

EA02025

TEXAS INSTRUMENTS, INC.'S

09/10/03 LETTER TO ODI

REQUEST 9

BOX 12

PART A – 0

PART C

EA02025

TEXAS INSTRUMENTS, INC.'S

09/10/03 LETTER TO ODI

REQUEST 9

BOX 12

PART A – L

PART C

Tech in field. Panther CrownVic, Margie, Town Car
Relay packs
ECS module (all four NHTSA)

Expertise to look @ parts

Norm. focused on switch / side's row about others;

Buy back vehicles and study system

91-93-94: Design Analysis @ Dealership
91: different
93-94 similar

→ had a splash shield to protect 42w conn from brake overflow

What about other competitors - Do they use? How wired?

FCSD (warranty Returns), FRACAS could highlight town car rts for getting Auto warranties

* Next week for report from analysis

IF we see leaks, corrosion how to relate it to fires?

Memphis had fire out of switch (Dealer saw) car in for other pblm.

Containment

Pull speed control

New circuit for ECS (not hot all the time)

Contain what?

NHTSA
Even without Resolution,
must contain

DOE to check...

Ford to work on other applications

ACRG → Critical Concern Review Group

Must Diagnose switch! Which heat! Joe Nemi → has Dealer reports

Guilty until innocent

① connector
② relay pack

Don't start IAD, start work plan

Many questions to ASO regarding fire (Town, CrownVic, Grand Marq)

Next week for Tech Adv or follow up Mtg.

Switch is (1) of several reasons for Town Car fires

* updated Memphis Act
Back residue looks like
Brake fluid: oxide of
metal
concentrate on 1st
switch

* Need TI feedback for questions @ TI w/ Memphis incident..



Ford Motor Company

Thomas E. Masters
Supervisor Large/Lux Car & Truck
Systems & Wiring OPD
AVT EEMC - OPD

2000 Rotunda Drive MD 5017
Rm. 2A024, Bldg. #6
Dearborn, MI 48121-3063 USA

Tel: 784 860-8887
Fax: 313 317-8168



TI-NHTSA 016217



Steve Rainera

Product Design Engineer
~~Development and Testing~~
Chassis Electronic Systems
Advanced Vehicle Technology
PROF: SREINERS
Email: ~~SRINERS@ford.com~~

2000 Richards Drive
Dearborn, MI 48121
Bldg. 45, 3800E-45-0000
Telephone: 313390-3288
Fax: 313390-4465

SRINERS@ford.com



**TEXAS
INSTRUMENTS**

February 5, 1999

TO: Name: Mr. Fred Porter
Ford

FROM: Stephen Proia

Phone Number: 313-845-3722

508-236-1383

FAX Number: 313-390-4145

508-236-3586

SJ: 77PS - Cruise Control Pressure Switch

* OF PAGES: 13 (INCLUDING THIS PAGE)

Fred,

Please feel free to contact me with any questions. In this fax you will find:

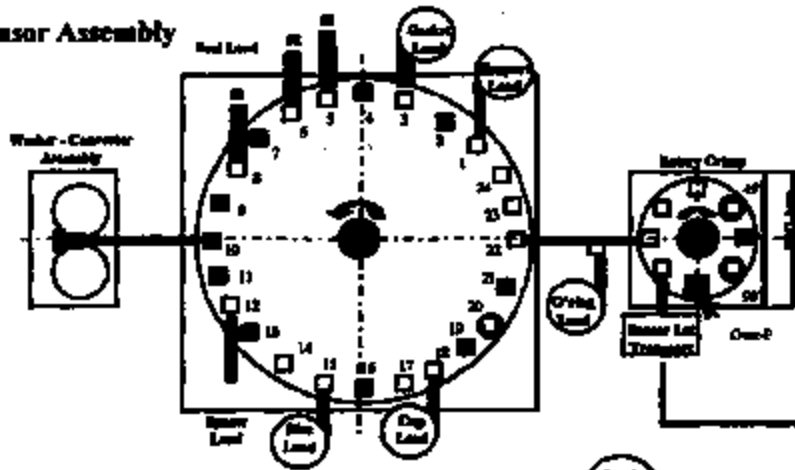
1. Process flow diagrams for the 77PS switch
2. Equipment illustration

Have a nice weekend.

