EA02025 **TEXAS INSTRUMENTS, INC.'S 09/10/03 LETTER TO ODI REQUEST 9 BOX 12** PART A – O PART J

Epstein, Sally

From:	Wett, Jim Swett@email.mc.tl.com]
Sent:	Monday, March 01, 1999 3:55 PM
To:	Baumann, Russ; Beringhause, Steven; Dague, Bryan; Pechonia, John; Rahman, Aziz;
	Rowland, Thomas; Douglas, Charles; Pawlowski, Robin; Baker, Gary, O'Nelli, ED; Haskell,
	Beth; Sharpe, Robert; McGuink, Andy
Subject:	RE: FORD P/8 TRANSITIONS OF CURRENT INTEREST

. .

٤.



· •

Andy,

Below are the files you were requesting:

Town Car Switch Usage Sequence:

<<7725timeline.ppt>>

2. 77PS Suppliers' Request For Engineering Analysis (SREA) history:

<<77PS SREA-ALERT UPDATE.XLS>>

з. Fart Number 46515 (7798 Molded Base Material History):

<<77PS Molded Base P.N. 46525 UPDATE.XLS>>

Jim Watt, QRA, magid: jw02; mail station 12-33; page (50\$)236-1010, no. (0696) ph (508) 236-1719; fax (508)236-3153

McGuirk, Andy Fremi Sent: Monday, March 01, 1999 10:22 AM Baumann, Russ; Beringhause, Steven; Dague, Bryan; Pechonis, John; Rahman, TOL Aziz; Rowland, Thomas; Douglas, Charles, Watt, Jim; Fawlowski, Robin; Baker, Gary; O'Naill, Ed: Maskell, Beth; Sharpe, Robert

Subject: FORD P/S TRANSITIONS OF CURRENT INTEREST

JIN WATT, FLS FULL TOGETHER THE TEAM OF CHARLIE DOUGLAS AND ROBIN FAULOWSKI AND OTHERS TO RECONSTRUCT THE TIME-LINE OF TI PRESSURE SWITCH 77PS FAMILY.

SPECIFIC AREAS OF INTEREST ARE QUIET SWITCH AND NORMAL SWITCH AS WELL AS GE PLASTIC AND CILENEX PLASTIC AS INSTALLED INTO THE FORD TOWN CAR PLATFORM IN MODEL YEAR '92 AND '93. I UNDERSTAND WE ARE ABLE TO DEFINE THE TIER-ONE CUSTOMERS AND THERE WILL BE A NEED TO CONNECT THEM TO THIS PLATFORM AND YOU SHOULD USE VARIOUS AVENUES TO ACCOMPLISE SAME.

PLEASE PLAN & 'MINI' TEAM METTING WITH JOHN FECHONIS AND CHARLIE DOUGLAS AND YOURSELF (AND OTHER IF YOU FEEL VALUE IS ADDED)" (AT JOSH'S OFFICE) TO REVIEW OUR STATUS LATER TODAY ... SAY 4-ISH. IT IS INFORTANT THIS INFO BE ACCURATE AS WELL AS PROMPT. THE



RESULTING PRODUCT WOULD BE REVIEWED WITH RUSS TOMORROW MORNING BY ME.

2

λ

. . .

4

٠,

ALTOMOTIVE SENSORS AND CONTROLS ORA MANGER 34 TOREST ST N/S 23-05 ATTLEBORG, MA 02703 TEL : (508) 236-3080 FAX : (508) 236-3745 PAGE: (800) 467-3700 PIN 504-2044

-

Shere La Pondeter 3/1/99 43 Tanela Story Flee. (Luracheritics lpat Resistant termines many hereport 34 - 39MASS x- when pulgo a cob Store the open cruit Pressourceared + - USI'S - 148ps: - open Still ON'S Stops - Lelal Stillori Lat 200ps - sully piped pressie - (bused at 62 psi - upered at 148 psi again Termis lak discolored water consist?

Epstein, Sally

From:	LaRouche, Steve (S.) [sitrouch@ford.com]
Sent:	Tuesday, March 02, 1999 10:58 AM
To:	Porter, Fred (F.J.); LaPointe, Norman (N.R.); Reimers, Steve (S.J.); Rahman, Aziz;
	McCarthy, Shaun (S.L.); LaRouche, Steve (6.)

We have found three switches so far (including the one to be analyzed by the Sci Lab), that will not open electrically when disc is heard to snap under application of air pressure. I sectioned one of these switches and found what appears to be water (it evaporated rather quickly at room temp) and corresion product. I found that the transfer pin has been stuck in place by the corresion products. What this means, is that even if the disc snaps, the pin will not pull back, and the contacts will not open. None of these switches showed evidence of disphragm leakage on the test stand.

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

Epstein, Selly

From: Rahman, Aziz (arahman@emoik.mc.b.com) Sent: Tuesday, March 02, 1999 3:25 PM To: McGuirk, Andy; Dagus, Bryan; Dougles, Charles; Sharpe, Robert; Beumann, Russ; Beringhause, Staven Subject: PW: Central Lab Analyses

fyi

From: LaRouche, Steve [3.][SMTF:slarouch@ford.com] Sent: Tuesday, March 02, 1999 11:36 AM To: Forter, Fred (F.J.); LaPointe, Norman (N.R.); Reimers, Steve (S.J.); 'A. Rahman'; McCarthy, Shaun (S.L.); LaRouche, Steve (S.)

We have found three switches so far (including the one to be analyzed by the Sci Lab), that will not open electrically when disc is heard to snap under application of air pressure. I sectioned one of these switches and found what appears to be water (it evaporated rather quickly at room temp) and corrosion product. I found that the transfer pin has been stuck in place by the corrosion products. What this means, is that even if the disc snaps, the pin will not pull back, and the contacts will not open. None of these switches showed evidence of disphragm leakage on the test stand.

L

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

•.1

Epstein, Sally

(313) 845-4876

LaRouche, Steve (S.) [starouch@ford.com] Front: Wednesday, March 03, 1999 7:42 AM Sent: Rehman, Aziz Ta: **RE: Switches** Subject: Ariz: I believe these were the junkyard samples. Two had the connectors fully engaged, while the connector on the third was not fully engaged. (SLAROUCZ) Steve LaRouche Metallurgy Section, Central Laboratory, Room \$410 (313) 322-1614 FAX (313) 845-4876 -----Original Message-----From: Rahman, Aziz [mailto:arahman@umail.mc.ti.com] Sent: Tussday, March 02, 1999 4:28 PM To: Forter, Fred (f.J.); LaFcipte, Norman (N.R.); Reimers, Steve (S.J.); 'Steve LaRouche (Ford)' Cer McGulrk, Andy Subject: RE: Switches Steve L., what was the condition of the switches as received. Did they have connectors attached to them, or ware they open to the elements? More these from the "junkyard" group of the earlier group? Regards Aziz, LaRouche, Steve (5.) [SMTP:slarouch@ford.com] From: Tuesday, March 02, 1999 11:56 AM Sent: Porter, Fred (F.J.); LaPointe, Norman (N.R.); Reimers, Steve To: (S.J.); 'A. Rahman'; McCarthy, Shaun (S.L.); LaRouche, Stave (S.) We have found three switches so far (including the one to be analyzed by the Sci Leb), that will not open electrically when disc is heard to shap under application of air pressure. I sectioned one of these switches and found what appears to be water (it evaporated rather quickly at room temp) and corresion product. I found that the transfer pin has been stuck in place by the corrosion products. What this means, is that even if the disc anaps, the pin will not pull back, and the contacts will not open. None of these switches showed evidence of disphrage leakage on the test stand. Steve LaRouche (SLAROUCH) Metallurgy Section, Central Laboratory, Room N410

(313) 322-1614 FAX

.

Breize Pressure Switch Meeting

	EMAL	3/3	\$ 99
Store Rainers	SREMERS	803236	LUT/EESE
FRED PORTOR	FPORTEL	X53722	AVT GESE
19. P. R. 555	MEESE	x 771+2	0FD 410
Pac Sharpe	r Erarpt & Bis Ism	205-572 T	TEXA. Ing to a part of t
GIEG STEVENS	GSTEVEN1	x 36686	ANT MAT'L
Norm LAPOINTE	NLAPBINT	* +2-686	ANT/DES. form
STEVE LAROUCHE	SLAROUCH	e 24876	Compar LAD
HADDY HIL Gowiek	Q-14 4 11 12 12 12 1	1. com 506 234	3080 TE QRH
-	L WARAANCE	E 313 32 23	284 ATU
+ Stere Beringhause / Bryan	Dague from TI	an confordate ca	N

3/3/99 `war Ream` Town Car Weakly Mby. Assade Yesting Status - Brake Switch Relacetion Other Potential Salations · 92 Town Car at Proving Grounds (43K) 🔓 Haue RES, Suitch Pressure rea (**1** Switch beng CAN Fluid) " Many ST TELES (LA complete #1. Coteve R . has data is } Samples of Brake Fluid haken SWIER is ATAZH "33" (SAMP) very alaan. and Service His bary + & issues , no majors Finited switch base (quickly on) bureard to som but not arts haven't - wich burning harness chanked boost than ewitch) once on fire, burned "up" guicking into the connector " best Andry "Reviewed 2/24/49 Potential Thermal Event Theory (w/ stave Bar ghaves) Now is this different than the Remains true in Plants " (Ante of concernen such more since in addition } 600 - 18 annual hits/m 15-20% lankage , shit benks Bill Lorem) displaying dependention is a metriculture. And is well as so de top car (Norm) & can be get a site what sole (shake area ions to drive a care ۳, to and use /attor is not preter up in rutained analysis (daulis dra) " " Prove in any data from Report, water establish an annexemption to Tafian Kopton in terfior control, were over life taffin will wake any. *TI+ see as anytic and impact on Kapton + Task w/ Saylic and instrum of anit (Fas) Recent Just york returns 1th returns showing an earce of connector brook Dan stated that the broke Churd is very fearranise to term certains Relocation of Broke Switch to eriol (22,03) """"""" More & Trade, interdicent information All in ter Courty (But his could be impreparte the causey with "luke" or Silicon (insulation) Stars & LL TI-NHTSA 016703

•

look at ald Orake Fluid for conductivity Engl A If we put a fuse for connector, impact to cus temen Jay Logal (Ford Logal) Video tope to clarify specific conditions, helpful to normal applications. I to format! Chalps with confidentiality) ŝ **TI-NHTSA 016704**

Braha 1	Pressure Suri	tch Meet	و
	EMAL	3/3	199
Stave Rainers	SREME	803286	AVT/EESE
FRED PORTOR	FPORTER	X53722	AVT BEDE
NO. P. REESC	MREESE	x771+2	0PD 21/0
Roc Sharpe	rsharpe B ti. com	/149 305-5727	Teres Bastrum 2 3 TS
GREG STEVENS	G STEVEN 1	x 36686	AVT MAT'L
Norm. LAPOINTE	NLAFENT	× +2.68%	AVT/DES. Inx
STEVE LARANCHE	SLAROUCH	5 54876	CENTRAL LIAD
ANDY ME GAMAK	a-mequirer @ +	.com 508 234	3080 TE QRA
WILLIAM M. ABRAMCZI	IK WARKAMEZ	313 32 237	184 ASO
* Stove Boringhouse / Bryan	Dague From TI	an anfaicate co	u

ł

2/10/99 4-5:15 Brainsborn when - Get Dow ON TEAM ASK THEM HOW FIRE STARTS WITHIN CONSTRAINTS [14 0, Black Substance 15 AMP MAX CURRENT, VEH. TEMPERATURES. 7 - Char's REAL VEH Brake Pressure. in ABSETC EVENT. بر بر بر زر 10 - Thermo-couple Brk Pr switch after Weh. Driven & turned off. - Take Rate of ABS ABSW/TC - Ave Laaks/Fires common to stracton Assur. - Black Substance : Copper, Zinc, Silver, Sulfur, - Understand TC/ABS Pressure Pulse/ TH STORY OF ELECTROLYSIS IN Brake Flaid.

3/3/99

് പറ Room 1 Town Car Weakly MEq. Agende Testing Status - Brake Switch Relocation · Other Potential Solutions · 92 Town Car at Proving Grounds (43K) Haue ABS, Switch Pressure recordings (43K) no traction control switch benp (Arr, Fluid) * Many Paramaters 55 Tests (4 completed) B (steve R. hes details) Samples of Brake Fluid Anken Switch is STAZH "BB" (enop) very clean (and Frinked with Loss (and Frinked with Tignited ewitch base (quickly on) buyned to can but not esto harvess tried burning harness (hanked lower than ewideh) once on fire, burned "up" guickly into the connector + base Andy Reviewed 2/24/99 Potential Thermal Event Theory (a/stove Beringhause) How is this different than the Econoline Line includings ? (Rule of Econosian much main Jourse in/ Econolise) (Bill abren) 600 - IK service hits/me 15-2075 leakage, shill thinks disphragen depredation is a contributor. Anders water with degrade tapton (Norm) @ Can we get a file what salt (Stark need long to drive dectroly =) to sodium /childrine not preted up in returned analysis (deglie heid) ⁽³⁾ Prior to my when from Deposet, Water establish an non-reactant to Tetion Kapton is tollow control, where over life tarlow will brake in a *TI + look at acylic acid impact on Kapton -> Took w/ deeple acid instead of calk (Fad) Recent Junk yerd returns 12th returns shawing avidence of connector brinch Dow stated that the brake Fluid is very depression to term contacts Relocation of Binke Switch to polal (92,93) (mity) More difficult, interformer w/bracket For ABS switch (enrefy) Now looking to alkarnative packaging (existing hole for dump value) investigating other suppliers for patential packaging application (Bill A.) could we impregnate the cavity with "lube" or Silicon (insulation) Stone & D.

1

look at ald brake Fluid for conductivity (BHA) If we put a fuse for connector, impact to customen Jay Logel (Ford Logel) Uiden tape to clarify specific conditions, helpful to parrow applications. Bd format! Chelps with confidentiality) **电**和24 ງຊະວັດບ TI-NHTSA 016708

Note printed by FPORTER on 4 Mar 1989 at 11,05:33

FIGE: SLAROUCH--FORDMAL Dete and time 03/02/99 11:56:23 To: FPORTER --FORDMAIL Porter, Fred (F.J. MLAPOINT--FORDMAIL LaPointe, Norman SREIMERS--FORDMAIL Reimers, Stave (5. 13060628--EXTERMAL 'A. Rahman' SNCCART2--FORDMAIL McCarthy, Shaun (5 SLAROUCH--FORDMAL LaRouche, Stave (1

Frem: LaRouche, Steve (S.) Subject:

We have found three switches so far (including the one to be analyzed by the Sci Lab), that will not open electrically when disc it makes to be under application of air pressure. I sectioned the of these switches and when what appears to be water (it evaporated rather quickly at room tamp) which correction product. I found that the transfer pin has been stuck in place by the correction products. What this means, is that even if the disc snape. the pin will not pull back, and the contacts will not open. Works of these switches showed evidence of disphrage leakage on the test stand.

Stave LaRouchs (SLAROUCH) Metalluryy Section, Central Leboratory, Room M410 (313) 845-4876 (313) 322-1614 FAX

- - -

3713 1371

TI-NHTSA 016709

>

COLORADO DA COL

Taxing Least's month incorporated

TEXAS

34 Forga Sinter P.O. Box 2004 Artifebore, 4AA 02703-0804

(508) 238-3800

t Contur McGuirk

To: FIEL POLICE

Re :

Total # Pages = 🤷

Me####@# : _____

JANET S. BOURGEOIS

Ph: 508-236-3287

D Fax: 508-236-1598

Thanks, Janet S. Bourgeois

Hat Whe spiller Annual 11.1 THE CAST IN CASE PORT HERE IN A ates of this -The second s تك غربك eineles s égé or to lease provide them فنثله لأجادة تطلبوها ويججزونها 14

High Curre ر - متابع هب بر

THNHTSA 010711

1944 نبعة عد ع 748 و وا عا به فتاحد ودينوسر جز جي The **....** الات كأم م

ai as Lipan idaend jost 1 tin 1). The smalls coacide rod. and primary of

j, cri

Companies Tracking Index. CTI as demonstrate by UL 746A a organized as the rollege which alunity instang on a weighted site of degree of 0.1% anymeness officials address and been applied. The marks of the congred 2 mm Distincts the culorise of the social of the statistic t perioretance at any thickness. Materials are classified into one of 6 categories (see Table 1).

÷., Performance Lavel Class (PLO)

7.6	5 K		· · · · · · · · · · · · · · · · · · ·		
		MAI High Cosmel An ightine	2017R High Values Arts Thatting Plane	D 496 Acc-Residence	CTI Companiika Tracijag inder
14			(THENHER)	84C	V
		2110	0-jü	:420	2400
		-12 9	>10-25.4	3605420	400±600
		36588	>26.160	3006360	2505/00
		H5530	>80-150	240-300	175-250
	1 Callman		3 1 20	100-5240	1005175
				1205160	6 %1 0 0
			†	#04120	· .
i.	. 7			D≤50	- 1

\$. Ä -Ş 2 DIGLAND

* -

•

a .

Έ



High Ampere Arc Ignition (HAI)

Under certain normal or abnormal operation of electric equipment, insulating materials might be in proximity of eroing. If the intensity and duration of the arcing are severa, the insulating material can become ignited. This test is intended to simulate such a condition

The test method is usefult in differentiating among solid insulating meterials with regard tot resistance to ignition from arcing electrical sources.

Material are clessified based on the mean number of arcs to cause ignition.

Meteriels are classified into 5 classes (PLC level)



•

DEM (B

PAGE 03

127

Hot Wire Ignition (HWI)

Under cartain conditions of operation or methanction, electrical adulpment, wires other conductors, resistors, or other parts may become abnormally hot. When these overheated carts are in contact with insulationg materials ignition may occur.

The HWI test eccording to ASTM 0 3874 is intended to determine the relative resistance to ignition under such conditions.

The test resultsmake it possible to provide a relative comparison of various materials according to the time at which the speciarum ignities during the application of the ignition source.

The HWI is expressed as the mean number of seconds required to ignite a standard test specimen

(125 * 12,5 mm * thickness as used) wrapped with resistance wire that dissipates a specified level of electrical energy.

Meterials are classified into 4 classes (<u>PLC (avai</u>), for which UL considers mailing through the material without ignition as if ignition occured.

This test method is not valid for determining the ignition behaviour of complete

DEM NEW ENGLAND

• •

Ξ. L.

•	DâM Engine	ering Plea	rtica in	C.				0) ani	¢	ł
	STANYL PA 4	GR FR	ų	L. File i	21732	25		1	5 febr	LINY	1998
	Grania	Gal	ittin Thiak Mitti	ULIN'	6Ļ	NTI 10		₩.,		044	5 † 1
	TEXHAS	147, 196 NG, 86 NG, 86	64 1,5 1,6	9440 9440 9440		110 110 110	+10) 130) 120	4 2 1		;	3
		NC, HK NC, EK NC, EK	09 (1) 10	94440 94440 194440	139 139 130	: 19 : 10 : 10	19 199 199	4	000	÷	- 2
(48 41 41	0.38 0 70 1 6 3 0	04440 94440 94440	10	979.	170 126 130	. 6 . 0	.000		-
	Tipinie - ties allar	에 사 시 시 시	0.4- 0.76 18 30		-			:	-		- -
		. 2	478 14 10		19	140. 121 121	19 19 19	, 0 0	0 0 0 0	; ;	
-											
		7			-						
			0.78 1,6 349								
			18								4
		•							• •	• •	
	· ·					• • •					

. .

TI-NHTSA 016714

03/09/1999 12:25 4010044500

.

29M 13 **DSM Engineering Plastics Inc.** UL File E173225 15 february 1999 ANNITE - PET GR. 9 H 10 1 H V T R ç, 18.84 **ب**تو 0 + 1 لعت 150 140 150 141 140 142 900 6.5.5 4 3 4 44 45 46 173 19 10 1000 TV4 241 58. ò . ì 19 19 19 656 19 19 19 323 4 54943 54946 54946 075 15 20 A1 44 44 TV4 200 QH • : ż



TI-NHT8A 016715

Stanyl®

Olass Reinforced, Flatne Retardarg, 4/5 Nylon

Values were derived from testing a limited number of lots and should not be used for specification.

PROPERTY DATA			-	
Thysical Properties	ASTM	UNIT	TELOFS	TE220F9
Specific Gravey	D792		1.64	1.92
Melting Point	03417	47	562	562
Winer Absorption (equil., 73"#/50% RED		5	1.6	↓.2
Mechanical Properties				
1zod (repact				
notained (dry ⁴)	0254	R-Iba/in	1.3	19
perched (conditioned		B-lbs/in	1.9	22
Tetraile Strength				
(dry)	D636	pui	25,400	29,000
(conditioned)		pat	18,100	21,800
Tensile Elongetion		P***	(0,104	
(dry)	U631	*4	2.5	2.1
(conditioned)			3.5	3.0
4			5.5	3.0
Tatalle Modulus	D638		1.618	1 600
(dry)	19036	Кон	1,810	2,500
(canditioned)		Крні	1,140	1,700
Pierrarai Stronger				
(dry)	D790	рн	34,700	43,500
(conditioned)		per.	27,600	36,300
Figure Modelin.				
(1)	D790	Ken	1,600	2,200

and the second second

			-	
-776		1.10		
· · · · · ·				· · · · ·
	· · · ·			

All addresses		

(47)

۰.

2

÷

. :

it him the state of the state of the way of the state of

Headquarters DB4 Brightening Finites P.C. Bas 333 2207 Wes Mill Post Branville, D1 47720 Toll Free 200-333-4237 Pis 412-435-7704

Ξ.



Lato

Ľ



Property data

ARNITE? TV4 290 SN .

(30% Glass Reinforced non-Bloeming Flame Relardant PRT)

PROPERTY			DATA	. AM The
PHYSICAL PROPERTIES				
Cenety		qm/orr ³	1.67	HSO 1165
Mail: Flow Rate (225,2,161		GUT Street	4.4	AETM G1258
Water Abecration		%	0.20	ASTN 0670
Mold Shrinkage u		Minin	1.5	Dent
Mold Shrinkson 1		MileAn	11	Daw
TENGILE & PLEXURAL PROP	EATHLE		- <u> </u>	
Tennie Strength at field		pei	16,000	·50 527
Elongation at Breas			2.2	180 527
Terraie Modelus		1 144	1,980.080	16D 527
Flence Strength		jan i i	39,800	80 178
Fiercerst Maskelus			1,408.00	160 175
INPACT PROPERTIES				· · · ·
kand Unmatcher Impect @ +23	°C	1. Herin	4	190) 190/4C
Lood Nationed Impact @ +27'C		3-19-19	1.8	1807 1804A
THERMAL PROPERTIES				
HDT & 15 MPa last (254 pm)		1 🖛	410	160 75A
HOT @ 0.46 load (05 pe)		- F	444	100 754
Cost of Unear Thisted Excen	nion ()	inte ^r t	0.2=10-4	CIN 53762
Cost, of Lines: Thermal Expert	aan 11	inter**	S.Auto	CIN SET #2
Thurnet Combustvely		STUTIE I	2.43	ON 62812
			I	1.74
RTI @ 36 Mile (Differtiel)			F 🛥 `	1.748
			1 22	
and the second secon				
		1 - 1 - 1 - 1 - 1	17 S. 10	
				:
Start Bee Told Start and The				
	1 - C - C - C - C - C - C - C - C - C -			-
A GIVE THE THE TWO IS A	1			
Hal Cumuk Ain legiton (1945)				
	in a 111 an			1.1.15
and the second				E.S. Contraction
Distantia Chingle C 1.0 mm				
A DESCRIPTION OF A DESC				
geriete 2 (State) herewet			12.40	
Constant Constant of the		Contraction		
Contraction Constraints of 10 ⁴ Har				
Distanting Sector 50 Hz		- Ka 20 🗕 👘	-	4 E. C. E. E. E.
				17 N.
Dissignites Platter @ 10 ⁴ 14.				
	AL CONTRACT LAND MARTINE	يەتە ھەرب 177 پ	telet entry	
				the state of the state of the state
Mandauerters				

Headquarters Diffe Engineering Photies P.O. Ben 3333 2267 West Mill Road Grammilla, Dk. 47720 Toll Feet \$02-133-4237

2 . .

- -



3/10/99 PIN FANGUT mike Hardy Quality Conter MATTAX? by Passibility of working "aff site" Boull group, average additional to everent From Mamphis (steve has La Roucho) F2VC "AB" 2128 Fred task with FESD (tool Field Service) to help w/ Oasis call EAR attended Andry -(Nemi) resistance ? (Bill A.) reach pig + details, associal about reliability issue. Priories report , brate fing the work + (CAS)-S. Harmann CAS Spec. "Takt" Operating Range does not makeh graph + drawing graph UU - Need CSP Model · (Ideas) + contracts @ TI + 3rd Party Structured Inventive Thinking -NHTSA 016718 10--

Vehicle/Customer Information

Model Year:	Meke:	VIN#:			Mileage:
Build Date:		Present Vehicle Location:			Who owns vehicle now:
Customer Name:		Phone:	is it ek	fix engin	cering to contact customer.

Incident Info/Vehicle History

Where did fire originate? (segine compartment quadrant, suspect location, or mapped component(s))

What was the vehicle circumstances when the fire was noticed? Was the vehicle running, packed, engine on/off... if aff, how loag?

Did customer notice snything unusual prior to fire? (specifically... difficulty getting the vehicle out of park, specifically... control not working, brake werning lamp illuminated, stop lamp inoperative)

Do my underhood relays show evidence of overheat?

Wees the underhood fore links blown?

Were there any fuses that were blown or show evidence of other demage?

Is the correct fase for the stop lamp switch in the fase box?

Was there any damage to any wiring in the area where the fire was suspected to start?

Does the sir suspension pump show evidence of overheating?

Was there any aftermarket modifications to the vahicle? (specifically car alarm, trailer tow, or remote start)

Was the vehicle involved in a natural disaster/accident that required significant vehicle clean up? If so where was cleasus performed?

What was vehicle repair history?

Parts that we would like from vehicle if nonfbie to acoust: Brake pressure switch (preferably with wire pigtell/connector attached and still stached to prop valve)

Sample of brake fluid at prop valve (in scaled glass container)

Relay pack located on LH fender apron (with as much wiring as possible)

EDIS 8 module located on LH Sender

Speed control module located on LH fender

Air surpension compressor located under air filter

Air suspension relay

Other suspect parts

Brake Pressure Switch Meeting 3/3/99 EMAIL . AUT/EESE 803286 Stavie Rainers SRUMIAS ANT BESE FPORTER-X53722 FRO PORTOL M.P. REESC メラシ/+2 OPD LVC MRESSE 13 rarps & tillion 305-5729 78 10 4 Zinstrumen 73 Roc: Snorpe X 36686 AVT MAT'L GSTEVEN1 GREG STEVENS AVT/DES. from. Noen LATEINTE NLAPEINT 1 42 686 STEVE LARDICHE CENTRAL LIAD 54876 SLAROUCHE Q-MCGNIER @+1. COM SE 2303080 TE QRH ANDY 11 Gunak WILLIAM M. ABRAMCZYL WARLAMCZ 313 32 23284 ASO * Steve Berlaghouse / Brzan Dague from TI - on conference call

3/3/99 Town Gar Wasklyr Mikey. War Room * Testing States. _. Brake Switch Salacatien Other Potential Salations ... 92 Town Car ale Pressure Convoide (43K) . Here & ABS, Sonkab Pressure recording a Switch brug. LAN; Eluid) ... * May 1..... Samples of Brake Fluid Saken (stails) (inte) Service His bary 1. 6. 132 40 majors Switch (19., SFSZH 198, Samp), usery 41447. follow controls been Cignickly on Durand to commut not instea hencers "no" guicking into the connector + beat · Andy Reviewed 2/21/99 . Potential Thermal Event Theory (w/ stave Beringhause) How is the different than the Econoline Line includents ? (Rate of Carrowing much main Jonary w/ Sconoline) (Bill Asrem) 600 - 1K Beruice hits/me 15.20% teakage , shill blicks displaying dependention is a embributor. Andre water will depende kopten (Norm) & Can we get a fer what salt (Sheat A need ions to drive sinctroly s) condium /abilities not picted up in rationed analysis Charglie deid) B Prior to anty the From Deport. Water cited as non-reactant to Tetion Kepton is toflar conted. Wass over life tafter will brake down Free lack at anylic evid impact on Kapton + Tall w/ dayle and instead of onlt (Jal) Recent Junk yord reduces 1th returns showing avidence of concertor brook Down stated that the brake filmed is very Venerosium to term contacts Robcotion of Brake Switch to polal (92,03) / Non 14) More difficult, intrifacture w/brocket me ABS switch (every) numbering & alternative packaging (existing hole for durp value) invastigating ather suppliers for potential packaging application (Bit b.) could us improved the cavity with "lube" or Silicon (insulation) Show a Li <u>.</u> 18 a a s - - -

look at ald brake Fluid. For conductivity (вм А́) onnector, impact to τf Jay Logal Chard Logal) , conditions, Urden tape f applications stfy. specific .ط Format ! Kisles with ÷. TI-NHTSA 016722

" ANK Whene Fave, FRAC W/ Style Baimers . 4492 Date Codes ship . electabes . to ... Gerry Terins the the fact DOC make the both snap and quiet Very interestable The When we useding the gulet lopect lockings/ concerned . Fleshed Matrix Cyclicust a 7000 6565 for mentions on Crun Vic / Grand May & Focus on Town Gr others not looked out Pressure Switch Steve / charlie Ku35 er la la Attorned Chining TI-NHTSA 016723

			-
.	2/17/48	Tenn Review & Ford	-
	switch Task Log Ruos. (1-11) Brake Fluid Fluid Fluid 312 F (sport) auto ignition. 605 F		
an a	Any 92,93 vehicles checked for actual pressure (Planning to evaluate + Ford).	levels æ switch?	
	Saveral Marter Cylinder & Capaidarable) Enduces a brake heath fices Justify making & 22 1931 s	n 92,83 caysed	
	" Do not assume .15 Aug. Fuze protection es This tast will be increased with power. Joe Demi & last at "speck" input	*s),	
	May want to book for any theansited the loss capacitive discharge)		
	Dece En determine if hhie in a ducability event CTam Markers callacting all data). reports	avent int a single "	
	Brake / speed control system changed in 196		
	Any 92-95 Town Car, Gran Vic, Colored Mary will a		
	Presource Einen Ciff mit From Tarros) 45K John 1	۰ ۱	
• .	Table 23HSTA today that we will (Ford) take Common to eas reliability issues begin in cold, calt area).		
	Tom Beril -> Marty Reese 7-7142 M	leese@frid.om	
	Friday ntg. (have profile-pressure from '92,	centeriament, Dow interface)	
		2. ™24 *3 1	
	· * *	TI-NHTSA O	167

1.2.1.1.1.1

•

. . . .

