, May 18, 1996 10:19 AM Douglas, Charles

To:

Ce:

Pombo, Julie: McGuirk, Andy: Spencer, John; O'Nalli, Ed: Martin, Scott Milhey, Mery-Jean; Welch, Thomas; Richolia, Wilmstort, Pachonia, John Another Increase to 77F8L2-1

Subject

Ford Service has just called, and fexed to me, an increase to their existing purchase order. They want an additional 25K added to the 200K they have already ordered. Again, they reminded me that they want product se fest me we can build it. I am adding the increase to ship 6-26-99, but please build to an east date. Regerds, Barb

Currey, Pat

From: M

McGuirk, Andy [a-meguirk@email.mc.ti.com]

Sent:

Wednesday, May 19, 1999 6:04 PM

To:

Baumann, Russ; Rowland, Thomas; Beringhause, Steven; Pechonis, John

Ce:

Sullivan, Martha: Sharpe, Robert

Subject:

p/s undate

attorney - client privileged communication

we participated in fred's 'normal' weds core team meeting and rob delivered our '91-'92 data showing compliance to spec in the period of interest. again, ford and fred are looking for the evidence that something in our process got better over time so they can define an end point to the issue....and we'll review our records to see what data, if anything, we have to provide a response.

i have made plans to meet with tim donovan and his team friday morning at an as-yet-to-be finalized time. I would believe fred will be there too. this will provide the forum for a face to face dialogue and probable delivery of our summary statement letter being developed by me and/or ford acknowledgment that we met spece back in '91-'92.

rob and i will meet with our STA friday morning also and discuss/understand his 'desires' for the upcoming on-site audit. there is a major disconnect at ford regarding timing....STA thinking JULY and fred thinking 26th. fred's core team is meeting with the STA later friday and i believe will re-direct the time sensitivity as well as some of those STA 'desires'. i would guess it will be jume 1 or 2. (which I need to make happen then as i travel to Mexico from 3rd thru 16th---- or after the 16th.)

fred has indicated this STA audit would like to be a very broad engagement...'92 records being verified by actual '99 practices. i acknowledged hearing the request and will address resolution friday. as suspected, the desire by fred was some unstated industrial tourism of the entire factory and records where we would 'bounce around' in some undirected fashion. I will not allow this non-agenda to happen.

pls contact me with any thoughts you develop.

AUTOMOTIVE SENSORS AND CONTROLS QRA MANAGER

34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703 TEL: (508) 236-3080 FAX: (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

Epstein, Sally

From:

Warner, Pam (pwarner@amail.mo.ti.com)

Sent

To:

Thursday, May 20, 1996 \$:20 PM CoMettie, Mike; Tolbert, Kenneth; Racine, James; Watt, Jim; Pechonie, John; Tourangeau,

Ray; Bartosh, Bob; Froia, Stephen

Subject:

Porci Program Switch Audit

Written on behalf of Andy McGuirk.

We will be hosting, probably three individuals, from the Ford organization as early as Monday of next week to participate in some form of industrial tourism of our facility.

I am currently visiting Ford in order to work out the specific details, as well as, understand the objective.

I will see if it's possible to arrange this audit on or about June 17, but until that's resolved, I would sek that we put together an audit team to get into the 77FS operation and walk through with a fine-toothed comb and collect appropriate observations and start to drive us toward counter measures and operactive actions.

Again, time will be of the essence! I appreciate your urgent support in this matter. Thanks.

Regezde,

Andy

Epetein, Sally

From:

McGulrk, Andy (a-mcguirk@email.mc.tl.com)

Sent

Monday, April 19, 1999 3:19 PM

To:

Demers, Richard

Ce:

Wett, Jim; Bundaram, Sunder

Subject:

RE: IMPULSE TEST DATA FOR IP2 TEST

the answer will be a 'qualified' yes to both questions......i do not know if you/i need characteristic sheets. I want all 77 ps impulse test 'history' with focus on the line 400k and 500k cycle test at room temp (the so called rapid cycler that all qu used to run in qu loading samples atc) with focus on after test for 'no oil leakers after cycles' for production pilots and runs that were ultimately built into product and shipped...

start the data summary with most recent history first

a

AUTOMOTIVE SENSORS AND CONTROLS ORA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703 TEL | [506) 236-3080 FAX : (508) 236-3745 MOBILE: (508) 208-6119

> Froms Demers, Richard

PAGE: (800) 467-3700 PIN 604-2044

Sent: Monday, April 19, 1999 11:48 AK

To: McGuirk, Andy

IMPULSE TEST DATA FOR IF? TEST Subject:

ANDY,

JIM WATT STOPPED ME THIS MORNING IN BLDG. 12 HE WAS TELLING THAT YOU WERE AGAIN LOOKING FOR SOME DATA FROM THE LINE, IN THE FORM OF CHARACTERISTIC SHIETS.

HE SAID HE TROUGHT YOU MAY BE LOOKING FOR STUFF FROM THE EARLY 90's 1991 etc. IS THIS CORRECT?

THE DATA I SUPPLIED YOU WITH LATE LAST YEAR WAS FROM 1998 .

IN ANY CASE; UNLESS YOU WANT STUFF YTD. I WOULD MEED TO

RETRIEVE IT FROM DATA STORAGE.

PLEASE ADVISE , THANKS & REGARDS, RICK

Rick Democra Texas Instruments, Inc. 34 Forest Street Attleboro, Na., 02703 tel # 508-236-2588 (fax) 508-236-2430 May 21, 1999

Mr. Fredrick J. Porter, Supervisor E/E Systems Engineering Building 5, Mail Drop 5011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2053

Deer Fred:

I want to review our recent support of the Ford core team to assure we do not have any misunderstandings regarding our pressure switch performance and our contribution to the team.

For six months the Texas instruments Automotive Sensors & Controls Team has been supporting the Ford Core Diagnostic Team with technical facts, data, and analysis regarding our brake pressure switch product applied in the Ford cruise control deactivation circuit.

A senior TI pressure switch engineer was in residence at Ford for three weeks to assist with switch related Issues in the system diagnostic process. Senior TI leadership participation has also been involved in virtually every Ford Core Team meeting delivering facts, data, and technical support year-to-date '99.

Below is a very brief recap of activities leading us to several conclusions:

Dealer switch samples have produced several pressure switches with brake fluid leakage supporting a theory that switches were leaking in the field application. There has been significant focus upon the Kapton® seel system without concluding the cause of these brake fluid leakers. Certain switches evidenced wear-out due to exposure to many pressure cycles (It has theorized a vehicle application cycle quantity issue and/or Kapton stress riser lesue maybe factors).

Conclusion to date: Some switches exhibit end-of-life wear out and leak brake fluid thru the Kapton® diaphragm and appear to be "beyond life".

We also investigated switch capability, and using agreed upon accelerated simulation life testing techniques, demonstrated the ability of the model year '92, '93, '94 Town Car brake switches to consistently exceed "cycle life specification" of 500,000 pressure cycles. TI Weibuli reports of pressure switches tested in '1999 conservatively demonstrate 95% reliability to 1 million cycles (with confidence intervals greater than 50%) while success testing records of some

Mr. Fred Porter Mey 21, 1999 Page 2

665 ES units shows zero leakage at 500,000 cycles during the 1991 - 1992 period (11/91 - 12/92).

Conclusion to date: 1992 period switches met specification. 1999 switch meets or exceeds specification

We have developed and delivered a model of accelerated plastic based ignition resulting from fluid in the switch cavity coupled with the constant power application of the speed control circuit. This model was used to help define the containment and countermeasure programs in the Ford overall program. Theories from the model suggest that fluids in the switch cavity could corrode and might create a plastic base ignition path.

Conclusion to date: Constant speed control power allows long term corresion.

We have been open and forthright in our communications and delivery of information and we believe we have been instrumental in helping Ford address, the underhood fire concern issue.

in this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the vintage 1992 product move towards a timely conclusion. The 1992 test records we recently forwarded clearly demonstrate the product met specification.

We are committed to fulfilling your request for hosting a site visit, optimizing our product line process controls, supporting campaign field return device analysis, and participating in robust system brainstorming moving toward conclusion in July.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards.

Andrew C, McGuirk QRA Manager Texas Instruments

attachments: 1992 Testing History

TI 77PS Test synopsis

TI 77PS Investigation Flow Diagram

ATTORNEY CLIENT PRIORITY INFORMATION

May 21, 1999

Mr. Tim F. Donovan, Manager E/E Systems-Ongoing Prod. Dev. E/E Systems Engineering Building 5, Mail Drop 5017 20000 Rotunde Drive, Rm 1A043 Desrborn, MI, 48121-2053

Dear Tim.

I want to review our recent support of the Ford core team to assure we do not have any misunderstandings regarding our pressure switch performance and our contribution to the team.

For six months the Texas Instruments Automotive Sensors & Controls Team has been supporting the Ford Core Diagnostic Team with technical facts, data, and analysis regarding our brake pressure switch product applied in the Ford cruise control descrivation circuit.

A senior TI pressure switch engineer was in residence at Ford for three weeks to assist with switch related issues in the system diagnostic process. Senior TI leadership participation has also been involved in virtually every Ford Core Team meeting delivering facts, data, and technical support year-to-date 199.

Below is a very brief recep of activities leading us to several conclusions:

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Conclusion to date: Some switches exhibit end-of-life weer out and leak brake fluid thru the Kepton® disphragm and appear to be "beyond life".