Sincerely,

Stephen B. Proia
Hydraulic Pressure Switch
Mfg Engineering Supervisor

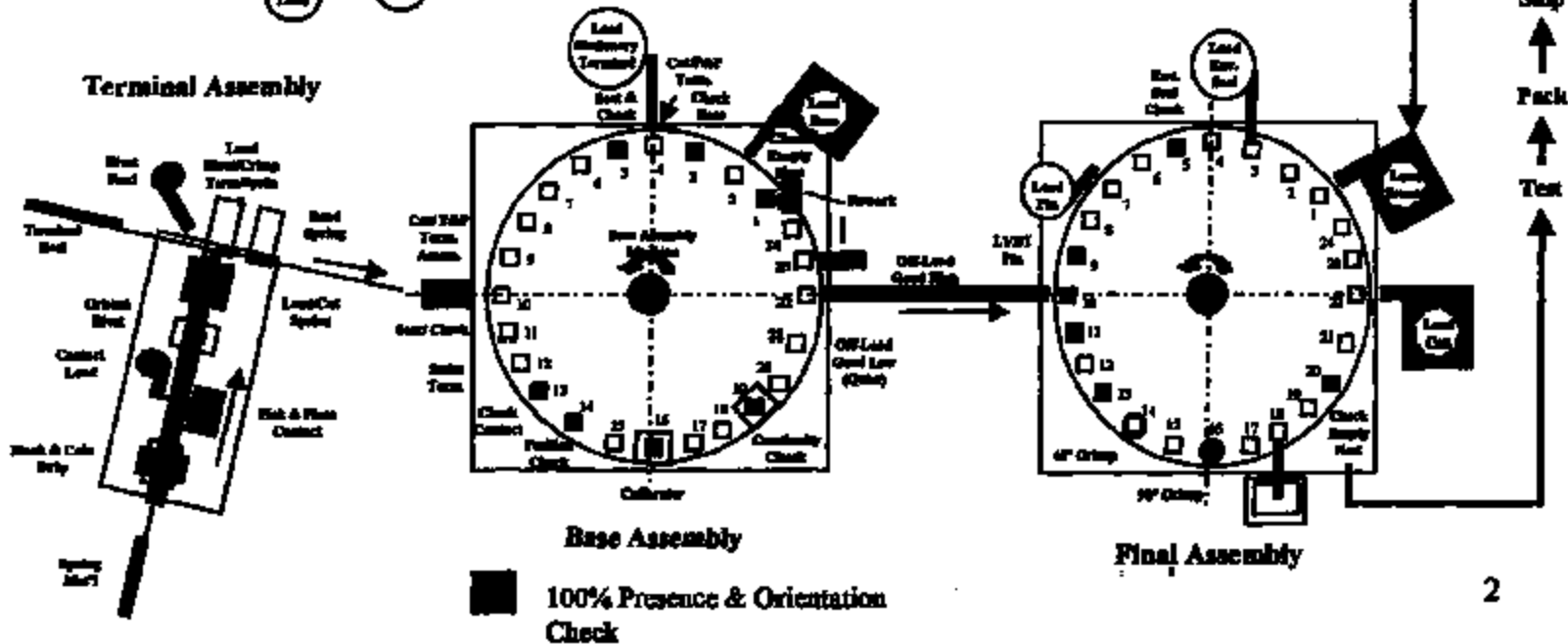
Sensor Assembly



**Hydraulic Pressure Switches
Line Mount Switches - Attleboro
77PS Product Line**



Terminal Assembly



TI-NHTSA 016220

PROCESS FLOW DIAGRAM

PROCESS: OVERVIEW

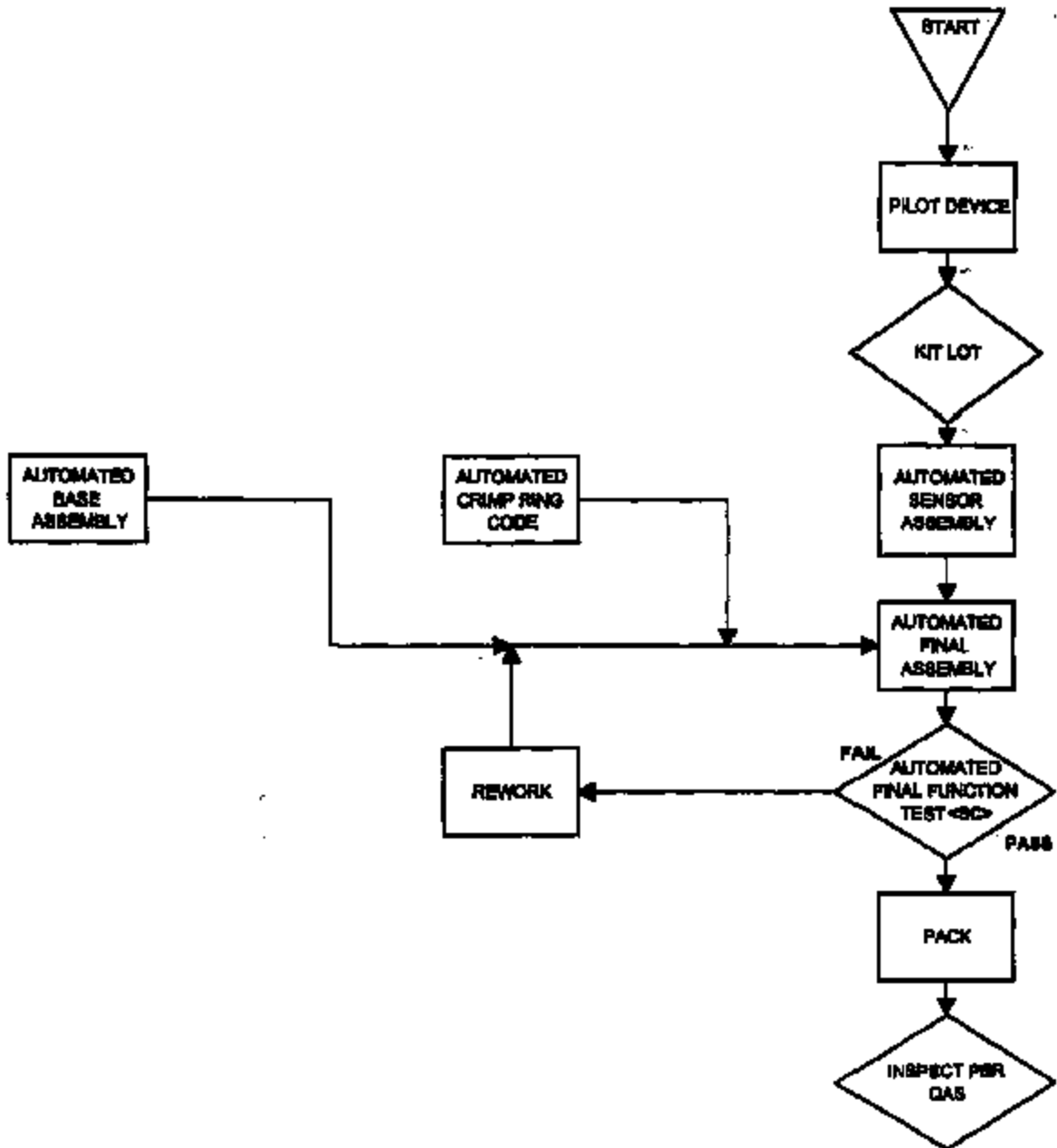
MODEL YEAR(S)/VEHICLE(S): 77/87PS

PREPARED BY: ANN REA
PF DATE(ORIG.): 8/12/88
PF REVISION: A
DOCUMENT #S12362

LEGEND:



SC
SPECIAL
CHARACTERISTIC
CLASSIFICATION



TI-NHTSA 016221

PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED SENSOR ASSEMBLY

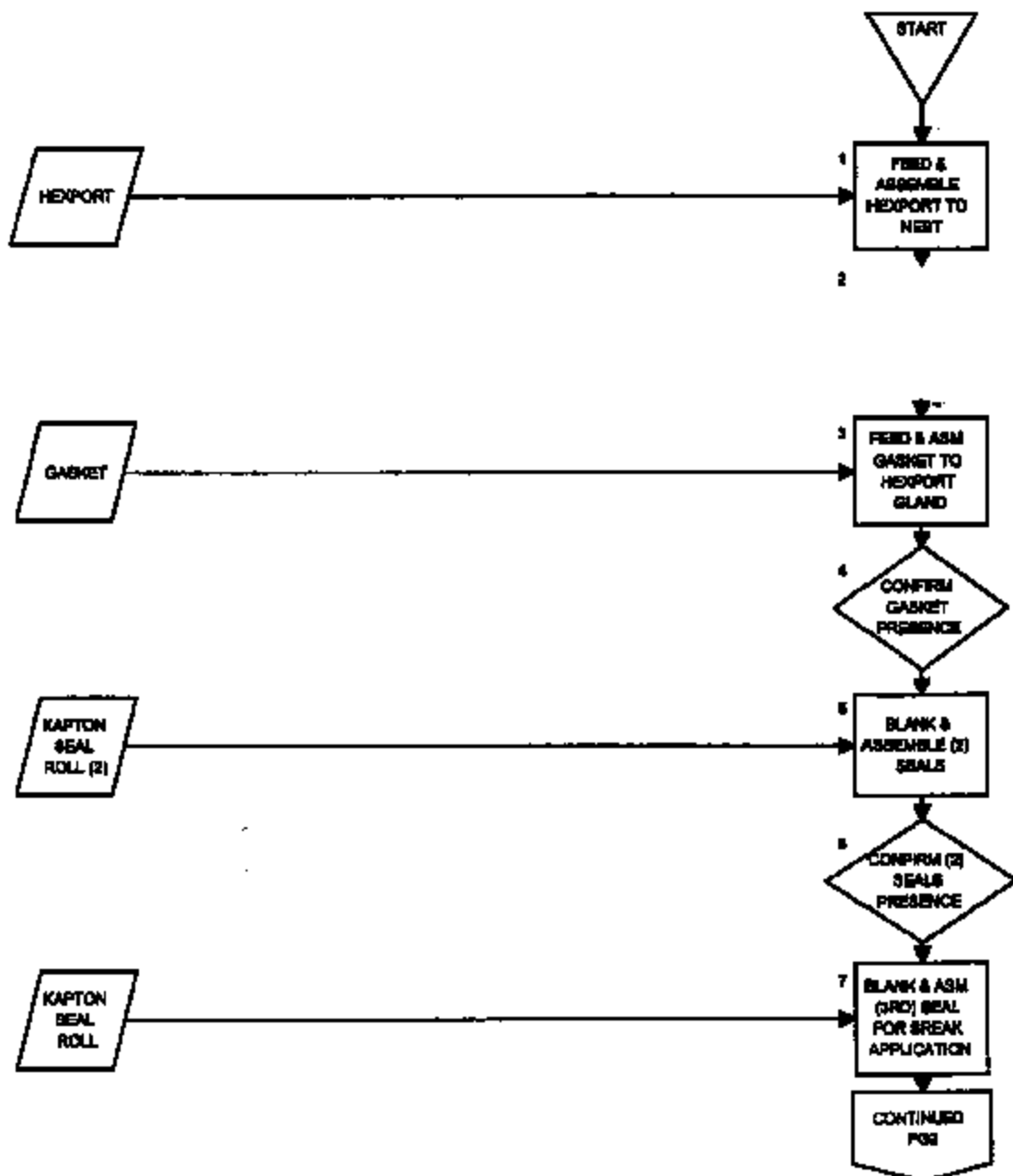
MODEL YEAR(S)/VEHICLE(S): 52/5777/90/87P8

PREPARED BY: ANN REA
PF DATE(ORIG): #12/88
PF REVISION: A
DOCUMENT #012393

LEGEND:



<SC>
SPECIAL
CHARACTERISTIC
CLASSIFICATION



PROCESS FLOW DIAGRAM

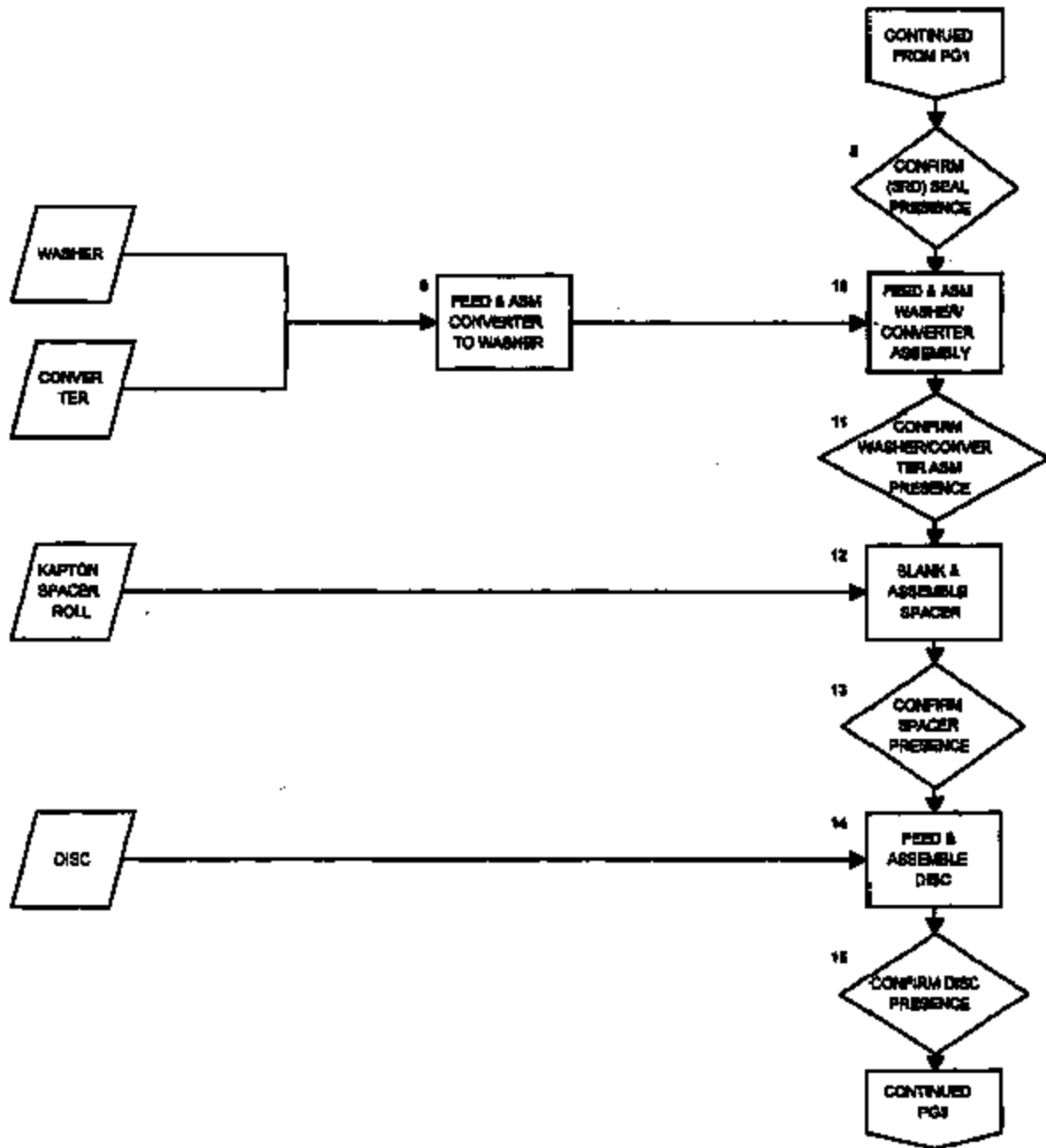
PROCESS: AUTOMATED SENSOR ASSEMBLY
 MODEL YEAR(S)/VEHICLE(S): 82/87/77/80/87/98

PREPARED BY: ANN REA
 PF DATE(ORIG.): 8/12/86
 PF REVISION: A
 DOCUMENT #812393

LEGEND:



<BC>
 SPECIAL
 CHARACTERISTIC
 CLASSIFICATION

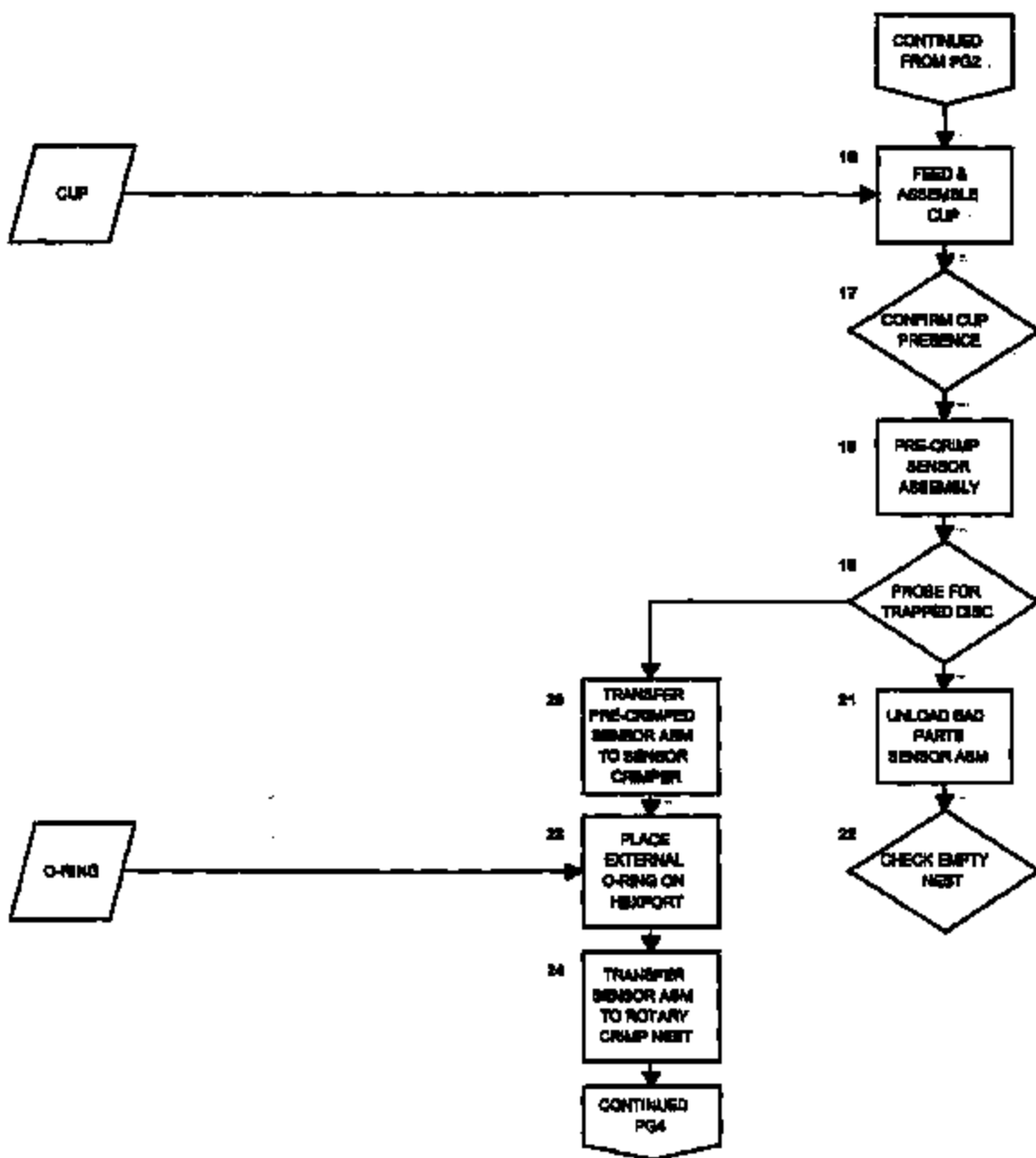


PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED SENSOR ASSEMBLY
 MODEL YEAR(S)/VEHICLE(S): 82/87/77/80/81/79

PREPARED BY: ANN REA
 PF DATE(ORIG.): 6/12/88
 PF REVISION: A
 DOCUMENT #812883

LEGEND:



PROCESS FLOW DIAGRAM

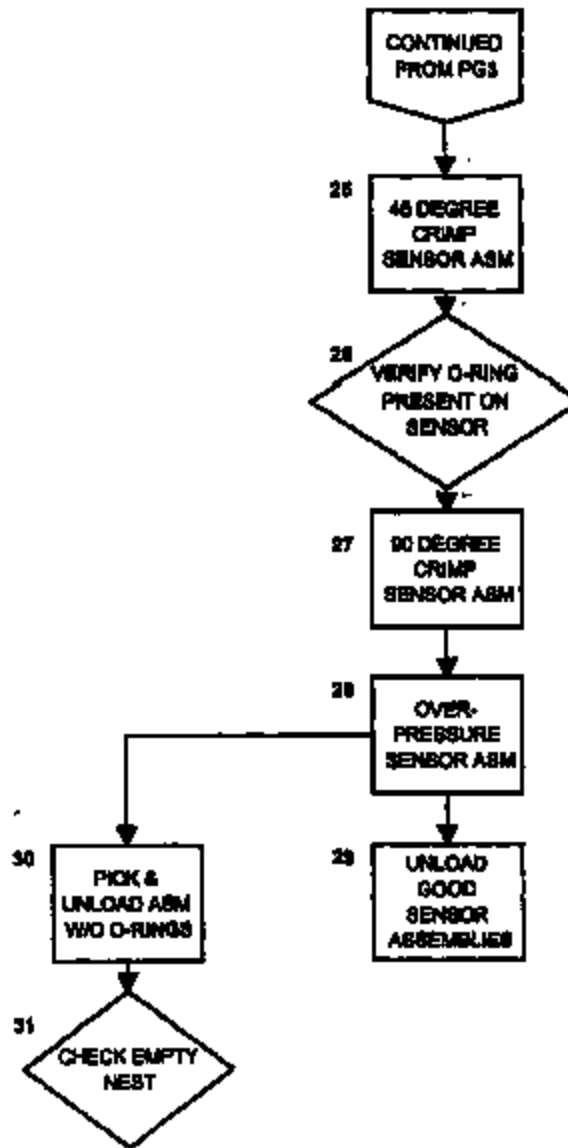
PROCESS: AUTOMATED SENSOR ASSEMBLY
MODEL YEAR(S)/VEHICLE(S): 52/57/77/80/87P3

PREPARED BY: ANN REA
PF DATE(ORIG.): 8/12/98
PF REVISION: A
DOCUMENT #612393

LEGEND:



<SC>
SPECIAL
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CLASSIFICATION

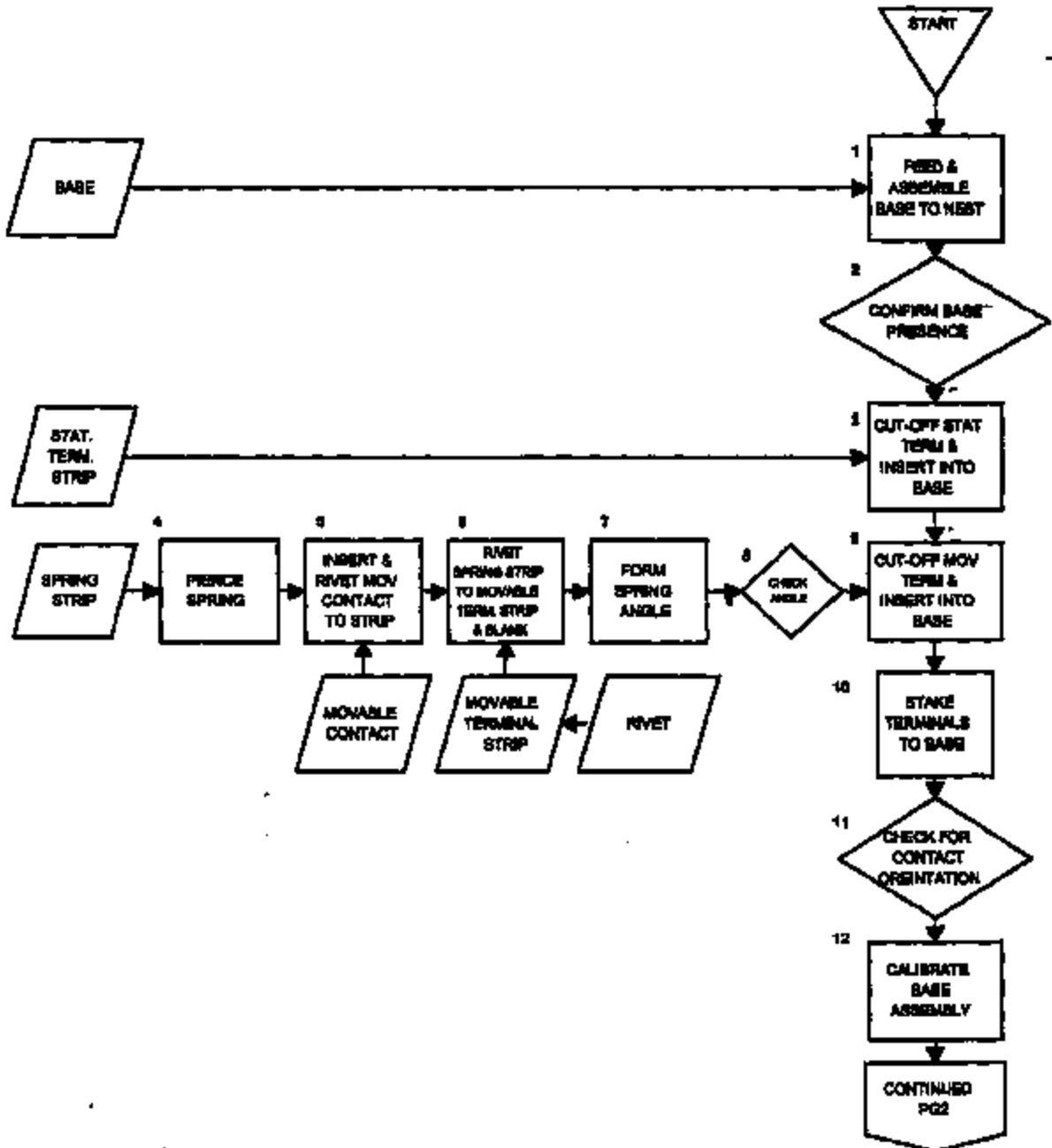


PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED BASE ASSEMBLY
 MODEL YEAR(S)/VEHICLE(S): 77/STP5

PREPARED BY: VALENTINA VIDEVA
 PP DATE(ORIG.): 0/1/2000
 PP REVISION: C
 DOCUMENT # 512377

LEGEND:



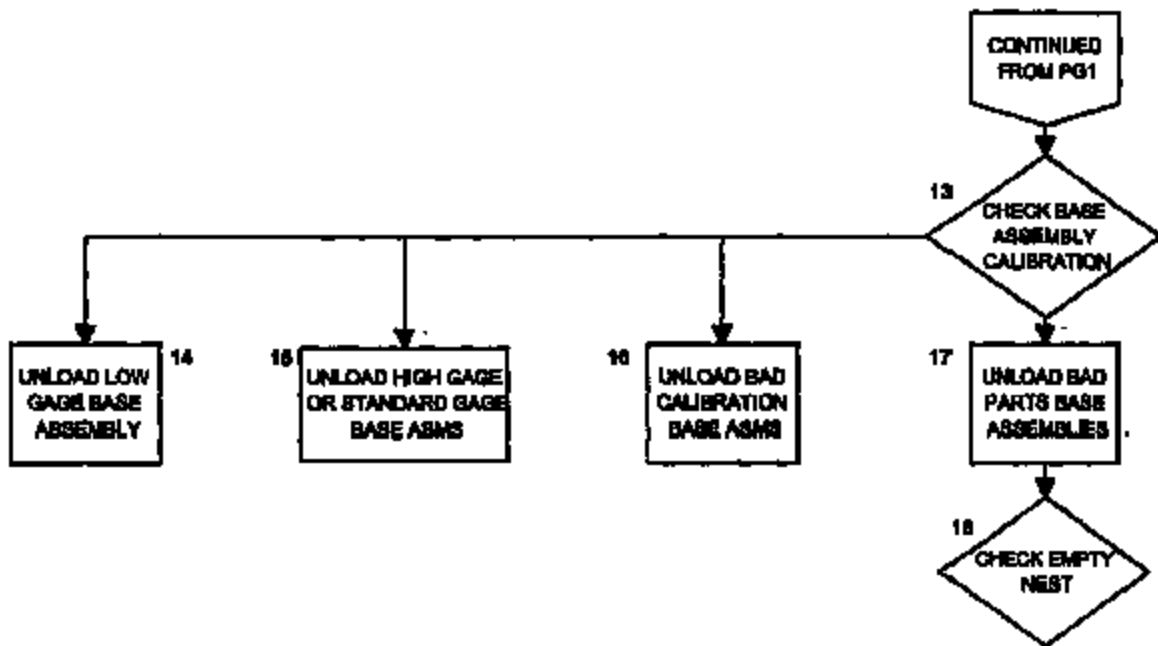
PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED BASE ASSEMBLY

MODEL YEAR(S)/VEHICLES(S): 77/STPS

PREPARED BY: VALENTINA VIDEVA
PF DATE/ORIG.: 8/12/88
PF REVISION: C
DOCUMENT # 512377

LEGEND:



PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED FINAL ASSEMBLY

MODEL YEAR(S)/VEHICLE(S): 07/77/87FS

PREPARED BY: ANN REA

PF DATE(ORIG.): 01/2008

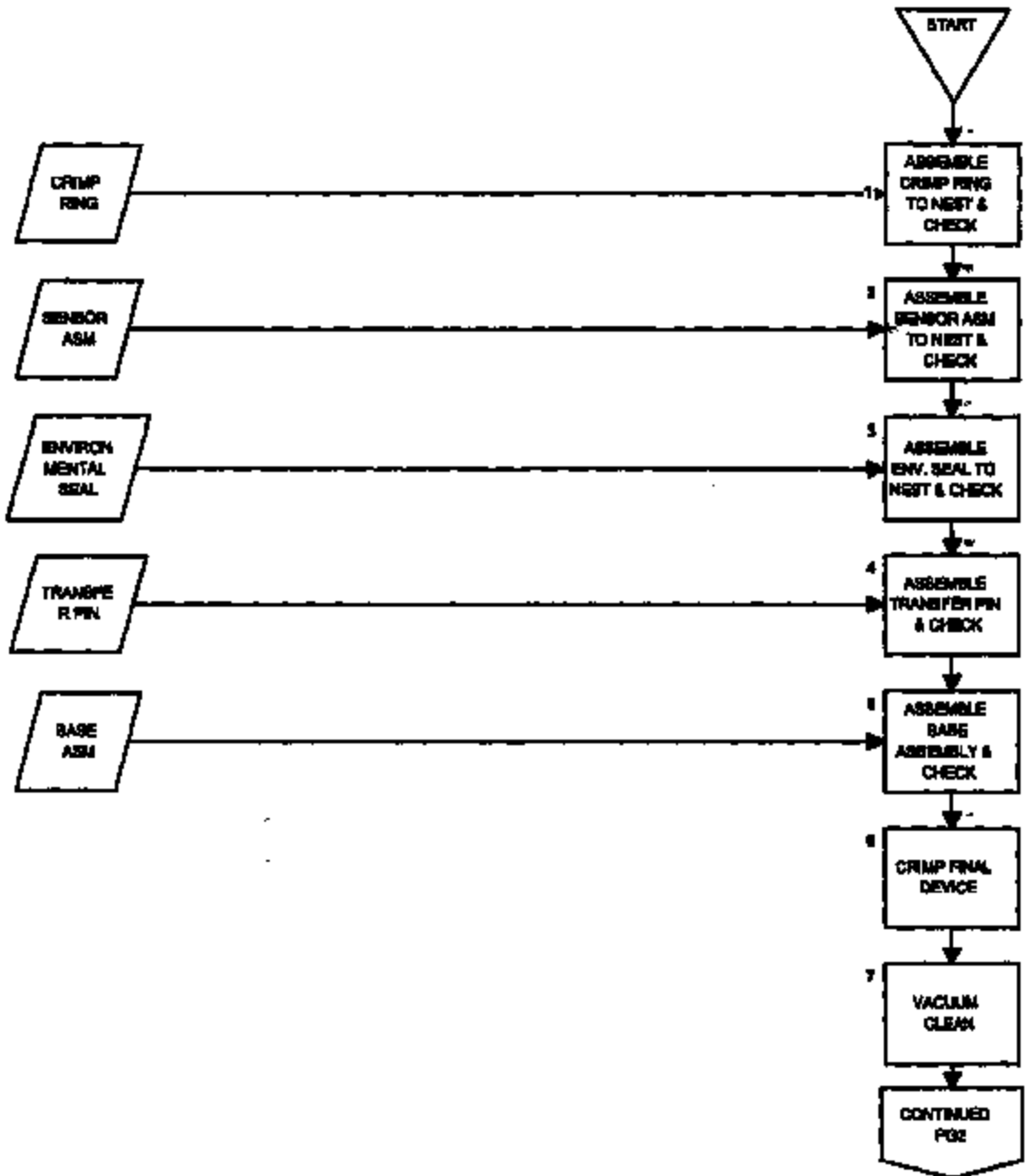
PF REVISION: A

DOCUMENT # 512376

LEGEND:



<SC>
SPECIAL
CHARACTERISTIC
CLASSIFICATION



TI-NHTSA 016228

PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED FINAL ASSEMBLY

MODEL YEAR(S)/VEHICLES(S): 5777/57P8

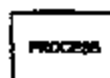
PREPARED BY: ANN REA

PF DATE(ORIG.): 8/12/98

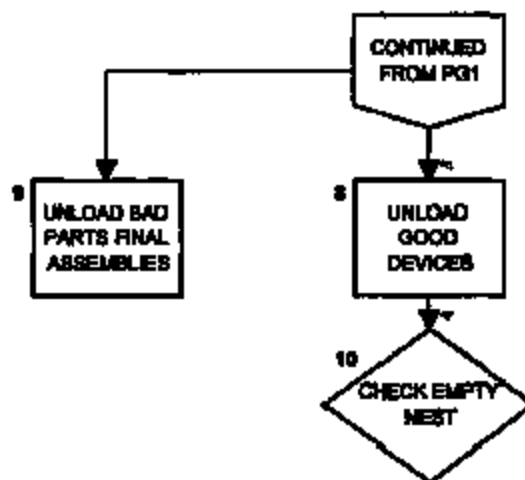
PF REVISION: A

DOCUMENT # 612375

LEGEND:



<SC>
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CHARACTERISTIC
CLASSIFICATION



PROCESS FLOW DIAGRAM

PROCESS: AUTOMATED CRIMP RING CODE

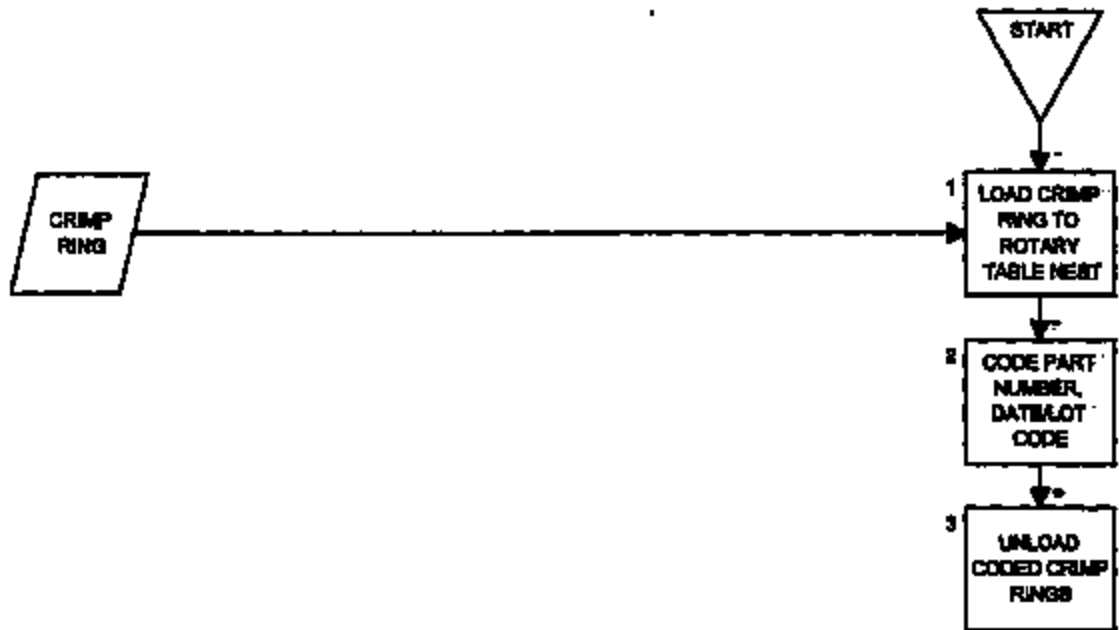
MODEL YEAR(S)/VEHICLE(S): ALL HYDRAULIC PS

PREPARED BY: ANN REA
PF DATE(ORIG.): 8/12/68
PF REVISION: A
DOCUMENT #512366

LEGEND:



<SC>
SPECIAL
CHARACTERISTIC
CLASSIFICATION



PROCESS FLOW DIAGRAM

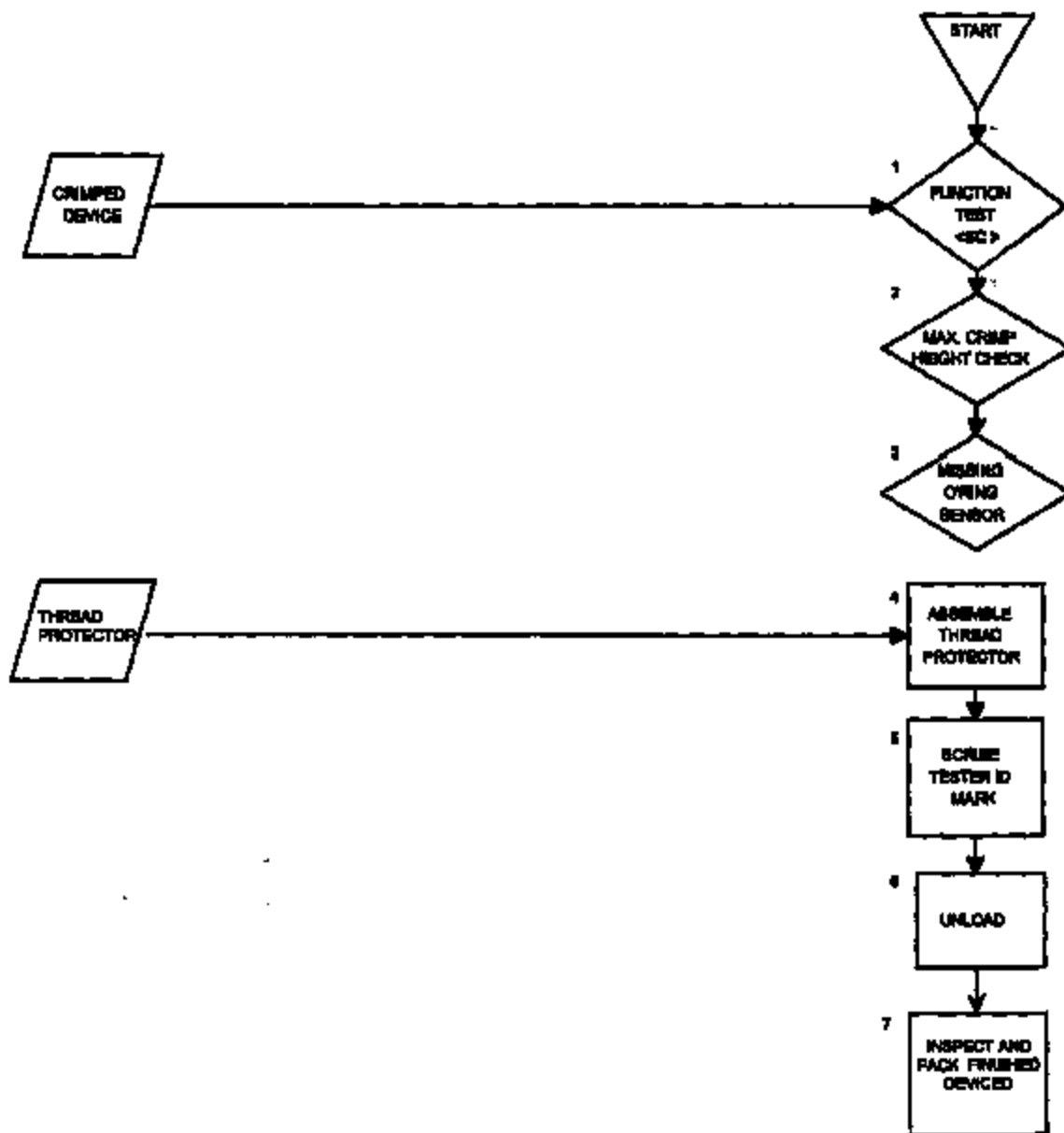
PROCESS: AUTOMATED FINAL FUNCTION TEST
MODEL YEAR(S)/VEHICLE(S): ALL HYDRAULIC PS

PREPARED BY: ANH/BA
PF DATE (ORGL): 8/12/98
PF REVISION: 8
PF REVISION DATE: 12/10/98
DOCUMENT # 812281

LEGEND:



<SC >
SPECIAL
CHARACTERISTIC
CLASSIFICATION





TI-NHTSA 016232



TI-NHTSA 016233



TI-NHTSA 016234



TI-NHTSA 016236

Epstein, Sally

From: Douglas, Charles [c-douglas2@email.mcti.com]
Sent: Friday, February 05, 1999 8:11 AM
To: Rahman, Aziz
Subject: 77PS



Lincoln.doc



Usage Matrix - Speed
Control C...

Aziz,

Documents which may be of some help / good reference information:

<<Lincoln.doc>> <<Usage Matrix - Speed Control Deactivation Pressure Switch>>

Regards,

Charlie

Charlie Douglas
(508) 236-3837 (P)
(508) 236-1598 (F)
c-douglas2@ti.com

Fred,

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

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

Vehicle - Part Number Correlation

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

TI P/N Correlation to Above

- (1) 77PSL2-1
- (2) 77PSL2-3
- (3) 77PSL3-1
- (4) 77PSL3-2
- (5) 77PSL3-3
- (6) 77PSL4-1
- (7) 77PSL5-2
- (8) 77PSL6-1

Epstein, Sally

From: Douglas, Charles [c-douglas2@gmail.com]
Sent: Friday, December 18, 1998 9:38 AM
To: 'Porter, Fred (Ford)'
Cc: Sharpe, Robert
Subject: Usage Matrix - Speed Control Deactivation Pressure Switch

Fred,

The following represents a rough usage matrix over time:

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

To be quite honest, I think we actually have more of a grasp on the application matrix in the MY92 - MY95 timeframe than MY96 on. Where you see ??, this means the actual starting or ending model year for a program may be +/- 1 model year. Also, it is conceivable that as of the MY98 timeframe, we are actually released on more platforms than what is shown above. I say this because our actual shipped volumes which are in the 2M0 range, would indicate either 100% penetration for cruise control on all of the platforms listed or we are on more than the listed platforms.

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

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

Regards,

Charlie

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

Dague, Bryan

From: Beringhaus, Steven
Sent: Friday, February 05, 1999 6:48 AM
To: Dague, Bryan
Subject: FW: Ford Lincoln Cruise control

From: McGuirk, Andy
Sent: Thursday, February 04, 1999 4:46 PM
To: Sullivan, Mark; Baumann, Russ; Douglas, Charles
Cc: Beringhaus, 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 specifications
.....DAGUE/BERINGHAUSE.

1B) Please **identify the difference** between these parts materials
.....DAGUE/BERINGHAUSE

1C) please **identify the difference** between these parts manufacturing process.....PECHONIS

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. (BREA HISTORY)..... MCGUIRK

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

REGARDS

A

AUTOMOTIVE REPAIRS AND CORROSION QSA GROUP
14 FOREST ST E/S 23-05
ATTLEBORO, MA 02163
TEL : (508) 236-1000
FAX : (508) 236-1743
PAGE: (800) 467-1708 FAX 504-2064

From: Douglas, Charles
Sent: Thursday, February 04, 1999 1:00 PM
To: Sullivan, Mark; Baumann, Russ; McGuirk, Andy
Cc: Beringhaus, 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 77PB 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) 338-3857 (P)
(508) 238-1888 (F)
c-douglas2@tl.com

6
AUTOMOTIVE RESEARCH AND CONTROLS (ARC) MEMBER
34 FOREST ST N/E 13-05
ATTLEBORO, MA 02763
TEL : (508) 234-3080
FAX : (508) 336-3743
PAGE: (508) 487-3704 PSM 884-2044

2100000000 TO 2100000000

1	77PSL2-1	2729-10	0615-1	3000-1	2776-1	7400-1	7406-1	3407-1	3408-1	2729-13	3409-1	7453-1	2771-1
2	77PSL2-3	2729-13	0615-1	3000-1	2776-1	7400-1	7406-1	3407-1	3408-1	2729-14	3409-1	7453-1	2771-1
3	77PSL3-1	2770-9	0615-3	3000-1	2776-1	7400-1	7406-1	3407-1	3408-1	2729-25	3409-1	7453-1	2771-1
4	77PSL3-3	2770-8	0615-10	3000-1	2776-1	7400-1	7406-1	3407-1	3408-1	2729-18	3409-1	7453-1	2771-1
5	77PSL3-3	2770-7	0615-7	3000-1	2776-1	7400-1	7406-1	3407-1	3408-1	2729-27	3409-1	7453-1	2771-1
6	77PSL4-1	2770-9	0615-3	3000-1	2776-3	7400-3	7406-1	3407-1	3408-1	2729-29	3409-1	7453-1	2771-1
7	77PSL5-2	2770-9	0615-3	3000-1	2776-2	7400-1	7406-1	3407-1	3408-1	2729-30	3409-1	7453-1	2771-1
8	77PSL6-1	2770-8	0615-10	3000-1	2776-1	7400-1	7406-1	3407-1	3408-1	2729-28	3409-1	7453-1	2771-2

Fred,

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

<u>Part Number</u>	<u>Actuation</u>	<u>Release Rate</u>	<u>Hexport</u>	<u>Thread</u>	<u>Spr O</u>
F2VC 9F924 AB 90-160 (1)	20 min	Brown / pos 2	J512	3/8-24M	Snap
F6LC 9F924 AA 200-300 (2)	40 min	Black / pos 1	J512	3/8-24M	Snap
F2AC 9F924 AA 90-200 (3)	20 min	Natural / pos 2	J512	3/8-24M	Quiet
F58A 9F924 AA 90-160 (4)	20 min	Grey / pos 1	J512	3/8-24M	Quiet
FJTA 9F924 CA 200-300 (5)	40 min	Red / pos 1	J512	3/8-24M	Snap
94DA 9F924 AA 90-160 (6)	20 min	Natural / pos 2	o-ring	M10x1.0M	Quiet
F9DC 9F924 AA 90-160 (7)	20 min	Natural / pos 2	Snubber	3/8-24M	Quiet
94JA 9F924 AB 90-160 (8)	20 min	Grey / pos 1	o-ring	3/8-24M	Quiet

Vehicle - Part Number Correlation

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

TI/FN Correlation to Above

- (1) 77PSL2-1
- (2) 77PSL2-3
- (3) 77PSL3-1
- (4) 77PSL3-2
- (5) 77PSL3-3
- (6) 77PSL4-1
- (7) 77PSL3-2
- (8) 77PSL6-1

TI-NHTSA 016242

Morris, Irene

From: Sullivan, Martha
Sent: Friday, February 05, 1999 8:03 AM
To: Rowland, Thomas
Subject: FW: Ford Lincoln Cruise control

There has been discussion about tapping Aziz Rahman to be resident at Ford. Please be prepared to discuss this at the meeting today.