۰.

.

2/10/99 4-5:15 Brainsborn w/con - Get Dow ON TEAM ASK. THEM HOW FIRE STARTS 15 AMP MAX CUREENT, VEH. TEMPERATURES. 7 Charz REAL VEH Brake Pressure IN ABSETC در مر در EVENT, - Thermo-couple Brk Pr switch after Vehi. Doiven & turned off. - Take Rate of ABS - ABS W/TC - Are Leaks/Fires common to stracton tasur. - Black Substance : Copper, Zinc, Silver, Sulfur, - Understand TC/ABS Pressure Pulse/ THISTORY OF ELECTROLYSIS IN Brake Fluid.

Deliveral to Hudy M. 3/1999 by ForD.

Potential Actions

	limprove connector seal	Re-otlant corrector	Re-locate switch to brake peda	Improve kapton disphragm	insect in-the fuse with switch	Add power off switch	Re-locate switch to ground side	Re-locate switch to RUN circuli	insulate awitch from prop vaive	Use flame retardant plastic	
Connector Seal		a						[]
Kapion Lile						<u> </u>				·	
Continuous Power						•	· ■	•		·	1
Aminch Orientation											1
Current Capability	Ĺ			•	ο.	•	-		•	·	1
Grounded Hex-port									•		1
Hastic Parameters								·			1

= fixed = improved



Contributing Factors • 5 15 A 3 Batt

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

AUTOMOTIVE SERIEGRA AND CONTROLA GRA MARIER 34 FOREST BT N/5 23-05 ATTLEBORG, NA 02703 TRL (508) 236-3046 FAK : (508) 236-3745 FAGE: (800) 457-3700 FMF 604-2044

 Fram:
 Frederick J. Porter(SMTP:tporter@tord.com)

 Sent:
 Friday. March 12, 1999 9:01 AM

 To:
 a-maguik@email.math.com

 Subject:
 (U) Broinstorming

to: a-meguirk@email.mc.ti.com

Regards,

Fred Porter OV - fporter fporter@ford.com Chassis E/E Systems Applications (313)045-3722 Bldg 5 - Mail Drop 5030 - Cubicle 3E004 fax: 390-4145 *** Forwarding note from FFORTER --DREND07 03/11/99 17:59 *** To: N1654504--EXTERNAL

FROM: F. J. Porter Subject: (U) Brainstorming

λndy,

Attached is a list of ideas that were developed by a group from our research laboratory of potential changes that could be made to the switch that may improve our condition. If has investigated some of these already.

USAET (UTC -05:00)

I would like you to go through each idea and let us know what your feasibility and manufacturing issues are as well as timing for their potential implementation.

- Cost cup with plastic or other non-conductive coating (like anodizing) Lengthens corrosive path to ground Insulates from broken spring switch contacting ground
- Make cup of non-conductive material Lengthens corrosive path to ground Insulates from broken spring switch contacting ground
- 3. Add plastic disphragm between cup/transfer pin and the spring contact/switch cavity Additional for and isolation between mechanical components and electrical proponents
- Place plastic insulator disk on the cup with hole only for the transfer pin

Reduces surface area exposed between battery and ground

- 5. Replace kapton membranes with pure terlon membranes Increased flexibility of membrane
- Replace kapton seal with sliding piston seal Eliminates wear on kapton
- Change cup/converter topology Spread flexure over greater area of the kapton

Reduce interfaces where extreme flexure occur

- 8. Replace switch with pressure transducer and semi-conductor switch Eliminates kepton seal
- 9. Design thermal link in power supply side of switch that opens at elevated temperature (one time or cycling) Turns off power before heat becomes great enough to cause ignition
- 10. Reverse polarity of switch contacts Removes power from spring contact if it moves out of position
- 11. Insulate/plastic cost spring except contact area Reduces corrosive exposure Reduces conductive material to making contact with ground
- 12. Gold plate spring contact Reduces corrosion

ï

:

- 13. Fill air gap in switch housing with potting material to seal connector openning Seal off connector path of contamination
- 14. Change switch housing material for improved ignition parameters Reduces ability for flame to spread after initial heat source is removed
- 15. Add another layer to the kepton seal Possible increased life of seal before perforations occur

16. Add ground fault interrupter circuit to switch circuit

Turns off power if ground path to case is detected

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

Dague, Bryan 🛛 💰

From:	St. Plene, Keith
Seni:	Filday, March 12, 1999 3:25 PM
To:	Muligan, Sean; Dague, Bryan; Cambra, Lance
Subject:	Test Data


Currey, Pat

۰.

.

ł

.

From: Sent: To: Cc: Subject:	McGuirk, Andy [a-mcguirk@email.mc.ti.com] Friday, March 12, 1999 [0:3] AM Beringhause, Steven; Dague, Bryan; Baumann, Russ Rowland, Thomas; Pechonis, John FW: (U) Brainstonning
AUTOMOTIVE SENSORS AND 34 FOREST ST M/S 23-03 ATTLEBORO, MA 02703 TEL : (508) 236-3080 FAX : (508) 236-3745 PAGE: (800) 467-3700 F	
From: Frederick J. Sent: Friday, March To: a-mcguirkéemail. Subject: (U) Brains	mc.ti.com
to: a-meguirk@email.me	ati.com
	0 - Cubicle 32004 fax: 390-4145 om FPORTER DRBN007 03/11/99 17:59 ***
fROM: F. J. Porter Subject: (U) Brainstor	USAET (UTC -05:00)
Andy,	
research laboratory of	ideas that were developed by a group from our potential changes that could be made to the e our condition. II has investigated some of
	through each idea and let us know what your cturing issues are as well as timing for their on.
Lengthens corrosi	ic or other non-conductive coating (like encdizing) we path to ground oken spring switch contacting ground
	ductive material ve path to ground oken spring switch contacting ground
contact/switch cavity	gm between cup/transfer pin and the spring of isolation between mechanical components and ents
4. Place plastic insul pin	ator disk on the cup with hole only for the transfer
	1

Reduces surface area exposed between battery and ground

- Replace kapton membranes with pure teflon membranes Increased flexibility of membrane
- 6. Replace kapton seal with sliding piston seal Eliminates wear on kapton
- Change cup/converter topology Spread flexure over greater area of the kapton Reduce interfaces where extreme flexure occur
- Replace switch with pressure transducer and semi-conductor switch Eliminates kapton seal
- 9. Design thermal link in power supply side of awitch that opens at elevated temperature (one time or cycling) Turns off power before heat becomes great enough to cause ignition
- 10. Reverse polarity of switch contacts Removes power from spring contact if it moves out of position
- 11. Insulate/plastic cost spring except contact area Reduces corrosive exposure Reduces conductive material to making contact with ground
- 12. Gold plate spring contact Reduces corrosion

۰,

- Fill air gap in switch housing with potting material to seal connector openning Seal off connector path of contamination
- Change switch housing material for improved ignition parameters Reduces ability for flame to spread after initial heat source is removed
- 15. Add another layer to the kapton seal Possible increased life of seal before perforations occur
- 16. Add ground fault interrupter circuit to switch circuit Turns off power if ground path to case is detected

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

From:	McGuirk, Andy
Sent:	Friday, March 12, 1999 11:31 AM
To:	Beringhause, Steven: Dague, Bryan: Baumann, Russ
Cc:	Rowland, Thomas: Pechonia, John
Subject:	FW: (U) Brainstorming

AUTOMOTIVE EMESORS AND CONTROLS ORA MANGER 34 TOMEST ST M/S 23-05 AUTOMEST, NA 02703 THE : (508) 236-2080 TAX : (508) 236-3745 FAUE: (800) 467-3700 FIN 604-2044

 From:
 Fraderick J. Parter(SMIP:fporter@ford.com)

 Sent:
 Friday, March 12, 1999 9:01 AM

 To:
 a-meguirk@email.me.til.com

 Subject:
 (U) Brainstorming

to: a-mcguirk@email.mc.ti.com

Regards, Fred Porter OV - fporter fporter@ford.com Chassis E/E Systems Applications (313)845-3722 Bldg 5 - Mail Drop 5030 - Cubicle 3R004 fax: 390-4145 *** Forwarding note from FPORTER --DREN007 03/11/99 17:59 *** To: N1654584--EXTERNAL

FROM: F. J. Porter Subject: (U) Brainstorning USAET (UTC -05:00)

Andy,

Attached is a list of ideas that were developed by a group from our research laboratory of potential changes that could be made to the switch that may improve our condition. TI has investigated some of these already.

I would like you to go through each idea and let us know what your feasibility and manufacturing issues are as well as timing for their potential implementation.

- Cost cup with plastic or other non-conductive coating (like anodizing) Lengthens corrosive path to ground Insulates from broken spring switch contacting ground
- Make cup of non-conductive material Lengthens corrosive path to ground Insulates from broken spring switch contacting ground.
- 3. Add plastic diaphragm between cup/transfer pin and the spring contact/switch cavity Additional layer of isolation between mechanical components and electrical components

4. Place plastic insulator disk on the cup with hole only for the transfer pin

Page 1

Reduces surface area exposed between battery and ground

- 5. Replace kapton membranes with pure teflon membranes Increased flexibility of membrane
- 5. Replace kapton seal with sliding piston seal Eliminates wear on kapton
- 7. Change cup/converter topology Spread flexure over greater area of the kepton Reduce interfaces where extreme flexure occur
- 8. Replace switch with pressure transducer and semi-conductor switch Eliminates kapton seal
- 9. Design thermal link in power supply side of switch that opens at elevated temperature (one time or cycling) Turns off power before heat becomes great enough to cause ignition
- 10. Reverse polarity of switch contacts Removes power from spring contact if it moves out of position
- 11. Insulate/plastic coat spring except contact area Reduces corrosive exposure Reduces conductive material to making contact with ground
- 12. Gold plate spring contact Reduces corrosion
- 13. Fill air gap in switch housing with potting material to seal connector openning Seal off connector path of contamination
- 14. Change switch housing material for improved ignition parameters Reduces ability for flame to spread after initial heat source is removed
- 15. Add another layer to the kapton seal Possible increased life of seal before perforations occur
- 16. Add ground fault interrupter circuit to switch circuit Turns off power if ground path to case is detected

Regards,

Fred ForterOV - fporterfporter@ford.comChassis E/E Systems Applications(313)845-3722Bldg 5 - Mail Drop 5030 - Cubicle 3E004fax: 390-4145

Dague, Bryan

From:	Rahman, Aziz
Sent	Wednesday, March 10, 1999 8:03 AM
To:	Warner, Pam
Co:	McGuitk, Andy; Dague, Bryan; Beringhause, Steven

Page 2

>	> etc.?
>	>
>	> Please give me as much information as you can.
>	>
>	> All the best,
>	>
>	> Sean P. Mulligan
>	>
>	> Texas Instruments
>	> Automotive Sensora & Controla
>	> Mechanical Design
>	> Phone (508) 236-2535
>	> Pax (50B) 236-3586

L

From:	McGuirk, Andy
Sent:	Tuesday, June 01, 1999 9:39 AM
To;	Pechonia, John; Dague, Bryan; Prola, Stephen; Watt, Jim
Cc:	Boumann, Russ
Subject:	FW: Ford Core team update

for your background info as we host Steve reimers weds

Ð,

AUTOMOTIVE SEMEORS AND CONTROLS ORA MARKETR 34 FOREST ST N/5 23-09 ATTLEBORG, MA 02703 Tail : (508) 236-3080 FAX : (508) 236-3745 MORILE: (508) 208-6119 FAXE: (600) 467-3700 FIN 604-2044

From:	McGuirk, Andy
Sent:	Friday, May 28, 1999 3:22 PM
To:	'Frederick J. Porter'
Co:	Beringhause, Steven; Sharpe, Robert
Subject:	Ford Core team update

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









Page 3

TI-NHTSA 016734

Charlie

Charile Douglas (508) 236-3657 (P) (508) 236-1598 (F) c-douglas2@ti.com

From:Sullvan, MarthaSeni:Monday, February 08, 1999 9:02 AMTo:McGuirk, AndyCa:Douglas, Charles; Beringhause, Steven; Rowland, ThomasSubject:Ford ISAC Meeting

I am leaving for a Ford ISAC meeting tomorrow. Given reports of executive level exposure on the Town Carissue, I expect some queetions. Could you please consolidate the questions we've been asked and our responses to date.

Dague, Bryan

From:	McGulik, Andy
Sent:	Monday, February 08, 1999 8:05 AM
To:	Baumann, Russ; Beringhause, Steven
Ce:	Dague, Bryan; Pechonis, John; Rowland, Thomas; Sullivan, Martha; Baker, Gary; Rahman, Aziz; Sharpe, Robert
Subject:	Friday 'eve' Fred Porter telecon 2/5/99

attorney - client privileged communication

I was able to speak with Fred Porter Friday afternoon. We brought Rob Sharpe Into a contarence call and delivered several points:

 Aziz Rehman was coming into the team to join Fred 10AM Tuesday as a Ti Design Engineering resource..."great" was the reaction.

- Andy McGuirk was corning into the team as a mechanism to augment our desire and actions for prompt and complete communication...he has my 24 hour nationwide pager and home tel number should be feil a need to elevate any issue through Ti be was told to feel free to contact me and allow a 20 minute response. I could feel Frec trying to explain some of the Ford meeting implied feedback about our support and just re-stated our commitment to be fully supportive of the process.

 Rob helped us lead into a discussion that allowed me to re-enforce that this P/S issue was receiving highest priority inside TI and we were committed to resolving issues/questions/analysis around the application...I spoke of executive and leadership level involvement.

- Fred was very difficult to connect with.... he stated this was the worst week he could recall.... his voice malibox had become overflowing on Friday. he also stated that our deliverables for Friday could be delivered Monday and again Tuesday during Aziz's first day. I covered some of those on the phone to let him know we had done our homework.

- We arranged to have Steve Beringhause have a conversation Friday afternoon...but Fred Implied he was too tired to focus...

a

AUTOMOTIVE SUBSORS AND CONTROLS GRA MANGER 34 PORKET AT M/S 23-05 ATTIMICATO, 30, 02703 THL : (508) 236-3030 FAX : (508) 236-3745 FAX : (508) 236-3745 FAX : (508) 2467-3700 FIN 604-2044

Dague, Bryan

From:	McGuirk, Andy
Sent:	Saturday, February 06, 1999 10:54 AM
To:	Baumann, Russ; Rose, Elaine; Watt, Jim
Ce:	Beringhause, Steven; Dague, Bryan; Pechanis, John; Rowland, Thomas; Sullivan, Martha;
	Baker, Gary; Rohman, Aziz; Sharpe, Robert
Subject:	77 p/s 'durability' baseline information

attorney - client privileged communication

Jim and Elaine, as I mentioned in my telecons, I would like us to move forward in quickly assembling data that we can use to help Ford understand our 'sensor' assembly durability baseline in the brake switch package. This, as i see it, would be composed of 3 major sections per below (please feel free to insert your ideas also) and for the most part needs to be delivered early w/o Feb 8th:

A) I want to demonstrate that manufacturing anomalies did not escape to the field in the form of a projection of hydraulic fluid leakers through the supply chain.... and we can help achieve this objective by assembling data that demonstrates our history of hydraulic leak rates in the subject time-frame of MY92 and MY 93 as seen in our factory floor and/or customer feedback. Jim, please take the lead on getting this done ASAP. we should consider customer AIQ spreadsheets and RMR data coupled with 6D's of the time to build a case for the low PPM leak rates of the sensor assembly further protected by downstream supply chain testing at the TIER-one and OEM. Also, there may be an opportunity to integrate manufacturing test data as a validator of that feak rate number as well as using the leak test data from impulse testing as an attemate source. There will be a building need to deliver data and evidence by Tuesday via Aziz and we should consider an alternate path of aneodotal estimate should the records not be readily available, (I know we will need to kiertify and recall records and that will take time)

B) I want to demonstrate that the sensor assembly is mechanically durable and surpasses the 'expected' life cycles as expressed on the Ford specs....and we can achieve this objective by assembling ES 'impulse' testing data from the timetrame of interest. In an ideal eliuation we would take this raw data and project into WEIBULL successtesting estimate of cycle capability in the 'accelerated elimitated' cyclers used in our process controls. Elaine please coordinate the data collection here. (We will likely turn to reliability experienced quality engineers Paul spaceman and Tushar Parkin to convert the data to information). Again, should we run out of time, we will need to turn to whatever relevant 'recent' data we have to propose our position and support with historical based data once we sort through the files and record recall process. Bryan, please inject any life test data from other qualification platforms hare so we have 'test-to-failure' data if available. Also, we should make a side note of the pressure profile used in the cycler process for future use with Aziz during his upcoming dialogues with Ford.

C) I want to demonstrate that the sensor is chemically resistant per the IP and PPAP testing and surpasses 'expected' exposures per the Ford Specs... and we can achieve this by assembling both relevant IP testing and PPAP results to demonstrate compliance. There may also be other testing history of the period that would convey that durability of the switch assembly in the typical automotive fluid environment of gas-oil-coolant-fluids in the proper orientation and connector protection. Elaine, please assemble this data and we will provide to Aziz to deliver to Ford. Again, should we run out of time, delivery of the readily available records from '85-'96-'97 per your Friday work would suffice as a starting point.

To provide some further clarity, I have included the focal part numbers from Charlie Douglas below. As we assemble data and translate into information please track the differences between 57 and 77 and 87 styles but also integrate the brake sensor assembly data and treat it as a family. As you discover the level of effort and resource needs, pls see John or me for help in getting people assigned or priority provided.

thank you for your continued support here,

a,

AUTOMOTIVE SERIEORS AND CONTROLE ORA NARGHR 34 FORMET ST N/5 23-05 Attimucro, MA 02703 Tel.: (508) 336-3080 FAX: (508) 336-3745 FAX: (508) 467-3700 FIN 504-2044

From:	Douglas, Charles
Sent:	Friday, February 05, 1999 8:43 AM
To:	McGuirk, Andy; Rose, Elaine
Subject:	77PS Matrix

Andy / Elaine,

Per our discussion:



Unedinute

Regards,

Charlie

Charlie Dougles (508) 236-3557 (P) (505) 236-1598 (F) o-douglas2@til.com

Prom:	Douglas, Charles
Sent:	Friday, February 05, 1999 11:51 AM
TO:	Baker, Gary: Dague, Bryan; Rahman, Aziz: Rowland, Thomas; McGuirk, Andy
Cc:	Pechonis, John
Subject:	FW: Town Car Brake Pressure Switch

tyi,

Charlie

Chartie Douglas (508) 236-3857 (P) (508) 236-1598 (F) c-douglas2@tl.com

+	
From:	Sharpe, Robert
Sent:	Friday, February 06, 1999 11:45 AM
To:	Douglas. Charles
Cc:	Beringhause, Steven; Sulivan, Martha; Baumann, Russ; Dodd, Bob
Subject:	Town Car Brake Pressure Switch

Yesterday atternoon, I was requested to attend a meeting at Ford in regards to the Lincoin Town Car Fire Issue.

Attendee's

Fred Porter, Steve Reimers - Chaels Electronic Systems Tom Masters - Large/Lux Vehicle Systems & Wiring Steve LaRouche - Ford Central Labs Norm LaPointe - AVT Design Analysis Rob English - Core Electrical Paul Stokes - Speed (cruise) Control John McInerry - Large/Lux Vehicle Safety Group Joe Nemi (sp?) - Large/Lux Vehicle Safety Group

Summary 8 1

This issue is one of Ford's top priorities and is gaining Executive Level exposure. Ford does not have a root cause to reply to NHTSA's inquiry. Strong perception that the fires have originated at the pressure switch, based on (1) NHTSA's internal investigation, (2) reports from insurance investigators, (3) incident at Memphis where vehicle fire started in front of mechanic and mechanic noted that only the switch was "burning" (switch was replaced and vehicle returned to owner - same switch that was analyzed in Ti-A). Ford stated that the pressure switch should be considered as "guilty" until proven innocent. To this point, Ti has been viewed as "cooperative" but not "proactive" (Ford is looking for our help as they consider Ti the experts in regards to switch issues).

Ford is concerned that in absence of a "root cause" response to NHTSA, NHTSA will pick the brake switch and demand that all Town Care with Crules Control be grounded (recalled). Without a root cause, containment action is unclear. Possible containment includes (1) disengage cruise/speed control option (high impact to customer) or (2) rewire the brake switch to an ignition feed. It was confirmed by the cruise control group that there is no necessity to have the brake switch "not" (12v) at all times. Both options are under discussion. Although there is high attention on the brake switch, John Mcinemy stated that other components must be investigated as well. His comments were based on;

- Data Base search of all MY92/93 Lincoln Town Car fires shows approx. 132 incidents
 Data Base search of all MY92/93 Town Car fires with brake switch identified shows approx 32 incidents.
- NHTSA has requested Ford to investigate/respond to the following components;
 - **Brake Pressure Switch**
 - 42 way connector (beneath the brake fluid fill reservoir)
 - EEC (Controller) wire harness
 - Relay Pack (contains 3 relays (AC Cut off, EEC, fuel pump) and the EEC diode)

Ford is now investigating to verify if other fires, similar in nature, have occurred on other vehicle lines that use this switch. Focus is on the MY92/93 Crown Vic and Grand Marq as they have identical systems.

Ford has requested an "on site" TI representative familiar with this specific brake switch application.

Questions for TI

- What are the flash points for all components/material used in the switch?

- Are the material spece submitted to Ford the same as the material spec's used on the MY92/93 applications?

- Dose our DFMEA or PFMEA Identify any potential "fire" occurrences?
- How do we control our terminal positioning in production? Any chance for the terminals to "short"?
- Has our IP testing showed any failures or concerne (confirm IP testing results)?
- Are there any material differences between the different colored bases?
- Where are the answers/feedback to the "many" questions asked during the analysis at Ti Tech Lab's? (stated many questions were asked, primary was in regards to the cause of the crease mark found on the

kapton)

- What testing/investigating is Ti doing internally. Are we trying to simulate any conditions that verify a fire potential?

- Do we sell the brake switch outside of Ford applications? If so, is it wired "hot" at all times?
- Ford would like "color" pictures from the Econoline failure analysis report (connector issue).

<u>Actions</u>

- (TI) Respond to above questions by early next week.
- (TI) Respond to Ford request of providing on-site engineer, preferably on 2/5/99
- (Ford) Develop a Work Plan to support a 14D and a Tech Review

(Ford) Retrieve additional field samples from the South. All components identified by NHTSA will be

collected.

12 additional switches from Houston (hi mileage, no fire) were given to Fred Porter

(Ford) Support meeting with UTA on 2/12/99 to discuss wiring/connector issues

(Ford) Monitor testing of brake switches (@ Bidg5) injected with brake fluid and a 24v supply across terminate (ongoing)

Please contact me if you have questions regarding the information above.

Best Regards,

Rob Sharpe

Texas Instruments Phone (248) 305-5729 Fax (248) 305-5734 During week 6 or week 7, Stan will be setting up a technical brainstorming meeting where the objective is to look at alternative technical approaches for developing a switch that will be robust to cavitation and meet customer technical performance requirements.

As part of this meet, we are being asked to help define the global market opportunity for pump mount pressure switches. I know we have done some of this analysis in the past so hopefully this request for market information will not be to much of a burden. By way of this mag, I would appreciate it if you could provide the following information by no later than February 5th:

- * Breakdown of TI pump mount pressure switch volume in KU by customer for your region for CY00 CY05
- * Breakdown of total known market for pump mount pressure switches in KU for your region for CY00 CY05

I would also appreciate it if you could include any comments relative to critical oustomer care-abouts for design criteria relative to your region. A few possible examples are as follows:

- * Your customers may require a specific switch logic
- * Hex on body may be a necessity
- * A minimum switch differential may be a requirement
- * Cost / price fectors may be a significant issue

Any commente you can offer will help this brainstorming activity.

Please let me know in advance if you do not think you can provide your inputs by February 5th.

Thanks and best regards,

Charlie

Charlie Douglas (505) 235-3657 (P) (508) 235-1595 (P) o-douglas2 Oti.com

Dague, Bryan

From:Beringhause, StevenSent:Friday, February 06, 1999 6:46 AM.To:Dague, BryanSubject:FW: Ford Lincoln Cruise control

Frain: McGuilk, Andy Sent: Thursday, February 04, 1999 5:46 PM To: Suffixan, Mariha: Baumann, Russ: Douglas, Charles Co: Beringhause, Steven; Baker, Gary; Rowland, Thomas: Pechonis, John Subject: Ford Lincoln Cruise control

ATTORNEY CLIENT PRIVILEGED INFORMATION

LETS ALL AGREE TO A SHORT ACTION LIST OF THE THINGS WE ARE DELIVERING TO FORD TODAY....FRIDAY FEB 5TH

1) DIFFERENCES BETWEEN THE FORD P/S ON PORTER LIST (ACTIVE PRODUCTION P/N ONLY) 1A) **identify the difference** between these parts specificationsDAGUE/BERINGHAUSE,

18) Please **identify the difference** between these parts materials

2) CHANGES ON THE FORD P/N ON THE PORTER LIST (ACTIVE PRODUCTION P/N ONLY) 2A) also include the **Change history** on these components. (SREA HISTORY)..... MCGUIRK

3) OVERVIEW OF PROCESS FLOW (requested an assembly process overview).......DOUGLAS

REGARD8

A

, ANYOMETTVE SERVICES AND CONTROLS (RA NAMEER 34 FOREST ST E/S 23-05 ANTLERODO, NA 02703 TEL : (508) 236-3080 FAC: (508) 236-3745 FAC: (508) 457-3700 FIM 504-2044

From:	Douglas, Charles
Sent:	Thursday, February 04, 1999 1:56 PM
To:	Sullvan, Martha; Baumann, Russ; McGuirk, Andy
Cc:	Berlinghause, Steven; Baker, Gary; Rowland, Thomas
Subject:	RE: Ford Lincoln Cruise control

attorney - client privileged information.

As additional and new information. Fred Porter just phoned in and this whole situation appears to be escalating. Ford is very concerned that NHTSA is going to issue a final ruling (with or without Ford Input) and that the ruling could literally come down within the next few days. I did not attempt to get into specifics as to implications from a NHTSA ruling.

Rob Sharpe has been called in to attend an emergency meeting at Ford at 2:00 pm today. Only questions Rob will be prepared to answer center around capacity on the 77PS assembly line. Meeting was called by Fred Porter's group.

Fred had several technical requests all of which were deferred to Steve. Fred also requested an assembly process overview. If there are any issues with honoring this request, please let me know asap as I have committed to a response of no later than Friday am.

Regards,

Charlie

Charlie Douglas (508) 236-3657 (P) (508) 236-1598 (F) c-douglas2@6.com

a

ALFONDTIVE SERIEORS AND CONTROLS ORA BARGER 34 FOREST ST M/S 23-05 ATTLESORD, NA 02703 THL : (508) 216-3080 TAX : (508) 236-3745 PAGE: (800) 467-3700 PIN 604-2044

Dogue, Bryan

From:Berlinghause, StevenSent:Thursday, February 04, 1999 3:33 PMTo:Baumann, RussCc:Baker, Gary; Rowland, Thomas; Douglas, Charles; Dague, Bryan; Suillvan, Martha; McGuirk,
AndySubject:RE: Ford Lincoln Cruise control

attorney - client privileged information.

I spoke with Fred Porter this afternoon. He also told me he is concerned that NHTSA will issue a finding. He said another fire occurred yesterday and this whole thing was heating up.

He feels one solution is to disconnect the awtich, he believes that the electricity is involved in the ignition. He believes the switch is at the center of the fire. He is currently running an experiment where he has taken a switch, drilled a hole in the housing and filled it with brake fluid. He has applied 24V to the switch for two days and nothing has happened. The switch is only drawing 0.5ma. He is waiting to see if the current draw increases over time. We discussed that maybe the current driver is occuring elsewhere. He stated that the clutch coll limits the current flow and there is a FET to ground.