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Conclusion to date: 1992 period switches met specification. 1999 switch meets or exceeds specification.

We have developed and delivered a model of accelerated plastic based ignition resulting from fluid in the switch cavity coupled with the constant power application of the speed control circuit. This model was used to help define the containment and countermeasure programs in the Ford overall program. Theories from the model suggest that fluids in the switch cavity could corrode and might create a plastic base ignition path.

Conclusion: constant speed control power allows long term correction

We have been open, and forthright in our communications and delivery of information and we believe we have been instrumental in Ford addressing the underhood fire concern issue. We would at this point like to conclude our exhaustive technical analysis as we believe we have clearly presented facts that validate product conformance to specification. In view of the recent discovery of 1992 test records which clearly demonstrate the product met specification we feel our contribution to further diagnostics appears limited and of diminishing value.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards,

Andrew C. McGuirk QRA Manager Texas instruments

ACM/pew

C: Thomas E. Masters - Ford Fraderick J. Porter - Ford Thomas Rowland - Texas Instruments Steve Beringhause - Texas Instruments

Turne instruments laporporated Materials and Controls Colors



34 Femar Janua P.O. Box 2564 Addition. AAA 02703-2864 GEOR 228-2800

May 21, 1999

Mr. Fredrick J. Porter, Supervisor E/E Systems Engineering Building 5, Mail Orop 5011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2053

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Additionally "success testing records" of some 685 ES units that were tested during the 1991 - 1992 (11/91 - 12/92) showed 0 testage at 500,000 cycles.

Conclusion to date: 1992 period switches met specification. 1999 switch meets or exceeds specification

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Mr. Tim Donoven May 21, 1999 Page 2

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in this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the virtage 1992 product move towards a timely conclusion. The 1992 test records we recently forwarded clearly demonstrate the product met specification. We are committed to fulfilling your request for a site visit and long term fluid exposure tests but would like to come to a mutual agreement on a near term milestone or time frame for concluding our effort.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regarde.

Andrew C. McGuirk QRA Menager Yexas instruments - RETURN TEST PARTYSIS -OPPIMITE PROCESS CONDIAS - PARTICIPATE IN ROSSIST_

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Mr. Frederick J. Porter, Supervisor E/E Systems Engineering Building 5, Mail Drop 5011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2053

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Mr. Fred Porter May 25, 1999 Page 2

Conclusion to date: Constant speed control power allows long term corrosion.

In light of this laboratory model and the need for cruise system power only during vehicle operation, we suggest the system architecture of "key-on/off" based power be considered.

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In this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the vintage 1992 product move towards a timely conclusion. Toward this end, we will continue to support the "core" team review of 1992 product history with targeted completion in July 1999.

We are preparing to fulfill your request for hosting a site visit, supporting campaign field return device analysis, and participating in robust system brainstorming sessions moving toward conclusion in July, as well as reviewing the optimization of our product line process controls.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards,

Andrew C. McGuirk QRA Manager Texas Instruments

attachments: 1992 Testing History

TI 77PS Test synopuls

TI 77PS Investigation Flow Diagram

Currey, Pat

From:

McGuirk, Andy [a-mcguirk@email.mc.ti.com]

Segt

Wednesday, May 26, 1999 9:02 AM

Tor

7

Beringhause, Steven; Baumann, Ruse; Pechonis, John; Rowland, Thomas; Baker,

Gary

Çez

Werner, Pam

Subject:

ford draft...attorney client privileged communication



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pls review and edit

AUTOMOTIVE SEMBORS AND CONTROLS GRA MANAGER 34 FOREST ST M/S 23-05 ATTLEBONO, MA 02703 TEL: (508) 236-3080 FAX: (508) 236-3745

MOBILE: (508) 208-6119 PAGE: (800) 467-3700 PIN 604-2044

May 25, 1998

Mr. Frederick J. Porter, Supervisor E/E Systems Engineering Building 5, Meil Orop 5011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2063

Dear Fred:

I want to review our recent support of the Ford core team to assure we do not have any misunderstandings regarding our pressure switch performance, our continued contribution to the 'core' team, and our commitment to a quick conclusion.

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Mr. Fred Porter May 25, 1999 Page 2

application of constant power as designed in the speed control circuit. Theories from the model suggest that fluids in the switch cavity could corrode and might create a plastic base ignition path in the presence of uninterrupted power.

Conclusion to date: Constant speed control power allows long term corrosion.

In light of this laboratory model and the need for cruise system power only during vehicle operation, we suggest the system architecture of "key-on/off" based power be considered.

We have been open and forthright in our communications and delivery of information and we believe we have been instrumental in helping Ford address the underhood fire concern issue.

In this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the vintage 1992 product move towards a timely conclusion.

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Regards.

Andrew C. McGuirk QRA Menager Texas Instruments

attachments: 1992 Testing History

TI 77PS Test avnocels

TI 77PS Investigation Flow Diagram

Currey, Pat

From:

Beringhause, Steven [sberinghause@email.mc.ti.com]

Sent:

Wednesday, May 26, 1999 9:41 AM

To:

McGuirk, Andy

Subject:

RE: ford draft...attorney client privileged communication.

Andy,
I think it looks good. Do we want to be more specific about eliminating power in FUTURE model years?

Steve

From: McGuirk, Andy

Sent: Wednesday, May 26, 1999 10:01 AM
To: Bezinghause, Steven; Baumann, Russ; Pechonis, John; Rowland,

Thomas: Baker, Gary Cc: Warner, Pam

Subject:

ford draft...attorney client privileged

communication

<<File: FredPort final2.doc>>

pls review and edit

AUTOMOTIVE SENSORS AND CONTROLS QRA MAMAGER 34 FOREST ST M/S 23-05

ATTLEBORO, MA 02703 TEL: (508) 236-3060 FAX: (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

Currey, Pat

Frem:

McGuirk. Andy (a-mcguirk@email.mc.ti.com)

Senti

Wednesday, May 26, 1999 3:34 PM

To:

Sharpe, Robert

Sebject:

FW: ford draft... attorney client privileged communication



right draft

AUTOMOTIVE SENSORS AND CONTROLS QRA MANAGER 34 FOREST ST M/S 23-05

ATTLEBORO, MA 02703 TEL : [508] 236-3080 FAX : [508] 236-3745 MOSILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

Propi McGulzk, Andy

Wednesday, May 26, 1999 4:22 PM

Sharpa, Robert

Subject: FW: ford draft...attorney client privileged communication

AUTOMOTIVE SENSORS AND CONTROLS ORA MANAGER

34 FORBST ST M/S 23-05 ATTLEBORO, MA 02703 TRL : (508) 236-3080 FAX : (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

Fram: McGuirk, Andy

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Wednesday, May 26, 1999 10:01 AM Beringhause, Steven; Baumann, Ruse; Pechonis, John; Rowland, Thomas;

Baker, Gary Co: Warner, Pem

ford draft ... attorney client privileged communication Subject:

<<fredFort final2.doc>>

pls review and edit

AUTOMOTIVE SENSORS AND CONTROLS QRA MANAGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703

TI-NHTSA 016964

TEL: .39) 236-3080 FAX: (508) 236-3745 MOBILE: (508) 208-6119 PAGE: (800) 467-3700 PIN 604-2044

Attorney Client Privileged

May 26, 1999

Mr. Frederick J. Porter, Supervisor E/E Systems Engineering Building 5, Mail Drop 5011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2053

Dear Fred:

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Mr. Fred Porter May 26, 1999 Page 2

Conclusion to date: Constant speed control power allows long term corrosion.

Per Fred no problem to this point In light of this laboratory model and the need for cruise system power only during vehicle operation, we suggest the system architecture of "key-on/off" based power be considered.

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Under Store of

We are preparing to fulfill your request for hosting a site visit, supporting campaign field return device analysis, and participating in robust system brainstorming sessions moving toward conclusion in July, as well as reviewing the optimization of our product line process controls.

Our prime facus at this time is in rapidity supplying Ford with 226,000 units in support of the field ections.

Regards,

Andrew C. McGulrk QRA Manager Texas Instruments

attachments: 1992 Testing History

TI 77PS Test synopsis

TI 77PS Investigation Flow Diagram

* Fred has issue with the left 3 paragraphs in regards to closing or defining a conclusion to the diagnostic journey. This comes from the fact Uthet we still do not have a root cause.

* Initial field service to rewire switch circuit (w/relay) was rejected due to durability concerns with relay (washed).

Do not want to introduce another potential problem.

May 26, 1999

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Mr. Fred Porter May 26, 1999 Page 2

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Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards,

Andrew C. McGuirk QRA Manager Texas Instruments

attachments: 1992 Testing History

TI 77PS Test synopsis

TI 77P8 Investigation Flow Diagram

TI 77PS Test Synopsis

This document is a synopsis of tests conducted by Texas Instruments during the 77PS investigation. The intent of this document is to highlight test findings which drove the investigation to its current state. Throughout the investigation, several tests were conducted with the same objective. When each objective was met, efforts were refocused to obtain a new level of understanding and to establish a new set of objectives. As such, tests have been categorized into (5) levels, representing the level of knowledge obtained from the group of tests conducted. Each level is listed below with a short description of the objective:

- Level 1: Create a laboratory switch ignition without any restrictions on methods.
- Level 2: Create a laboratory switch ignition using only conditions found in the switch operating environment.
- Level 3: Understand the laboratory ignition mechanism.
- Level 4: Compare factors contributing to laboratory ignition.
- Level 5: Evaluate recommendations.