—Original Message—

From: Beringhaus, Steven
Sent: Thursday, February 04, 1999 3:33 PM
To: Baumann, Russ
Co: Baker, Gary; Rowland, Thomas; Douglas, Charles; DeGus, Bryan; Sullivan, Martha; McGuirk, Andy
Subject: 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 switch, 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 occurring elsewhere. He stated that the clutch coil 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 switches 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, continents), 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 send 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

Currey, Pat

From: Sharpe, Robert [rsharpe@email.mc.ti.com]
Sent: Friday, February 05, 1999 10:46 AM
To: Douglas, Charles
Cc: Beringhouse, Steven; Sullivan, Martha; Baumann, Russ; Dodd, Bob
Subject: Town Car Brake Pressure Switch

Yesterday afternoon, I was requested to attend a meeting at Ford in regards to the Lincoln Town Car fire issue.

Attendee's

Fred Porter, Steve Reimers - Chassis 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 McInerney - Large/Lux Vehicle Safety Group
Joe Nemi (sp?) - Large/Lux Vehicle Safety Group

Summary

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 Cars with Cruise 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 "hot" (12v) at all times. Both options are under discussion.

Although there is high attention on the brake switch, John McInerney 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)
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 - Relay Pack (contains 3 relays (AC Cut off, EEC, fuel pump) and the EEC diode)

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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.

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- What are the flash points for all components/material used in the switch?
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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
rsharpe@ti.com

McGuirk, Andy

From: 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

tyl

Charlie

Charlie Douglas
(508) 238-3857 (P)
(508) 238-1598 (F)
c-douglas2@fi.com

Norm TUES
Steve Reimers

From: Sharpe, Robert
Sent: Friday, February 05, 1999 11:45 AM
To: Douglas, Charles
CC: Berlinghouse, Steven; Sullivan, Martha; Baumann, Russ; Dodd, Bob
Subject: Town Car Brake Pressure Switch

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Attendee's

- Fred Porter, Steve Reimers - Chassis Electronic Systems
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- Rob English - Core Electrical
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Summary

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Ford is concerned that in absence of a "root cause" response to NHTSA, NHTSA will pick the brake switch and demand that all Town Cars with Cruise 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 "hot" (12v) at all times. Both options are under discussion.

Although there is high attention on the brake switch, John McInerney stated that other components must be

FD Cross-Ref List on 2/20/99 by S. Cooper 7798 Results
 TO BE USED FOR REFERENCE ONLY

PRINTED DATA

Index	Case No.	Case Name	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested	Arrested
1	7798L-1	FELC-SP24-AA	Paul PC	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
2	7798L-2	FELC-SP24-AA	John J. J.	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
3	7798L-3	FELC-SP24-AA	PC - EGO	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
4	7798L-4	FELC-SP24-AA	Paul W. W.	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
5	7798L-5	FELC-SP24-AA	L/T - People	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
6	7798L-6	FELC-SP24-AA	Paul - People	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
7	7798L-7	FELC-SP24-AA	Thomas W.	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100
8	7798L-8	FELC-SP24-AA	Paul - Capt	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100	20-100

??

- DATE OF Δ
 - PLASTICS

Δ ECONO & TOWN

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- 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) - *direction last month..... questions & answers*
- 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).

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- (Ford) Monitor testing of brake switches (@ Bldg5) injected with brake fluid and a 24v supply across terminals (ongoing)

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

Rob Sharpe

Rob Sharpe

Tel: 348-2734
Fax: (348) 305-5739
rsharpe@ti.com

From: McGuirk, Andy
Sent: Thursday, February 18, 1998 9:52 AM
To: Sullivan, Martha; Rowland, Thomas; Baumann, Russ; Baker, Gary
Cc: Berfinghaus, Steven; Pechonis, John; Rahman, Aziz; Bartosh, Bob
Subject: Ford overview.... 2/18 'status' Update

attorney client privileged communication

Ford has seen switch 'wear out' in several samples where brake fluid is believed to have leaked into the switch cavity (total of 7 switches 'analyzed' to 'complete scientific conclusions' from 1 P/S thermal event, 3 underhood thermal events, 2 cruise inops and 1 reference). There are 24 switches awaiting analysis at Ford, and in fact a faster paced analysis scheme is under review at Ford in order to work thru this backlog. (Steve, do we recommend this approach?...lets respond ASAP)

Ford has concluded the Town Car underhood fire and thermal event and thermal anomaly history (my 927 and my 93?) is comprised of:
149 total events...broken down by Ford as follows

127 unknown causes
17 potential other causes
- 8 pressure switch causes.....or said a different way, Ford might say that P/S is the number one known cause

another cut at this.....broken down by Ford

106 events status unknown
38 events with engine off
8 events with engine on..... or said a different way, Ford might say engine on/off has little effect.....

Ford's executive team has established a plan to achieve root cause phase by March 3rd.

We believe Ford has obtained a two month window from NHTSA.... April 14th 'public disclosure' plan

Ford's executive team seems to be frustrated by the inability to get to root cause...to turn on/off by the 'science fair' type testing being done at both TI and Ford to create the issue

We have presented the concept of de-power of the P/S as a containment mechanism....the Ford 1st line people do not seem to be moving toward this....more Friday

We have also presented the concept of the possible application of the APT as a containment mechanism....little movement here too.

Ford's current thought seems to be that the preferred containment solution might be to replace the P/S with a Brake Pedal position sensor as is on-board the '99 Town Car. Looks like first line folks are focused here.....seems like Ford 1st line guys do not want to 'tap' into brake lines in the future?

A hand as unknown as on cars
Ford continues to move slowly.... no Dow or Dupont or Teves involvement 'results' yet....seems like they're still fixing to get ready

Ford's Fred Porter (my primary contact) is on vacation and I am making plans to connect with his 'actee' either late today (he's out ?) or first tomorrow to discuss and direct some of these points. I will publish a 'plan' memo early afternoon today.

A powered the the flow
Page 3
NRE.....

TI-NHTSA 016249

3
AUTOMOTIVE SENSORS AND CONTROLS (DA HANDE)
34 FOREST ST W/A 22-05
ATTLEBORO, MA 02783
TEL : (508) 238-3680
FAX : (508) 238-3745
PAGE: (800) 467-3700 PIN 604-2944

From: Rahman, Aziz
Sent: Wednesday, February 17, 1999 5:16 PM
To: Beringhouse, Steven; Dague, Bryan; McGuirk, Andy; Baumann, Russ; Sharpe, Robert
Subject: 2/17 Update

Main event: 2PM core team meeting. Highlights:

- Manager Len Brown agitated that Dow has not shown up yet. Will probably get them on board tomorrow or Friday.
- Exec. meeting at 4pm Friday. TI not invited. Will present test plan (copy with Steve B.).
- Ford team in DC today at NHTSA, asking for two months for public action.
- People surprised that on-vehicle characterization has not yet occurred. Leads provided on expediting this.
- Increasing tempo on getting more parts back for analysis.
- Re-emphasized need to study warranty data more closely for trending, and special causes.
- Increasing speculation that pure heat is not sufficient to ignite. Need spark.
- Will present brake pedal position sensor to execs as possible containment.