We discussed the possibility of adding a fuse to the wire harness but he does not know what current threshold to set the fuse at. We discussed the use of a thermal protection device in the connector and he thought that it might be a possible idea but he is unsure how to do it.

They found copper and zinc on the sensor cup for both leakers and the two very burned ewitches from fires. He

feels that corrosion of the contact arm is a common thread in leakers and fires.

Fred believes there will be a recall, he hopes that it can be limited to the F2VC part (town car, contenental, etc) and not across the fleet. They are looking at differences in pressure, mounting location etc. as well as warranty reports that may validate this approach.

Fred also requested that TI sends an engineer to Ford for a few weeks to help them with the investigation. The engineer would need to have switch design and process knowledge as well as be a contact to the rest of the TI organization. I told him I would get back to him on this.

Steve

Dague, Bryan

From:	Ha, Di
Seni:	Thursday, February 04, 1999 11:11 AM
To:	Dague, Bryan
Subject:	RE: 77PS reports

http://www-pcd.mc.tl.com/pdl/pa/reporta/reports.htm

From:	Ha, Di
Sent:	Thursday, February 04, 1999 10:06 AM
Te:	Dague, Bryan
Subject:	77PS reports

Here's all I could dig out from the logs:

1995 thru 1998 (on the Web)

<<File: 77report_95 thru 98.xis>> 1991 THRU 1994 (NOT ON WEB) <<File: 77reports.xis>>

Dague, Bryan

From: Ha, Dl Sent: Thursday, February 04, 1999 10:05 AM To: Dague, Bryan Subject: 77PS reports

Here's all I could dig out from the logs:

1995 thru 1998 (on the Web)



.

1991 THRU 1994 (NOT ON WEB)

77mportusia

Dague, Bryan

From:	Douglas, Charles
Sent	Wednesday, February 03, 1999 3:10 PM
To:	Dague, Bryan
Ce:	Beringhause, Steven
Subject:	Matrix for Fred Porter

Bryan,

Per our discussion, hopefully the attached will help.



Regards,

Charlie

Charlie Dougles (508) 235-3557 (P) (508) 238-1598 (F) c-dougles2 Sti.com

REDACTED

TI-NHTSA 016744

From:St.Pierre, KetthSent:Tuesday, March 16, 1999 10:17 AMTo:Dague, Bryan; Mullgan, Sean; Cambra, LanceSubject:Rain Water.xis



Dague, Bryan

From:	McGulik, Andy
Sent:	Saturday, March 13, 1999 9:00 AM
TO:	Beringhause, Steven; Dague, Bryan; Baumann, Russ
Cc:	Rowland, Thomas; Baker, Gary
Subject:	FW: (U) Brainstorming

fred and team really like the last one....and it may be a very good solution as it deals with a method of de-powering which is near to our long term input to Ford.....TURN OFF THE POWER. this is done if a fault is detected....

.

when could we have an idea/concept? should we deploy this to an extended engig team outside us for 'invention' - delivery ?

8

TI-NHTSA 016745

Jim

REDACTED

REDACTED

REDACTED

REDACTED

1

Degue, Bryan

Sent	Hapidns, Al. Wednesday, January 20, 1999 11:21 AM Dague, Bryan: Boumann, Russel
To: Co: Subject:	McGulirk, Andrew, Andres, Amy 99-033: TSL # 150709: ANALYSIS OF MATERIAL REMOVED FROM 77PS THERMAL EVENT

Page 33

ATTORNEY-CLIENT PRIVILEGED COMMUNICATION

OBJECTIVE:

Determine nature of deposit; in particular, determine if it is consistent with the results from Ford's analysis.

SCHOLARY :

The results were very similar to those found by Ford. The main difference is that our EDX detector has a much better low energy cutoff than did the Ford detector. Their detector is unable to detect carbon and oxygen. Our analysis showed large amounts of carbon and oxygen on all three samples.

REPULTS AND DISCUSSION:

All of the samples were comprised of a mixture of different phases that had agglomerated together. A description of our findings is shown below;

BLACK FLAKE FROM TROUGH: We found the following elements which are listed in a vary approximate decreasing order of prependerance: copper, oxygen, carbon, chrome, zinc, potassium, sulfur, and silver.

MATERIAL SCRAPPED FROM CUP ASSEMBLY: There were a very large number of glass fibers present which had the composition that is typically used in plastics for reinforcing purposes. In other words, this is almost certainly from thermal decomposition of the plastic base. The EDX detectable elements in these fibers are calcium, aluminum, silicon and oxygen. The rest of the material was very similar in composition to that reported for the above sample although we also detected some phosphorous in this sample.

GREEN MATERIAL ON CUP: This material was similar to that found on the first sample although the amount of chrome was much less.

The data was collected under the guidelines of TSL-S-71, Rev A which can be accessed at <u>http://www-mcd.mc.ti.com/tsl/</u>. SEM-EDX (Scanning Electron Microscope with Energy Disparsive Analysis of X-rays) analysis was used in the above described analysis. The data will be sent through the internal mail.

AL HOPKINS

MSG ID; AHOP

PHONE: 508/236-3040

hameas) could contribute to brake fluid entering into our ewitch thru the connector.

 NHTSA is investigating this issue independently. Based on their findings, NHTSA could demand a Ford response (recail ?) within 5 days of their response. Fred said NHTSA response could happen "anytime".

 Ford has pulled 12 switches from vehicles in Florida with mileage's ranging between 50K - 100K. These switches, which have not experienced any thermal degradation, will be analyzed with switches from thermal events, at Ford. See item 5) from the above requests from Fred Porter.

Charile, please review this note with the team and inform me of timing in regards to the above 5 requests from Fred. I feel that it would be to our benefit to have a qualified TI representative at Ford during their upcoming analysis of brake switches from both thermal and non thermal events. Again, Ford would like to begin this analysis ASAP (next couple of days) but is waiting for our reply before beginning. Ford is on Holiday today in recognition of Martin Luther King.

Best Regards,

Rob Sharpe

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

Dague, Bryan

From:	Sharpe, Robert
Sent:	Monday, January 18, 1999 9:09 AM
To:	Douglas, Charles; Baumann, Russ
Cc:	Rowland, Thomas: Baker, Gary; Dague, Bryan; McGuirk, Andy; Dodd, Bob
Subject:	Uncoln Town Car Brake Switch

(Ford) Fred Porter contacted me late last Friday (1/15) and had the following requests;

A copy of a Ti 8D from a previous brake switch (thermal) issue on an Econoline application.

A copy of the Ti report from the analysis performed at our technical labs (w/Ford) on 1/7/99.

Material Specification #'s for all components of the brake switch.

Status of any Ti Internal teeting to recreate a thermal event within the switch.

5) Ford has received several additional ewitches from Lincolns which experienced a thermal event. Fred has invited T) to participate in their analysis at Ford labs. This testing needs to start ASAP but Ford will wait for our response.

** I informed Fred that above items 1) and 3) were submitted to Norm LaPointe on 1/7/99. He asked if we

Page 36

could provide additional copies to his attention.

In a follow up conversation with Fred, the following items were discussed;

- There is a total of 48 Lincoln Town Car's documented/related to this thermal issue. Fred stated that they are now searching their entire field warranty data base and have found similar issues on a few Crown Vic/Grande Marques applications. In addition, it appears that the Town Car incidents may not be isolated to the South. This search (on all Ford applications) is still in process.

Ford legal completed a "sweep" on 1/8/99, collecting all internal Ford documents relating to this issue. A class
action suit has been filed against Ford.

- Fred has not issued any internal summary report. As of today, Fred stated that he has not seen any evidence that would point to something "other than the brake switch" as the origin of the thermal issue. However, Fred stated that he has not personally reviewed all of the investigations his team is performing. He added that Bill Bramzick (sp ?), who is the Ford rep responsible for replying to NHTSA inquiry, has been investigating actual field incidents and noted that several vehicles' power distribution boxes (located near the brake switch) also appeared damaged from a thermal event. Fred is also wondering if possible overtill of brake fluid (onto the wire harness) could contribute to brake fluid entering into our ewitch thru the connector.

 NHTSA is investigating this issue independently. Based on their findings, NHTSA could demand a Ford response (recall ?) within 5 days of their response. Fred said NHTSA response could happen "anytime".

Ford has pulled 12 switches from vehicles in Horida with milesge's ranging between 50K - 100K. These switches, which have not experienced any thermal degradation, will be analyzed with switches from thermal events, at Ford.
 See item 5) from the above requests from Fred Porter.

Charlie, please review this note with the team and inform me of timing in regards to the above 6 requests from Fred. I feel that it would be to our benefit to have a qualified Ti representative at Ford during their upcoming analysis of brake switches from both thermal and non thermal events. Again, Ford would like to begin this analysis ASAP (next couple of days) but is waiting for our reply before beginning. Ford is on Holiday today in recognition of Martin Luther King.

Best Regards,

Rob Sharpe

Texas Instruments Phone (248) 305–5729 Fax (248) 305–5734 reharpe@ti.com

Dague, Bryan

From:	Hopkins, AL
Sent:	Filday, January 08, 1999 5:12 PM
To:	Dague, Bryan; Prola, Stephen; Douglas, Charles
Cc:	Andrea, Amy
Subject:	99-014: TSL # 150709: 77PS FROM LINCOLN TOWN CAR

Page 37

Bryan, could you use Ford's x-rays to double check my belief that the movable contact fracture/arc-off occurred within the plastic layer separating the switch cavity from the terminal cavity. For my selective corrosion theory to be reasonable, there has to be some force keeping a small amount of water up against the terminal leg. I assume that that force has to be capillary attraction. For that to be true, the failure has to occur within that layer of plastic which separates the two cavities.

The data was collected under the guidelines of TSL-S-71, Rev A which can be accessed at <u>http://www-mcd.mc.ti.com/tsl/</u>. SEM-EDAX (Scanning Electron Microscope with Energy Dispersive Analysis of X-rays) analysis was used in the above described analysis. The data will be sent through the internal mail.

AL HOPKINS

MSG ID: AHOP

PHONE: 508/236-3040

Dague, Bryan

From:	Kill, Beth
Sent.	Friday, January 08, 1999 3:15 PM
To;	Dague, Bryan
Co:	Hopkins, Al
Subject:	TSL # 150709, Fluid Identification

Objective:

Isolate and identify the fluid samples found in customer returned device.

Results;

First, I rinsed the cap, excluding the transfer pin hole, with chloroform. I filtered the mixture to remove the solids, and then evaporated the solvent. The remaining residue was identified as brake fluid by FT-IR spectroscopy. The match factor was 89% compared to a reference sample of Nissan brake fluid in my database. Visual comparison of the Nissan fluid to the sample suggests the fluid from the sample contains less water. This may be due to slightly different formulations produced by different manufacturers.

Next, I scanned the samples of fluid, provided by AI, from the transfer pin hole and the converter of this device. The two samples from the transfer pin hole are identical to the fluid finand from the cap with chloroform. The fluid from the converter also appears to be brake fluid, but appears to contain slightly more water than the other samples.

I will forward the spectral data to you by internal mail. Please let me know if I can discard the remaining fluid samples, or if you would like me to forward these to you slep.

Regarda,

Reth

Ext. 3069 MS 10-16 Fax 1670

From:	Douglas, Charles
Sent:	Wednesday, January 06, 1999 12:09 PM
To:	Dague, Bryan
Cc:	Baker, Gary; Beringhause, Steven; Hopkins, AL
Subject:	FW: Florida Information

Bryan,

I am not sure if you are having any success in working through our suppliers but I think we need to be in a position to provide answers to the questions Fred has asked no later than the meeting tomorrow. Please let me know if you think this will be a problem.

Regards,

Charlie

Charlie Douglas (808) 236-3657 (P) (508) 236-1698 (F) c-douglas2 @ti.com

 From:
 Douglas, Charles

 Sent:
 Monday, January 04, 1999 5:23 PM

 Ta:
 'Porter, Fred (Ford)'

 Subject:
 FW: Rorida Information

Fred,

I was not able to get answers to all of your queations and will pass along what we know right now:

- While the exact mett temperature of the Noryl GTX 830 was not available, we do know that this material is molded in the 540 F - 580 F range.
- Kapton does not melt nor burn. Technically it "chars". While we have not been able to determine the exact char temperature of the Kapton, we do know that it is well above 600 F.
- Our team is working on the information on the gasket --> we need to get this from our supplier.

I have a meeting with Bryan Degue and Ai Hopkins first thing in the morning and will raise these questions again with them (Ai is only returning from vacation on Tuesday). My concern is that we may be reliant on our suppliers for some of the information that you are requesting. What I will try to understand from AI and Bryan is if we have the capability to run tests to determine these temperatures ourselves (if this is the best way to generate the information).

Regarda,

Charlie

Charlis Dougles (508) 236-3657 (P) (508) 236-1598 (F) o-dougles2@tl.com

From: Sent: To: Co: Subject: K. Porter(SMTP:kporter@voyager.net) Monday, January 04, 1999 12:18 AM c-douglas2@til.com Fred Porter Rorida Information

PC0002.pg.pe







Charlie,

Attached are four pictures that I took of the vehicle in Fiorida.

There was no plastic left on the part and the connector and seal were also gone. According to the analysis, the wires in the wire harness showed no signs of shorting.

Questions that arose:

1) What is the melting point of kapton, the seal and the plastic used in the switch?

2) At what temperature will those three start to burn?

Dague, Bryan

 From:
 Baker, Gary

 Sent:
 Wednesday, January 06, 1999 12:05 PM

 Ta:
 Prola. Stephen; Douglas, Charles; Hopkins, AL; McGuirk, Andy; Dague, Bryan; Baumann, Russ

 Subject:
 Plastics Flamability

I have had Val get a copy of the UL Standard 94 that relates to Flamability of Plastics. The pressure switch Noryl material is UL rated to Standard 94HB (horizontal burning). Basically, to my reading, to earn UL 94HB rating a tast specimin must self-extinguish after being ignited by a Bunsen burner. This should be useful background information for tomorrow's discussion.

I will give this info to Charlie to support the visit.

```
- Gary

- Original Meanage ---

From: Prola, Stephen

Sent: Wedneeday, January DS, 1999 7:52 AM

To: Douglas, Churles; Hopkins, AL; McGulik, Andy; Baker, Gary; Dague, Bryan; Baumann, Russ

Subject: 77ps.ppt

<< File: 77ps.ppt >>

Here's the "Cause & Effect" diagram we discussed yesterday. Please review and

comment. Thanks

Regards,

Steve
```

From:	Prola, Stephen
Sent:	Wednesday, January 06, 1999 7:52 AM
To:	Douglas, Charles; Hopkins, AL; McGuirk, Andy; Baker, Gary; Dague, Bryan; Baumann, Russ
Subject:	77ps,ppt



Here's the "Cause & Effect" diagram we discussed yesterday. Please review and comment. Thanks

Regards,

Steve

Dague, Bryan

From:	Hopkins, AL
Seni:	Tuesday, January 05, 1999 7:37 PM
To:	Dague, Bryan; Prola, Stephen: Douglas, Charles
Cc:	Baumann, Russ; Baker, Gary; McGulik, Andy; Beringhause, Steven: Andres, Amy; Suzdak,
	Allan; Pavao, Joe
Subject:	99-003: PROPOSED PROTOCOL FOR DISASSEMBLY AND ANALYSIS OF SWITCH FROM 77PS FROM LINCOLN TOWN CAR

Sere's a rough pass, what do you guys think?

TI-NHTSA 016753

PROFOSED PROTOCOL FOR DISASSEMBLY AND ANALYSIS OF SWITCH FROM 7798 FROM LINCOLN TOWN CAR

- Review Ford's Analysis data that they are bringing in.
- Examine threads and determine if it is OK to just chase the threads to get a good seal or should we remove material for analysis.
- Pressure Leak Test the device (15 minute static-hold, air-pressurized test).
- Decide if we should remove any material or try any other analysis before we start disassembling the device.
- Do a practice decap using the below procedure on a deliberately fractured part (to mimic the condition that the returned device will be in) before performing it on the real sample. Bryan, you and I could do this now.
- Procedure to remove aluminum crimp ring
- Use aluminum foil (or plastic if Ford prefers) to mask the analysis surface.
- Also create a paper/tape shield to further reduce chance of contamination during cutting of crimp ring.
- Place a piece of tape over the area to be cut.
- Cut trimp ring using jewelers sow or Dremel cutoff wheel in one of the two areas indicated on optical photo.
- Cut corners of ring at 180 degree orientation
- Unfold crimp ring
- Optically examine revealed surfaces. Take optical photographs (Digital camera with macro lens plus instant microphotography) and document observations where appropriate. Examine the following areas
 - Inside surface of crimp ring.
 - Seal area and underside of base
 - Top of cap
- Start SEM-KDX (Scanning Electron Microscope with Energy Dispersive Analysis of Xrays) analysis on the inside of the ring and on various surfaces of the plastic base.
- Reprotect the top surface and remove the cap. Bryan had originally suggested just using an end mill to remove the cap. I wouldn't, however, go all the way through with the end mill. I would leave some material behind as a shield. I would suggest then behding the cap off.
- Optically document all revealed surfaces starting with cap.
- Meanwhile, start SRM-EDX analysis on top side of cap. Particularly focus in on the edges of the ceramic pin guide and on the indented ring that lines up with interior wall of the switch cavity. Farticularly look for evidence of corrosion or arcing.
- Decide if we should try to flake off any of the overlaying debris to try to examine the underlying metal surface.
- Proceed to perform SEM-EDX analysis on other component surfaces revealed by removal of cap.
- Non-destructively probe inside of the grommet to determine its resilience which will give us an indication of the temperature that it saw. Another indication might be the depth of the indentations left by the grommet seal rings in the wire.
- Decide if it makes sense to further examine the mating connector or grownet seal.

Regards,

Al :

Prom:	Douglas, Charles
Sent:	Tuesday, January 05, 1999 4:02 PM
To:	Dague, Bryan; Hopkins, AL; Proka, Stephen
Cc:	Baumann, Russ; Baker, Gary; McGulrk, Andrew; Beringhause, Steven
Subject:	FW: Ford 77PS Town Car Visit

tyi,

Charlie

Charile Dougles (508) 236-3657 (P) (508) 236-1598 (F) c-douglas2@ti.com

Sharpë, Robert
Tuesday, January 05, 1999 3:59 PM
Douglas, Charles
RE: Ford 77PS Town Car Visit

Hi Charlie,

Norman LaPointe (Ford AVT-Design Analysi) will be on NW Flight 1440, departing Detroit Metro @ 7:00AM on Thursday, 1/7/99. I Informed him that you would meet him at the gate as he is departing the plane. In case you need it, his home phone# is (248) 926-9896. I also gave him your home phone# as (401) 274-3588. Norm is scheduled to ratum to Detroit from Providence on 1/7/99 (NW1441, 7:25pm departure). Casual attire (no ties) was confirmed.

Conversations with Fred Porter confirmed that he will not be participating in the 1/7/89 visit. Fred did state that John Mcinemey is plenning on attending the 1/7/99 visit. John will be flying in Wednesday evening and will be staying at a Holiday inn in "Mariborough" (?), Mass.. Fred has given your phone# to John who will be calling you for directions.

Norm is hoping to have test results from Ford Central Labs with him. These test results are from amail asmples removed from the actual device (to be hand carried by Norm) and would include;

detection of brake fluid traces

SEM results from 1) white residue (fire extinguisher ?)

2) green realdue (corroelon ?)

3) switch contacts

In addition, Fred asked that we keep Mike Thomas (Hilite) informed of our findings as Hilite is somewhat involved as the Tier1 supplier. Fred has apoken directly with Mike and stated that TI has been very supportive/cooperative in helping Ford with this investigation. Mike's # is (248) 543-6520.

Best Regards,

Rob Sharpe

Texas Instruments Phone (248) 305-5729

TI-NHTSA 016766

Fax (248) 305-5734

rsharpe@ti.com

Original Meesage		
From:	Dauglas, Charles	
Sent:	Tuesday, January 05, 1999 1:25 PM	
To:	Degue, Bryan; Hopkins, AL; Prola, Biteghen	
Cqi	Baker, Gary, Baumann, Russ; Beringhause, Steven; McGulik, Andrew; Pechonia, John; Sharpe, Robert	
Subject:	RE: Ford 77PS Town Car Visit	

Team.

Here is the latest update on the visit. Visit will definitely take place on Thursday. When all is said and done, we may only have one visitor from Ford. Fred Porter will not be coming in. Norm LaPointe will definitely be coming in and one additional visitor may also be coming.

Norm will be flying in Thursday moming and leaving on the 7 PM flight. Since Rob cannot make it, i will pick up Norm at the akport. The meeting will start at 9:30 and will be housed in 12-18.

Ti participants should be limited to those directly addressed. Also, at both Norm and Fred Porter's request, no presentations or line tours will take place to start the meeting. Beyond introductions, we will go right into the tear down analysis per the protocol that Al will publish later today.

At this point, unless you hear otherwise, assume casual dress for this vielt.

Any questions / issues, please let me know.

Regarda,

Charlie

Charile Dougles (508) 235-3657 (P) (508) 236-1598 (P) c-dougles2@ti.com

> From: Douglas, Charles Sent: Monday, January 04, 1999 2:16 PM To: Dague, Bryan: Gildea, Robert; Hopkins, AL; Prola, Stephen: Douglas, Charles Cc: Baker, Gary; Baumann, Russ: Beringhause, Steven; McGuilk, Andy; Pechonis, John; Sharpe, Robert Subject: RE: Ford 77PS Town Car Visit

As an update, three different people at Ford have made three different sets of recervations for coming out here --> one flying in Tuesday evening for Wednesday visit, one flying in Wednesday evening for Thursday visit, and one flying in Thursday morning for Thursday visit. The Ford folks are currently working to operdinate their schedules so we may not know until tomorrow morning whether the visit is Wednesday or Thursday though my best guess at this point would be a Thursday visit.

Regarda,

Charlie

Charile Dougles (508) 235-3657 (P)

(508) 235-1696 (F) o-douglas2@tLoom

 From:
 Douglas, Charles

 Seni:
 Monday, January 04, 1999 12:17 PM

 To:
 Dague, Bryan: Gildea, Robert; Hopkins, AL; Prola, Stephen

 Cc:
 Baker, Gary: Baumann, Russ: Beringhause, Steven: McGuirk, Andy; Pechonis, John; Sharpe, Robert

 Subject:
 Ford 77PS Town Car Visit

Team,

A quick mag on this subject. There is some question as to whether this visit will take place on Wednesday or Thursday. Rob is currently working to nall this down. Weather in Detroit may be keeping Ford personnel out today or resulting in them getting into the office late today.

Relative to framework for an agenda, we are going to keep it fairly simple. Before actually conducting the tear down analysis, we should present a process overview and take them up to the assembly line. Also, we should have both P and D free's available.

Bryan,

Any information we can pull together from the MY92 Econoline excursion will also be of use.

The meeting is going to be housed in 12-18.

More information will be forthcoming hopefully by late afternoon.

Regards,

Charlie

Charlis Douglas (508) 236-3657 (P) (506) 236-1566 (F) c-douglas2@tl.com

Dague, Bryan

From:	Douglas, Charles
Sent:	Tuesday, January 05, 1999 1:25 PM
To:	Dague, Bryan: Hopkins, AL: Proia, Stephen
Cc:	Baker, Gary; Baumann, Russ; Beringhause, Steven: McGuirk, Andrew; Pechonis, John;
	Sharpe, Robert
Subject:	RE: Ford 77PS Town Car Visit

Team,

Here is the latest update on the visit. Visit will definitely take place on Thursday. When all is said and done, we may only have one visitor from Ford. Fred Porter will not be coming in. Norm LaPointe will definitely be coming in and one additional visitor may also be coming.

Norm will be flying in Thursday morning and leaving on the 7 PM flight. Since Rob cannot make it, I will pick up Norm at the airport. The meeting will start at 9:30 and will be housed in 12-18.

Ti participants should be limited to those directly addressed. Also, at both Norm and Fred Porter's request, no presentations or line tours will take place to start the meeting. Beyond introductions, we will go right into the tear down analysis per the protocol that Al will publish later today.

At this point, unless you hear otherwise, assume casual creas for this visit.

Any quastions / issues, please let me know.

Regards,

Charlie

Churile Dougles (506) 238-3857 (P) (506) 238-1598 (F) c-dougles2@ti.com

From:Douglas, CharlesSent:Monday, January 04, 1999 2:16 PMTo:Dague, Bryan; Gideo, Robert; Hopkins, AL; Proia, Stephen: Douglas, CharlesCo:Baker, Gary; Baumann, Russ; Beringhause, Steven: McGuirk, Andy: Pechonis, John: Sharpe, RobertSubject:RE: Ford 77PS Town Car Visit

As an update, three different people at Ford have made three different sets of reservations for coming out here -- > one flying in Tuesday evening for Wedneeday visit, one flying in Wedneeday evening for Thursday visit, and one flying in Thursday moming for Thursday visit. The Ford folks are ourrently working to occidinate their schedules so we may not know until tomorrow moming whether the visit is Wedneeday or Thursday though my best guess at this point would be a Thursday visit.

Regards,

Charlie

Charile Douglas (508) 235-3657 (P) (508) 235-1598 (F) c-douglas29ti.com

Fram:Douglas, CharlesSent:Monday, January 04, 1999 12:17 PMTo:Dogue, Bryan; Gildea, Robert; Hopkins, A1; Proka, StephenCc:Baker, Gary; Baumann, Russ; Beringhause, Steven; McGuirk, Andy; Pechonia, John; Sharpe, RobertSubject:Ford 77PS Town Car Visit

Team,

A quick mag on this subject. There is some question as to whether this visit will take place on Wednesday or Thursday. Rob is currently working to nail this down. Weather in Detroit may be keeping Ford personnel out today or resulting in them getting into the office late today.

Relative to framework for an agenda, we are going to keep it fairly simple. Before actually conducting the tear down analysis, we should present a process overview and take them up to the assembly line. Also, we should have both P and D treat's available.

Bryan,

Any information we can pull together from the MY92 Econoline excursion will also be of use.

The meeting is going to be housed in 12-16.

More information will be forthcoming hopefully by late afternoon.

Regarda,

Charlie

Charlie Dougles (508) 235-3557 (P) (508) 235-1598 (F) c-douglas29 tl.com

REDACTED

REDACTED

REDACTED

TI-NHTSA 016759

REDACTED

REDACTED

Dague, Bryan

.

 From:
 Watt, Jim

 Sent:
 Wednesday, June 09, 1999 7:11 AM

 To:
 Pawlowski, Robin: Dague, Bryan; Dougkes, Charles: Gildea, Robert: Martin, Scott; Milkey, Mary-Jean: Pechonis, John; Prola, Stephen; Watt, James

 Subject:
 FW: Ford STA visit- June 17-18, 1999

fyi for upcoming Ford 77PS visit. Jim Watt, GRA, msgld: Jw02; mail station 12-53; page (508)236-1010, no. (0696) ph (508) 236-1719; fax (508)236-3153

From:Sharpe, RobertSent:Wedneiday, June 09, 1999 8:10 AMTo:Spencer, John; McGutrk, AndyCc:Faster, Barbara; DeMattia, Mike; Watt, Jim

 There was considerable concern that the field data set is not complete, and Joe Nemi has been tasked to get a clearer picture of the events breakdown.

There were strong feelings of "got to do more".

- Fred's statement that "TI Engineering is resident here" eloited a "Good" response.

I met with Fred 2/12 morning to capture his thoughts on follow up actions:

- Need a "raft" of experiments to accelerate kapton wear. Need to **design and execute a DOE** with temperature, moleture, disc energy, contaminants (scap, detergent), # of kapton layers etc as factors. I will close with Bryan on this. We need a plan with timing by next Wednesday.

Looks like we may need 2 - 3x life. Will need to establish real application requirement for 10vr/150k miles.
 500k is not enough. What solutions can Tilevaluate and put into place in 2 months.

- No potential solution should be eliminated for cost reasons.

 Having the switch hot at all times is not a good practice, and Ford will be internally working on a solution for this. I old not get a feeling that this is going to happen in the 2 month time frame established earlier.

• I have the formal workplan that Steve Reimers is coordinating. I will fax it to Andy today. Quite a few of the TL actions have been completed, but are open on the list. I will work with Steve to close these out.

I have a meeting with Central Labs folks at 1.00 today to look at kapton from non-fire, non-leak switches with varying mileage. This will be key in trying to <u>correlate kapton aging in the field as opposed to lab tests</u>. Bryan, can we do this with the switches we putied from the field with known mileage. Can we swap parts in used cars, say at Tasca? Today PM, we will meet with Greg Stevens, materials guy at AVT who has been tesked with getting Dow in the loop.

With Fred out next week, Steve Reimers will be main Tillason. I do plan to continue my field assignment for another week, and will evaluate need for further extensions at the end of next week.

FYI, I have a phone & pager now. Thanks Andy. I felt fixe "Far From the Maddening Crowd." (Thomas Hardy) without the comm-linki Phone: 508-208-6119 Pager: 1800-946-4646, pin 604-2042

Regarde Aziz.

TI-NHTSA 016761

From:	Baker, Gary
Sent:	Friday, February 12, 1999 1:28 PM
To:	Rahman, Aziz
Cc:	McGuirk, Andy; Beringhause, Steven; Dague, Bryan; Baumann, Russ; Sharpe, Robert;
	Douglas, Charles; Rowland, Thomas
Subject:	RE: 77PS, 2/11/99

Aziz,

Thanks for the update.