Refer to Brake Pressure Switch Test Log.

Level 1 Objective: Determine if a switch ignition can be created in the laboratory.

Test l

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Switch contact cavity flooded with brake fluid mixed with varying amounts of % H₂0,

14 volts applied to one terminal, second terminal electrically floating. (No electrical load across switch terminals). Switch hexport electrically grounded.

Results:

- (8) samples were tested total:
- (2) with 4% H₂0 in brake fluid.
- (2) with 6% H₂0 in brake fluid.
- (2) with 10% H₂0 in brake fluid.
- (2) with 75% H₂0 in brake fluid.

No ignition occurred. No significant temperature rise observed in all samples. Current draw ranged from 0.5 mAmps to 5 mAmps over a period greater than (250) hours.

Test 2

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Switch contact flooded with brake fluid.

14 volts applied to one terminal, second terminal connected to a 14 ¹² resistor which is tied to ground. (1 Amp foad across switch terminals). Switch hexport electrically grounded.

Results: (2) samples were tested. No ignition occurred. No significant temperature rise observed for a period over (250) hours.

Conclusion: A (1) Amp load through switch terminals did not ignite brake fluid in the contact cavity of switches.

Test 6

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Heater element installed in contact cavity of the switch.

Power applied to the heater element until plastic base melts.

Spark generated in contact cavity of switch.

Brake fluid present in the contact cavity (wet device) and absent in the contact cavity (dry device).

Results: (2) dry devices were tested and (1) wet device was tested. Ignition occurred in all devices.

Wet device: The internal temperature of a wet device reached 660 F. A hole burned through the base of the switch (close to the heating element). The applied spark ignited the fumes in the contact cavity of the switch and engulfed the base material of the switch.

<u>Dry device</u>: The internal temperature of a dry switch reached over 1000°F. The switch base flopped over. The applied spark ignited the fumes in the contact cavity of the switch and engulfed the base material of the switch.

Conclusion: A switch ignition can occur under the following laboratory conditions:

Heater element installed in the switch contact cavity.

5 watts of power dissipated in heating elements

Spark generated in the contact cavity of the switch.

Brake fluid did not contribute to the ignition process.

Level 2: Objective: Determine if a laboratory ignition can occur using only switch components and elements found in the switch environment.

* Test da

Objective: Determine if corrosive degradation of switch electrical components can cause an increase in electrical resistance (and thus a source of heat) in the switch, which may lead to an ignition.

Results: (1) out of (15) samples tested increased resistance to 5 Ω s. A solution of 5 wt. % NaCl in H₂0 can corrode the electrical components of the switch and cause an increase in electrical resistance. Repeated injections of the solution of 5 wt. % NaCl in H₂0 into the contact cavity of a switch, with the switch continuously powered at 14 Volts, can cause an ignition.

Conclusion: A switch ignition can occur under the following laboratory conditions:

A solution of 5% NaCl in H₂0 is injected into contact cavity of a switch. Continuous 14 Volt power applied to the switch. Hexport is grounded.

Current is limited at 15 Amps.

Test 6c

Objective: Determine if brake fluid with metal shavings is conductive enough to create an ignition.

Regults: (3) devices with various size metal particles were tested. No significant current increase detected.

Conclusion: Metal shavings did not significantly increase conductivity brake fluid. Current levels measured were well below levels necessary to create an ignition.

Test 7

Objective: Determine if switch meets cycle life specification.

Results: Tests conducted during the first quarter of 1999 show that switches exceed cycle life specification.

In the first quarter of 1999, a total of (42) 77PSL2-1 snap switches were impulse tested to over 1,000,000 cycles with only (1) leak below 1,000,000 cycles, which

occurred at 728,000 cycles. A Weibull analysis showed 99.9% reliability at 500,000 cycles at 95% confidence level.

Conclusions: Switches meet cycle life specification. First quarter, 1999 tests confirm impulse test findings made during the period between 1991 and 1992. During that period, (6) impulse tests on 144 devices of 57PS and 77PS construction, had no leaks when tested to 500,000 cycles. A Weibuil analysis of first quarter, 1999 tests, showed 99.9% reliability at 500,000 cycles at 95% confidence level.

Test 15a.

Objective: Determine the long term corrosive effects of brake fluid on the electrical components of switches which are continuously powered at 14 Volts.

Results: Test was suspended after 550 hours of testing. (6) samples were tested with continuous 14 Volts power. The contact cavity of (4) switches contained new brake fluid and (2) switches contained old brake fluid. Switches with old brake fluid drew very little bexport current and showed a decrease in hexport current over time to less than 1/10 mAmp. Samples with new brake fluid showed an increase in hexport current to over 20 mAmps toward the end of the 550 hours of testing. Analyses of (1) sample with new brake fluid and (1) sample with old brake fluid revealed electrolytic corrusion of the contact arm of both switches. There was a much lower level of corrosion in the sample with used brake fluid than the sample with new brake fluid.

Conclusion: Brake fluid in the contact cavity of switches, which are at 14 Volta continuous power for over 500 hours, can cause electrolytic corrosion of the switch contact arm and an increase in hexport current.

Test 17

Objective: Quantify the long term corresive effects of new brake fluid on the electrical components of switches under the following laboratory conditions:

Contact cavity of switch flooded with new brake fluid. Switches at continuous 14 Volts power.

Switches subjected to vibration for (1) hour per day.

Switches subjected to 100°C for (1) hour per day.

Results: Test suspended after (312) hours. (50) samples tested. The average hexport current draw after (312) hours is 1.9 mAmps with a standard deviation of 1.8 mAmps. These results are consistent with results previously found in Test 15a at the 300 hour point.

Conclusion: New brake fluid in the contact cavity of switches, has not caused an increase in hexport current after (312) hours at continuous 14 Volts power.

Level 3: Objective: Understand the laboratory ignition process, determine the current path and establish a repeatable ignition method.

Test 6b

Objective: Understand the ignition process, determine the current path and establish a repeatable ignition method.

Results: Multiple attempts at laboratory ignition, via injection of a solution of 5 wt. % NaCl in H₂0 into the contact cavity of switches, has resulted in a repeatability rate of approximately 50%. Plots of hexport current verses time show an increase in current until the point of ignition.

Conclusion: A repeatable laboratory method for switch ignition was established. Based on hexport current measurements, the current path is from switch terminals to hexport body.

When a solution of 5 wt. % NaCl in H₂0 is repeatedly injected into the contact cavity of powered switches, electrolytic corresion of the switch terminal regults in an increase in terminal resistance. When sufficient power is drawn through the corresive resistance, switch elements beat up and begin to glow red bot. A hole burns through the switch base and ignition occurs. There is aroing visible throughout the corresion process which may provide the spark necessary for ignition.

Level 4: Objective: Compare and contrast variables influencing ignition using the established laboratory ignition method.

Test 13a

Objective: Compare various fluids in the established ignition method.

Results: The following fluids were tested.

- NaCl in H₂0.
- (1) tep weter
- (1) rain water
- (1) used brake fluid
- (1) used brake fluid with 5 wt. 1/4 Hz0
- (1) new brake fluid
- (1) new brake fluid with 5 wt. % H₂O

The switch filled with 5 wt. % NaCl in H₂0 resulted in an ignition when average hexport current exceeded 2.5 Amps. Switches that were filled with tap water and rain water drew less than 10 mAmps over a (3) hour test and showed hitle signs of

corrogion. Switches filled with a matrix of new and used brake fluids, with water and without water, all drew less than 3 mAmps hexport current draw and showed no signs of corrosion over the (24) hour test.

Conclusion: Brake fluid is not conductive enough to cause the electrolytic corresion and necessary current draw to create an ignition within a 3 hour lab text. Because of its' significantly higher conductivity, an ionic rich fluid such as NaCl in H₂0 can cause an ignition in a 3 hour lab test exposure...

Test 15

Objective: Compare the ignition characteristics of various plastics as switch base material.

Results: When 5 wt. % NaCl in H₂0 was injected into switches with different base materials, the following results were obtained: Cellanex 4300 ignited 3 out of 5 attempts. Novyl ignited 2 out of 5 attempts. Zytel ignited 1 out of 5 attempts.

Conclusions: All plantics tested can ignite using the established laboratory ignition method.

Test 15b

Objective: Determine if switch ignition can occur in the vertical position and 45° orientation. Determine if switch ignition can occur and at different rotational angles in the 45° orientation.

Results: Switch ignitions can occur in both the vertical and 45° orientation using the established laboratory ignition method.

Conclusion: Switch ignition does not appear to be sensitive to vertical orientation verses 45° orientation nor to rotational angle in the 45° orientation.

Lovel 5 Objective:

Test 16

Objective: Test proposed ruley circuit.

Results: (1) switch was injected with a solution of 5 wt. % Necl in H₂0 and placed in the proposed current limiting circuit for (48) hours. The current draw remained constant at 180 mAmps throughout the test. There was no activity observed and the contact arm remained mostly intact.

(1) switch was brought to an impending burn condition using the established burn method. An impending burn is a condition where a corresive resistance has built

up in the switch and an ignition is imminent. The switch was then placed in the proposed relay circuit for (18) hours where it drew 160 mAmps, showed no visible activity and did not result in an ignition.