On the point that "Having the ewitch not at all times is not a good practice", has Ford given us any reaction to cur proposal to adding a relay in series with the pressure switch?

It may be important to get Ford on the record on this point.

Best regarda, Gary

From:	Rahman, Aziz
Sent:	Friday, February 12, 1999 11:28 AM
To:	MaGuirk, Andy; Beringhause, Steven; Dague, Bryan; Baumann, Russ: Sharpe, Robert: Douglas, Charles: Boker,
Subject	Gory: Rowland, Thomas 77PS, 2/11/99

Main event of the day was the Technical Review. Highlights:

Chief Engineer, Luxury VC Program Engineer, Town Car Quality Directory, Luxury VC Manager Large Vehicles Electrical Systems	
	Quality Directory, Luxury VC

Next Tech Review: Every Thursday, Implies core team prep meeting every Wedneeday.

There is a need to have the ability to implement, whatever solution is decided, in two months max.

- Next meeting with NHTSA is next week, as part of their regular quaterty meetings. Town Car underhood fires will be high on the discussion list, and the expectation (hope?) is that Ford will be able to get 2 months time to implement a solution.

- There is a very urgent need to re-create ignition in the lab. They kept coming back to this again and again.

 There was considerable concern that the field data set is not complete, and Joe Nemi has been tasked to get a clearer picture of the events breakdown.

There were strong feelings of "got to do more".

- Fred's statement that "TI Engineering is resident here" elicited a "Good" response.

I met with Fred 2/12 morning to capture his thoughts on follow up actions:

- Need a "rait" of experiments to accelerate kapton wear. Need to design and execute a DOE with

temperature, moisture, disc energy, contaminants (scap, detergent), # of kapton layers etc as factors. I will close with Bryan on this. We need a plan with timing by next Wednesday.

- Looks like we may need 2 - 3x life. Will need to establish real application regultement for 10yr/150k miles. 500k is not enough. What solutions can Ti evaluate and put into place in 2 months.

No potential solution should be eliminated for cost reasons.

- Having the switch hot at all times is not a good practice, and Ford will be internally working on a solution for

this. I did not get a feeling that this is going to happen in the 2 month time frame established earlier.

- I have the formal workplan that Steve Reimers is coordinating. I will fax it to Andy today. Quite a few of the TI actions have been completed, but are open on the list. I will work with Steve to close these out.

I have a meeting with Central Labe tolks at 1.00 today to look at kapton from non-fire, non-leak switches with varying mileage. This will be key in trying to <u>correlate kapton aging in the field as opposed to lab testa</u>. Bryan, can we do this with the switches we pulled from the field with known mileage. Can we swap parts in used cars, say at Tasca? Today PM, we will meet with Greg Stevens, materials guy at AVT who has been tasked with getting Dow in the loop.

With Fred out next week, Steve Reimers will be main T) lisson. I do plan to continue my field assignment for another week, and will evaluate need for further extensions at the end of next week.

FYI, I have a phone & pager now. Thanks Andy. I felt like "Far From the Maddening Crowd " (Thomas Hardy) without the comm-linki Phone: 508-208-6119 Pager: 1800-948-4648, pin 604-2042

Regarde Aziz.

Dague, Bryan

From:	McGulik, Andy
Sent:	Friday, February 12, 1999 12:41 PM
To:	Watt, Jim; Baumann, Russ; Dague, Bryan
Cc:	Beringhause, Steven
ŝubjeci;	FW: Ford conference call

attorney - client privileged communication

Jim

there is a building desire to be able to characterize switches in different states of life wear and to do so with recent samples.. I get the feeling that we are describing the situation and are not being able to 'show' same to the satisfaction of the receivers at Ford.

ple discuss with Bryan ideas we may have regarding sources of 'old' switches which might be available to alde in this direction in a prompt fashion.

I can guess that Ford will want Aziz or Bryan to 'characterize' samples from the field and this would be a base fine for that...

8

AUTOMOTIVE SEMBORS AND CONTROLS (BA MANNER 34 Porest ST K/S 23-05 Autoence, NR 02703 TRL : (508) 236-3080 FAI : (506) 236-3745 FAI : (400) 467-3700 PIN 604-2044

From:	McGuirk, Andy
Sent:	Friday, February 12, 1999 12:09 PM
To:	Beringhause, Steven; Baumann, Russ; Rahman, Aziz; Dague, Bryan
Cc:	Sullivan, Martha; Reynolds, Steven; Pechanis, John; Douglas, Charles
Subject:	Ford conference call

Aziz notified me of a plan for Aziz and Fred Porter to hold a conference call to me at 2:30 Friday today . 3 am planning to participate and have responded to the positive.

point, as I understand it from Aziz, would be to align the plans for Aziz for next week while Fred is out of the office.

Steve, I would like you to participate in this call with me and invite opinions about other participation.

8

AINCHEVILVE BENGUNG AND COMPECTS ONA MANGER 34 TOREST BT N/S 23-05 ATTLESCIDO, NA 62703 TEL: (508) 236-3060 FAX: (508) 236-3745 FACE: (508) 467-3700 PIN 604-2044

below is Aziz day three feedback

attomey - client privileged communication

 From:
 Rahman, Aziz

 Sent:
 Friday, February 12, 1999 11:28 AM

 To:
 McGuirk, Andy: Beringhause, Steven; Dague, Bryan; Baumann, Russ; Sharpe, Robert; Douglas, Charles; Baker, Gary; Rowland, Thomas

 Subject:
 77PS, 2/11/99

Main event of the day was the Technical Review. Highlights:

Next Tech Review:	Every Thuraday	y, implies core team prep meeting every Wednesday.
Key participants were:	Jack Pasques Chuck Paske Ann O'Nell Sam Cole	Chief Engineer, Luxury VC Program Engineer, Town Car Quality Directory, Luxury VC Manager Large Vehicles Electrical Systems

There is a need to have the ability to implement, whatever solution is decided, in two months max.

 Next meeting with NHTSA is next week, as part of their regular quaterty meetings. Town Car underhood fires will be high on the discussion list, and the expectation (hope?) is that Ford will be able to get 2 months time to implement a solution.

- There is a very urgent need to re-create ignition in the lab. They kept coming back to this again and again.

 There was considerable concern that the field data set is not complete, and Joe Nemi has been tasked to get a clearer picture of the events breakdown.

- There were strong feelings of "got to do more".

- Fred's statement that "TI Engineering is resident here" elicited a "Good" response.

I met with Fred 2/12 morning to capture his thoughts on follow up actions:

 Need a "rait" of experiments to accelerate kapton wear. Need to design and execute a DOE with temperature, molature, diac energy, contaminants (scap, detergent), # of kapton layers etc as factors. I will close with Bryan on this. We need a plan with timing by next Wednesday.

- Looks like we may need 2 - 3x life. Will need to establish real application requirement for 10yr/150k miles. 500k is not enough. What solutions can Ti evaluate and out into piece in 2 months.

- No potential solution should be eliminated for cost reasons.

- Having the switch hot at all times is not a good practice, and Ford will be internally working on a solution for this, i did not get a feeling that this is going to happen in the 2 month time frame established earlier.

I have the formal workplan that Steve Reimers is coordinating. I will fax it to Andy today. Quite a few of the TI actions have been completed, but are open on the list. I will work with Steve to close these out.

I have a meeting with Central Labs tolks at 1.00 today to look at kapton from non-fire, non-leak switches with varying mileage. This will be key in trying to <u>corraigite kapton aging in the field as opposed to lab tasts</u>. Bryan, can we do this with the switches we pulled from the field with known mileage. Can we swap parts in used cars, say at Tasca? Today PM, we will meet with Greg Stevens, materials guy at AVT who has been tasked with getting Dow in the loop.

With Fred out next week, Steve Reimers will be main Ti liason. I do plan to continue my field assignment for another week, and will evaluate need for further extensions at the end of next week.

FYI, I have a phone & pager now. Thanks Andy. I felt like "Far From the Maddening Crowd " (Thomas Hardy) without the comm-link! Phone: 508-208-6119 Pager: 1800-948-4648, pin 604-2042

Regards Aziz.

Dague, Bryan

From:	McGuirk, Andy
Sent:	Friday, February 12, 1999 12:09 PM
To:	Beringhause, Steven: Baumann, Russ; Rahman, Aziz; Dague, Bryan
Cc:	Sullvan, Martha: Reynolds, Steven; Pechonis, John; Douglas, Charles
Subject:	Ford conference call

Aziz notified me of a plan for Aziz and Fred Porter to hold a conference call to me at 2:30 Friday today . I am planning to participate and have responded to the positive.

point, as I understand it from Aziz, would be to align the plans for Aziz for next week while Fred is out of the office.

Steve, I would like you to participate in this call with me and invite opinions about other participation.
AUTOMOTIVE SEMSORS AND CONTROLS ORA MANUER 34 FORESP SP K/S 23-05 ATTLEBORD, NA. 02703 TEL : (SOB) 236-3080 PAK : (SOB) 236-3745 PAGM: (SOD) 467-3760 PIM 604-2244

below is Aziz day three feedback

attorney - client privileged communication

From:	Rahman, Aziz
Sent:	Friday, February 12, 1999 11:28 AM
To:	McGulrk, Andy: Beringhause, Steven; Dague, Bryan; Baumann, Russ; Sharpe, Robert; Douglas, Charles; Baker, Gay; Rowland, Thomas
Subject:	77FS, 2/11/99

Main event of the day was the Technical Review. Highlights:

Jack Pasquee	Chief Engineer, Luxury VC
Chuck Peske	Program Engineer, Town Car
Ann O'Neill	Quality Directory, Luxury VC
Sam Cole	Manager Large Vehicles Electrical Systems
	Jack Pasques Chuck Pesks Ann O'Nelli

Next Tech Review: Every Thursday, Implies care team prep meeting every Wednesday.

- There is a need to have the ability to implement, whatever solution is decided. In two months max.

- Next meeting with NHTSA is next week, as part of their regular quaterly meetings. Town Car underhood fires will be high on the discussion list, and the expectation (hope?) is that Ford will be able to get 2 months time to implement a solution.

- There is a very urgent need to re-create ionition in the lab. They kept coming back to this again and again,

- There was considerable concern that the field data set is not complete, and Joe Nemi has been tasked to get a clearer ploture of the events breakdown.

- There were strong feelings of "got to do more".

- Fred's statement that "TI Engineering is realdent here" elicited a "Good" response.

I met with Fred 2/12 morning to capture his thoughts on follow up actions:

- Need a "raft" of experiments to accelerate kapton wear. Need to design and execute a OOE with temperature, molature, disc energy, contaminants (scap, detergent), # of kapton layers etc as factors. I will close with Bryan on this. We need a plan with timing by next Wednesday.

- Looks like we may need 2 - 3x life. Will need to establish real application requirement for 10yr/150k miles. 500k is not enough. What solutions can Ti evaluate and put into place in 2 months.

No potential solution should be eliminated for cost reasons.

- Having the switch hot at all times is not a good practice, and Ford will be internally working on a solution for this. I did not get a feeling that this is going to happen in the 2 month time frame established earlier.

- I have the formal workplan that Steve Reimers is coordinating. I will fax it to Andy today. Quite a few of the TI actions have been completed, but are open on the list. I will work with Steve to close these out.

I have a meeting with Central Labs folks at 1.00 today to look at kepton from non-fire, non-leak switches with varying mileage. This will be key in trying to <u>correlate kepton aging in the field as opposed to leb tests</u>. Bryan, can we do this with the switches we pulled from the field with known mileage. Can we awap parts in used cars, say at Tasca? Today PM, we will meet with Greg Stevens, materials guy at AVT who has been tasked with getting Dow in the loop.

With Fred out next week, Stave Reimens will be main TI liason. I do plan to continue my field assignment for another week, and will evaluate need for further extensione at the end of next week.

FYI, I have a phone & pager now. Thanks Andy, I felt like "Far From the Maddening Crowd " (Thomas Hardy)

without the comm-linki Phone: 508-208-6119 Pager: 1800-948-4646, pin 604-2042

Regarda Aziz.

Dague, Bryan

From:	Rahman, Aziz
Sent:	Filday, February 12, 1999 11:28 AM
To:	McGuirk, Andy; Beringhause, Steven; Dague, Bryan; Baumann, Russ; Sharpe, Robert; Douglas, Charles; Baker, Gary; Rowland, Thomas
Subject:	77PS, 2/11/99

Main event of the day was the Technical Review. Highlights:

Key participants were:	Jack Pasques Chuck Peake Ann O'Neill Sam Cole	Chief Engineer, Luxury VC Program Engineer, Town Car Quality Directory, Luxury VC Manager Large Vehicles Electrical Systems

Next Tech Review: Every Thursday, implies core team prep meeting every Wednesday.

- There is a need to have the ability to implement, whatever solution is decided, in two months max.

 Next meeting with NHTSA is next week, as part of their regular quaterty meetings. Town Car underhood fires will be high on the discussion list, and the expectation (hope?) is that Ford will be able to get 2 months time to implement a solution.

There is a very urgent need to re-create ignition in the leb. They kept coming back to this again and again.

- There was considerable concern that the field data set is not complete, and Joe Nemi has been tasked to get a clearer picture of the events breakdown.

- There were strong feelings of "get to do more".

- Fred's statement that "Ti Engineering is resident here" elicited a "Good" response.

I met with Fred 2/12 morning to capture his thoughts on follow up actions:

 Need a "rait" of experiments to accelerate kapton wear. Need to deelan and execute a DOE with temperature, moleture, disc energy, contaminants (soap, detergent), # of kapton layers etc as factors. I will close with Bryan on this. We need a plan with timing by next Wednesday.

- Looks like we may need 2 - 3x life. Will need to establish met application requirement for 10vr/150k miles. 500k is not enough. What solutions can TI evaluate and put into place in 2 months.

- No potential solution should be eliminated for cost reasons.

- Having the switch hot at all times is not a good practice, and Ford will be internally working on a solution for this. I did not get a feeling that this is going to happen in the 2 month time frame established earlier.

- I have the formal workplan that Steve Reimers is coordinating. I will fax it to Andy today. Quite a few of the TI actions have been completed, but are open on the list. I will work with Steve to close these out.

I have a meeting with Central Labs folks at 1.00 today to look at kapton from non-fire, non-leak switches with varying mileage. This will be key in trying to <u>correlate (apton coing in the field as opposed to leb testa</u>. Bryan, can we do this with the switches we pulled from the field with known mileage. Can we swap parts in used cars, say at Tasca? Today PM, we will meet with Greg Stevens, materials guy at AVT who has been tasked with getting Dow in the loop.

With Fred out next week, Steve Reimera will be main TI liason. I do plan to continue my field assignment for another week, and will evaluate need for further extensions at the end of next week.

FYI, I have a phone & pager now. Thanks Andy, I felt like "Far From the Maddening Crowd " (Thomas Hardy) without the comm-linki Phone: 508-208-6119 Pager: 1800-948-4646, pin 604-2042

Regarda Aziz.

.

•

Dague, Bryan

From:Rahman, AzizSeni:Friday, February 12, 1999 9:20 AMTo:Dague, Bryan; McGuirk, Andy; Beringhause, StevenSubject:FW: Tl action

Eryan, can you send me the lists of tests in progress at TIA. Thanks. Also, any luck with finding the Welbull parts from last year? They are expecting to see them next week. If you can't find those switches, do you have any others that have gone to atleast 500k cycles at temp? Let me know.

Thanka Aziz,

From: Sent: To: Subject:	Steve Reimen(SMTP:reimen: G ford.com) Thunday, February 11, 1999 7:16 PM Aziz Rohman, Texas 11 action				
Aziz, I will not be in to work on Friday. See you Monday. What is TI doing to try and ignite the brake pressure switch?					
	ers s E/E System Applications REIMERS sreimers@ford.com	building 5 3C043 mail drop 5011 fax 39-03286	;>		

Dague, Bryan

From:	Watt, Jim
Seni:	Thursday, February 11, 1999 4:55 PM
To:	'Baumann, Russ RUSB'; Dague, Bryan; McGuirk, Andy; Beringhause, Steven
Subject:	RE: 77PS Diaphragm Wear Out Cause & Effect Diagram - Updated a/o 5:00pm
Sensitvity:	Confidential



.

Jim Watt , GRA, megid: jw02; mail station 12-33; page (508)236-1010, no. (0696) ph (608) 236-1719; fax (508)236-3153

From:Watt, JimSent:Thursday, February 11, 1999 10:10 AMTa:Baumann, Russ RUSB: Dogue, Bryan; McGuirk, Andy; Beringhause, Steven; Watf, JimSubject:Rg: 77P8 Diaphragm Wear Out Cause & Effect Diagram - ResendSensitivity:Confidential

<<File: Ford 77PS1.ppt>>

Jim Watt , GRA msgld: jw02; mail station 12-33; page (505)236-1010, no. (0696) ph (508) 236-1719; fax (608)236-3153

From: Watt, Jim Sent: Thursday, February 11, 1999 9:55 AM To: Baumann, Russ RUSB: Dague, Bryan; McGulrk, Andy; Seringhause, Steven Subject: RE: 77PS Diaphragm Wear Out Cause & Effect Diagram Importance: High Seneltivity: Confidential

The below 77PS Disphragm Wear Out Cause & Effect Diagram is fyl, comments. ...:

<<File: Ford 77PS1.ppt>>

Jim Watt , QRA, msgid: jw02; mail station 12-33; page (508)236-1010, no. (0696) ph (608) 236-1719; fax (506)236-3153

From:McGuirk, AndySeni:Wednesday, February 10, 1999 3:05 PMfe:Baumann, Russ RUSB; Dague, BryanCa:Seringhause, Steven; 'Rahman, Aziz ZIZ': Watt, JimSubject:RE: 77PS Design explanation

Attorney Client Privileged Information

overall, an outstanding document draft. I made a number of changes and am on callback to discuss my thoughts.

I think it might be of value to discuss weibuil success factor projections from the 'zillions' of 'es' test results we must have? we should also speak to the thunderbird applications ? maybe refer to the econoline issue of '93 with connector issues ?

we need some summary statement as to the ending of this document

```
8
AUTOMOTIVE SERVICES AND CONTROLS ON MOUSER
34 FOREET ST N/S 23-05
ATTLENCRO, WA 02703
TEL : (508) 236-3080
FAX : (508) 236-3080
FAX: (508) 236-3745
FAX: (508) 236-3745
```

From:	Dague, Bryan
Sent:	Wednesday, February 10, 1999 1:24 PM
To:	Baumann, Russ RUSB
Ce:	Beringhause, Steven; Rahman, Aziz Ziz; McGuin, Andy
Subject:	77PS Design explanation

Folks,

Here is a summary of how and why the 77PS is designed as it is. Please give me any comments you might have.

Aziz,

Read this and use the information as you see fit, but do not distribute it until we all agree on the wording.

Regarda,

Bryan

Attorney Client Privileged Information

Brake Fluid Intrusion

2/10/99

TI's 77PS switch family has been specifically designed to operate in an automotive braking system. The pressure cavity of the switch has been designed to seal brake fluid and transmit force and movement to the sensing portion of the switch over the life of the 500,000 cycle specification which in turn traslates into an electrical switching reaction used in the automobile system as a redundant satisfy related cruise control shutoff switch..

Background:

The pressure cavity is composed of the hexport, gasket, and Kapton diaphragms (Called out as "seal" on attachment 1.). The purpose of the gasket is to provide a fluid tight seal between the boxport and diaphragms. The purpose of the Kapton diaphragms is to provide a fluid tight seal between the pressure cavity and the internal components of the switch. Furthermore, the diaphragms are intended to transfer pressure to the converter, and follow the movement of the converter as pressure in the pressure cavity is varied.

There are two different ways that brake fluid may enter the contact cavity of TI's brake switches from the pressure cavity. Brake fluid could potentially leak past an impaired gasket seal, or leak through a damaged or 'worn out' Kapton disphragm.

The Gaskets

In order to create a fluid tight elastomeric seal, there must be proper compression of the elastomer, sufficient backing of the seal material to prevent movement when pressure is applied, and finally the elastomer must be compatible with the working fluid and expected thermal ranges of the environment and application.

Fluid compatibility is typically established by the use of published tables. These tables list fluid groups and general material types. Lab testing is done with the specific fluid that the customer has specified for the application along with the specific compound formulated by the selected gasket supplier. Etylene Propylene for brake applications is common practice throughout the industry for seal gasket materials, and TI has been using this material in brake applications since 1988.

The gasket compression target was obtained from publish industry standards (see Parker O-ring Handbook). In this particular design a nominal gasket compression of 24% was selected. The depth of the hexport gland shown on attachment #2 controls this attribute. This gland dimension is cut into the hexport at the time of manufacturing. As a result, this dimension in combination with the gasket dimensions determines the final gasket compression when the assembly is crimp together.

Lastly, the movement/position of the gasket when pressure is applied must be controlled and restrained. This design accompliance this by selecting the outer diameter of the gasket to be slightly smaller than the inner diameter of the gasket gland of the steel plated hexport. Therefore, the hexport gland prevents the gasket from moving outwards when high pressure is applied to the switch.

The DFMEA outlines the types of tests that were selected and run to confirm that all of these parameters are selected correctly. The resulting design was exposed to test conditions that were intended to duplicate actual application conditions, and in some cases go beyond the intended limits to failure. See the DFMEA Document number 503794 and customer specification ES-F2VC-9F924-AA. Specifically, burst testing, impulse testing, and thermal cycle tests were performed to confirm that the gasket performed as intended. The specifica details of these tests and the results can be seen in a number the following PV test reports:

Te	t Report #	TI Switch Part number	Year Tested
1.	PS/91/48	77PSL2-3	1991
2.	PS/91/49	77PSL2-1	199 1
3.	PS/92/49	77PSL3-1	1992
4.	PS/92/80	77PSL5-2	1992
5.	PS/92/82	77PSL3-1	1992
6.	PS/93/11	77PSL6-1	1993
7.	PS/93/44	77PSL4-1	1993

also, there are IP-2 texts of 6/95, 10/95, 1/96 and 8/96 that are readily at hand and show field capability resistances

In order to protect II's customersupply chain from gatket-manufacturing issues there are several preventative actions in place. These actions include: bair note, protective smocks, and cleaning procedures for the equipment

As a result of the process and product controls, 'Ti's customer return rates including line failout rates and end of line acceptance tests indicate gasket-manufacturing anomalies are below measurable limits (one leak return in 5 years from master cylinder leak testing or less then 1 ppm). Gasket-manufacturing anomalies can be produced from out of spec gaskets, contamination of the gasket, or scaling surfaces, and as a result, may cause leaks early in life but in our expert opinion not in late life without early leak eigns.

Kapton Disphragon:

A pressure switch disphragm must seal the pressure cavity, transmit pressures forces to the converter, and follow the converter motion without significantly affecting the switch calibration points. In addition, the disphragm meterial must be resistant to chamical attack of the brake fluid.

Basically, a single piece of Kapton in this design consists of a 0.003-inch thick polyimide film laminated on

both sides with a 0.001-inch thick FEP Terion film. The polymide film has the ability to stretch without breaking (strains on the order of 70% before rupture), and the Terion film is compatible with a wide range of chemicals. As a result of this layered construction, Kapton was selected for its mechanical and chemical properties. Moreover, TI has been using this material in a wide variety of pressure switch applications since 1981.

To confirm the correct material was selected for this application we refer to the DFMEA. Specifically, this document identifies burst testing, impulse testing, and thermal cycle testing. These tests confirmed the Kapton's Capability to meet the specified requirements (see PV reports listed above). Since temperature, chemical exposure, and stress levels all affect the life expectancy of the Kapton diaphragma, additional testing is commonly done. A typical impulse test would include pressure cycles to 1450 psi, constant temperature of 135 C, and a cycle rate of 120 cycles/minute. Depending on the factors listed above, the life expectancy of a TI brake pressure switch is around 1 million cycles which is well above the 500,000 cycles specified by the Ford (ES-F2VC-9F924-AA) See Life Testing to Failure (PS/98/14).

In addition, continued conformance testing has been ongoing for many years at TI. The purpose of this testing is to confirm that the components, materials, and processes have remained stable over time and that the design intent is consistently being achieved. See attached IP reports.

While the similar manufacturing anomalies listed above can affect the Kapton diaphragms (see PFMEA Document # 503831), additional factors can cause leakage via the Kapton diaphragm. Material/chemical compatibility and stress/strain concentrations can also cause the Kapton diaphragms to leak. See DFMEA Document number 503796. In order to verify the correct design parameters were selected, the switch was subjected to a number of tests designed to simulate accelerated life testing of the application. See PS reports called out above. Life testing per the customer specification (ES-F2VC-9F924-AA) has shown acceptable performance.

Typically, Kapton fatigue occurs well over 0.5 million full-scale pressure cycles in Out history of elmulated and accelerated life testing. When Kapton rupture does occur, there are visual signs of de-lamination, cracking, and embritlement. The Kapton disphragms break down first in the areas of highest stress and or strain. In our expert opinion, the first region to show break down is the circumferential area surrounding the converter button. See Endurance Test (report # PS/98/53). Again, disphragm life depends on stress levels (pressure magnitude applied), temperature, and chemical exposure.

The above mentioned tests were conducted in TI's Life Test lab with relatively controlled conditions. Water will accelerate the aging of the base polymide. Chemical attach can come from two directions:

- By entering the contact cavity via the electrical connector,
- By being in solution in the brake fluid and entering the switch via the pressure port.

When water enters the connector it will "age" the Kapton diaphragms and make them appear as though they have reached the end of life. This condition leaves visual cluss. Classic signs of chemical attack of the Kapton include de-lamination of the Tetlon from the base polymide base, embrittlement, and cracking of the base polymer. See Endurance Test (report PS/98/53).

End of Document,

Dague, Bryan

Eroser-

Sent:Thursday, February 11, 1999 4:48 PMTo:Dague, Bryan; Baumann, Russ; Beringhause, Steven; Douglas, Charles; Rahman, Aziz; Baker,
Gary; Hopkins, AL; Sullivan, Martha; Sharpe, RobertSubject:Aziz cell phone

we provided Aziz a cell phone and pager

cell phone is 508 208 6119

pager is 800 467 3700 pin 604 2042 for numeric..... I sent web page under sep cover to you for alpha page(mobilecomm.com/message)

EL AUFORDTIVE SERVICES AND CONTROLS ORA MONTER 34 FOREST ST K/S 23-05 ATTLINCEO, NA 02703 TSL : (508) 236-3080 YAX : (508) 236-3745 YAX2E: (800) 467-3700 FLF 624-2044

Dague, Bryan

From:	Hopkins, AL
Sent:	Thursday, February 11, 1999 4:43 PM
To:	Dague, Bryan; Baumann, Russell; Beringhause, Steven; McGuirk, Andrew; Douglas, Charles; Rahman, Aziz; Baker, Gary
Cc:	Andres, Amy
Subject:	RE: 77PS Day 2, 2/10/99 Summary

My comments are in olive color

Regards,

Al

From:Dague, BryanSent:Thuraday, February 11, 1999 1:13 PMTo:Hopkins, AlfredSubject:FW: 77PS Day 2, 2/10/99 Summary

AI,

t think the answer is yee, but can you add your 2 cents worth??

Bry

 From:
 Rahmon, Aziz

 Seni:
 Thursday, February 11, 1999 11:06 AM

 To:
 McGuirk, Andy; Beringhause, Steven; Baumann, Russ; Dague, Bryan; Dougkas, Charles; Sharpe, Robert; Sullivan, Martha; Rowland, Thomas; Baker, Gary

 Subject:
 77PS Day 2, 2/10/99 Summary

Day 2, 2/10/99 Highlights

Main event of the day was a team meeting to prep for the Executive Technical Review on 2/11. Joe Nemi of Large Vehicle Salety Group led the meeting. There were a lot of participants, including Fred Porter, Tem Masters from Engineering, Norm LePointe AVT Design Analysis, Steve LaRouche from CRL, Ford legal folks, wiring, connector etc. TI was the only supplier represented.

TI is not invited to the Tech Rev. (whew?!)

Tech Rev will be a high level, broad overview of Town Car Underhood Fires Numbers Joe has thus far:

149 Underhood Fires, Thermal Anomalies, Thermal Events

39 with engine off, 9 with engine on, no information on the rest

5 possible related to the Brake Pressure Switch (BPS), 17 potential other root causes, no information on the rest

Other root causes from above line : 42 way connector, EEC wire hamese, Relay pack.

At this point NHTSA response required on BPS, F2VC part only. Others may follow

Lengthy discussion on approach for the review. General consensus that presentation from technical side should be broad based, since sufficient info is not available for any deep dive.

General consensus that we need a lot more parts back from the field that were involved in these events. Oasis message discussed.

Someone inquired about TI answers to questions from lest meeting. I responded that I had provided the information to Fred and Steve Reimers, and they acknowledged. Two other questions for TI:

Does Ti sell the switch directly to aftermarket, like auto part stores. I replied that most probably not. We would go through Ford Service Parts for service parts. Is that accurate Charlie?

Does TI have fire experts on site who can determine origin of fires, as in experts who work on structural fires. I replied in the negative, but eald I would follow up.

Fran Finnegan used to be involved in a large number of fire/litigation issues for CS&C. He is retired now but I think that they have hired a replacement.

Any inputs? Intent was to answer repeatedly asked question; Do we know where the fire originated. Outside - in, inside - out,

I think important information can be obtained by x-raying the connector/switch assembly from each fire or otherwise examining the terminals. In particular, the amount of arcing that occurs on the terminals (especially the hot one) will give indications as to whether the fire likely started inside of the device or not. Also, it would be worthwhile to know which fuses were blown in the system. Also was there any arc ruputure of wire between switch and battery.

what burned first, brake fluid, or plastic base??

If the scenario that this question address is to assume that the switch was the source of the fire, I believe that the brake fluid would be the first thing to burn. Just from my own point of view, it seems to me that it would be kind of tough to get a real fire going without brake fluid to start it. I would guess that charring of the plastic would be more likely without the presence of brake fluid. This should be relatively easy to test, however,

Joe's meeting was followed by a vigorous brainstorming session with Fred, Tom, Nonn, Steve & Len. This was all technical and I actively participated.

I reviewed TI report PS/98/14 on weibull life of quiet switch showing first leaker at 900k+ cycles. Gave copy to Norm. Bryan, need weibull data quickly on pass-car snap switch.

I reviewed our finding that the 92 through 97 Town Car, Grand Marquis, Crown Vic platforms had prop valve mounted switches and that in vehicles with ABS option, the prop valve is located downstream of the ABS module.

There was considerable discussion on pressure profile at such a location with Leo saying that the switch probably sees full pressure reversals. We agreed that I would contact Teves for more info.

We discussed formation of electrolytic cell with Brake Fluid in the base cavity, and how a low resistance path to ground could be formed. Discussed the wattage available with a 15A fuse and 14Vdc system. Is that sufficient to generate enough heat through the ground path.

Discussed CRL analysis of Memphis part, and gave copy of Al's report to Norm. Bryan, per Norm, Al retained "spoonfula" of the corrosion residue. Do you know if Al has done any compositional analysis (IR) as opposed to elemental only?

The quantity was more like a dropful than spoonfuls. None the less, the Chem Lab examined the liquid phase that was present in three areas and found that it was almost certainly brake fluid (I have separately forwarded that memo to Bryan again). It wasn't possible to perform FT/IR analysis of the actual agglomeration of corrosion products and decomposed plastic.

Kept getting back to source of firs. Ford has not yet been able to create a fire in a switch. Team decided that pulling in Dow Chemical was key to understand if we can create a fire with given constraints.

Are they exploring my best guess hypothesis that you need the following components:

- Heat source within switch caused by high resistance short
 - Conductivity caused by brake fluid/water/conductive contamination mixture
 - Direct metallic contact (caused by broken arm blade)

for instance)

- Fuel
 - (Air/Heated brake fluid vapors) mixture is the most likely
- · Arc source
 - Perhaps the drying out of a conductive, corrosion product bridge caused by resistance heating.
 - Since the above might be a random effect, it might be necessary to separately create an arc in the switch cavity.

I will start exposing the resistivity test here to temperature 2/11.

No phone yet. Andy has arranged for a cellular phone and pager. On the positive side, received invitation from Fred to join his team for a Section Lunch at the Hawaiian Cafe. Should be fund

More tomorrow.

Regards Aziz.

Dague, Bryan

From:	Janet S. Bourgeols(SMTP: -bourgeols@til.com)
Sent;	Thursday, February 11, 1999 4:37 PM
To:	sberinghause@ti.com; rbaumann@ti.com;; bdague@ti.com; c-douglas2@ti.com; m-
	sullvan@ti.com; AZIZ@ti.com; g-baker7@ti.com; rsharpe@ti.com
Subject:	MobileComm Messaging



http://www.mobilecomm.com/message/

To send a short message alpha page to AZIZ while at Ford please enter this web page and use pin number 6042042

Andy

Correy, Pat

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

 Sent:
 Friday, March 12, 1999 12:13 PM

 To:
 Frederick J. Porter'

 Subject:
 mating connectors

Fred, can you advise when you think I could have some quantity of mating connectors (I'd settle for three dozen ASAF) ? I want them on board during our testing processes.

1

8

AUTOMOTIVE SENSORS AND CONTROLS ORA MANGER 34 FOREST ST M/S 23-05 ATTLEBORO, MA 02703 TEL : (508) 236-3080 FAX : (508) 236-3745 PAGE: (800) 467-3700 FIN 604-2044

Data Log Brake Pressure Switch

VIN	Event	Mileage	Term-Hexport Resistance	Leaker?	Kapion #1	Kapton #2	Kepton IKI	Present Status
PY62297	7 Sw. Fire				creck	crack	crack.	Analysia Complete
PY88522	4 Underhood Fire				mo india	no lafo	no info	Analysis Complete
NY74511	9 Underhood Fire				-			Six not available
NY70370	5 Underhood Fire							Analysis in Progress
VX14537	3 Cruite Intep		4.0NEGADHM8	¥25	crack	crack -	crack	Analysis Comolole
NX76871	4 Reference		OPEN	140	worn, no crack			
NY7602	25 Cruise Inop		4NEGACHILI	ym.	crack	cack	cnick	Analysia Complete
NX 76265	8 Reference	79164	OPEN					
PY72404	13 Reference	71337	OPEN					
PY62817	O Reference	56067	OPEN					
py83232	Reference	90349						Analysis in Progress
py72961	1 Reference	47325	•					Analysis in Progress
N0.7264S		86922	OPEN					
PX 18022		55614	OPEN					
PX63770		77	OPEN					
PY66837			OPEN					
PY72608			OPEN					
P7400-27			OPEN					
NY74020			OPEN					
PX62367			OPEN					
PY8953/		77	OPEN					
9Y63996			OPEN					
PYESO22		72114	OPEN					
PY85676			OPEN					
PY77425			OPEN					
PY75457			OPEN					
PX64361	-• ··		OPEN					
??	Reference	77						
PX62993	4 Relevance	66302	OPEN					

. .

Reference Reference Reference Reference	1929939 77 40642
	40642
Reference	73115
Underhood Fire	77
Reference	77
	Reference Reference Reference Reference Underhood Fire

.

page 1 of 2 pnnled 3/12/99 6.54 AM uncontrolled document

sevised 2/18/99

.

.

Epstein, Sally

From: Bent: To:	McGuirk, Andy (e-moguirk@emsil.mo.ti.com) Saturdey, Merch 13, 1999 8:01 AM Beringhause, Steven; Cegue, Bryan; Baumann, Russ	
Cc: Subject:	Rowland, Thomas; Baker, Gary FW: (L) Breinstorning	

fred and team really like the last one....and it may be a very good solution as it deals with a method of de-powering which is near to our long term input to Ford.....TURN OFF THE POWER. this is done if a fault is detected....

when could we have an idea/concept? should we deploy this to an extended eng'g team outside us for 'invention' - delivery ?

AUTOMOTIVE SENSORS AND CONTROLS ORA MANGER 34 FOREST ST M/S 23-05 ATTLEBORD, MA 02703 TEL (508) 236-3080 FAX : (508) 236-3745 PAGE: (600) 467-3700 PIN 604-2044

a

From: Frederick J. Porter(SMTP:fporter@ford.com) Sent: Friday, March 12, 1999 9:01 AM To: a-moguirk@email.mc.ti.com Subject: (U) Brainstorming

to: a-mcguirk@email.mc.ti.com

Regards, Fred Porter OV - Sporter Sporter@ford.com Chassis E/E Systems Applications (313)845-3722 Bldg 5 - Mmil Drop 5030 - Cubicle 32004 fax: 390-4145 *** Forwarding note from FPORTER --DREM007 03/11/99 17:59 *** To: N1654584--EXTERNAL

FROM: F. J. Porter Subject: (U) Brainstorming UBART (UTC -05:00)

Andy.

Attached is a list of ideas that were developed by a group from our research laboratory of potential changes that could be made to the switch that may improve our condition. TI has investigated some of these already.

I would like you to go through each idea and lat us know what your feasibility and manufacturing issues are as well as timing for their potential implementation.

- Cost cup with plastic or other non-conductive costing (like anodizing) Lengthens corrosive path to ground Insulates from broken spring switch contacting ground
- Make cup of non-conductive material Lengthens corrosive path to ground Insulates from broken spring switch contacting ground.
- Add plastic disphragm between cup/transfer pin and the spring contact/switch cavity Additional layer of isolation between mechanical components and electrical components
- 4. Place plastic insulator disk on the cup with hole only for the transfer pin

Reduces surface area exposed between battery and ground

- 5. Replace kepton membranes with pure teflon membranes Increased flexibility of membrane
- 5. Replace kepton seel with sliding piston seel Eliminates wear on kepton
- 7. Change cup/converter topology Spread flexure over greater area of the kapton Reduce interfaces where extreme flexure occur
- 5. Replace switch with pressure transducer and semi-conductor switch Eliminates kepton seal
- 9. Design thermal link in power supply side of switch that opens at elevated temperature (one time or cycling) Turns off power before heat becomes great enough to cause ignition
- Reverse polarity of switch contacts Removes power from spring contact if it moves out of position
- 11. Insulate/plastic coat spring except contact area Reduces corrosive exposure Reduces conductive material to making contact with ground
- 12. Gold plate spring contect Reduces corresion
 - 13. Fill air gap in switch housing with potting material to seal connector openning Seal off connector path of contamination
 - 14. Change switch housing material for improved ignition parameters Reduces ability for flame to spread after initial heat source is removed
 - 15. Add another layer to the kepton seal Possible increased life of seal before perforations occur
 - 16. Add ground fault interrupter circuit to switch circuit Turns off power if ground path to case is detected

Regards, Fred Forter OV ~ fporter fporter@ford.com Chassis E/E Systems Applications (313)845-3722 ~

.

TI-NHTSA 016781

3

Epstein, Sally

From: Sent: To: LaRouche, Steve (S.) (alarouch@ford.com) Monday, March 15, 1999 1:44 PM Rahman, Aziz

<<chklist.xls>> Steve LaRouche (SLAROUCH) Metallurgy Section, Central Laboratory, Room N410 (313) 845-4875 (313) 322-1614 FAX

1

Brake Switch Testing Checklist

ж

в

Menaphis

.

INF - INFINITY (OPEN) NP = NOT PERFORMED NRCLE - NOT REC'D AT CEN SAB

F

NV780155 NX782855

E

10002-00022

D

С

	1	PY622317	PY665224	NY745119	NY703705	VX145373	NX758774		NX782858
		C	C	C	C .	c	<u> </u>		C
inis inis	1 Log Faile Inter 440 Suidet Log vil	- <u>-</u>	C	C	<u> </u>	C _	C	<u> </u>	
i	2 Page 2	<u>-</u>	C	C	С	C	<u> </u>	<u> </u>	<u> </u>
	Second any statute offered states (b) angles a	<u> </u>	NA	NA T	NA	ž	NA	NA	NA
	4 Cauch lar Convertier regulation	<u> </u>	NA	144	NA.	NA	- NA	NA NA	NA
	2.49 Cd appropriate	NA NA	HAA -	NA	NA	NA .	NA	NA	<u> </u>
imitel +	6 West TR. College Wass 3 (DRIVERSE) Presidents	110			NA	NA	NA	NA	<u>NA</u>
Connector	Gauss 18 GP3 In Harpot Resettings	NA -		NA NA	MA -	NA	NA	NA	NA
Assembly	7 the 201000E to Hanger Research		NA T		<u> </u>	NA .	. MA	NA	- 444
	6 Superior States	1ī		NA -	<u> </u>	NA	NA	NA I	<u> NA</u>
Cannector	Distantin Contaction Stand	C			- m		NA NA	NA	NA
Only	ID Map 14. GRI In Man 20044622 Houseness	NA	L						
				I MA	1 104	1 44	NA	HA_	144
	12 Case to be against of commer	M	<u>NA</u>		+	NA	NA	NA	NA
	13	C .	NA	1			1-iii	NA T	NA
	14 Charle your parts	<u>c</u>	<u>104</u>	 ₩		- NA		NA NA	HAA .
	15 Cal was and the to chart in concern	Ċ	NM.		+		NA T	NA NA	¢
Sealch	16 American Garage to Cantantan Stand	NA	<u></u>	<u>w</u>		t- <u></u>	<u> </u>	C C	03
Enterniti	17 Spring Telepool to Stationary Telepool Recolations	MA	<u>MA</u>	<u> MA</u>	<u>NA</u>	<u> </u>			∎NF
Unprese vized	12 Agency Thermal in Playment Republicant	NA	<u>N4</u>	NA	NA	<u> č</u>	t <u>č</u>		NF
	10 Subwey Terried & Hypertratelence	NA _	NA NA	<u></u>					330
	20 Charles in Harport Reportments		NA	NA	NA.				
							1 104	145	122
		NA	AHA	NA	<u>NA</u>	<u> </u>	╪─╦─		59
Switch	24 Banders Canada Pressore	- MA	NA _	NA .	NA	<u></u>			MOLEAK
Edoped	25 Guilds Closing Present	1	NA	NA	<u>NA</u>				<u>c</u>
Presturbed	25 Proof Tear to College	NA	MA	NA .	<u> </u>	· · · · · · · · · · · · · · · · · · ·			INF
L	27 Chapter Streen 17 Bartugh 20 of 180 pmg		NA T	NA	NA	<u> </u>	MA		
F	17 String Toronton California Torontal Property		NA	NA_	NA	NA	<u> </u>	<u>NA</u>	- .
			NA NA	NA.	MA	<u></u>	<u>NA</u>		
1	10 Status Territoria Status Status			444	NA .	<u></u>	NA NA		
1	20 aug ist installe			NP	6	C .	<u> </u>	c _	
Swetch	20 Remove about the company			NP	C	C			<u></u>
1	28 Connet standard values. Proligraph	<u></u>		- NP		C C	¢	<u>¢</u>	
1	30 server op				- C	c	C	<u> </u>	
L	31 E arrive stated suffer on Planty and			NP		С	¢		NP
Technosum	31 SEMIEDU IFTIE LAND CONSEL TOTAL	<u> </u>	- 1 - 2 -		<u>-</u> -	C C	C	<u> </u>	NP
1	TO SEN OW FIN CUP INNON, WARMAN AND TO	<u> </u>			-f <u>c</u>	c	C	C	NP
1	33 states age agest analysis of states to	¢				C	c	C	NP
1		C C							

C = COMPLETÉ NA = NOT APPLICABLE THP = TO BE PERFORMED

TI-NHTSA 016783

----and for partnerse of strength of paraly

.

Brake Switch Testing Checklist

INF - INFINITY (OPEN) NP = NOT PERFORMED NRCLS + NOT REC'D AT CEN LAS

		3	4	5	в		6	8	10
		PY724043	PY528170	PY652223	PY/29611	NX728439	PX180223	PX637766	PY059375
		c	c	C	C	C	C	c	c
en no	1 Log Familiado rego Santa Log alto		NP	NP	NP	NP	NP	NP	MP
	2 Pinangriph Guild	<u> </u>	C	¢	¢	C	ç	<u> </u>	<u> </u>
	3 Parcent any university states in source observations.	NA -	NA NA	NA	NA	NA	NA	<u>NA</u>	NA
	4 Check for Connector any partituit	NA	NA	NA	NA	NA	NA	NA	NĂ
	Kar i i i i i i i i i i i i i i i i i i i	- NA	NA	NA	NA.	- MA	NA.	NA	NA
Mich +	Stree 11, Griph Time 2(CRANCE) Rentpare		NA	NA	NA	NA.	NA _	NA	NA
in motor	Certine 10.514 to insurant Handlands	NA NA	NA NA	NA NA	NA	NA	ŇA	ŇĂ	NA.
asembly	7 March (CRUCE) in Hope Readersh	NA		NA	NA	NA	NA	ŇA	, NA
	C Separate Harrand Forth Busick		NA	NA	NA	NA.	NA	NA	NA
Communitation of the Institution	9 Verty Consider Stal				NA	NA.	NA	NA	NA
Doly	1D IVer III.GR to Yes 202002 manual								
			E RMA	NA	NA	NA	NA	NA	NA.
	12 Class for fait aspegment of connector	<u> </u>		NA NA		NA	1MA	NA.	NA
	13 Creek	<u> ₩A</u>	NA NA		NA NA	NA	NA	- MA	Nô
	14 Chart wit grup sants	NA	+ ₩	NA NA		NA NA	NA	NA	NA.
	15 Current material and the company	<u> </u>		NA	NA	Ċ	т. с	C	c
huizh	19 Annually Research in Californian Simul	<u> </u>	C.			02	02	02.	22
Enternatio	17 Spring Types of the Statescory Terminal Research	02	03		<u></u>	I INF	INF .	NF	INF
Unpresidentized	10 Spang Territory in Property Residence		NF	<u> NA</u> –			WE	NF	INF
	19 Statement Terranel to Hagend whether	NF		NA		7 84	185	754	144
	20 Reve in Harpot Revaluest	11.4	164	NA		, , ,	1.1.2		i i
			400	MĂ	NA	147	132	140	137
Select	24 Seats Opening Pressen	134	180	<u> </u>		70	66	112	8
Enternal	25 Senten Classes Present	- 59	<u>66</u>			HOLEAK	NOLEAK	NO LEAK	NOLEAK
Presentized	20 Proof Test for Laskage	NOLEAK	NOLEAK			- <u>c</u>	C	C	c
	27 Property Steps 17 through 20 at 140 party	<u> </u>	C	114			INF	INF	IN F
	17 Provide Research in Britanny Torontal Productions	<u>inf</u>			NA -	NF.	INF	INF	MF
	18 Aprile Transmit in Hargani Restringent	NF	(NF	<u>NA</u>			WIF I	NF	INF
	19 Contrary Property in Despert with some	NF	NF_	NA	<u> </u>		NF NF	INF	INF
	2 Mary In Harris Residence	INF	NF	NA		NP	NP	NP	NP
		NP	<u>NP</u>	<u> </u>	<u> </u>				NP
Switch	29 E alement riversited surfaces Photograph	NP	NP	<u> </u>	<u> </u>	NP		NP	NP
		NP	NP	±	<u> </u>	NP NP		NP	NP NP
	3D Annia Lat.	NP	NP	C	с			NP	NP
			NP	NP	NP		NP		
		NP	NP _				1		
Techniques	31 SEAL SECTION A THE DATA OF CAREAUS, MAILINESS		NP	NP	NP NP	NP.		NP NP	

C = COMPLETE NA = NOT APPLICABLE TRP = TO BE PERFORMED

C = COUPLETE

NA + NOT APPLICABLE TEP = TO BE PERFORMED **Brake Switch Testing Checklist**

INF - INF(NITY (OPEN) NP - NOT PERFORMED NRCLS - NOT REC'D AT CEN LAB

L	Lost-for exercise of contractor of all my	NP	NP .	NP	NP NP	NP	٨P	ŃP	NP.
		11	12	13	14 -	15	16 -	17	18 -
		PY726066	PX665270	NY740208	PX623672	PY695374	BY639984	PY650225	PY653795
Field Into	1 Log Freid Into anto Switch Log als		c	C	C C	С	C	C C	c
	2 Propaga Salas	NP .	· · ·		. : :				
	Bernet any state of starts in some additional	С							
	Check for Committee companyees	NA.							
	L Cap & & Appropriate	NA							
Selich +	Swart (LUR) Wet 200442E) Restance	NA							
Connector	Ghine (J.G.R.) to Harport Receiving	NA							
Assembly	7 MAR STORANOE) IN Hispart Research	NA							
	B Separate Harrays Inne Gaugh	NA							
Connector	9 Youdy Conventor Sant	NĂ							
Only	10 sine (£0.05) is the 2;08mGE) watering	NA							
	12 Charts for half organization of convector								
	13 Card you making	NA							
	14 Charle www.gory.enils	NA 1							
	15 Cut wave annulation to check for commune	NA S							
Smith	TG Assessing Sweets to Constance Stand	<u>с</u>							
External	17 Spray Territorian Statement Territoria	02							
Unpresented	18 Spring Teachanal Springpool Periodiation	NF NF							
	19 Solarry Travel is Hypert success	NF							
	20 Sees to Heapon Residence	NF NF							
Switch	24 Sunta Operating Pressure	130							
External	25 Suba Change Process	71							
Pressurged	20 Peopl Terra the Landsage	NOLEAK							
	27 Report Gaps, 17 through 20 at 160 page	c							
	17 Junior Transmitter Malance, Transmitter	INF							
	10 Pades Terrind in Trepart Participan	INF							
	19 Suface Tenha binest misters	INF							
	20 Bann an bingeler finnittenen 3	INF							
Sunich	28 Austo-a Warman Carlo reg	NP							
	29 Example resulted surfaces Photograph	NÞ							
	30 Remoin cup	NP							
		NP	F . ()						
Techniques	31 Europe contained surfaces Producting	NP NP							

C = COMPLETE NA = NOT APPLICABLE

TEP = TO BE PERFORMED

Brake Switch Testing Checklist

NF - INFINITY (OPEN) NP + NOT PERFORMED NRCLS = NOT REC'D AT CEN, LAB

33 annual graphic analysis of contacts	NP	2 1 2 2	A CONTRACTOR OF
geory in materials in each and the			

		19	20	21	22	23			
		PY/74256	PY754575	PX643515	77	PX825934	PY858990	PX163920	3
Fundel inclu	1 tog Faith hits and Savers Log as					1.10220001	C		RX641595
	2 Presinguaget Except						<u>č</u>	<u> </u>	<u> </u>
	3 Parton in a second minimal warps of parameters						<u>c</u>	<u>с</u>	<u> </u>
	4 Class in Conserve angigueses						č		- <u>c</u>
	X-style & appropriate						NA NA	<u> </u>	
Switch +	5 Wes UL DROP Was 20R4462) Readings						0.3	<u>01</u>	NA
Commeter	6 Was MIGRY In Humpon Research	1					 		02
Assembly	7 Way 2(ORAHOE) to Harpert Resistance								H#
	Sapanda Hannas her Soth								INF
Corrector	9 Yorky Connector Sand						č		c
Only	10 Mar 18-047 m New 20044408) resolution							C	. <u> </u>
							(N ^F	INF	MF
	12 Deck to Ad orgagement of consider								
	13 Charle state produces						C .	<u> </u>	<u> </u>
	14 Church wert gang samb						<u> </u>	<u> </u>	c
	15 Cal vote establism to classic to comment						2 C 784	C .	<u> </u>
Smith	10 Amazalda Saditta in Califordian Sund							TBP	780
External	17 Spring Territoria in Electrony Territoria Residence						c	<u> </u>	C.
Linguisiant	10 Spring Terminal in Hereford Remainson						03	<u>0 t</u>	02
	19 Statemery Terrenal in Hayan assistant						UNF	WF	INF
	20 Since to Hangers Repetition						INF	INF	NF
							_ 5 5	MF	17 TK
Swech	24 Sentes Opening Profilem						198	127	125
Estambi	25 Seriet Clang Amoun							82	
	25 Provid Taxa Bat Leadings						NOLEAK	NOLEAK	NOLEAK
	27 Sugart Steen 17 Surage 20 at 108 page						<u> </u>	C C	C
	17 States Treatest in Stationary Research Residence						NF	61	1115
	10 Status Reduct in Linear Statistics						NF		WF
	19 Cinterer, Tarriter in Hap & relations						INF I		INF
	20 mart in fangest Remainen								HIF
Smith	20 Render almanum geragrang								<u>""</u>
	29 to amount structure with an Photograph							<u> </u>	
	30 Diamous cup								
	31 - serve in-extent suffactors Produgraph						- MP		NP I
Techniques	31 ST M HOR F TR Back controls, Latitudes					· ·			
							70°		NP

Brake Switch Testing Checklist

INF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS - NOT REC'D AT CEN LAB

1	SZ MEN COL WITH CAR, IMPANI, MICHINE LINES, OF								
	72						NP	C	NP
	33 Million and the second seco	-					NP	NP	MP
i	Last to endered of contacts of acad						NP	с.	NP
			<u> </u>	·				-	
				0	(-B-	10	
	T	PX103312		NY724366	PY750172	NY733191	PY758158	PX151140	NY757408
Field Info	1 Log Full He with Switch Log als	<u> </u>	- C	с С	<u> </u>	0	c	с .	с
	2 harring and a second	<u> </u>	c	C	C	_ C	C	C C	Ċ.
	3 No. of Mary manual minute sums descentes:	¢	<u> </u>	C	<u>с</u>	C	С	C	c
	Classic for Canadrian empirication	C C	C "	KA.	Ċ	ŇĂ	C	NA -	C
	Kang di ananggan	C	2	ÂA .	NÅ.	NÅ	C	NĂ	NA
Smith •	Stating 14.07(to they 2(Child) American	HP -	02	HM.	NF	NA	2	Q.(NP
Connucler	Callers 14, Call Q is He-part Recourses	NP ·	INF	N N	N Ë	NA	6.GM	NF	NP
Assombly	7 New 208 MICE) to Magazi Managara	NP I		NA	N.	NA	6.1M	T.F.	NP
	Copusts Harpen boy, Surth	C	-	NA L	<u> </u>	NA	с –	5	C
Connector	O Aurily Connecton State	C C	, c	NA NA	C ·	NA.	<u>с</u>	с – С	c
Ciniy	10 May M. GRO to West 2007/ICE) resultants			NA NA	₩ F	NA	ŇĒ	NE	NP
	12 Clark for 6.4 and ighter 6.4 company	C	2	NA	C	NA	C	c l	C
	13 Class was another	C	C	NA	<u> </u>	61A		c	
	14 Charle with gay seems	с — С	<u>с</u>	NA I	G	NA	Ċ		c C
	16 Call was contained to check its constant	TBP	TBP	NA I	TSP	NA	TBP	165	TBP
Seach	16 Accordin Sunth to Calibratio Stand	C	C	NA I	C ·	NA	c	- <u>c</u>	C
Enternal	17 Space Conversion Statementy Conversion Researchings	41	02	-	03	NA	15	04	01
Unpresentinged	18 Spring Terrated in Strepost Principator	WF	NF	NA	NF	NA	8 3 4		
	19 Cinterry Terrent to Haged readings	₩F.	NF	NA	M	NA	6 44	UNF .	
	29 Date to Himcon Resistance	NF	180K	NÁ	463K		04	88	WF
								va	
Switch	245-L+ 0j-mag P-man	133	151	NA	(36	HA	164	136	135
Ederant	25 Sate Careg Param	60	87	MA				106	74
President	25 Pred Test for Lesings	NOLEAK	NÜLEAK	NA	NOLEAK		NOLEAK	NOLEAK	NOLEAK
	27 Report Sugar 17 Warrage 38 at 180 page	C C	č	- NA	C		C	<u> </u>	C
	17 figung Territori to Statemen Territori Remoteres	LINE T	N	NA	NF	- NA	01	ŇF	HNF .
	18 linde Temilie in Stager Right Anen	HAF		NA	NF NF		-970K		INF
	12 Mainer Trainite staget withom	HIF		NA NA	NF	NA NA	-970K		
	20 Sera to Hages Benings	NF -		NA	INF		gvuk INF		INF INF
Switch		NP		NP	NP	NP NP	· · · · · ·		NP
		- NP-	NP	NP	NP		<u>с</u>		NP
	29 Common and stations, Photograph	- NP		<u>. NP</u>	NP NP	MP		<u>NP</u>	
	30 Антина сир		NP	NP 1			<u></u>		NP
	31 Eugene washes hereburget		nr			nin.	L.	NP	<u>NP</u>

Brake Switch Testing Checklist

INF = INFINITY (OPEN) NP = NOT PERFO**RMED** NRCLS = NOT REC'D AT CEN LAB

Techniques	31 Sen ETA #18 base compete increase	ht	NP	NP	NP	NP	C	NP	жР
	32 SEW ELX #TH cap. hashed, within your, and	NP		NP	NP	NP	C	NP	₽
1	33 Intelligencies and the discussion	NP	NP	NP	NP	NP	Ň	NP	
	Look by anderes of conserve a second	NP	2	9	ł	NP	¢	8	NP .