Because the proposed relay circuit acts as a resistor which limits current to the switch, the maximum power to the switch is limited to .75 Watts. A resistive wire was wrapped around the base of (1) switch and 0.75 Watts of power was dissipated in the wire. The wire became warm to the touch but had no effect on the switch.

Conclusion: 0.75 Watts, the maximum power in the proposed circuit design, is insufficient to cause substantial electrolytic corrosion or significant switch terminal heating, which is necessary to create an ignition. In previous tests, using a resistor as the heating element (see Test 6), approximately 5 Watts of power was necessary to create an ignition.

TI-NHT&A 016997

Brake Pressure Switch Test Log, Updated 7/22/99

Category	Test	-pesition	Teet Personaturs	Results Update
Lab Simulation	777	ŢĪ	Very water concentrations in 'new Brake Fluid	250+ hours, Current draw in the 0.5mA to 6mA range
of Potential Ignition			14Vdc to one terminal, hexport grounded	Fluid has discolored.
In Switch		-	Whiter Conc. 4%, 6%, 10%, 76%	No Significant Temperature Rise. Test Buspended.
			 	Internal Analysis suspended
	- † - †			
	- 1 2 1	. 1 1	New Books Fluid	250+ hours. Constant temperature.
	$\neg \neg$		1 Amp through switch terminals	No significant temperature rise with time
	-1-1		14Vdc to one terminal, hexport grounded	Test Suspended
	- - 			
	13	AVT	new Brake Fluid in Switch, 24 VDC to one	> 300 hours into test, max current 7mA
			terminal. Hexport Grounded	No significant change with time. Test suspended
	- - 	<u> </u>		<u> </u>
	-121	TVA	new Brake Fluid in Switch, 24 VDC to one	16 hours into test mex current 5mA
	- - 		terretagi. Happort Grounded, Ambient at 100 C	No significant temperature rice with time. Test suspended.
 	- - 			
	1 5	ĀVT	neer Breits Fluid in Switch, 16 Amps	Temperature rise of 20 C above more temp
	- - 	1111	Through switch terminals	Della T reached steady state at 20 C. Test suspended.
				
	- 50	ÄVT	neer Grates Field in Switch approx. 50 Amps	Temperature rose to approx. 270 F. No amoke. No ignition
	- 	7,01	Service Settch Teaminets	Test suspended.
				
	18	π_	Build heater elements into Switch.	3 tested. Smoke observed, ignition observed on part wheater
	- - * 		Heat M failure, include operating.	See attackment
	- - 		(1) w' solution of Brake Fluid and 8 wt. % H ₂ 0	Test complete
	- 11 - 1		(1) to contain - the contain and the contain	Brake fuld in cavity slows down heat build-up
			 	Sympto observed at 675 F, Base make and falls off at 800 F
			<u> </u>	Ottom Control Taylor Daniel Hilliam Circ Daniel Hilliam Circ
	6.	π	Creeks heater by correcting spring sure	One out of 15 devices increased resistance to 5 ohms.
	- ° -	<u>''-</u>	Set water solution, 14V between apring	Others either very low resistance or megachins
				It took about 100 hours to reach the 5 ohm stage.
			and hesport	The 5 ohm device ignited under conditions similar to test 6.
				THE B WILL SENSE PROPERTY AND PROPERTY OF SERVICE
				Switch ignition with repeated 5% water solution into switch
		T1	Re-run ignition test to undecetand	Current path is through hexport.
L			repostability and current polit.	See plots and video.
	_			Additional test include top water, old BF, new BF and other.
			<u> </u>	Notice and suppose and support the part income and come.

Brake Pressure Switch Test Log, Updated 7/22/99

· · -	60	Π	Pure 'now' brake full with matel shavings	Metal shavings do not contribute algorificantly to braids thaid
				coductivity
<u> </u>				
Life Cycle Refeablity	7	Tt .	O-1400 pelo pressure pulses at 1350	First leak observed at 728,000 sycles.
of Pressure Switch			per ES	Test Completed. Box attached Weibuil Chart.
Displange Wear	ı		0-1400 paig pressure pulses et 136C.	Parts withdrawn every 200k cycles, characterized for was:
Flatt ve Lab Consistion		Control Libra	Field returns, from dealer lots, jurisymple	Parts in Central Lake, see Fard spreadsheet
Design Of Experiments (1)	10	ŤI	Vary water concentrations in 'new' Braite Fluid	Test Report being written investigation continues.
Evaluating Factors	1		12 samp + 12 quiet eviliation w/ 0 % wester in OF	Suspended at 1.3 million cycles with no leaks observed.
Effecting Disphragm West	_		12 enep + 12 quiet suffiches w/ 5 % worler in BF	Brisp samples suspended at 1.8 million cycles with 2 leaks
Impulse feet	1			observed at 1.3M. Quiet samples suspended at 500k cycles to
Articles and	1 —			assess faturing enumelies.
On-Vehicle Characterization	11	TVA	Monitor Pressure and Temperature	Test at AVTsee Ford charts>500k in cer?
of Pressure & Temperature	 	-~	at Switch Location for ABB and non-ABB	
Profile in Town C=	! 		braking events.	
Process at 10000 Ca				
Braica fuld shelyals	110	₹1	Analyse weed brake faild at the master cylinder	Test complete.
Used fluid at meeter cylinder.	 '''		(URAC), used brains fluid at the celliper (UCA)	LIMC: Cu = 415 (agint), Fe = 5.6 (agint), Cr = 0.08 (agint), 1.1 %H20.
Chief land or times chance.	[and new banks field (NEW) for contail and water	UCA: Cu = 592 (Lights), Po = 5.5 (ug/ml), Cr = 1.9 (ug/ml), 1.1 %H20.
	 		content.	MENt: Qu =<0.01 (mphn), Fa = 0.02 (mphn), Cr =<.01 (uphn), 0.3 %H20.
			- Contract	
Constant the Objects	12	Cartellate	Determine if endepark forms in switch	Equipment set-up in progress at Central Labo.
Spark Mac Study	12	CHR CH-	using clutch loads and high speed video.	Ti Experimented with no 'significant' sparks observed
	╄		Use dry suitches as well as switches with	
		l	vertous (noise field motor mboss.	
			TERROR CORP. SQUEEZENE HISTOR.	
	T 46	An Indian	When the land of particular	Data tog and analysis procedure set up complete.
Characterization of	13	CONTRACTOR	Chamcharige electrical, rescharaced	Analysis of switches in progress.
evelation retrieved from fold	4	:	and charactel aspects of returned surfaces	MINISTER OF SALESING AT PROPERTY.
turiliyanda 6. cilhat sources				
				Tart combine
Fluid Ingrees Tests	120	11 _	Repeat ignition absulation with different fulds.	Test complete.
			(3) hour lasts:	6% NaCl nample resulted in an ignition.
			6% NeSt in top weter	All brake fluid samples draw less than 3 mAmps. No corrosion
•	T		rain water	visible on braics Suid semples.

Brake Pressure Switch Test Log, Updated 7/22/99

	7 1		(24) hour tests:	Rain water and tap water eampies draw <10 mAmps and showed
	1 1		top water	some signes of corresion.
	1 7		used brake fluid	Chemical aniyals in process.
	1—		used brake fluid w/ 6% H ₂ 0	
	╅		now brake fluid	
	╅		new brake (tub) w/ 9% H ₂ 0	
Design Of Experiments (2)	135	· #1	Very water concentrations in frew Brake Fluid	Test suspended. Analysis in process to assess test fixturing.
Repeat of test 10	 ''		10 map + 20 quiet outlinhes w/ 0 % water in 8F	
topen to the 12	+ +		10 snep + 20 quiet pullation of 5 % wreter in BF	
	╉┈╾┪			
<u> </u>				
Description of Contra	1 14	Dupont	Characterize change in properties of Kapton	Test in progress (100) hours completed. Oxelic sold shows
Computation of Kapton	- '~ -	Dispose .	with various % coalic acid to brake fuld.	similar effects that water has on Kapton proerties.
ARII Challes verso			WELL AND IN COURT OF THE PARTY	
	15	_ π	Assess proporties and moldability of different	Test suspended,
veluation of Plastic	 	 '' .	grades of plastic resin with additives	Colonese and Noryl ignited 3/5 and 2/5 triels
Materials with kinproved	╬┷┤		to improve plantic part performence	ZYTEL semples tested 1/5 ignitions
Carriers .			D Illebrate beisen ber benehmen	
	17.	· · TI	(4) samples with new brake fluid	Test suspended (550) hours completed.
ong duration brake fluid	15a		(2) samples with used brake fuld	Used brake fluid purrent droppes off in <1/10 mAmp.
ngress test.			(2) sprights will used break year	New EF texport current can incremes w/ time under cont. power.
				The state of the s
	4.5		Assess ignition sensitivity to awash orientation.	Test complete. Ignition is independent of switch orientation.
valuation of Switch	150	<u> </u>	Test vertical verses 45 degree.	simulated ewitch ignition can occur in vertical or 46 degree angle.
Drientetion	┩—		Test rotational sensitivity in 45 deg. orientation.	ignition appears not sensitive to switch rotational atignment.
	<u> </u>		Test formation sectorary at 40 days observed it.	Calegory abbases and terrestant in taken a control and a second
			Mary and desired the factor of the state of	Test complete. No ignition. Corrector rate drastically reduced.
Relay Classit	16		Repeat test 13s in Ford relay circuit for (48) hrs.	Insufficient power in circuit to create or move toward ignition in lab
Test	4		Bring switch to impending ignition in (15) Amp	Hanter element was warm to the touch.
			orcult then place in relay circuit for (18) ivs.	LUMBER SHETTER AND SABLE OF GLO WOODS
		:	Input mist, direuit power into heater on writch.	
				The state of the s
Long duration brake fluid	17	Ħ	(50) semples filled with new brake fluid	Test suspended. (312) hours completed.
ingraes test number 2			(1) hour of vibration per day	Average heapon current is 1.9 mAmp (strievistion = 1.8 mAmps)
			(1) hour sook at 100 dag C per day	<u> </u>

preliminary draft summary of TI record search findings of May 14-17 1999

summary by Steve Beringhause & Andy McGuirk May 19th 1999

TIP/N:

77PSL2-1

Ford P/N:

F2VC-9F924-AB

Tested at woom torap' per manufacturing ES requirements

Qty					
	Lat	lmpulse	Qty		
Date	Size	Tested	Legk		
26-Nov-91	4,000	10	-		
26-Nov-91	4,000	10	-		
S-Dec-91	4,000	10	•		
5-Dec-91	4,000	LO	•		
9-Dec-91	4,000	10	•		
9-Dec-91	2,000	5	-		
11-Dec-91	4,000	10	-		
11-Dec-91	4,000	10	-		
13-Dec-91	4,000	10	-		
14-Dac-91	4,000	10	•		
16-Dec-91	4,000	LO	•		
16-Dec-91	4,000	10	•		
2-Jan-92	4,000	10	-		
6-Jan-92	4,000	10	-		
7-J ac- 92	2,000	5	-		
8-Jan-92	4,000	10	•		
6-Jan-92	4,000	10	-		
14-Jan-92	4,000	10	-		
14-Jan-92	4,000	10	-		
15-f an-9 2	4,000	10	-		
28-Jan-92	2,000	5	-		
31-Jan-92	4,000	10	-		
2-Feb-92	1,650	5	•		
4-Pd:-92	4,000	10	-		
5-Feb-92	4,000	10	-		
6-Feb-92	4,000	10	-		
10-Feb-92	4,000	10	-		
11-Fcb-92	4,000	10	-		
12-Fab-92	4,000	10	-		
12 -F-6-92	4,000	10	-		
14-Feb-92	4,000	10	•		
14-Feb-92	4,000	. 10	-		
14-Fdp-92	4,000	10			
15-Feb-92	4,000	10	•		
24-Fcb-92	4,000	10			
26-F -6 -92	4,000	10			
26-Peb-92	4,000	10	-		
28-Peb-92	4,000	ю	-		
28-Feb-92	4,000	10	-		
28-Feb-92	4,000	10	-		
6-Mar-92	4,000	10	-		
10-Mar-92	4,000	10	-		
	, .				

77PGL2-1: Impulse Data Results 11/91 - 12/92

11-Mar-92	4,000	10	-
12-Mar-92	4,000	10	-
18-Mar-92	4,000	10	-
23-Apr-92	2,000	5	•
2-May-92	2,000	5	•
5-May-92	2,000	5	•
6-May-92	2,000	5	-
14-Sep-92	2,000	5	-
22-Sep-92	4,000	10	-
30-8cp-92	4,000	10	-
7-Oct-92	4,000	10	•
7-0:4-92	4,000	10	•
16-Oct-92	4,000	10	-
21-Oct-92	2,000	5	•
20-Oct-92	4,000	10	•
29-Oct-92	4,000	10	-
29-Oct-92	4,000	10	•
30-Oct-92	4,000	10	-
4-Nov-92	4,000	10	-
10-Nov-92	4,000	10	-
10-Nov-92	4,000	10	-
11-Nav-92	4,000	10	-
17-Nav-92	2,000	5	-
20-Nov-92	4,000	10	-
4-Dec-92	2,000	5	•
9-D 00-9 2	2,000	5	•
14-Dec-92	2,000	5	-
16-Dec-92	4,000	10	-
16-Dec-92	4,000	10	-
16-Dec-92	4,000	ĮŮ	-
21-Dec-92	2,000	5	-
21-Dec-92	4,000	10	-

Tatale make	- 264	444	

Carrey, Pat

From:

McGuirk, Andy (a-meguirk@mmil.me.tl.com)

Sent:

Friday, May 28, 1999 8:01 AM

To:

Sharpe, Robert Beumneren, Russ

Ces **Subject**:

FW: ford draft...attorney client privileged communication



per our discussion about your visit

AUTOMOTIVE SENSORS AND CONTROLS ORA MAMAGER 34 FOREST ST M/S 23-05 ATTIRBONO, MA 02703 TEL: (508) 234-3080 FAX: (508) 236-3745 MOBILE: (508) 208-8119 PAGE: (800) 467-3700 PIN 604-2044

From: McGuirk, Andy

Sente

Medinesday, May 26, 1999 10:01 AM Beringhause, Steven; Barmson, Russ; Fechonis, John; Rowland, Thomas; TO:

Sakez, Gary Co: Warner, Pen

ford draft ... attorney client privileged communication Subject:

<<TracdPort final2.doc>>

pls zeview and edit

AUTOMOTIVE SEMBORS AND CONTROLS GRA MURACER 34 TORREST BT M/8 23-05 ATTLEMOND, NR. 02700 TEL : (500) 234-3000 FRE : (500) 234-3745 MOBILE: (500) 200-5119 PAGE: (800) 467-3700 PIN 404-2044

May 25, 1999

Mr. Frederick J. Porter, Supervisor E/E Systems Engineering Building 5, Mail Orop 6011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2053

Dear Fred:

I want to review our recent support of the Ford core team to assure we do not have any misunderstandings regarding our pressure switch performance, our continued contribution to the 'core' team, and our commitment to a quick conclusion.

For six months the Texas Instruments Automotive Sensors & Controls Team has been supporting the Ford Core Diagnostic Team with technical facts, data, and analysis regarding our brake pressure switch product applied in the Ford cruise control descrivation circuit.

A senior TI pressure switch engineer was in residence at Ford for three weeks to essist with switch related issues in the system diagnostic process. Senior TI teadership participation has also been involved in virtually every Ford Core Team meeting delivering facts, data, and technical support year-to-date '99.

We also investigated switch capability, and using agreed upon accelerated almulation life testing techniques, demonstrated the ability of the model year '92 & '93, Town Car speed control describation switches to consistently expeed "cycle life specification" of 500,000 pressure cycles. '11 Webuil reports of pressure switches tested in '1999 conservatively demonstrate 95% religibility to 1 million cycles (with confidence intervals greater than 50%).

Additionally "success testing records" of some 685 ES units that were tested during the 1991 - 1992 (11/91 - 12/92) showed zero leakage at 500,000 cycles.

Conclusion to date: 1992 period exitches met specification. 1999 exitch meets or exapede specification

We have developed and delivered a interactory model of accelerated pixelic base ignition of the exition rejutting from fluid in the exition cavity coupled with application of constant power on designed in the speed control circuit. Theories from the model suggest that fluids in the switch cavity in the presence of uninterrupted power could lead to a corrector product formation which might create a plactic base ignition path.

Mr. Fred Porter May 25, 1999 Page 2

Conclusion to date: Constant speed control power allows long term corrosion

in light of this laboratory model and the need for cruise system power only during vehicle operation, we suggest the system architecture of "key-on/off" based power be considered.

We have been open and forthright in our communications and delivery of information and we believe we have been instrumental in helping Ford address the underhood fire concern issue.

In this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the virtage 1892 product move towards a timely conclusion. Toward this end, we will continue to support the "core" team review of 1892 product history with targeted completion in July 1999.

We are preparing to fulfill your request for hosting a site visit, supporting compaign field return device analysis, and participating in robust system brainstorming assessors moving toward conclusion in July, as well as reviewing the optimization of our product line process controls.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards,

Andrew C. McGuirk QRA Manager Texas instruments

attachments: 1992 Teeting History
Ti 77PS Teet synopsis
Ti 77PS Investigation Flow Chagrent

Morrie, irene

From: Senti

Te:

McGuirk, Andy Friday, May 28, 1999 9:00 AM Sharpe, Robert Baumerin, Russ

Co:

Bubject:

FW: ford druft_attorney client privileged communication

per our discussion about your visit

ACTIONS OF MAIN AND CONTRACT GRA MAINTEE 24 PRODUCT OF WAR 12-US ESTABLISHED NO. 122791 THE T (1806) 236-2706 FAR T (906) 235-2706 HOMELE: (806) 265-2716 HOMELE: (806) 267-2706 FOR 804-2044

McGuirk, Andy Wednesday, May 26, 1990 10:01 AM Beringhayin, Staven; Beameryn, Ruse; Peshania, Jr Wasser, Parm lord draft, alternay allert privileged communication ren; Baumann, Ruse; Peshouis, John; Royaland, Thomas, Baker, Gary



ple review end edit

ACCIONTIVE SERVINE AND CONTECLS QUA TREP-CE 14 PORQUET UT N/O 23-05 ATTAINMED, PA 02703 TEL (100) 234-1400 PAC (140) 238-2705 HERITAIN 1908) 100-6118 PAGE (180) 487-2704 PER 484-2844

REDACTED

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From: McGuirk, Andy Sent: Friday, May 28, 1999 3:22 PM

To: 'Frederick J. Forter' Cc: Beringhause, Steven; Sharpe, Robert

Subject: Ford Core team update

Fred, per our discussions and Rob Sharpe's visit enclosed is our updates...