		12	13			<u> </u>	 1	<u> </u>
		PT742658	PY7433413	NY734410	PY#05626		 1	
Field Into	1 Long Factor into anto Santato Long da.	Ē.	C I	TBIP	TBP			
	2 Phone part Suites	Ċ	C	TBP			 	
	3 Reveal any manual expension of chaptering	Ċ,	c	C	<u> </u>			
	4 Charle for Computer suggesteril	C	C	HA .	NA			
	K cay I d appropriate	C	NA		HA			
3milich •	Sares 14 Gillio West S(CR/MGE) Researces	0.3	63	ž	NÅ			
Corrector -	6 Mar 18 Cally in Players Research	20 24	NF	H.	NA		 	<u> </u>
Amonthly	7 Marco 2(CRAVIOE) to Marganit Remaining	21.54			NA			
	E Supervice Hamman Same Savet-1	C	C .	NA .	2			
Connector	B Vardy Community Service	C	C	14	NA			k
Omly	10 Hore (J. G.R.) to Man 200 WEGE) where	ÎNF _	, MF	N	NA.		 	
-								
	12 Clock for hit opposed of corrector	С		NA	N A			_
	13 Cinci mar and thi	C	C	NA	NA		 <u> </u>	
	14 Canto mer gegramme	Ē	¢	NĂ	NA I			i
	12 Cat way exclusion in shack he approach	TRP	199	ž	HA I		 ┹╼╌╍╍	
Suict	18 Annual Start In Californian Start	C	<u> </u>	С	- <u>c</u>			- -
External	17 Spong Terranal to Simonary Research Residence	9.2	0.2	-700K	=130K		 _	
Unpressurized	10 Spring Second in Harpert Resolution	3464	INF	>250K	>17K		 	
-	10 Statemy Transport to Hisport Minister	394	NF	>350K	>120K		 	+
l l	20 Bans 10 Hargest Streatments	63.4K	75M	NF	(<u>1NF</u>			<u> </u>
Sentich	24 Sunta Opening Presson	148	150	152	NO SOUND		 	
Edwint	25 Sames Course Pressure	61	. 70	92	NO SOUND		 	
Presented	20 Paul Tell for Léanage	NOLEAK	NOLEAK	NO LEAK	NO LEAK		 	
	27 Report Shops 17 Brough 30 at 168 perce	- C	<u> </u>	, c	С.,		 	
┝╾╸ ╶	17 and a Carrier in the second framework for the second	<u>0.1</u>	NF.	-1.0M	170K		 	.
	10 Keing Terring in Harpert Residence	INF		>600K	>140K		 	
	1 Conserver Second in Press of second second	UNF	INF	>400K	≥15K		 	
	20 Dass in Harrest Railtante	WF	INF	WF	INF		 	┨╾╸╸┍╼╍
Swelct	28 Remore alements or prop	SCI LAB	NP	TOP	TEP		 _	+
1	29 Example serviced testingers Processing	SCILAB	NP	TBP	TBP		 	
	30 Norman Lap	SCI UAB	NP NP	TBP	TOP			

Brake Switch Testing Checklist

.

INF = INFINITY (OPEN) NP > NOT PERFORMED NRCL5 > NOT REC'D AT CEN LAB

	99 2					_		
	31 Emmany revealed surfaces Photograph	SCI LAB	NP	T6P	THE			
Techniques	31 SEA COX FT & Lans. contacts, terminals	SCILAS	NP	TEP	780			
1 .				105	TBP			1
•	32 Set (CAL #710 cap began ander sette de	SCILAB	NP	TBP	TBP		 	<u> </u>
4	33 Manufacture and part of particular	SCI LAB	NP	TBP	780		 	
					TBP			i
L	Look in earlier of converse a strong	SCILAB	NP	TBP	182		 	

		and the second s							
			·	·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	<u></u>	 	
						1			
Fuild Inits	1 Lag Fait has no Series Log de			-					
	2 Participant Santa				t —				┠────
ł	Dertind any element manual suggestion				<u> </u>	<u> </u>		F	╋━╼┈━
	4 Clark to Converte Angletowel			 -	t			 .	┢────
1	il ster if i spetter min			t·	{ ──· - `─	╞━━━╵═╴╼╴	┣━━━━		
Switch +	Stern 10.0470 New 207844623 Residence	1		<u>+</u>	┢┉╌───	┢━┄╼╼	<u> </u>	·	<u> </u>
Connector	Caller 18:049 millioner Residence		·	f		<u> </u>			
Assembly	7 Non 2(CRANCE) to Hamplet Reactions	┨┑╰───			!	┦──└───			
	Capitale Hanna Lan, Suideh				 				
Contector	Presty Caseson Sant			┟────	┟─────			<u> </u>	
Colv	10 MAY VIGER IN WAS SCROOL OF THE PARTY	1		~ ~				l	
-							·		
	12 Classic and real to the suggestant of converses			↓					
	13 Charle was Maniatan								
	14 Dent van gegraaph							_	
	19 Cer was madeled to check for caracters		_						
Swiich	16 Ausselle Britch in California Sport								
Edana	17 Spring Territorial to Statementy Territoria Residences					··• ·			
Unpreseurzed	18 Spring Terreration Pringent Reproperty								
	12 Statement to Happan anning								
	20 Base to Hangard Recovery								
Switch	24 Sunich Comme Pressure								
Enternal	25 Dante Colleg Pressure	+							
Pressurged.	20 Presi Test in Loning	<u></u>				··- ·			
	27 Page a Stope 17 monuph 20 et 196 ping	<u>+</u>							
	17 Upring Terrolitative Mathematy Terrolitationers	1							
	10 deng Terebit to Happin Responses	1				·			
	10 Sulariy Lines in Sugar, address	┪╼┅╾╸╴╽							
	20 Carrier Harpert Rubbards	┨────┨							I
Switch		┫╶╴╶═══╋						·	
	28 Homen distribution company	┨┈╍══┛┨							
1	29 Corner would what Provport								

Brake Switch Testing Checklist

INF - MFINITY (OPEN) NP = NOT PERFORMED NFICLS - NOT REC'D AT CEN LAB

	3	Ranaus Lup					
	31	Example servated todatos: Plennglaph					
Tá chung stá.	- 31	SEMACEX FTR taxa, centects, texanula					
	32	CEMECK FTH any, happed, washin such, etc.					
	33	Manhalographics and place of Constants				·	
		Look let a-dance of contains in many					

Brake Switch Testing Checklist

(NF + INFINITY (OPEN) NP + NOT PERFORMED NRCLS = NOT REC'O AT CEN. LAB

	Memphis	A	В			E	ι	1
	PY622077	PY685224	NY745119	NY703705	VX145373	NX758774	NY760055	NX78285
1 kog Faja ala ala Santhing al			C	c	C	C	C	C
2 Promptoph South	С	c	C	C.	¢	C	<u> </u>	NP
3 Record any second second read class where	C	C	C	C C	C C	С	C	C C
Canada Lar Caranacian angegannant	C	19A	NA	NA.	NA	NA.	NA	NA
it any it is appropriate	с —	NA T	NA	NA	NA	144	NA	NA.
States 16 Gray Has 2004400 Residence	T	[NA	NA	NÅ	NA	NA.	NA	NA NA
Convert LOR to Harden Chemater			NA	NA	NA	RA.	- m	NA
7 Nov 2011/NOC in Harport Reastance	NA	NA NA	NA	NÅ	NA.	NA.	164	NA
Reports Course 100 Seath		NA	NA NA	<u> </u>	NA -	NA	NA	NA.
Shink Careford Seri	C C	NA	NA NA	с	NA	NA	NA NA	NA
	**	AK I	MA	NA.	NA	NA.	NM.	NA
				11-3				
12 Deck by the constraint of something		NA,	NA	NA	NA.	HA.	NA	NA
	<u> </u>		164	NA	NA	NA NA	NA -	NA
	c	NA	MA.	NA.	NA	644	NA.	NÅ
	t c	NA.	NA	NA	NA.	MA -	- NA	NA
		NA	KA	NA.	NA	34	**	c
		NA	HA.	NA	Ċ	с	- <u>c</u>	03
		NA			• •			INF
		NA		NA		c c	c	WF
	MA	NA	144	NA.	NA	NA	NA	3.31
							· ·	
20 Parts Owner Parts of	NA	I MA	NA NA	NA.	NA.	KA.	NA -	122
	NA	NA NA	NA	- NA	NA	n/A	NA	58
	NA -	NA	NA	NA.	NA	NA	NA 1	NO LEAK
	NA NA	NA	NA		NA NA	NA	NA I	- C
	NA	NA	NA		NA	NA		HEF
A REAL PROPERTY AND A REAL						NA	NA	INEF
A Participation of the partici						NA	NA	INF
And the second sec			NA	NA	- m -	NA		INF
And the second sec			NE		- <u>c</u>	C C	c	NP
						<u> </u>	c	NP
the second se							<u>°</u>	NP
				-		č		- NP
		· · ·						NP
								NP
			<u> </u>	<u> </u>	<u> </u>	<u> </u>	Č	NP
33 Milliographic analysis of Lonauch				2	 č - · ·	<u> </u>		NP -
	Promynaph Zunkth Rezerd any annual deterministic classification Rezerd any annual deterministic classification Rezerd any annual deterministic Lay of a appropriate Also 15 Cartyon Water 2008/4002 Resettance Mine 16 Cartyon Resettance Mine 17 Cartyon Resettance Mine 18 Cartyon Resettance Mine 19	1 Log Fight and and Samth Log d. C 2 Processed any mean of determine and observations. C 3 Record any mean of determine and observation. C 4 Drawk for Comparison angegenegate C 5 Alam 16 (2009) West 2008/40061 Restations MA 6 More 13,0000 Empression MA 7 More 2008/40001 Restations MA 8 More 13,0000 Empression C 9 More 2008/0000 Empression C 10 More 2008/0000 Empression C 11 Deck North Management of accumutation MA 12 Deck North Management of accumutation MA 13 Count Non amataban C 14 Deck North Management of accumutation MA 15 Col Non angegenergic florence (Seconsen C 16 Approximation Hamped Empression MA 17 Deck North Management for Accumutation MA 18 Approximation Hamped Empression MA 19 Restation Transmit for Accumutation MA 20 Res	PYRE22017 PYRE22217 PYRE32221 1 tray Fuent tab arts Samth Lag als C C C 2 Parangaget Samth Lag als C C C 3 Rezard any annual description anglegament C NA NA 5 Aprint for Convection anglegament C NA NA 5 Aprint for Convection anglegament C NA NA 6 Max of Sagergament C NA NA 7 Atta 2000 New 2000 Sength C NA NA 7 Atta 2000 Anglegament of somethers NA NA NA 8 Verify Connectors Send C NA NA 9 Verify Connectors Send C NA NA 10 Research for for Sength C NA NA 110 Research for for Sength C NA NA 12 Sheet Ro fold anglegament of somethers C NA NA 12 Sheet Ro fold anglegamet of somethers<	PY622277 PY6825224 NY745118 1 scgr runs and anti-Sumphing at C C C 2 Parampush Sumth C C C 3 Parameter Sumphing and Costmators C C C 3 Parameter Sumphing and Costmators C NA NA 4 Kary & & Appartment C NA NA 5 Correct for Connection angenesses MA NA NA 6 Main 11 (State) in Margon Marganasa MA NA NA 7 Marganite C NA NA NA 8 Main 12 (State) in Margon Marganasa MA NA NA 9 Main 12 (State) in Margan Marganasa MA NA NA 9 Main 12 (State) in Margan Marganasa MA NA NA 10 Parameter Control (State) in Margan Marganasa MA NA NA 10 Parameter Control (State) in Margan Marganasa MA NA NA 11 Parameter Control (State) in Margan Marganasa MA NA NA 12 State of Ageneter Control (State) in Marganasa C MA NA 13 Contro (State) in Control (State) in Control (State) <t< td=""><td>PYRE22017/ PYRE3224 NY745110 NY7403705 1 trg fram white Samphing at C</td><td>PY68222177 PY682224 NY745118 NY745118 NY7453705 VX745573 1 kog Fød ab ad: Sizerking ab C NA <t< td=""><td>PY6222177 PY6825224 NY745119 NY703705 VX14537/5 NX759774 1 keg had als Samph Lag al. C NA NA<!--</td--><td>PYRE22077 PYRE22247 PYRE2247 PYRE22447 PYRE2447 <t< td=""></t<></td></td></t<></td></t<>	PYRE22017/ PYRE3224 NY745110 NY7403705 1 trg fram white Samphing at C	PY68222177 PY682224 NY745118 NY745118 NY7453705 VX745573 1 kog Fød ab ad: Sizerking ab C NA NA <t< td=""><td>PY6222177 PY6825224 NY745119 NY703705 VX14537/5 NX759774 1 keg had als Samph Lag al. C NA NA<!--</td--><td>PYRE22077 PYRE22247 PYRE2247 PYRE22447 PYRE2447 <t< td=""></t<></td></td></t<>	PY6222177 PY6825224 NY745119 NY703705 VX14537/5 NX759774 1 keg had als Samph Lag al. C NA NA </td <td>PYRE22077 PYRE22247 PYRE2247 PYRE22447 PYRE2447 <t< td=""></t<></td>	PYRE22077 PYRE22247 PYRE2247 PYRE22447 PYRE2447 PYRE2447 <t< td=""></t<>

Brake Switch Testing Checkilst

INF = INFINITY (CPEN) NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN LAB

		3	4	5	8	/		8	- - 10
		PY/24043	PY625170	PY632320	PY729611	NX728439	PX160223	PX637765	PY669375
Field Info	Log Fasti Irla alla Genich Log alp	C	Ċ	C	С	ic ii	с –	c	<u>с</u>
	2 Pickagangia Swatch	MP .	NP	NP	NP NP	J NP	NP NP	NP -	149
	Species any amount interest wheat about the	C	<u> </u>	c	С	C	c	<u> </u>	<u> </u>
	Check to Connection suggestient	, HA	HA.	NA	ŇĂ	NA	NA	NA -	NA
	K-any di Cappanganda	NA	NA	NA	NA NA	NA	MA	***	NA
Swich +	Grow 1 p. Origo Was 2(OR/MOR) Revalues	NA	NA	NA.	NA	NA.	AMA.	NA -	- NA
Connector	Eritar 18.000 in Harpen Desetunce	, MA	14A	NA	NA NA	NA I		NA	NA
Assembly .	7 New 2010/06(2) to Harpert Residence	NA.	NA	NA	NA NA	N#A.	NA	NA	NA.
	Bargetrate Hanning Bohn 3-0ch	NA	<u> </u>	NA	- NA	NA	NA	NA NA	-
Competitor	Bundy Consumer Sant	NA	NA	NA NA	XK	NA.	NA	NA	
Chalg	10 Non 18 GR in Was 30 Rev GE manager	NA	M	NA	NA .	NA.	NA	NA	NA
-						-			
	12 Cash to bill experiment of secondar	NA	NA	NA	H4.	NA	NA	56	NA
	13 Chart	NA	NA	***		NA NA	NA	NA	NA
	14 Canto wang ny santa	NA T	NA .		ANA .	NA	NA	NA	NA
	15 Cut was applied to check in contains	NA	NA.	NA NA	NA	NA.	NA	NA	NA
Swiitzle	16 Ausoratio Divisió la California Marri	C	C	NA	NA.	<u> </u>	C	C	
Estantial .	17 April Termini in Stationary Terminal Resources	02	0.3	HA .	MA.	02	02	82	22
(Inspectional Internet	18 Spray Tenned in Harpert Resolution	INF	RIF :	NA	NM .	WF	HHF	NF	INF
• • • • •	10 Stationaly Terrenal Volterspet at etters	INF	INF .	NA	444	NF	MF	NF	INF
	20 Sine to Negot Researce	114	1 GM	NA	- MA	784	185	75M	144
							485		
Swiich	24 Builds Opporty Promine	134	160	NA	NA	19	- 132	140	137
	26 Bankin Channy Presson	50	86	<u>NA</u>	NA ·	70	66	162	66
- Resturized	26 Paul Taskin Lankage	<u>NOLEAK</u>	NO LEAK C	<u></u>		NO LEAK	_NOLEAK C	NO1EAK	NO LEAK
	27 Passad Slope 17 shough 28 at 180 mag	_							_
	17 July Trained in Statement Present Production	UNF	NF	NA	NA		INF	Nf	N₽
	18 Pring Terring in Progent Tangaren	INF	NF	NA	NA	INF	INF	iNF .	INF
	10 Suffering Territori in Property sectors	HNIF	NF NF	NA NA	NA NA	(NF	MF	RAF	INF INF
	20 Dans bi Rougett Red Hours	HHF			NA	N#	NF		
Seatch	20 Gamera ziemenen erme ong	<u>NP</u>		<u> </u>	<u> </u>		NP	MP-	NP
	29 Eastern resultation Plates (p)	NP	NP	<u> </u>	<u> </u>	NP	NP	NP	NP
	30 Remove cup	NP	NP .	C .	<u> </u>	NP	N ^P	NP NO	NP
	31 Economic revealed participe. Physiophysiol	NP	NP	C C	¢	NP	NP	NP	NP
Techniques	31 SEMEDILATIA base vorticity inmende	NP	MP	<u>NP</u>	NP	NP	NP	_ NP	NP.
	32 SAM COLA IN US INVAL AND AND AL	NP	NP	NP	NP	<u>NP</u>	<u>₩</u> P	HP	<u> </u>
	33 Intel degraphic analysis of Cartacity	N 19	NP	NP	NP	MP	NP 1	NP	NP

Brake Switch Testing Checklist

(NF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS = NOT REC'D AT GEN (AB

.

·	Lash for entiries of conceron to arong	NP	NP	NP	NP	NP	NP	مد ا	NP
					_				
			12	13	14	15	15	17	18
r		PY726066	PX685270	NY740208	PX623672	PYM95374	BY639984	PY650225	P765579
Fadd Lafa	t ung Fanis inin ang Grants Log an	C	C	C	C	С	С	C C	C
	2 Protegraph Surget	. NP			. –				
	3 Decord my manual minute -to-et chierenaute	<u> </u>							
	Chast its Contactor argagement	NA							
	X-mg i f approprie	NA							
Swiich +	Silver 1 & Collins Some 20 Martine Receipton	NA .							
Consector	General Laboration in Compart Relations	NA							
Assembly	7 W-e 2(ORWGE) to Haspiti Resonance	NA							
	E Separate Hermone Invite Swellin	NA							
Cananactor	. Security Connector Sant	W.							
Only	10 Mar I (CRI) to Was 200 MOED readings	**							
	12 Check in fail ingrgement of computer	NØ.							
	13 Church was managed	NA							
	14 Check may gay mak	··· ••							
	15 Cut use modulos to check for converse	NA							
Switch	10 Assessor South to Caldadon Stand	С							
External	17 Sprag Territori to Statementy Territori Residence	02							
Unprocessized	18 Spring Terranal to Alexant Resurgers	INF							
	19 Statement Territorial to Harport resultance	NF							
	20 Prove to Harrywell Reseatance	INF							
l									
Selete	24 Sector Operang Products	139							
External	25 Guilds Cloury Presare	71							
Pressunged	28 Proof Tank to Londage	NOLEAK							
	27 Flagman Slages 17 Harappin 20 at 180 ping	C							
	17 States Territori an Bastaney Territori Massares								
	10 Party Transmitte Stagent Restatores								
	12 California Residuel in Languat angletaren	NF .							
	20 Report Prograf Reducers 1	NF -							
Switch	28 Minute statement camp ing	NP							
	20 Entrans revealed surfaces. Protograph	NP							
	30kmace	NP							
	31 transported surfaces instruction	NP .							
Techniques	31 JEM EDX FTH LASE CORPUS MARAN	NP							
	Zabili EOK FIR cap introd washin such als	NP							

-

Brake Switch Testing Checklist

INF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN 148

33 minutiographic analysis of constants	NP		······
Look for entities of canousy a arcing	NP		
· · · · · · · · ·			

		19	20	21	22	23	1	<u> </u>	3
		PY7742.55	PY754575	PX643515	7?	PX029334	PY838990	PX163920	RX641585
Field Info	1 Log Partitizio mio Sorich Loguin						C	C C	c
	2 Protograph Samela						C	c	C
	3 Second any constant animal version states						С	с	c
	Create for Connector regargement						C	C	<u>с</u>
	K-my & S appropriate						NA	- c	NA
Swatch +	Salar 10.000 is Wei 20000000 Restance						03	<u>04</u>	₽ 2
Connector	Colors 10.GR) to Harpest Restauran						BNF -	INF	NF
Accestly	7 Wes 20RMACE) in Hywynd Resymans							NF	NF
	6 Separate Herman from Senten						с —	¢	
Connector	B Varily Comments Stel						С	c	c
Only	10 mm 10.000 to Whe 200704020 minimum						INF	NF	ŇĒ
-									
	12 Class to tel appropriate consider	l					С	Ċ	C
	13 Chick was realized						c		c c
	14 Charth way goy sumb						<u> </u>	C C	
	15 Call were evaluation to check for compares						THE	TBP	TBP
Switch	10 Assemble South to Calendar Speci						Ċ	C	c
Enterinal .	17 Spring Terrarul to Statemery Terrarul Pasadance						03	01	02
Lingenmentand	16 Rong Terrardian Physics Resistors						NF	INF	NF
1	19 Summery Terroral Streeport Stationes						NF	MEF	WF
	20 Gaps to Appen Restance						55	WF	17.7K
Switch	24 Series Opening Protocols						165	127	126
External	25 Surice Course Presses						60	62	64
Pressurged	20 Proof Test to Leakings						NOLEAK	NOLEAK	NOLEAK
	20 Provi feld to L denige 27 Report Sings 17 through 20 of 180 print.							C	C
		-					NF	81	NF .
	17 Annual Territoria Contactory Territoria (Springerson								
	10 States Testing to Players, Readingson							INF INF	NF
	10 Calmany Territori () Hagert webieren 20 Carro Hildegrit Territoren								
n i i							<u></u>		NP
Switch	28 Reserve alameters simpling						NP NP	<u> </u>	NP
	29 Clamas revises subscent Photograph						NP	<u> </u>	NP
	30 Human cap 31 Cummer resulted uning a Photograph						NP NP	<u>c</u>	
							NP		
Techniques	31 SEE EQUIPTIC DATA, COMPANY, NOTIONALS						ar	<u> </u>	<u>NP</u>

i

Brake Switch Testing Checklist

INF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN LAB

32 SEM EDK #THI sup. haupent, weeker same, we		NP 1	c	NP
33 Ministry spins analysis of contents		MP	NP	NP
Loss to extend of comester or every		NP	6	NP

			3	6	···· 7	8		10	
		PX165512	PY610364	NY724866	PY750172	NY7351191	PY758158	PX151140	NY/5/408
Field Info	1 Log Paint laite sain Straich Log ain	C	c –	C	C	C	С	C	с
	2 Protograph Switch	С	C	C	C	<u>с</u>	C	С	С
	3 Rectard any surgery of estimated second advantations	C	C	С	¢	G	С	c	C
	Clast is Counts unjufferd	C	C	NA :	C	NA	c	NA	- c
	K	C.	NA	NA	NA	NA	С	NA NA	
Seitch +	5 min (g.) Age was 2014406) Readows	NP	0.2	NA	NÊ	NA	2	04	NP
Carmector	Entry 1 p.G.R. to Figure 1 Revenues		NF	NA	NF	NA	6 OM	PF	NIP
Apparenticy	7 Non 2019 Milling in Harport Residence	HP -	NF	NA	**	NA	8 1M	NF	NP
	E Equinite Harmins from Smith	3	Ċ	NA	C .	NA	С		c
Cornector	O Verily Connection Seal	С [—] С	C C	NA	C	NA	c	c	c
Only	10 years of Cally in stress 2007-Michig addresses	98°		NA	INF	NA	NF	NF	NIP
-									
	12 Cases to bit approach discussion	C	с —	NA.	С	NA.	3	£	C
	13 Classic una ancience	C C	C C	NA	C	NA	ā	C	
	14Cant on pay ants	¢	c	NA	C	NA	C	- č	<u> </u>
	15 Cet use equilator to shack for suscess	TBP	TBP	NA	TBP	MA.	TBP	TBP	TBP
Santah	10 American Series to California Stand	- <u> </u>	c	NH.	c	NA	C	C	C C
Esternal	17 Sunny Tananad to Statementy Terranal Resolution	0,1	02	NA	0.3	NA	15	04	01
Unpression	1.3 Surray Tenneral to Amport Remainsco	HF	NF	NA	. MF	NA	6.314	INF	NF
	19 Support Terminal in Harport spectrum	MF	NF	NA	NF	NA	64M	NF	H
	20 time in stargest filmenia-re	<u>H</u> F	160K	NA	463K	NA.	04	68	UNF
Switch	24 Suida Dynavy Promos	133	151	NA	136	NA.	164	138	135
Edanti	25 Switch Chang Pressue	(ð _	. k z_	NA	<u>. 66</u>	NA	66	108	74
Pressurence	25 Paul Test to Lastage	NOLEAK	NOLEAK	NA NA	NOLEAK	N	NOLEAK	NOLEAK	ND LEAK
	27 Report Step. 17 Arrigh 20 at 180 pag	C	С	NA	C	NA	C	C C	C
· · ·	17 Space Residence Colleges Version Residence	NF	NF	ž	INF .	N	01	INF	
	10 Junio Paratest in the gent Theorem	nf	INF	NA I	INF	NA I	-9XX	JNF	NF.
	10 Defining Territud is stargert mildaren	INF	INF	NA	INF	NÄ	-970K	ÍNF	INF
	20 mars in Harpert Flankstoner	N F	INF	NA	INF	NA	INF .	ÍNF	INF
Smith	20 Names damage care say	NP	NP	NP	NP	NP	С	NP	NP
	295 server enabled services PixAges	NP	NP	NP	NP	NP		NP	NP
	30 Henrow cup	NP 1	NP	NP	NP	NP	с	NP	NP

C = COMPLETE

NA - NOT APPLICABLE TBP = TO BE PERFORMED

Brake Switch Testing Checklist

NF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS = NOT RECTLAT CEN LAB

Techniques 31 State Elst & Int same contacts, impanyle	₩P		NP	140	мо	<u> </u>		
32 SEM EDI FIR op Suppl. water sain re-	NP	NP	NP NP	<u></u>		<u> </u>		······
33 Ministry system and part of contacts	NP		NP	100	··			
Loth for evaluation of concession or strong	NP	NP NP	NP				······	

		12	13		T				
		PY742858	PY7433413	NY734410	Pyeoseze		· · ·	·	-
Field into	1 Log Faile Into anto Statisti Log ato	G	5	TBP	TBP		-		+
	2 Prettyper Subst	c		1 9 P	1782		í	-{	
	3 Carrie Sty - artest into all anarchise		C	C	c		∔ ──`-		
	Chath in County available	C		NA	NA				
	Diraty d d'appropriette	C	NA	NA	NA.				
Swiich +	S Mar 12 Mars Was ACOMING Residence	0.3	03	N4A	NA .				+
Connector	Colline 10 GR in Propert Resolution	26.25	WF .	MA	NA -			-	
Age and a second se	7 Mar 200 Million Harper Researce	21 54	₩ F	NA	MA				
	Capitale Hannes from States	<u>с</u> –	5	NA	NA.				
Connector	S Verily Connerge Seri	C	C .	NA	NM ····		· · · ·		
Owly	YOMM 18.649 to Was 2(08/HGE) maximum	₩F.	HF	NA	NA		┫━━━┅┉━	-	
-									
	12 Canada San Andreagong and an annual ar	С	Ć	NA	NA.				
	13 Charles were reasoned		C	NA	NA		┫	+	-
	14 Chest sur pay such	с	c	NA	NA	<u> </u>	I	+	
	16 Car was an interest in contacts	TBP	ТВР — -	MA	NA		· · ·	·	
Smith	10 Annually Sugar in Catholica Sheet	<u> </u>	C C	C	C		1		
Eulernal	17 Sports Terranda to Statuceary Terrandi Reprinters	02	02	>70MK	-130K		1		
Ungreenwiged	\$8 Gaung Teamorel in Human Association	344	** F	-25 K	>17K				
•	19 Statemy Terrand & Page 1, statemete	304	INF	>350K	>120K				1
	20 face in Happy Lincolumn	R4	754	ane.	INF			┫ → −	
Bullch.	24 Custo Darrag Presson	148	150	152	NO SOLIND				
E de mais	Zithets Carry Perrow	61	70	92	NO SOUND			_	
Presentized	26 Paul Taxier (Josége	NOLEAK	NOLEAK	NOLEAK	NOLEAK				
	27 Report Stage 17 Seitungs 21 al. 188 ping	C	C	C	C				
	TT tarta Tantiata danan Tanin Reitang	0.1	∎NF	>1.0M	170K				
	10 Redie Territes to History Residence	WF	en F	×600K	>140K			1	
	19 Calancer Personal in Propriet synthemet.	NF	NF	>4DQM	>#5K				
	20 Same - Harpert Reddieres	NF	INF	WF .	(NF				
Seitch .	28 Remark Surface Company	SCILAB	NP	TBP	TBP				
	29 Carman revealed seffects Phatograph	SC) LAB	NP	TBP	TBP				
	30	BCI LAB	NP	TBP	TBP				

Brake Switch Testing Checklist

JWF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN LAB

L	37 Earner revealed satisfies Photograph	SCILAB	NP	TËP	T6P -			
Techniques	31 and 204 47m lane, cantacta, increasia	SCILAB	NP	TBP	TBP			
	32 SEM SING ATER Cap. Magani, webbin analo, etc.	SCILAB	NP .	TBP	TBP			
	33 Manufagengelar menigers of comparis	SCI LAB	NP '	TBP	TBP		· · _	
	Last in resident of survey	SCILAB	NP	TBP	TEP		· ·	

		_		 		_		
								r
				ł			i	
Field info	1 Lug Patricia and Berlink Log als	<u> </u>		 r	····		<u> </u>	
	2 Protograph Sealth	1		 <u> </u>				f
	3 Decent may created provided established by						 	
	4 Cleate for Connector angugament	1	1				╏──────────	
	Stamp of a spectra super-							
Sealch +	Salve 11.GR00 Way 200440E) Amajimay						ł ——	
Convector	Coline 1(I.G.R) is Harper Research		[
Assessibly	7 Mer 2084902 is Hagat Readown							- —
	Constant Harrist fant Swath						<u> </u>	
Cannador	B Marily Committy Spat							
Cinty	10 www.section.com							
	12 Costs of said in the opposite of a constant							
	13 Check way multiple		.				<u> </u>	
	14 Check www.goy.emin				[.		1	
	15 Cut was meeting to check for some							
Swiich	16 Automato Swach to Calamatin Stant			(
Externel	17 Spray Terrent in Singury Terrent Bernene							
Unpressuited	18 Sarray Termania to Harport Republication							
	18 Sintenary Terminal in Haugert montance			 				
	20 Serve to Harport Resolution							
Switch	24 Suidsh Ogaanny Presson							
Enternal	25 South Chang Pressor			-				
Pressure	26 Prod Test in Lankage							
	27 Response Statute 17 Brancips 20 at 1980 parag							
	17 Spring Terrelative Stationary Translate Stretterers				_			
	10 Long Territori to Harport Mexisterie		i					
l	10 Theorem & Property and Street			 1				
	20 and a require second second							
Switch	25 Remove ductions in clinics and			 				
5	29 Economic tractation and according to the logicity of the	L				L	<u>.</u>	
-								