<<FredPortCore.doc>> <<aynopsil.doc>> <<TESTLOG9.xls>> <<77PSL2_1.zla>>

AUTOMOTIVE SENSORS AND CONTROLS QRA MANAGER 34 FOREST 97 M/S 23-05 ATTLEBORO, MA 02703 TEL : (508) 236-3080 FAX : (508) 236-3745 MOBILE: (508) 208-6119

PAGE: (800) 467-3700 PIN 604-2044

May 26, 1999

Mr. Frederick J. Porter, Supervisor E/E Systems Engineering Building 5, Mail Orop 5011 20000 Rotunda Drive, Rm 3E004 Dearborn MI 48121-2053

Dear Fred:

I want to review our recent support of the Ford core team to assure we do not have any misunderstandings regarding our pressure switch performance, our continued contribution to the 'core' team, and our commitment to a quick conclusion.

For six months the Texas Instruments Automotive Sensors & Controls Team has been supporting the Ford Core Diagnostic Team with technical facts, data, and analysis regarding our brake pressure switch product applied in the Ford cruise control deactivation circuit.

A senior TI pressure switch engineer was in residence at Ford for three weeks to assist with switch related issues in the system diagnostic process. Senior TI leadership participation has also been involved in virtually every Ford Core Team meeting delivering facts, data, and technical support year-to-date '99.

We also investigated switch capability, and using agreed upon accelerated simulation life testing techniques, demonstrated the ability of the model year '92 & '93. Town Car speed control deactivation switches to consistently exceed "cycle life specification" of 500,000 pressure cycles. Ti Welbuil reports of pressure switches tested in 1999 conservatively demonstrate 95% reliability to 1 million cycles (with confidence intervals greater than 50%).

Additionally "success teeting records" of some 555 ES units that were tested during the 1991 - 1992 (11/91 - 12/92) showed zero leakage at 500,000 cycles.

Conclusion to date: 1992 period switches met specification. 1999 switch meets or exceeds specification

We have developed and delivered a laboratory model of accelerated plastic base ignition of the switch resulting from fluid in the switch cavity coupled with application of constant power as designed in the speed control circuit. Theories from the model suggest that fluids in the switch cavity in the presence of uninterrupted power could lead to a corresion product formation which might create a plastic base ignition path.

Mr. Fred Porter May 26, 1999 Page 2

Conclusion to date: Constant speed control power allows long term corrosion.

In light of this laboratory model and the need for cruise system power only during vehicle operation, we suggest the system architecture of "key-on/off" based power be considered.

We have been open and forthright in our communications and delivery of information and we believe we have been instrumental in helping Ford address the underhood fire concern issue.

In this regard, we think it is appropriate at this point that our active participation in the diagnostic journey of the vintage 1992 product move towards a timely conclusion. Toward this end, we will continue to support the "core" team review of 1992 product history with targeted completion in July 1999.

We are preparing to fulfill your request for hosting a site visit, supporting campaign field return device analysis, and participating in robust system brainstorming sessions moving toward conclusion in July, as well as reviewing the optimization of our product line process controls.

Our prime focus at this time is in rapidly supplying Ford with 225,000 units in support of the field actions.

Regards,

Andrew C. McGuirk QRA Maneger Texas Instruments

attachments: 1992 Testing History

TI 77PS Test synopsis

TI 77PS Investigation Flow Diagram

TI 77PS Test Synopsis

This document is a synopsis of tests conducted by Texas Instruments during the 77PS investigation. The intent of this document is to highlight test findings which drove the investigation to its current state. Throughout the investigation, several tests were conducted with the same objective. When each objective was met, efforts were refocused to obtain a new level of understanding and to establish a new set of objectives. As such, tests have been categorized into (5) levels, representing the level of knowledge obtained from the group of tests conducted. Each level is listed below with a short description of the objective:

- Level 1: Create a laboratory switch ignition without any restrictions on methods.
- Level 2: Create a laboratory switch ignition using only conditions found in the switch operating environment.
- Level 3: Understand the laboratory ignition mechanism.
- Level 4: Compare factors contributing to laboratory ignition.
- Level 5: Evaluate recommendations.

Refer to Brake Pressure Switch Test Log.

Level 1 Objective: Determine if a switch ignition can be created in the laboratory.

Test 1

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Switch contact cavity flooded with brake fluid mixed with varying amounts of % H₂0.

14 volts applied to one terminal, second terminal electrically floating. (No electrical load across switch terminals). Switch hexport electrically grounded.

Results:

- (8) samples were tested total:
- (2) with 4% H₂0 in brake fluid.
- (2) with 6% H₂0 in brake fluid.
- (2) with 10% H₂0 in brake fluid.
- (2) with 75% H₂0 in brake fluid.

No ignition occurred. No significant temperature rise observed in all samples. Current draw ranged from 0.5 mAmps to 5 mAmps over a period greater than (250) hours.

Test 2

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Switch contact flooded with brake fluid.

14 volts applied to one terminal, second terminal connected to a 14 Ω resistor which is tied to ground. (1 Amp load across switch terminals). Switch hexport electrically grounded.

Results: (2) samples were tested. No ignition occurred. No significant temperature rise observed for a period over (250) hours.

Conclusion: A (1) Amp load through switch terminals did not ignite brake fluid in the contact cavity of switches.

Text 6

Objective: Determine if switch ignition can occur under the following laboratory conditions:

Heater element installed in contact cavity of the switch.

Power applied to the heater element until plastic base melts.

Spark generated in contact cavity of switch.

Brake fluid present in the contact cavity (wet device) and absent in the contact cavity (dry device).

Results: (2) dry devices were tested and (1) wet device was tested. Ignition occurred in all devices.

<u>Wet device</u>: The internal temperature of a wet device reached 660°F. A hole burned through the base of the switch (close to the heating element). The applied spark ignited the furnes in the contact cavity of the switch and engulfed the base material of the switch.

<u>Dry device:</u> The internal temperature of a dry switch reached over 1000°F. The switch base flopped over. The applied spark ignited the fumes in the contact cavity of the switch and engulfed the base material of the switch.

Conclusion: A switch ignition can occur under the following laboratory conditions:

Heater element installed in the switch contact cavity. 5 watts of power dissipated in heating element. Spark generated in the contact cavity of the switch.

Brake fluid did not contribute to the ignition process.

TI-NHT8A 017010

Level 2: Objective: Determine if a laboratory ignition can occur using only switch components and elements found in the switch environment.

Test 6a.

Objective: Determine if corrosive degradation of switch electrical components can cause an increase in electrical resistance (and thus a source of heat) in the switch, which may lead to an ignition.

Results: (1) out of (15) samples tested increased resistance to 5 Ωs. A solution of 5 wt. % NaCl in H₂0 can corrode the electrical components of the switch and cause an increase in electrical resistance. Repeated injections of the solution of 5 wt. % NaCl in H₂0 into the contact cavity of a switch, with the switch continuously powered at 14 Volts, can cause an ignition.

Conclusion: A switch ignition can occur under the following laboratory conditions:

A solution of 5% NaCl in H₂0 is injected into contact cavity of a switch. Continuous 14 Volt power applied to the switch. Hexport is grounded.

Current is limited at 15 Amps.

Test 6c

Objective: Determine if brake fluid with metal shavings is conductive enough to create an ignition.

Results: (3) devices with various size metal particles were tested. No significant current increase detected.

Conclusion: Metal shavings did not significantly increase conductivity brake fluid. Current levels measured were well below levels necessary to create an ignition.

Test 7

Objective: Determine if switch meets cycle life specification.

Results: Tests conducted during the first quarter of 1999 show that switches exceed cycle life specification.

In the first quarter of 1999, a total of (42) 77PSL2-1 map switches were impulse tested to over 1,000,000 cycles with only (1) leak below 1,000,000 cycles, which

occurred at 728,000 cycles. A Weibuil analysis showed 99.9% reliability at 500,000 cycles at 95% confidence level.

Conclusions: Switches meet cycle life specification. First quarter, 1999 tests confirm impulse test findings made during the period between 1991 and 1992. During that period, (6) impulse tests on 144 devices of 57PS and 77PS construction, had no leaks when tested to 500,000 cycles. A Weibuil analysis of first quarter, 1999 tests, showed 99.9% reliability at 500,000 cycles at 95% confidence level.

Test 15a

Objective: Determine the long term corrosive effects of brake fluid on the electrical components of switches which are continuously powered at 14 Volts.

Results: Test was suspended after 550 hours of testing. (6) samples were tested with continuous 14 Volts power. The contact cavity of (4) switches contained new brake fluid and (2) switches contained old brake fluid. Switches with old brake fluid drew very little hexport current and showed a decrease in hexport current over time to less than 1/10 mAmp. Samples with new brake fluid showed an increase in hexport current to over 20 mAmps toward the end of the 550 hours of testing. Analyses of (1) sample with new brake fluid and (1) sample with old brake fluid revealed electrolytic corrosion of the contact arm of both switches. There was a much lower level of corrosion in the sample with used brake fluid than the sample with new brake fluid.

Conclusion: Brake fluid in the contact cavity of switches, which are at 14 Volta continuous power for over 500 hours, can cause electrolytic corresion of the switch contact arm and an increase in hexport current.

Test 17

Objective: Quantify the long term corrosive effects of new brake fluid on the electrical components of switches under the following laboratory conditions:

Contact cavity of switch flooded with new brake fluid. Switches at continuous 14 Volts power. Switches subjected to vibration for (1) hour per day. Switches subjected to 100°C for (1) hour per day.

Results: Test suspended after (312) hours. (50) samples tested. The average hexport current draw after (312) hours is 1.9 mAmps with a standard deviation of 1.8 mAmps. These results are consistent with results previously found in Test 15a at the 300 hour point.

TI-NHTSA 017012

Conclusion: New brake fluid in the contact cavity of switches, has not caused an increase in hexport current after (312) hours at continuous 14 Volts power.

Level 3: Objective: Understand the laboratory ignition process, determine the current path and establish a repeatable ignition method.

Test 6b

Objective: Understand the ignition process, determine the current path and establish a repeatable ignition method.

Results: Multiple attempts at laboratory ignition, via injection of a solution of 3 wt. % NaCl in H₂0 into the contact cavity of switches, has resulted in a repeatability rate of approximately 50%. Plots of hexport current verses time show an increase in current until the point of ignition.

Conclusion: A repeatable laboratory method for switch ignition was established. Based on hexport current measurements, the current path is from switch terminals to hexport body.

When a solution of 5 wt. % NaCl in H₂0 is repeatedly injected into the contact cavity of powered switches, electrolytic corrosion of the switch terminal results in an increase in terminal resistance. When sufficient power is drawn through the corrosive resistance, switch elements heat up and begin to glow red hot. A hole burns through the switch base and ignition occurs. There is arcing visible throughout the corrosion process which may provide the spark necessary for ignition.

Level 4: Objective: Compare and contrast variables influencing ignition using the established laboratory ignition method.

Test 13a

Objective: Compare various fluids in the established ignition method.

Results: The following fluids were tested.

- NaCl in H₂0.
- (1) tap water
- (1) rain water
- (i) used brake fluid
- (1) used brake fluid with 5 wt. % H₂O
- (1) new brake fluid
- (1) new brake fluid with 5 wt. % H₂O

The switch filled with 5 wt. % NaCl in H_20 resulted in an ignition when average hexport current exceeded 2.5 Amps. Switches that were filled with tap water and rain water drew less than 10 mAmps over a (3) hour test and showed little signs of

corrosion. Switches filled with a matrix of new and used brake fluids, with water and without water, all drew less than 3 mAmps hexport current draw and showed no signs of corrosion over the (24) hour test.

Conclusion: Brake fluid is not conductive enough to cause the electrolytic corrosion and necessary current draw to create an ignition within a 3 hour lab test. Because of its' significantly higher conductivity, an ionic rich fluid such as NaCl in H₂0 can cause an ignition in a 3 hour lab test exposure.

Test 15

Objective: Compare the ignition characteristics of various plastics as switch base material.

Results: When 5 wt. % NaCl in H_20 was injected into switches with different base materials, the following results were obtained: Cellanex 4300 ignited 3 out of 5 attempts. Noryl ignited 2 out of 5 attempts. Zytel ignited 1 out of 5 attempts.

Conclusions: All plastics tested can ignite using the established laboratory ignition method.

Test 15b

Objective: Determine if switch ignition can occur in the vertical position and 45° orientation. Determine if switch ignition can occur and at different rotational angles in the 45° orientation.

Results: Switch ignitions can occur in both the vertical and 45° orientation using the established laboratory ignition method.

Conclusion: Switch ignition does not appear to be sensitive to vertical orientation verses 45° orientation nor to rotational angle in the 45° orientation.

Level 5 Objective:

Test 16

Objective: Test proposed relay circuit.

Results: (1) switch was injected with a solution of 5 wt. % Nacl in H₂0 and placed in the proposed current limiting circuit for (48) hours. The current draw remained constant at 180 mAmps throughout the test. There was no activity observed and the contact arm remained mostly intact.

 switch was brought to an impending burn condition using the established burn method. An impending burn is a condition where a corrosive resistance has built up in the switch and an ignition is imminent. The switch was then placed in the proposed relay circuit for (18) hours where it drew 160 mAmps, showed no visible activity and did not result in an ignition.

Because the proposed relay circuit acts as a resistor which limits current to the switch, the maximum power to the switch is limited to .75 Watts. A resistive wire was wrapped around the base of (1) switch and 0.75 Watts of power was dissipated in the wire. The wire became warm to the touch but had no effect on the switch.

Conclusion: 0.75 Watta, the maximum power in the proposed circuit design, is insufficient to cause substantial electrolytic corrosion or significant switch terminal heating, which is necessary to create an ignition. In previous tests, using a resistor as the heating element (see Test 6), approximately 5 Watts of power was necessary to create an ignition.

Brake Pressure Switch Test Log, Updated 7/12/99

Category	Test	Location	Test Parameters	Recults Update	
Lab Simulation	11	Π	Very water concentrations in 'new' Brake Fluid	250+ hours, Current draw in the 0.5mA to 5mA range	
of Potential Ignition	$\neg \neg \tau$	'	14Vtlc to one terminal, hexport grounded	Fluid has discolored.	
în Şwitch			Water Conc. 4%, 8%, 10%, 75%	No Significant Temperature Rise. Test Suspended.	
				Internal Analysis suspended.	
-					
	2	π	Now Brake Fluid	250+ hours. Constant temperature.	
			1 Arrap through ewitch terminals	No algorificant temperature rise with time	
	1 1		14Vdc to one terminal, hexport grounded	Test Suspended.	
			<u> </u>		
	3	AVT	new Braits Fluid in Swiich, 24 VDC to one	> 300 hours into test, max current 7mA	
			terralismi. Heaport Grounded	No significant change with time. Test suspended	
	4	AVT	new Breite Fluid in Switch, 24 VDC to one	16 hours into test max current 5mA	
			terminal. Hesport Grounded, Ambient at 100 C	No significant temperature rise with time. Test suspended.	
	_				
	5]	XVT	new Brake Fluid in Switch, 16 Amps	Temperature rise of 20 C shows soom temp	
			Through switch terminals	Delin T reached standy state at 20 C. Test suspended.	
				<u></u>	
	50	AVT	new Brake Fluid in Switch approx. 50 Amps	Temperature rose to approx. 270 F. No smoke. No ignition	
			through Switch Terminals	Test suspended.	
<u> </u>	-		1		
	6	π	Build heater elements into Switch.	3 tested. Smoke observed, ignition observed on part wheater	
	-11		Heat # fallure, include sporting.	See altachment	
			(1) w/ solution of Brake Fluid and 6 vst. % H ₂ 0	Test complete	
				Brake fluid in cavity slows down heat build-up	
<u> </u>			<u> </u>	Smoke observed at 576 F, Base melts and falls off at 800 F	
<u> </u>			<u></u>		
	On	T	Create heater by corroding apring arm	One out of 15 devices increased resistance to 5 ohms.	
			Selt weter colution, 14V between spring	Others ofther very low realistance or megachina	
<u> </u>			and heaport	It took about 100 hours to reach the 5 ohm stage.	
				The 5 chm device ignited under conditions similar to test 6.	
L ₃			<u> </u>		
AN THE STATE OF TH	8b	<u> </u>	Re-run ignition test to understand	Switch ignition with repeated 5% water solution into switch	
Ļ f			repeatability and current path.	Current path is through hexport.	
				See plots and video.	
L 5				Additional test include tap water, old BF, new BF and other.	
	6c	Π.	Pure 'new' brake fuld with metal shavings	Metal shavings do not contribute significantly to brake fluid	