TI-NHTSA 016797

Brake Switch Testing Checklist

INF = INFINITY (OPEN) NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN LAB

1						
	30 Norman aug				· · · ·	
	31 Extension extented surfaces. Protograph			 ·	 	
Techniques	31 SEM CON F WE beau, contacts, taiseants			 	 	
_	32 Charles Filling, heppet, whith make, str	 · ·	·	 • • • • •	 ·	
	33 Maintegratus maigas el mainte.			 	 	· · · · · · · · · · · · · · · · · · ·
1	Louis for evidence of constance or arcsing				 	

C = COMPLETE NA = NOT APPLICABLE			Brake Switch	INF = INFINITY (OPEN)" NP = NOT PERFORMED					
	TO BE PERFORMED	FINE	(Valion)	Freed	how when	POLICE		NOT RECTO AT C	EN LAB.
		Memphis	n –	В	C	· · ·	. E	F	. 1
		PY622977	PY565224	NY745119	NY703705	VX145373	NX758774	NY760055	NX76285
Field Info	1 Log Field into Series Loguis	C C	3	<u> </u>	C	- C	<u>с</u> .	C	G
	2 Tholograph D-inth	<u>c</u>	¢	C	C	C	<u>с</u>	C	NP
	3 Second any control strategy likely dealers	c	C	C	C C	G	С	C	G
	4 Directs for Conversion accomposant		NA -	NA	NA	NA.	NA "	NA,	<u>NA</u>
	C-ay 7.4 appropriate		NA	NA	NA	NA	NA	NA	<u>NA</u>
witch +	Guile 1(LCR): Wes 2(2000)	NA	NA	<u>NA</u>	NA.	NA.	NA	- HA	NA.
onnector	Grine 10.007 to Playor Residence	NA	NA	NA	NA	NA	NAA	ž	NA NA
asombly	7 Mars S(ORMICE) to Harport Redenator	NA NA	NĂ	NA	NA	NA	NA	HA.	NA
	6 Separate Harrison Solicit	c	NA	NA	_ C	NA	ž	÷	NA
onnector	9 Vestig Connector Beat	C C	NA	NA.	сС	**	NA	NA	NA
aly :	10 Min 10.647) in Min 2(00.002) mathema	NA	NA	NA	NA	ž	NA	NA NA	NA
i									
;	12 Cruck for hit supposed of connected	NA	NA	NA.	NA.	NA.	NA	NA	NA
	13 Check nile insulation	C	NA	NA	54A	M	NA	NA	ž
	14 Crost also propried	c	NA	Ň	NA	NA.	NA	N	N6A
	15 Cat who installence check for concern	C C	NA	ź	÷.	NA	NA	NA I	NA
	16 Annual State of the Control of State	- MA	NA.	NA	۲.	ź	NA.	NA	C
odie mail	17 States Transient to Stationary Transient Residence	NA	NA	NA	NA	C	C	Ċ	0.3
inpriside sizesi	18 Autor Translant to Harpert Resistance	NA.	<u>NA</u> 1	NA.		Ç	C	C	NF
	19 Stationery Terratival to Mingort sociationce	NA	NA	NA .	MA	C	¢	C ·	NF
	20 Base to Harpert Periodican	NA	NA	NA	NA.	N	NA	NA	3.34
witch	24 Detet Carrier France	NA I	NÅ.	NA	NA	NA	NA	NA.	122
biamai	25 Buich Cherry Provide	NA.	NA.	NA	NA	NA	NA	NA NA	69
Restanced	25 Proof Test for Lastings	NA	NA .	NA	NA	NA	NA	NA	NOLEAK
	27 Payment Stage 17 Britagh 20 at 100 pag	NA	NA	NA	NA	NA	NA	NA	C
	17 Tentes Tenteste University Tentest Protocol	NA	NA.	NA	NA	NA	NA	NA.	NF
	18 Syday Tundisi sa tingan Bindasas	NA	NA.	NĂ	NA	NA	ŃÁ	NA.	. MF
	19 Delivery Tested is Report metrics	NA.	NA	NA	NA	NA	NA	NA	MF
	20 maie to Hangert Persistence	NA	NA	NA	NA	NA	NA	NA	NF
witch	28 Parate stands of a log	C	Ċ	NP.	C	С	C	C	NP
	20 Examine revealed surfaces. Periograph	Ċ	C	NP	c	· C	—— č	C	NP
	30	C	C	NP	Č Č	<u> </u>			NP
	31 Exercise revealed purpose. Photograph	C		NP	C	Č I	Ċ	<u> </u>	NP
Techniques	31 SEARCH FTR INC. CONT. Invite		C	MP	Ç	C	G	C I	₩ ⁰
	32 agent film of Till cap, temperi, wanter main, etc.	C	C D	Ċ	G	c	¢	ċ	NP
	33 aloualtographic analysis of contacts.		NA.	NP	c i	č	č -		NP
	Lock for existing of contains or arting	, c	NA	NP .	C	č	č	<u> </u>	NP
chilist		CXM AR	Cu cana		Connorm	RYLANS \	NOTONE OF NOTE		\$n599

.

TI-NHTSA 016799

ĸ

INF = INFINITY (OPEN) * NP = NOT PERFORMED NRCLS = NOT RECTO AT CEN. LAB, -

.

		3	4		L U		8	E E	10
		PY724043	PY628170	PY632329	PY729611	NX728439	PX160223	PX637766	PY669375
Field Info	فتبونا فقنة نفاقة وبا	C		Ċ	C	C	c	C	C
	2 Paragagit Solah	NP	NP	NP NP	NP	NP	NP	MP.	NP
	3 Present my council astrony stand characteries	Ç	C	, C	C	C	C	C C	С
	4 Check for Consolid engagement.	NA.	· NA	NA	NA.	NA.	NA	NA	NA
-	Kang Bill appropriate	NA.	NA	NA	NA.	NA NA	NA	NA	NA
Saidtch +	S Mins (1.667) in View 2007/VIEW) Residence	NA.	NA	Ň	NA	NA.	NA	NA	NA
Connector	Garden 1(2,047) to Hangard Residence	NA.	NA	NA	NA.	NA NA	NA	NA	NA
Assembly	7 Mins 2(2014) (Cliff) to Haspert Resistance	NA.	NA	NA.	NA	NA.	NA	NA	NA
	S disparate Harrow from Solicia	NA.	NA	NA	NA.		NA.	- NA	NA
Connector	9 and 10	NA.	NA	NA.	NA	NA	NA	NA	NĂ
Only	10 10 - 10 - 10 - 10 - 10 - 20 - 10 - 10	NA.	NA	NA	NA	NA	NA	NA	NA
-								121	
	12 Class in Lil opposit d'annur	344	MA	NA.	NA	NA	NA.	NA	NA
	13 Classic sales Installers	NA	**	NA	NA	NA	NA.		NA
	ماده بدو دان خطا	NA	NA	NA	NA	NA	NA	NA	NA
	15 Cut who providen to shark for concerns	NA I	NA.	NA NA	NA	NA	NA.	NA	NA
Seilich	15 America Subata Criteria Start	C	Ċ	NA	NA I	C	C T	c	C
Existent	17 Spring Territori in Stationary Terrinal Residence	02	60	NA	NA	0.2	0.2	42	22
Unpresention	16 Carlog Tember in Kingen Resister	NF	INF.	NA.	NA		NF	NF	INF
	19 Ministrary Terminal to Ampost maintance	N		NA	NA	INF .		INF	
	20 Annu in Harpert Residence	11.4	1.90	NA	NA	7.54	16.5	7.64	1.494
Switch	24 Puter Opening Presson	134	165	NA.	NA	147	122	140)	137
External	25 Sold Ching Proton	59		NA	NA	70	68	112	65
Preserved	28 Provi Teel for Lookage	NOLEAK	NOLEAK	NA	NA	NO LEAK	NOLEAK	NOLEAK	NO LEAK
	Z/Permit Sings 17 Braugh 28 at 180 page	<u> </u>	C	NA	NA	C	<u> </u>	C	<u> </u>
	17 States Topolari in Malayay Randol Resident	NF	NF	NA	NA	NF	NF	HF	NF
	18 Partie Turninet & Charget Restauret	NF		NA	NA		INF		NF
	19 Contrary Touristics Historics and States	NE	WWF	NA	NA	INF	WF	INF	NF
	20 Inte to Harpert Bunkharp version and San a	THE	INF	NA	NA	Ň	INF	INF	
Switch	28 Provent and a start ing	NP	64P	C	c	NP	NP	NP	NP
	29 Employ revealed european Phetograph	NP	NP	č	č	NP	NP	NP	
	30 hours ap	NP	MP	C C		NP	NP	NP NP	NP
		NP		Č,	⊢-č		NP	NP	
	31 Exercise annual a stains. Planarach					· · · · · · · · · · · · · · · · · · ·			
Tarbuireas	31 Exercise months arising Paringsph 31 With FDX FTR have compute leastings		NP	94	NP NP	NP		30	NP
Techniques	31 SEL4-EDX // TR. bern, consults, Laminale	NP	NP	NP ND	NP 19	NP		NP NO	
Tachriques			NP NP NP	NP NP NP	NP NP NP	NP NP	2 2 2 2 2	NP NP NP	NP NP NP

TI-NHTSA 016800

•*

\$

chidia), da

٠

•

3/15/99

•

.

Brake Switch Testing Checklist

· ,

.

INF = INFINITY (DPER) NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN. LAB,

-

		11	12	13 (14	15	16		19
		PY726068	PX885270	NY/40208	PX623672	PY695374	10 BY659684	1/ PY660225	18 PY688795
Figid Into	1 Log Field Into into Salah Asagana	С	C	C	C	C	c	C	c
	2 Training man Deligh	NP NP	1.12.2.1	THE P				A REAL PROPERTY	
	3 Record may annual second visual desarrowing	- c		· ··· ·			· · · · · · · · · · · · · · · · · · ·		
	4 Charle for Converter sugargarment	NA				· · · · ·		H	.:
	A ray I F appropriate	NA	i i		÷ .				
Switch +	Same In State View State State	NA		• • • • • • • • • • • • • • • • • • • •	;	· · · ·- · ·			· · · · ·
Connector	Contra 18.070 In Hargon Residence	NA	÷.						
Assembly	7 The 2004-465 to Harport Revisions	NA	ŀ						
-	Billionen an Caston	NA		• • • • • • • • •	· · · · · · · · ·				
Connector	B Martly Committee dans	NA	• • •		:				
Only	10 www. III.Gife in Win 20ReMOE) and success	NA							
	12 Canada for the suggestion of surveying	NA		,					
	13 Charle wire includes	- NA	·						
•	14 Crant, when going make								
	15 Cu with invaluation to charact for something	NA NA	÷				: . <u>.</u> '	; <u> </u>	
Selich	16 terestie Betch to Calibratics Stand	· · · ·	7 .	:	;····		;,		
External	17 Opening Territori in Ondersony Territori Angleigene	0.2	:						
Uesveesurizadi			-						
	18 Testing Testing to Human Residence 19 Statemy Testing to Human automate								
			:						
	20 Sam to Hargest Passings	N							
	-								
Switch	24 Suitch Opening Pressure	139	,		· -	· ·· · ·		.	
External	25 Autor Canada Presson	71							
Pressulted	28 Fred Tem to Lawing	NOLEAK	t.					:	
	27 Report State 17 Britigh 20 at 193 paig	C							
	17 total a faith a print of the state of the state of the	- NF							
	18 mater Timit al in Herpitt Randantin (1965)	NF	:						
	10 Cantal aff Training affin fait and affin anti-	NF							
	20 mai te May alt Austalia and Sala Balling Station				:				
Selich	28 haven stations alop ing	NP		. ,					
	28 Canadar annual dealarth Protograph				:				
	30 Partice tup								
	31 geneties envelopies finingraph								
T b - b					:				
Techniques.	31 STA State of the land, cardinals, have been	NP							
	52 ann 2011 (TSR cup), risipial, united annia, ala	NP							
	33 manage ages and a manage								
	Look for writings of onrosion or unting	NP				i			

chidist.xis

Page 3

3/15/98

.

.:
C = COMPLETE NA = NOT APPLICABLE TBP = TO BE PERFORMED

.

Brake Switch Testing Checklist

۰.

INF = INFINITY (OPEN)-NP = NOT PERFORMED NRCLS = NOT REC'D AT CEN, LAB.

	19	20	21	22 -	1 23	1 1	2	3
	PY774266	PY754575		77	PX629534	PY638990	PX163920	RX641585
1 Log Part into the Delph Log de	1	Lines -	COMPLETE:			C	C	C
2 Tholograph Barban						C	č	c
Second any constant subgraph sizes a subgraphic sec	3				• •	c	c	c
4 Charle for Corrector equipment	ĺ					c	c	c
Xeig & d'appropriate		·• ·				NA	Ċ	ŃA
Spring 12. Cittate West 2(CAMICH) Residence						0.3	6.4	62
Contra 10.000 to Harpert Residence						INF	INF	INF
7 Miles 2007 Weld 203 in Human Resistance		·· ·				NF	jif	NF
Ölymete Harmen ben Balte					·	C	С	С
9 Mady Consents Band					• • • •	Ĉ	С	C
10 New 10.071 to 14th S(CR/WHR) reduces						NF	_	D
12 Check for fall acquipement of careacher	-					C	C	C
13 Crack win tradition						C		Č
14 Check wine gray same						C		č
15 Car and a substance of adjusts for committing						TBP	TBP	199
10 Augusta Suich & Calendas South						C	6	C
17 Opening Transfered to Stationary Transfered Flavouring to						_		0.2
18 Spalling Themical in Figure Residence	-							NF
19 Clarity Transit in Happen resistance								NF
20 Nove to Harport Productor						6.5	N	17.7K
24 Prints Opening Frances						158	127	126
25 Settin Casing Pressure						68	62	64
20 Passet Text for Leadings						NOLEAK	NOLEAK	NOLEAK
27 Papert Sape 17 Strage 20 at 160 pag						Ç	C	C
······································	7					NF	0.1	NF
18 Sertig Laffina for Wingere Berlineten & Witte auf						ŇF		NF
The second state of the se						inf		
						ŇF	NF	N
			·			MP	C	NP
								NP
								NP
31 Carnine revealed surfaces. Photograph						NP	C	
						NP	_	NP
31 STATES STOR AND COMPANY AND COMPANY								
31 SPA Elix FTR tank, comerce, actives								
31 STA-ICC ATCR have, consider, someone 22 State East ATCR may, have and someone, and 33 State Sugartities analysis of consists.					an an sairtean An an sairtean		- <u></u>	
	Protograph Bolen Protograph Protograph Bolen Protograph Protograph Bolen Protograph Protograph Bolen P	1 Log Part Hele bete tree Darket Log. 40 2 Profograph Barkan 3 Raccord any Long-and migrand intrust singupations 4 Charts for Connector engingement 5 Rive SE CORRECT Engineering 5 Rive SE CORRECT Engineering 6 Protograph Barkan 7 Neto 2007044285 (or Height Engineering 8 Organization Height Engineering 9 Analy Connector Burd 14 Cranck with streambles 15 Cate adm installant to directo the connector 16 Cate adm installant to directo the connector 17 Opinity Transition In Margant Realizance 18 Cate adm in Margant Realizance 19 Cate adm in Margant Realizance 20 Protocol Real 17 Groups 20 at 1900 poly 21 Real 20 Freezering Pr	PY174255 PY174255 1 Log Pinet into internet internet. 2 Protograph Boltza 3 Patter internet internet internet internet internet internet internet. 3 Patter internet internet internet internet. 4 Charle for Connector regulgement. 5 Protograph Boltza 6 Protograph Internet internet internet. 7 Nice if Connector regulgement. 8 Opporte internet internet internet. 8 Opporte internet internet internet. 9 Maing Connector internet internet. 9 Maing Connector internet. 9 Maine Statistics in Connector 10 Maine Statistics in Connector 11 Connector internet. 12 Connector internet. 13 Connector internet. 14 Connector internet. 15 Connector internet. 16 Sparty Trendent in Mainternet. 17 Approx internet. 18 Mainer Connelog Promoter.	PY/74266 PY/54575 PX643515 1 Log Platf Moto Hole Dample Log A 2014 2014 2 Px65rd my Long A 2014 2014 3 Px65rd my Long A 2014 2014 4 Chantin Company Dample Ling A 2014 2014 5 Alley SLOPES A 2014 2014 6 Chantin Company Dimeter 2014 2014 7 Mark Company Dimeter 2014 2014 8 Alley SLOPES A 2014 2014 9 Mark Company Dimeter 2014 2014 9 Mark Company Dimeter 2014 2014 9 Mark Company Dimeter 2014 2014 10 Company Dimeter 2014 2014 11 Company Dimeter 2014 2014 12 Company Dimeter 2014 2014 13 Company Dimeter 2014 2014 14 Company Dimeter 2014 2014 15 Contained in Hangeat Readmanse 201 2014 16 Radrey Transfer Excellence 201 2014 15 Contained Status Contained Conta	PY1774266 PY174266 Pitting and the state bands Log.40 Pitting and the state bands Log.40 Pitting and bands Pitting and bands Pitting and bands Pitting and bands Pitting and ban	PY174265 PY1758575 PX8513515 P7 Statistic sequences induced internet int	PY774256 PY754575 PX543515 77 PX525834 PY5538980 C Project to the built to out of the second	""PY/742265 PY/54575 PX6245515 ??? PX6245514 PY6536900 PX625934 PY6536900 PX625934 PX625934

chiklist sta

Page 4

.

.

NF = INFINITY (OPEN)-NP = NOT PERFORMED ARICLS = NOT RECTO AT CEN, LAB.

		4	5	5	7	8	9	10	71
		PX163312	PY610384	NY724366	PY750172	NY733191	PY758158	PX151140	NY757408
Field info	1 Log Field into this Belick Logate	C	¢	С	Ċ	C	С	с	c
	2 Paragraph Salah	C	С	C	с	C C	Ċ	c –	- c
	3 Count my server administrative absorvations	C	C	C	C	Č	C	c	- č -
	4 Check for Convenien any particular	¢	- c	NA	C	NA	č	NA	C C
	Skray F 4 appropriate	3	NA	NA	NA	NA	C C	NA	NA
Switch +	5 Miles 10 Cillips Wess 200 AMORT Revisionen	NP	02	NA	HNF	NA	2	0.4	NP
Connector	Of Many 10,0070 in Harport Statistics	NP I	NF	NA	INF	NA	6.0N	INF	MP
Assembly	7 The SCHOOL IN COMPANY STATES	MP	INF	NA	INF	NA	6.1N	INF	NP
	Capacitie Harrison State Buildt	с	C	NA	С	NA	С	С	Ċ
Connector	Starty Committy Red	С	C	NA	С	NA I	с	c	Ċ
Ciniy	10 miles 10,000 in why 2008/HOE) wateres	NP		NA	INF	NA	UNIF		HP
-									
	12 Canabian ter tell any passes of an entry	c	C	NA	C	NA	C	c –	C
	13 Chart are tradition	C	Ċ	NA	Ċ	NA	č	č	<u> </u>
	14 Cault. ulti g'iy anni	c	Ċ	MA	C	NA.	c	c -	č
	16 Cut when transmission to check for contradien	TBP	TEP	KA	TBP	NA	TBP	TBAP	TEP
Switch	16 Country Sales in Californian Barri	C	C	NA	С	NA	C	c	c
Edemal	17 Series Territorius Territory Territori Resistance	01	0.2	NA	0.3	NA	1.5	0.4	<u>9,1</u>
Unprimiting	16 Bortra Terretari to Haspert Registerate	HF	NF	NA	HF	NA	0.34	NF	
	19 Bankersey Texasteries to Hampert and desce	INF	NF	NA	N F	NA	6.44	NF	N
	20 Inco to Manual Pandalance	NF	160K	NA	463K	NA	0.4	6.0	NF
Seitch.	24 Switch Controp Provide	133	161	NA	136	NA	164	136	135
External	25 Califor Cassing Pressor	63		NA.	66	NA	65	108	74
Pressultand	25 Proof Team for Landauge	NOLEAK	NOLEAK	NA .	NOLEAK	NA NA		NO LEAK	NOLEAK
	27 Report State 17 trough 20 at 140 page	С	c	NA.	C	NA	C	C	<u> </u>
	17 State Theidid of Statemer Terrature Residentity	INF	HF	NA		NA	0,1	NF	NF.
	1 Construction of the later of the second	NF	NF	NA	INF	NA	-970K	NF	NF
		HF		NA	INF	NA	-8706		
	20 Balan in Barthalt (Balante (S.) 184-1 - 186-18		NF	NA .		NA	INF	NF 1	
Switch	28 Preserve character story rig	NP	NP	NP	NP	NE	C	NP	NP
	29 Cuestine (symile) auflices. Prologanth	NP	ŇP	NP	NP	NP	C C	NP	NP
	30 faster ap	NP	NP.		NP	NP	C 1		
	31 Canada reastal patron. Partagony's	NP	NP	NP	NP		č		MP
Techniques	31 mill EDX FTR base, controls, territole	NP	NP		NP	NP NP	- č		MP
						NP NP	c	NP	NP
	SPECIAL POX FIRE and I shall be set of the								
	32 SEM EXX (FBR. up), Tanpini, within statis, Mr. 33 Statempopular surgers of emission		NP	MP MP	NP NP	NP	- NP		NP NP

'C = COMPLETE NA = NOT APPLICABLE TBP = TO BE PERFORMED

٠

:

.

		12	13	14111 1	28512 2	1		.	2
		PY/42868	PY7433413	NY734410	PY605626				{
Field Info	1 Log Field and Log Subsh Log and	C	- c	TBP	TBP		L		1
	2 Protograph Salach	C	Ċ	THE	TBP				
	. S Firead any unauti mismai visual charvelican	Ċ	Ċ		<u> </u>				
	Class for Conversion supported	C	Č	<u> </u>	t <u> </u>				
	Fray C Lappropriate	C	NA	NA.	NA				· ·
Seriati +	Diales 10.670 to 2020402 Reduces	0.3	0.9	NA	NA				
Convector	Calles 10.003 to Hayar Residence	20.264	INF	NA	NA				!
Assembly	7 Mar 2(04MAGE) to Harpert Paraleteres	21.54	LNF.	NA			·	1	1
	Classic Hanna ins Julia	ç	- c	NA.	NA				
Connector	Signally Converter Beat	C	Ć	NA	1 11			f	
Only	10 mm 10.040 m 10.040 (00.0400)	MF		NA	NA NA				
-									
	12 Constant for the angularment of Augustator	C	C	NA.	NA.				
	13 Check who insulation	C	č	NA			1	t	
	14 Carpo alto garg anda	С	c	NA	NA				
	15 Cal wire involution to stands for committee	196	TBP	NA NA	NA NA				
Swiich	16 Annual Substantin Callmann Signe	C	C	C	C C				
Extense	17 Spring Transient in Matterney Terrained Stationers	02	0.2	>700K	>135K				
Unpressurized	10 April Treatment to Hamport Provintionan	344	INF	>250K	>17K				· · · · · · · · · · · · · · · · · · ·
-	19 Sections, Territori & Margan, and Ameri	39M	WF	>35000	>120K				
	20 mar is Happert Hantalarma	63.4K	7. SN	' NF	HF				
Switch	24 Suba Quarte Press	148	150	162	NO SOUND				
External	25 Buildin Cloning Pressure	61	70	92	NO SOUND				
President	25 Part Test in Lashage	NOLEAK	NO LEAK	NOLEAK	NOLEAK				
	27 Report Maps 17 Straigh 20 at 180 pain	C	C	C	<u> </u>				
	- 17 Series The State of Federal Systems in State of State States	0.1	INF	>1.0M	170K				
	- 10 more than the second s	INF		>600K	>140K				
	19 auf auf Charles Statistics (Statistics of Statistics	INF	NF	>4006	>15K				
	20 Chair is Manual Manual Antonia	INF	NF	WF	NF				_
Swech	29 Paratoria alarah yang dag	SCI LAS	NP	TBP	TEP				
	20 Committee restanting purpletion. Proceedings	SCILAB	NP	TBP	TBP				
	SOPerative op	SCILAB	NP	TBP	TBP	·		·	-
	31 Section revealed sufficient Photograph	BCILAB	NP	TEP	TBP				
Techniques	31 HER-EDK FTR Base, commen, investmin	SCILAB	NP	TBP	TBP				
-	32 Mill SDK # THR cap, import, waster meth, sto.	SCILAB	NP	TBP	TBP				
	33 administrative analysis of services.	SCILAB	NP	TBP	TBP		· · · · · · · · · · · · · · · · · · ·		· ···
	Last in addition of constitution or under	SCILAB	NP	TBP	TBP	·			

childing to the

3/15/99

·C = COMPLETE NA = NOT APPLICABLE TBP = TO BE PERFORMED

.

÷

٠

.

TI-NHTSA 016805

Brake Switch Testing Checklist

WF = INFANTY (OPEN) + NP - NOT PERFORMED NRCLS = NOT RECT) AT CEN. LAB. .