Brake Pressure Switch Test Log, Updated 7/12/99

	T - T	i		coductivity
THE RESERVE OF THE PARTY OF THE			TO THE RESERVE THE PARTY OF THE	14. 18. 18. 18. 18. 18. 18. 18. 18. 18. 18
No Cycle Reliability	7 1	Ή	0-1400 peig pressure pulses at 185C	First leak abserved at 728,000 cycles.
Pressure Selich	1		per ES	Tract Completed, See attached Welbuil Chert.
	81 ST 12		THE THE PROPERTY OF THE PROPERTY OF	
Naphragm Wear	. 8		0-1400 peig pressure pulses at 136C.	Parts withdrawn every 200k cycles, characterized for wear
	100			
Teld ve Lab Correlation		Central Labs	Field column, from dealer lots, kinkyards	Parts in Cantral Labo, see Ford spreadsheet
	2 1 3		1	
legge Of Experiments (1)	10	П	Very under concentrations in 'new/ Brahe Fluid	Test Report being written investigation continues.
valuating Factors	│ ¨		12 arrap + 12 quiet switchee w/ 0 % water in 9F	Suspended at 1.3 million cycles with no lanks observed.
Hesting Disphregm Weer	-		12 amp + 12 quiet evilchee w/ 5 % water in RF	Snap complex suspended at 1.3 million cycles with 2 leaks
rguine tont	1 !			observed at 1.394. Quiet exemples suspended at 500k cycles to
	_			essees finished enomalies.
	5. Fr <i>3</i> ,	Part Special Control		
n-Vehicle Characterization	111	AVT	Micritize Processes and Temperature	Test at AVTsee Ford charts>600k in car?
/ Ревенте & Топороги <u>што</u>	1		at Switch Location for ABS and non-ABS	
votile in Town Car	_		breidno evente.	
	11.7	·		
Srake fluid enelysie	7 tin		Analyze used braics fluid at the mester cylinder	Test complete.
land fluid at master cylinder.	+		(UMC), used broke fluid at the caliper (UCA)	UNIC: Cu = 415 (ug/ml), Fu = 6.5 (ug/ml), Cr = 0.00 (ug/ml), 1.1 %H20.
	 		and new brake fluid (NEW) for metal and water	UCA: Cu = 582 (ug/m), Fe = 5.5 (ug/m), Cr = 1.9 (ug/m), 1.1 %(420.
			content.	MEM: Cu = <0.01 (ug/ml), Fe = 0.02 (ug/ml), Cr = <.01 (ug/ml), 0.3 %/120.
কুন্তের লাগীকুন্তি কিন্তা স		- 150 · · ·		是一个人的人,我们就是一个人的人,我们就是一个人的人,我们就是一个人的人。 第一个人的人的人,我们就是一个人的人的人的人,我们就是一个人的人的人,我们就是一个人的人的人的人的人,我们就是一个人的人的人的人的人,我们就是一个人的人的人的人
Spark /Arc Skudy	12	Central Labo	Determine if arc/sperk forms in switch	Equipment sel-up in progress at Control Labs.
	1		using clutch loads and high speed video.	Ti Experimented with no 'wignificant' sperits observed
			Use thy switches as well as extiches with	
	$\overline{}$		various brains fluid water mbds.	
新³5 46		1 2 3 4 5 7 7	17. 第1.41. ASM 等其	3. 有多种种的 1990年 199
Cherecterization of	T 13	Control Labs	Characteriza electrical, mechanical	Data log and analysis procedure set up complete.
switches retrieved from Said	 		and chamical supects of returned switches	Analysis of sultches in progress.
unkyarda & other sources	1			
Service of the servic	· '.'' ·.	10.82.0291.42		名 副國際共產黨的原統第28000 2000 2000 2000 2000 2000 2000 200
fuld Ingress Tests	130	П	Repeat ignition simulation with different fulcie.	Test complete.
	+	 	(Si) hour tests:	5% MaCl sample resulted in an ignition.
		 	5% NaCl in tap water	All brake fluid eamples draw less than 3 mAmps. No conceion
— 」	1	 	rain water	visible on brake fluid semples.
— <u>}</u> ———	+	 	(24) hour lests:	Rain water and top water samples draw <10 mAmps and showed
	1	 	(a) waitr	some signes of corrosion.
— . 	+	 	used brake fluid	Chamical artiyete in procees.

Brake Pressure Switch Test Log, Updated 7/12/99

			used breize Suid w/ 5% H ₂ 0	
]1		mew braits fluid	
	TT		new brake fluid w/ 5% H ₂ 0	
WAS TO SELECT THE SELE	is perfect	Service Control		
Design Of Experiments (2)	13b	Π	Vary water concentrations in new Brake Fluid	Test suspended. Analysis in process to sesses test fluturing.
Repeat of test 10	11		10 map + 20 quiet switches of 0 % water in BF	
	\Box		10 amap + 20 quiet exiteixes w/ 5 % water in RF	
	5 Baltis	gg mag i i i i i i i i i i i i i i i i i i i	(S.C.) No service of the Section of Section (Section Section S	TACOMETERS IN CONTRACTOR OF THE PROPERTY OF TH
Compatibility of Kapton	14	Dupant		
ellih Chapilic Acid	┼╌┤	- Probrair	Characterize change in properties of Kapton	Test in progress (100) hours completed. Ozniic sold shows
			with various % castle acid in brake fluid.	similar effects that water has an Kapton processes.
Evaluation of Photic	16		02107-011-0220	(1) 12 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
Asterials with Ingroved	+ ''' -	П	Among properties and moldability of different	Test suspended.
Standiffict Simone mix antachen	-} }		practice of physic main with additions	Celenese and Noryl igniled 3/5 and 2/5 trials
		::::::::::::::::::::::::::::::::::::::	to improve placic part performance	ZYTEL samples tested 1/5 (grations
	128.1			相信的"1990"。 4. 多一多种《水源 图》: 19 10 10 10 10 10 10 10 10 10 10 10 10 10
biult edend notionals guid	16a	R	(4) manifold Auto Sales plays and	Test suspended (550) hours completed.
ngress teet.			(2) usrnpies with used brates fluid	Used brake fuld current dropped off to <1/10 mAmp.
Charles for the control of the street of the	1	ranga ji gim sa ri		New BF herport current can increases within under cont. power.
All a separate properties and the separate properties and				这种的人的人们是一个人们的人们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们
voluntion of Switch	15b	Π	Assets trailer sensitivity to setch orientation.	Test complete. Ignition is independent of switch orientation.
Internation	 - 		Test vertical verses 45 degree.	simulated watch ignition can occur in vertical or 45 degree angle.
			Test rotational annalityity in 46 deg. orientation.) least on appears not sensitive to switch relational allowment.
sume at the second of the				· · · · · · · · · · · · · · · · · · ·
Valley Circuit	16	TI	Repeat test 13s in Ford retay circuit for (48) hrs.	Test complete. No ignition, Corresion rate drastically reduced.
<u>rest</u>			Bring switch to impending typillars in (16) Amp	Insufficient power in circuit to create or move toward ignition in lab
	<u> </u>		circuit then place in rainy circuit for (18) hrs.	Heater element was werm to the touch.
		· -	Angut mace, circuit power into heater on switch.	
ALA GARAGE SA			40 × 10 445 80.00	
ong duration brake fluid	17	n n	(60) samples filed with new brake fluid	Test suspended. (312) hours completed.
ngrees test number 2.			(1) hour of vibration per day	Average hexport current is 1.9 mAmp (stdeviation = 1.8 mAmps)
			(1) hour souk at 100 dag C per day	- 1.0 III. all the second of t

prelimingry draft summary of TI record search findings of May 14-17 1999

summary by Stove Boringhause & Andy McGuirk May 19th 1999

TI P/N:

77PSL2-1

Ford P/N:

F2VC-9F924-AB

Tessed at 'room temp' per manufacturing ES requirements

		Qty	
	Let	Impulso	Qty
Date	Size	Testad	Lenk
26-Nov-91	4,000	10	-
26-Nov-91	4,000	10	-
5-Dec-91	4,000	10	-
5-Dec-91 9-Dec-91	4,000 4,000	10 10	-
9-Dec-91	2,000	5	-
11-Dec-91	4,000	10	_
11-Dec-91	4,000	10	-
13-Dec-91	4,000	10	-
14-Dec-91	4,000	10	-
16-Dec-91	4,000	10	-
16-Dec-91	4,000	10	-
2-Jan-92	4,000	10	•
6-Jan-92	4,000	10	-
7-J 92	2,000	5	-
8-J m-92	4,000	10	-
8-Jan-92	4,000	10	-
14-Jan-92 14-Jan-92	4,000	10	-
15-Jan-92	4,000 4,000	10 10	-
28-Jan-92	2,000	5	-
31-Jan-92	4,000	10	-
2-Feb-92	1,650	5	-
4-Fab-92	4,000	10	-
5-Feb-92	4,000	10	-
6-Feb-92	4,000	10	-
10-Pab-92	4,000	10	-
11- Peb-92	4,000	10	•
12-Peb-92	4,000	10	•
12-Feb-92 14-Feb-92	4,000 4,000	10	-
14-Feb-92	4,000	10 10	•
14-Feb-92	4,000	10	•
15-Feb-92	4,000	10	_
24 Feb-92	4,000	10	_
26-Peb-92	4,000	10	_
26-Feb-92	4,000	10	-
28-Peb-92	4,000	10	
28-Feb-92	4,000	10	•
28-Pob-92	4,000	10	•
6-Mar-92	4,000	10	•
10-Mar-92	4,000	10	-
11-Mar-92	4,000	10	-
12-Mar-92	4,000	ΙQ	-

77PSL2-1: Impulse Data Results 11/91 - 12/92

stale waite	265,680	664	
21-040-32	7,000	10	_
21-Dec-92	4,000	ιó	-
21-Dec-92	2,000	5	-
16-Dec-92	4,000	10	_
16-Dec-92	4,000	10	_
16-Dec-92	4,000	10	_
14-Dec-92	2,000	5	-
9-Dec-92	2,000	5	
4-Dec-92	2,000	5	
20-Nov-92	4,000	10	-
17-Nov-92	2,000	5	-
11-Nov-92	4,000	10	-
10-Nov-92	4,000	10	-
10-Nov-92	4,000	10	-
4-Nov-92	4,000	10	-
30-Oct-92	4,000	10	
29-Oct-92	4,000	10	Ĭ
29-Oct-92	4,000	10	-
20-Oct-92	4,000	10	-
21-Oct-92	2,000	5	-
16-Oct-92	4,000	10	-
7-Oct-92	4,000	10	-
30-Sap-92 7-Oct-92	4,000	10	-
22-Sep-92	4,000 4,000	10	-
14- Sep- 92	2,000	5 10	-
6-May-92	2,000		-
5-May-92	2,000	5 5	-
2-May-92	2,000	5	-
23-Apr-92	2,000	5	-
18-Mar-92	4,000	10	-
10 34 00	4.000	40	