. •

Operation Operation <t< th=""><th>Subth Subth <td< th=""><th></th><th></th><th></th><th></th><th>T</th><th></th><th></th><th></th><th></th><th></th></td<></th></t<>	Subth Subth <td< th=""><th></th><th></th><th></th><th></th><th>T</th><th></th><th></th><th></th><th></th><th></th></td<>					T					
Shadge have been and advance	Shifting										
Shadge have provide deprint of an another provide and another provide deprint of an another provide deprovement provide deprint of an another provide deprint of an anoth	2 Transport Abord				_				· · ·	+ ·	
Image in the image in	2 Program invest Image	Field Info	1 Long Finite Into Price Statistic Long and	i			+		· · · ·		
Second system Second s	3) Photo or yourset server of the addression				<u> </u>	<u> </u>	+				
4 Deck of Constant Arrangement 1 <th< td=""><th>4 0</th><th></th><td></td><td></td><td><u> </u></td><td><u> </u></td><td><u> </u></td><td></td><td>.</td><td></td><td></td></th<>	4 0				<u> </u>	<u> </u>	<u> </u>		 .		
Start of Engregation Image: Start of Engregation <thimage: engregation<="" of="" start="" th=""> Image:</thimage:>	Solido + Solido										
Switch · S the SLATENE STRUCTURE Industrial	Studich + Studich + <t< th=""><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>+</td><td></td></t<>									+	
Optimizer Set State Stat	Consoctor Consoctor <thconsoctor< th=""> <thconsoctor< th=""> <thc< th=""><th></th><td>Note of Companying</td><td></td><td></td><td></td><td></td><td></td><td>····</td><td></td><td><u> </u></td></thc<></thconsoctor<></thconsoctor<>		Note of Companying						····		<u> </u>
Contractor de Mars Statute Integration and an anti- Assembly 77 Mars Statute Integration and an anti- Sector Mars Statute Integration and an anti- Contractor Integration and an anti- Contractor Integration and an anti- Data in the Statute Integration and and an anti- Statute Integration and anti- statute Integration anti- statute Integ	Connector Elements Image Spontantame Image Spon	Swäch +	Shine statute was accounted the bings						<u> </u>		
Addectivity 7 Muss SQCARADC is Import Musicana Image: Musicana	Assertidy 7 Max agr/Landon Image: Transmission I	Connector			· · · ·						
South 1 20 South 1 increase than 5 adam	Spectra terms trans trans have Image: Spectra terms trans tr				-						
Connector Descript Compactor Real Image: Connector of Connector o	Connector Distry Dynamic Product Red Image: Connector Red <thimage: connector="" red<="" th=""> Image: Connecto</thimage:>								_		
10 More 19 200 to Mar 20040900 relations 12 Data the syndhys 13 Train the syndhys 14 Dreit yreithy 15 Data the syndhys 16 Data the syndhys 17 Dreith yreithy 18 Data the machings to flatch for consults 19 Data the syndhys 10 Data the syndhys 11 Dreith yreithy 12 Data the machings to flatch for consults 13 Data the machings to flatch for consults 14 Dreith yreithy to flatch for consults 15 Data the machings to flatch for consults 16 Data the machings to flatch for consults 17 Dreith yreithy to flatch for consults 18 Data the machings to flatch for consults 19 Determing the flatch of the synthese to flatch for consults 10 Determing the flatch of the synthese to	Only 10 Prior 15 Add (at and is 1d cappyond) (contained) Image: contained (contained) <thi< th=""><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>·</td><td></td></thi<>									·	
10 More 19 200 to Mar 20040900 relations 12 Data the syndhys 13 Train the syndhys 14 Dreit yreithy 15 Data the syndhys 16 Data the syndhys 17 Dreith yreithy 18 Data the machings to flatch for consults 19 Data the syndhys 10 Data the syndhys 11 Dreith yreithy 12 Data the machings to flatch for consults 13 Data the machings to flatch for consults 14 Dreith yreithy to flatch for consults 15 Data the machings to flatch for consults 16 Data the machings to flatch for consults 17 Dreith yreithy to flatch for consults 18 Data the machings to flatch for consults 19 Determing the flatch of the synthese to flatch for consults 10 Determing the flatch of the synthese to	Only 10 Prior 15 Addy to the 200499(6) priminant A A 12 Data day by balls young of constance Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) priminant Image: Source day and prior to the 200499(6) prior to the	Connector	El Lindy Connector Beal				· · · · · · · · · · · · · · · · · · ·				·
12 Data information	12 Dath of an any growth of communic Image: communic of an any growth of any growth of communic Image: communic of an any growth of any growth o	Only									
13 Does we pression	12 Tweet was weaker 1 <th1< th=""> <th1< th=""> 1</th1<></th1<>										
13 Deck wire program Image: second s	12 Tweet was weaker 1 <th1< th=""> <th1< th=""> 1</th1<></th1<>		40								
14 Creds yills of your And	14 Desk priv provided. Image: Control of the Arc consults		12 Chiele And and for Sall any proved of exercises								
If B A data tables to should be carenders Image: Source of the Caren	15 Lut die immeliën to drach for consulen								_		
If B A data tables to should be carenders Image: Source of the Caren	15 Lut die immeliën to drach for consulen		14 Check who gray each.				<u> </u>				
Svilich 18 Autoride Sende in Callegion Hand	Switch 165 Jaaanada Sunda in Calenging Stand		15 Cut when transferrings to share for comparison				-				
Schemal 17 Opting Turning to Sublicity Truthed Restaurs	Editorial 17 Order Distance 10 Millions Thread Registers Image: Second Se	Curitoria									
Upproversized 18 Spring Translets is Happert Hamblesca	Uppresention 18. pring Teached is Mergert Heathers Image: Addition of the second seco							_		_	
19 Boltomy Ternital Is Hagart Anderson	19 Beletenery Kennine in Hagant Antikaryan		17 Oring Transient to Electrony Terratual Reputation		·			_			
20 Base to Hexport Residence Image: Second	20 Past a Hampert Baselance 20 Past a Hampert Ba	Depresentation									
20 Base to Hexanic Basistant Image: Second	20 Past a Hampert Baselance 20 Past a Hampert Ba		19 Outermany Terminal In Human Louisday and				t <u> </u>				<u> </u>
Solution 240 subtring Provide 2	Selection 248 Bable Opening Prepare 248 Bable Prepare 24		20 See to Hannet Bankings								
Edurabial 25 Dedich Citang Pressure Pressure 27 Report Suri for Loging 20 of TRU pig 27 Report State 1 of Decemponent of Relations 17 Report State 1 of Decemponent of Relations 18 State of the part relations for the part relations 20 Remon advectors relations for part of the p	Educated 20 Subst. Cooling Pressures 1 20 Subst. Cooling Pressures 1 20 Subst. Cooling Pressures 1 20 Subst. Cooling Pressure 1 20 S										
Edurabial 25 Dedich Citang Pressure Pressure 27 Report Suri for Loging 20 of TRU pig 27 Report State 1 of Decemponent of Relations 17 Report State 1 of Decemponent of Relations 18 State of the part relations for the part relations 20 Remon advectors relations for part of the p	Educated 20 Subst. Cooling Pressures 1 20 Subst. Cooling Pressures 1 20 Subst. Cooling Pressures 1 20 Subst. Cooling Pressure 1 20 S										
Edurabial 25 Dedich Citang Pressure Pressure 27 Report Suri for Loging 20 of TRU pig 27 Report State 1 of Decemponent of Relations 17 Report State 1 of Decemponent of Relations 14 Decemponent of Relations 15 Decemponent of Relations 16 Decemponent of Relations 17 Decemp	Echandal 20 Subt. Chang Panawa Pressured 20 Part Sam to Lookage 27 Repara State Lookage 28 Repara State Lookage 29 Remote Anteina state Lookage 29 Remote Anteina state Lookage 29 Remote Anteina state Lookage 20 Remote Anteina State										
Edurabial 25 Dedich Citang Pressure Pressure 27 Report Suri for Loging 20 of TRU pig 27 Report State 1 of Decemponent of Relations 17 Report State 1 of Decemponent of Relations 14 Decemponent of Relations 15 Decemponent of Relations 16 Decemponent of Relations 17 Decemp	Echandal 20 Subt. Chang Panawa Pressured 20 Part Sam to Lookage 27 Repara State Lookage 28 Repara State Lookage 29 Remote Anteina state Lookage 29 Remote Anteina state Lookage 29 Remote Anteina state Lookage 20 Remote Anteina State										
Eddardal 25 Batch Citating Paramete 27 Report State Leptage 27 Report State of Leptage 27 Report State of Paramete 27 Report State of Paramete 27 Report State of Parameter 27 Report State of Parameter 27 Report State of Parameter 27 Report Parameter 27 Report Parameter 27 Report Parameter 27 Report Parameter 27 Report Parameter 28 Remove addresses Parameter 29 Remove addresses Parameter 20 Remove addresses Parameter 29 Remove addresses Parameter 20 Remover 20 Remove addresses Parameter 20 Remove address	Extended 25 Patch Costing Person 4 Pression that Lookage 27 Report Start for Lookage 28 Part Start for Lookage 29 Report Start for Lookage 20 Report Start for Hanger (Residence) 20 Report Residence 20 Report 20 Report Residence 20 Report 20 Repor	Switch	24 Subih Caustry Press, or								
Pressurized 28 Fund Yam for (package) Image of the pack of	Pressurized 25 Sum Tank to Lindiago Image Status (17) funging) (2) of 180 pain Image Status (17) function (2) of 180 pain	External									
27 Repair Target 20 of TRD pig	27 Repare Rays (7 Amongh 2) of Witt pair					_					
17 Nortig Timpinal & Stations Touched Realization	17 Ruring Taminal in Statistics Theorem										_
14 Spring Yunched & Hispart Relating in	14 Byrty Tuning is Names Residence 14 Byrty Tuning is Residence 14 Byrt										
14 Spring Yunched & Hispart Relating in	14 Byrty Tuning is Names Residence 14 Byrty Tuning is Residence 14 Byrt		17 Series Transient in Stationary Treatment Resistance								
19 Intelescovy Taxinguit is Hosperi (relations) 10 10 10 10 10 20 Prim to Heapting (Relations) 10 10 10 10 10 20 Prim to Heapting (Relations) 10 10 10 10 10 20 Prim to Heapting (Relations) 10 10 10 10 10 20 Prim to Heapting (Relations) 10 10 10 10 10 20 Remote addresses Printigraph 10 10 10 10 10 30 Remote addresses Printigraph 10 10 10 10 10 31 Remote addresses Printigraph 10 10 10 10 10 31 Remote addresses Printigraph 10 10 10 10 10 32 Restrict (FTR) team, excited to the set is data 10 10 10 10	19 Set Standard, Table in Humper (Velocities 2010) 200 Feature of Humper (Velocities 2010) 200 Set Standard, Set Standard 200 Set Standard, Set Standard 200 Set Standard, Set Standard 200 Set Standard, Set Standard, Set Standard 200 Set Standard, Set Standard, Set Standard 200 Set Standard, Set Stand		18 Barten Turretent in Historiet Haulute im State		-						
20 Para to Yimple (Raddance 20 Para to Yimple (R	20 Permits Vingetin (Residence 20 Permits in the project 28 Permits in the project 29 Permits in the project 29 Permits in the project 29 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 30 Permits in the project 20 Permits in the project 31 Permits in the project 20 Permits in the project 32 Permits in the project 20 Permits in the project				•						
Series 28 Annow standsminuting stag 29 Scattists mentalist auticus: Protograph 30 Annow sup 31 Exercise mentalist customs 31 Exercise mentalist customs 32 Stable 201 FTRA tume, contexts, terainsh 32 Stable 201 FTRA tume, contexts, terainsh	28 for non-statistic service devices revealed earliers. Participants 29 for non-statistic service devices. Participants 30 for non-sup 31 for non-sup 31 for non-sup revealed earliers. Participants 32 for device revealed earliers. Participants 32 for device revealed earliers. Participants										
29 Exercise mentaled suffices: Production: 20 Exercise: Production: 20 Exercise mentale: <	29 Example revealed entropy of 1 30 Percent ap 31 Example revealed entropy of 1 31 Example revealed entropy of 1 32 Example revealed entropy of 1 32 Example revealed entropy of 1										
30 Remote app 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 311 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 321 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 322 Exercise of TRR cup, harport, maker dealer, data 11 Exercise of TRR cup, harport, maker dealer, data 11 Exercise of TRR cup, harport, maker dealer, data	30 Percent aup 31 Exercise myseled subtres. Plackagests 31 Exercise myseled subtres. Plackagests 32 B204 800x 67TeX cop, targets, interination	Switch							_	_ ·	
30 Remote app 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 311 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 321 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 11 Exercise myseled dealbare. Phalagoaph 322 Exercise of TRR cup, harport, maker dealer, data 11 Exercise of TRR cup, harport, maker dealer, data 11 Exercise of TRR cup, harport, maker dealer, data	30 Percent aup 31 Exercise myseled subtres. Plackagests 31 Exercise myseled subtres. Plackagests 32 B204 800x 67TeX cop, targets, interination	ſ	29 Evening Annalist automs, Protocom								
31 Exercise modeled dealbare. Planagagets Fechriques 31 State-Box #Finite team, analysis, terminatin 32 State-Box #Finite case, state team, state	31 Exercise mysteld dealstere. Planapapt Techniques 31 Statistication. Find papert. Interinde 32 B20480xx (FTR) cup, targent, interinde	t									
Techniques 31 State Act JFTR cap, target, targ	Techniques 31 state accut JFTR tases, excepts, tensinate 32 state 80x #TtR cap, tasport, under savie, etc.	1	31 Same and the state of the second								
	32 Bible 80xx (=Thirl cap, tangont, maker seein, etc.										
32 Bits 4() IR cup, tanpot, maker sain, siz	32 Bible R(cat (FTR) cap, targert, status and a dec	eclaniques	31 State Mark FTR Loose, and pits, braining								
			32 STARCE (TRI cup, targert, watter state, etc.							·	f
		1	35 Member white entering of contents						-		
	Last for existence of connection of article	ł									

Epstein, Selly

From: Sent: To: Subject:

ł

sreimers@ford.com Monday, March 15, 1999 8:29 AM Rahman, Aziz File SWITCHLO.XL8_PC



DRAWINGS AVAILABLE UPON REQUEST

Epstein, Sally

From:	Stave Reimers [sneimers@ford.com]
Sent:	Monday, March 15, 1999 B:3D AM
To:	Rahman, Aziz
Subject:	PC File(s) sent to you

I haven't updated this since 2/19/99.

Steve Reimers	building 5 3E008	
AVT Chassis B/E System Applications	mail drop 5011	
39-03286 SREIMERS sreimers@ford.com	fax 39-03286 ;>	

1

Epstein, Sally

۰.

From: Sent:	•	LaRouche, Stave (S.) [slarouch@ford.com] Monday, March 15, 1999 12:25 PM
To: Subject:		Rahmen, Aziz RE: Upplates

Aziz: I an sending you the updated testing checklist under a separate note. We have found three switches which appear to contain water correction only (no brake fluid and no evidence of a cell). Two have been analyzed by Contral Lab; one is being analyzed by ford Scientific Research Lab. We have also received two switches from the CASIS which appear to be leakers. We will open these in TI's presence per wishes of A. McGuirk.

Steve LaRouche (SLAROUCH) Metallurgy Section, Central Laboratory, Room N410 (313) 645-4876 (313) 322-1614 FAX

----Oziginal Massage----From: Rahman, Azig (mailto:arahman@email.mc.ti.com) Sent: Monday, March 15, 1999 8:50 AM To: 'Steve LaRouche' Subject: Updatam

From: Rahman, Asix Sent: Monday, March 15, 1999 \$:47 AM To: 'Steve Raimars'; 'Steve LaRouche' Subject: Updates

H1 Steve R and Steve L

I am limping back to normalcy here!

Could you please send me updates of the Switch Log (Steve R.) and the Analysis Results Log (Steve L.) files?

1

Thanks Aziz. 22

Currey, Pat

From:	McGuirk, Andy [a-mcguirk@email.mc.ti.com]
Sent:	Thursday, March 18, 1999 2:14 PM
To:	Beringhause, Steven; Dague, Bryan; Proia, Stephen
Ce:	Pechonis, John; Bartosh, Bob; Baumann, Russ; Rowland, Thomas
Subject:	FW: (U) Brainstorming

I would suggest a two 'bucket' approach.....

One bucket as to technical difficulty (consider: "A"....easy, known technology, can think of ways to do so, have relevant experience, little risk; "B"....moderate, have some pretty good ideas, little relevant experience, some risk, might need parallel paths, risky; and "C" tough, almost no idea as to how to accomplish, no experience, very risky,) and one bucket as to lead time to production level components (consider 2-4 months, 6-12 months, 12-24 months).

we should perform 'triage' by Friday afternoon and advise Fred of the a and c and 12-24 month items....and ponder the others for a more refined approach to deliver Monday.

ā

AUTOMOTIVE SENSORS AND CONTROLS ORA MANGER 34 Forest St N/S 23-05 AttleBorg, MA 02703 TEL : (508) 236-3080 FAX : (506) 236-3745 PAGE: (800) 467-3700 PIN 604-2044

From: Frederick J. Porter(SMTP:fporter#ford.com] Sent: Friday, March 12, 1999 9:01 AM To: a-acguirk@email.mc.ti.com Subject: (0) Stainstorming

to: a-mcguirk@email.mc.ti.com

Regards, Fred Porter DV - fporter fporter@ford.com Chassis E/E Systems Applications (313)845-3722 Bidg 5 - Nail Drop 5030 - Cubicle 3E004 fax: 390-4145 *** Forwarding note from FPORTER --DREND07 03/11/99 17:59 *** To: N1654584--EXTERNAL

FROM: F. J. Porter Subject: (U) Brainstorming

Andy,

Attached is a list of ideas that were developed by a group from our research laboratory of potential changes that could be made to the switch that may improve our condition. If has investigated some of these already.

USAET (UTC -05:00)

I would like you to go through each idea and let us know what your

feasibility and manufacturing issues are as well as timing for their potential implementation. 1. Coat sup with plastic or other non-conductive scating (like anodizing) Lengthens corrosive path to ground Insulates from broken spring switch contacting ground 2. Make cup of non-conductive material Longthens corrosive path to ground Insulates from broken spring switch contacting ground 3. Add plastic disphragm between cup/transfer pin and the spring contact/switch cavity Additional layer of isolation between mechanical components and electrical components 4. Flace plastic insulator disk on the cup with hole only for the transfer pin. Reduces surface area exposed between battery and ground 5. Replace kapton membranes with pure teflon membranes Increased flexibility of membrane Replace kapton seal with sliding piston seal Eliminates wear on kapton 7. Change cup/converter topology Spread flexure over greater area of the kapton Reduce interfaces where extreme flexure occur 8. Replace switch with pressure transducer and semi-conductor switch Eliminates kapton seal 9. Design thermal link in power supply side of switch that opens at elevated temperature (one time or cycling) Turns off power before heat becomes great enough to cause ignition 9a. terminal - fuse combination built into switch managing switch power 10. Reverse polarity of switch contacts Removes power from spring contact if it noves out of position 11. Insulate/plastic cost spring except contact area Reduces corroaive exposure Reduces conductive material to making contact with ground 12. Gold plate spring contect Reduces corrosion 13. Fill air gap in switch housing with potting material to seal connector openning Seal off connector path of contamination 14. Change switch housing material for improved ignition parameters Reduces ability for flame to spread after initial heat source is renoved 15. Add another layer to the kapton seal Possible increased life of seal before perforations occur 16. Add ground fault interrupter circuit to switch circuit Turns off power if ground path to case is detected Regards, OV - fporter fporter@ford.com Fred Porter

.h.ssis	E/ 6 5'	ystema	3 App1	1 :	cations		3131	845-3722
Bldg 5 -	Mail	Crop	5030	-	Cubicle	3E004	fax:	390-4145

- -

•

.

TI-NHTSA 016813

4

.

.

.

•

March 19, 1999

Mr. Tim F. Donovan, Manager E/E Systems Engineering Building 5, Mail Drop 5017 20000 Rotunda Drive, Rm 1A043 Dearborn Mil 48121-2053

Dear Tim,

Thank you for taking the time to visit with me on Wednesday, March 17, 1999.

For four months, the Texas Instruments inc. Automotive Sensors & Controls Team has been supporting the Ford Core Disgnostic Team with technical facts, data, and analysis regarding our brake pressure switch product.

A senior TI pressure ewitch angineer was in residence at Ford for three weeks to assist with any switch related issues in the system diagnostic process. Senior TI participation has also been involved in the last six consecutive Ford Core Team meetings.

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

Preliminary dealer and salvage yard samples have produced pressure ewitches with brake fluid leakage supporting a theory that switches were leaking in the field application. Certain switches evidenced wear-out due to exposure to many pressure cycles (there appears to be a vehicle application cycle quantity issue).

Conclusion to date: Some switches exhibit end-of-life wear-out & leak brake fluid, 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 Weibull reports of pressure switches tested in '99 conservatively demonstrate 95% reliability to 1 million cycles (with confidence intervals greater than 50%) while success testing records of some 7,500 ES units shows zero leakage at 500,000 cycles

Conclusion to date: Switch meets or exceeds specification.

Tim F. Donovan March 19, 1999 Page 2

Initially it was theorized that brake fluid leakage through the pressure switch contributed to thermal events but both TI and Ford have been unsuccessful in recreating thermal events with brake fluid inside the switch even under extreme conditions. Efforts are still continuing with TI currently experimenting with switch tests using "old" brake fluid to create more knowledge regarding combinations of "old" brake fluid and water in the switch cavity under powered conditions.

Conclusion to date: Brake fluid leakage in switch cavity does not cause thermal events.

Based upon extensive analysis of failed switches (and previous experience) we have developed and delivered a model of accelerated plastic base ignition using the constant power of the speed control circuit and conductive fluids (ionic enhanced water). This model used the 15-amp/14 volt DC power svallable in the speed control circuit (not the 1-amp joed required by the clutch application) and created ignition using water induced corrosion based products (not brake fluid) in the switch cavity. Ti understands the model sufficiently to re-create ignition in a laboratory environment.

Conclusion to date: Continuous speed control power allows long term corrosion. If conductive fluids are present in the switch cavity.

Electrical ourrant in excess of 1-amp clutch application needs supports corrosion process and allows excessive power dissipation through the corroded terminals.

We would like to review the scientific problem solving process and discuss the findings to assist in ecosierating our joint understanding and actions. Enclosed is a copy of the resulting "theory based significant factors" we have delivered to the Core Team to assist in the system understanding and diagnostics. Pieces consider a meeting with our General Manager and Design Engineering Manager to actieve this result.

Regards,

Andrew C. McGuirk QRA Manager Texas Instruments

C: Thomae E. Masters - Ford Frederick J. Porter - Ford Thomas Rowland - Texas instruments Steve Beringhause - Texas Instruments

TI-NHTSA 016815

Carrey, Pat

٩,

۰.

Fran: Sent: To: Subject: Warner, Pam [pwarner@email.mc.ti.com] Monday, May 24, 1999 8:26 AM McGuirk, Andy March 19, 1999



Andy,

Here is the current letter you gave to Fred. Let me know if I can be of any further help to you.

1

<<FredPorter52199b.>>

2

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

Dear Fred:

I want to review our recent support of the Ford care 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 Disgnostic 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 disgnostic 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, '94 Town Car brake switches to consistently exceed "cycle it's specification" of 500,000 pressure cycles. TI Weibuil reports of pressure switches tested in '1999 conservatively demonstrate 95% reliability to 1 million cycles (with confidence intervals greater than 50%).

Additionally "success testing records" of some 655 ES units that were tested during the 1991 - 1992 (11/91 - 12/92) showed 0 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 model of accelerated plastic based ignition 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

¥. .

TI-NHTSA 016817

Mr. Fred Porter May 21, 1999 Page 2

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 concision

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 firs 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 limely conclusion. The 1992 test records we recently forwarded clearly demonstrate the product met specification.

We are preparing to fulfill your request for hosting a site visit, supporting campaign field return device analysis, and participating in robust system brainstorming 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 Menager Texas Instruments

attachments: 1992 Testing History TI 77PS Test synopsis TI 77PS Investigation Flow Diagram

· · ·

TI-NHTSA 016818



<<Tim Donovan_FORD.doc>>

1

Attorney - Client Privileged Communication

March 19, 1999

.

Mr. Tim F. Donovan, Menager E/E Systems Engineering Building 5, Mail Drop 5017 20000 Rotunda Drive, Rm 1A043 Deerborn MI 48121-2053

Oper Tim,

Thenk you for taking the time to visit with me on Wednesday, March 17, 1999.

For some four months the Texes instruments Automotive Sensors & Controle Team has been supporting the Ford Core Diagnostic Team with technical facts, data, and analysis regarding our brake pressure switch product.

A service TI pressure switch engineer was in residence at Ford for three weeks. Senior TI participation has been delivered in the last six consecutive Ford Core Team meetings (and we intend to continue in this role???).

Below is a recep of activities leading us to several conclusions.

Initially it was theorized that brake fluid leakage through the pressure switch contributed to thermal events and both TI and Ford were unsuccessful in recreating thermal events with brake fluid inside the switch. During the next two weeks Ti will experiment with "old" brake fluid using our most recent test model.

Conclusion: Brake fluid does not cause thermal events

Preliminary design and salvage yard samples have produced several pressure switches with brake fluid leakage and there is some evidence that the switches are worn out. Some of these switches evidence being worn out due to exposure of many cycles and there appears to be a vehicle application cycle quantity issue.

Conclusion: Some switches are worn out

Tim F. Donovan March 19, 1999 Page 2

.

We also investigated switch capability, and using agreed upon accelerated simulation life testing techniques, demonstrated the ability of the 92-93-94 Town Car brake switches to consistently exceed "cycle life specification"

Conclusion: Switch meets or exceeds specification

We have developed and delivered a model of accelerated plantic based ignition using the constant power of the speed control circuit and conductive fluids.

Conclusion: Speed control power allows long term corresion

We would like to review the scientific problem solving process and discuss the findings to assist in accelerating our joint understanding and actions. Please consider a meeting with our General Manager and Design Engineering Manager to achieve this result.

Regards,

Andrew C. McGuirk QRA Menager Texas Instruments

ACM/paw

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

TI-NHTSA 016821

Currey, Pat

From:	Warner, Pam [pwarner@email.mc.ti.com]
Sent:	Monday, March 22, 1999 9:45 AM
Te:	Watt, Jim
Ce:	McOuick, Andy
Subjects	RE: foils for presentation 3/24/99

Jim,

Thank you for your quick response and for attaching the files. Some of us send the information and then realize we forgot to attach any information with it. Thanks again and have a good week.

From: Matt, Jim Sent: Monday, March 22, 1999 10:34 AM To: Warner, Pam Co: McGuirk, Andy Subject: RE: foils for presentation 3/24/99

Below are the updated files for 77PS:

<<File: Ford 77PS(diaphragm).ppt>>

<<File: Ford 77PS(thermalevents)switch.ppt>>

<<pre><<File: Ford 77PS(thermalevents)i2r.ppt>>

Jim Watt, QRA, megid: jw02; mail station 12-33; page (508)236-1010, no. (0696) ph (508) 236-1719; fax (508)236-3153

> From: Warner, Pag Sent: Monday, March 22, 1999 8:38 AM To: Watt, Jim Ce: McGuirk, Andy Subject: foils for presentation 3/24/99

Jim,

Attached are the foils you sent to andy moguink (electronically) for his presentation on 3/17. Will you please update for his presentation on Wednesday, March 24th and send them back to my attention by early Tuesday, March 23 so I can electronically send them for his meeting. Thanks Jim. If you have any questions, please call me on extension 2324 or send me an email.

1 .

TI-NHTSA 016822

.

Currey, Pat

٠,

•

Front	Watt, Jim [jwatt@email.mc.ti.com]
Sent:	Monday, March 22, 1999 9:34 AM
To:	Warner, Pam
Ce:	McGuirk, Andy
Subject:	RE: foils for presentation 3/24/99

.

Т foni Form Ford 76.0 n at . Hom. 79440 HT.00 Below are the updated files for 77PS: << Tord 77PS(diaphragm).ppt>> << Ford 7798(thermalevents)switch.ppt>> <kFord 77p8(thermalevents)12r.ppt>>; Jin Watt, QRA, megid: jw02; mail station 12-33; page (508)236-1010, no. (0696) ph (508) 236-1719; far (508)236-3153 From Warner, Pam CONFIDENTIAL Monday, March 22, 1999 8:36 AM Sent: Tos Watt, Jim Ce: McGuirk, Andy Subject: foils for presentation 3/24/99 Jim,

Attached are the foils you sent to andy moguink (electronically) for his presentation on 3/17. Will you please update for his presentation on Wednesday, March 24th and send them back to my attention by early Tuesday, Harch 23 so I can electronically send them for his meeting. Thanks Jim. If you have any questions, please call me on extension 2324 or send me an email.



TI-NHT8A 016824



. .

..



TI-NHTSA 016826

Number 11

. -

а.



b

TI-NHTSA 016827

۰.

Currey, Pat

From: Sent: To: Subject:	Frederick J. Porter (fporter@ford.com) Monday, March 22, 1999 5:43 PM McCuirk, Andy (U)	
to: a-meguirkéti.com		

Andy,

:

On Charlie's list of components, which use Celanex and which use Noryl?

Regards, Fred Porter	OV - fporter	fporter#ford.com
	Systems Applications 1 Grop 5030 - Cubicle 3E004	(313)845-3722 fex: 390-4145

.

.

.

1 . ·

```
Currey, Pat
```

```
From
                 .
                       Steve Reimers [sreimers@ford.com]
Seat:
                       Wednesday, March 24, 1999 7:59 AM
To:
                       McOuirk, Andy; Rahman, Aziz; Porter, F.J.; slarouch@ford.com
Subject:
                      RE: Brake Fluid Shipping addresses
FYI.
                                         building 5 3E008
mail drop 5011
Steve Raimers
RVT Chassis E/E System Applications
39-03286 SREIMERS sreimers@ford.com
                                         fax 39-04145
*** Forwarding note from 02421WP1--EXTERNAL 03/24/99 07:56 ***
To: SREIMERS--FORDMAIL 'Steve Reimers'
ce: OWOZLO9P--EXTERNAL Urbiha, Scott (SA)
From: Kitt, Michael (MB)
Subject: RE: Brake Fluid Shipping addresses
From: "Kitt, Michael (MB) "<mkitt@dow.com>
cc: "Orbina, Scott (SA)" (surbina@dow.com>
Steve.
Samples of the components used to make brake fluid were shipped to TI
today. The bland should be produced by adding two (2) gallons of
material from the container labeled as Dowanol 237 to the entire content
of the container labeled Dowanol 236.
Please call me if you have any questions.
Mike Kitt
> -----
                Steve Reimers(SMTF:sreimers@ford.com)
> Erom:
                Tuesday, March 16, 1999 4:37 PM
> Sent:
> To: mkitt#dow.com
> Subject:
               Srake Fluid Shipping addresses
> TO: mkittêdew.com
> please ship the 5 gallons of Ford formula brake fluid without
> inhibitors to:
                 5 **************
> *******
> DRGENT: Gerry Terino(508-236-3009)
> Texas Instruments Incorporated
> 34 Forest Street, NS-12-37
> *******
> and S gallons to:
> Ford Mator Ca.
> Central Laboratory
> 15000 Century Drive
> Commerce Park North
> Dearborn, MI 46120
> Attn: S. LaRouche
                                                            **********
> ********
> Please reply to this email so I may set-up an ID for you.
> thanks,
                                           building 5 3£008
> Steve Reimers
                                           mail drop 5011
> AVT Chassis E/E System Applications
                                            1 -
```

> 39-03206 SREIMERS areimers@ford.com fax 39-03206 />

. *

,

27

• •

•

TI-NHTSA 016830

4 -



TI-NHTSA 018831

64°



Carrey, Pat

4

٠

From:	Stove Reimers [steizners@ford.com]	
Sent:	Thursday, March 25, 1999 12:09 PM	
To:	McGuirk, Andy	
Subject:	BP switch Photo and Note	

Here are the best photos I found of the switch installed underhood on a 92 Town

car. What info do you want from the warranty data and decision matrix?

1 -

Stave Reimera	building 5 3E008
RVT Chansis E/E System Applications	mail drop 5011
39-03286 SREIMERS sreimers@ford.com	tax 39-04145 ;>





TI-NHTSA 016835

Currey, Pat

÷

From:	Steve Reimers [sreimers@ford.com]
Seat:	Thursday, March 25, 1999 12:19 PM
To:	McGuirle, Andy
Subject:	Two More Photos

These two were taken efter the instrumentation was installed. The BP switch is still in the same orientation but has moved away from the prop-valve about 2 i nches slond the hexport axis.

1>

•

1

Steve Reimers building 5 35008 RVT Chessis E/E System Applications mail drop 5011 39-03286 SREIMERS areimers@ford.com fax 39-04145

TI-NHTSA 01683