Two tests conducted today at AVT labs:

- Passed about 54 Amps at about 1V, through switch terminals, no fluid. Temp in connector area increased to about 182 F before system went open circuit. Dissection revealed spring arm deformed and twisted away from stationary. Will have pictures tomorrow.
- Passed about 50 Amps at about 1V through switch terminals, with switch based filled with approx 60% Brake Fluid, 50% salt water. Temp in connector area increased to about 270 F and stayed there. No smoke or ignition. Dissection revealed spring arm deformed. Pictures tomorrow.
- Will set up calibration station in Central Lab tomorrow.
- Will be returning to MA Friday 2pm flight. Later flights not available because of vacation week. Per Steve B.'s input, will plan to return next week.

Regards
Aziz

⇒ WITH OUT FEATURE -
A DESIGN PLAN

Rahman, Aziz

From: Douglas, Charles
Sent: Friday, February 06, 1999 11:31 AM
To: Baker, Gary; Dague, Bryan; Rahman, Aziz; Rowland, Thomas; McGuirk, Andy
Cc: Pachonka, John
Subject: FW: Town Car Brake Pressure Switch

From: Garpe, Robert
Sent: Friday, February 06, 1999 11:45 AM
To: Douglas, Charles
Cc: Badelgama, Steven; Sullivan, Martin; Bannam, Ross; Dodd, Bob
Subject: Town Car Brake Pressure Switch

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Fred Porter, Steve Reimers - Chassis Electronic Systems
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Summary

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).

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- What are the flash points for all components/material used in the switch? ✓
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- Does 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"? *Be hidden*
- Has our IP testing showed any failures or concerns (confirm IP testing results)? *Let us know*
- Are there any material differences between the different colored bases? *Yes...*
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Bob Sharpe

Rob Sharpe

Total Automotive
Phone (314) 328-8720
Fax (314) 328-8724
robsh@ta.com

Morris, Irene

From: Douglas, Charles
Sent: Friday, February 05, 1999 12:51 PM
To: Baker, Gary; Deque, Bryan; Rahman, Aziz; Rowland, Thomas; McGuirk, Andy
Cc: Pechonis, John
Subject: FW: Town Car Brake Pressure Switch

fyi,

Charlie

Charlie Douglas
(808) 238-3867 (F)
(508) 235-1598 (F)
c-douglas2@ti.com

From: Sharpe, Robert
Sent: Friday, February 05, 1999 11:45 AM
To: Douglas, Charles
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Best Regards,

Rob Sharpe

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

Baker, Gary

From: McGuirk, Andy.
Sent: Saturday, February 06, 1999 11:54 AM
To: Baumer, Russ; Roes, Elaine; Watt, Jim
Cc: Beringhouse, Steven; Dague, Bryan; Pachonis, John; Rowland, Thomas; Sullivan, Martha; Baker, Gary; Rahman, Aziz; Sharpe, Robert
Subject: 77 p/c '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 8D's of the time to build a case for the low PFM 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 leak rate number as well as using the leak test data from impulse testing as an alternate source. there will be a building need to deliver data and evidence by Tuesday via Aziz and we should consider an alternate path of anecdotal estimates should the records not be readily available. (I know we will need to identify 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 timeframe of interest. In an ideal situation we would take this raw data and project into WEIBULL success-failure estimate of cycle capability in the 'accelerated simulated' cycles used in our process controls. Elaine please coordinate the data collection here. (We will likely turn to reliability experienced quality engineers Paul specimen and Tushar Parikh 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 here so we have 'test-to-failure' data if available. Also, we should make a side note of the pressure profile used in the cycle 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 '95-'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 Charis Douglas below. As we assemble data and translate into information please track the differences between 87 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,

Page 1

TI-NHTSA 016255

ALTERNATIVE SENSORS AND CONTROLS Q&A HANDBOOK
14 FORBES ST F/W 11-08
ATTLEBORO, MA 01701
TEL : (508) 234-3000
FAX : (508) 234-3740
FAX2: (508) 487-3780 FAX 486-2044

From: Douglas, Charles
Sent: Friday, February 06, 1998 8:43 AM
To: McGuirk, Andy; Ross, Elaine
Subject: 77PS Matrix

Andy / Elaine,

Per our discussion:



Lincoln.doc

Regards,

Charlie

Charlie Douglas
(508) 234-3007 (F)
(508) 234-1500 (F)
c-douglas2@t.com

Fred,

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

Part Number	Actuation	Release Rate	Hexport	Thread	Scr O
F2VC 9F924 AB 90-160 (1)	20 min	Brown / pos 1	1512	3/8-24M	Snap
F6LC 9F924 AA 200-300 (2)	40 min	Black / pos 1	1512	3/8-24M	Snap
F2AC 9F924 AA 90-200 (3)	20 min	Natural / pos 2	1512	3/8-24M	Quiet
F58A 9F924 AA 90-160 (4)	20 min	Grey / pos 1	1512	3/8-24M	Quiet
F3TA 9F924 CA 200-300 (5)	40 min	Red / pos 1	1512	3/8-24M	Snap
94DA 9F924 AA 90-160 (6)	20 min	Natural / pos 2	o-ring	M10x1.0M	Quiet
F3DC 9F924 AA 90-160 (7)	20 min	Natural / pos 2	Scrubber	3/8-24M	Quiet
94IA 9F924 AB 90-160 (8)	20 min	Grey / pos 1	o-ring	3/8-24M	Quiet

Vehicle - Part Number Correlation

- (1) Crown Vic, Grand Marquis, Mark, Town Car
- (2) Econoline, Club Wagon
- (3) Crown Vic, Grand Marquis, Mark, Town Car
- (4) Winstar
- (5) Bronco, F-Series, Ranger, Explorer, Navigator, Expedition, Econoline, Club Wagon
- (6) Falcon
- (7) SEI Teurus
- (8) Capri

TIEN Correlation to Above

- (1) 77PSL2-1
- (2) 77PSL2-3
- (3) 77PSL3-1
- (4) 77PSL3-2
- (5) 77PSL3-3
- (6) 77PSL4-1
- (7) 77PSL3-2
- (8) 77PSL6-1

Morris, Irene

From: Douglas, Charles
Sent: Monday, February 08, 1999 2:41 PM
To: McGuirk, Andy; Sullivan, Martha
Cc: Beringhaus, Steven; Rowland, Thomas
Subject: RE: Ford ISAC Meeting

Martha,

Andy asked me to provide as much of the consolidated information as I am aware of. Attached, please find two pieces of direct correspondence from myself to Ford delineating application usage information:



Usage Matrix - Speed
Control Descri..



Lincoln.doc

In addition, we have provided the following in direct response to Ford requests / questions:

- Overview of switch design / function
- Copy of 8D delineating mating connector issue on Econoline
- Component level prints for 77PS
- Assembly process flow for 77PS
- Melt / Char temperature information related to Noryl GTX material and Kapton
- Design change matrix / history (will be carried out by Aziz tonight)
- Hosted Ford visit on January 8 to perform joint failure analysis on one switch captured from fire vehicle
- Ideas for fusing the switch in circuit (Discussion between Steve B. and Fred P.)

Information we owe / questions we have been asked:

- Process change history (likely complete tomorrow)
- Flash points for all components / materials used in switch
- Are material specs submitted to Ford the same as the material specs used on the MY92/93 applications
- Does our DFMEA or PFMEA identify any potential fire occurrences
- How do we control terminal positioning in production, any chance of the terminals to short?
- Has our in-process testing showed any failures or concerns
- Are there material differences between the different colored bases (will be answered by Design Change Matrix)
- What testing / investigating is TI doing internally
- Do we sell the brake switch outside of Ford applications (yes, Land Rover)
- Provide color pictures of Econoline failure analysis report

Steve,

If there are other questions which Fred may have put to you directly that I am not aware of, or additional information we may have volunteered (i.e. in-line relay?) please add to this msg.

Regards,

Charlie

Charlie Douglas
(508) 236-3887 (F)

(508) 238-1556 (F)
c-douglas2@ti.com

From: Sullivan, Martha
Sent: Monday, February 08, 1999 9:02 AM
To: McGuirk, Andy
Cc: Douglas, Charles; Beringhouse, Steven; Rowland, Thomas
Subject: Ford ISAC Meeting

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

Morris, Irene

From: Douglas, Charles
Sent: Friday, December 18, 1998 11:36 AM
To: 'Porter, Fred (Ford)'
Cc: Sharps, Robert
Subject: Usage Matrix - Speed Control Deactivation Pressure Switch

Fred,

The following represents a rough usage matrix over time:

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

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

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

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

Regards,

Charlie

Charlie Douglas
(508) 236-3857 (P)
(508) 236-1596 (F)
c-douglas2@ti.com

Fred,

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

<u>Part Number</u>	<u>Actuation</u>	<u>Release</u>	<u>Run</u>	<u>Hexport</u>	<u>Thread</u>	<u>S or Q</u>
F2VC 9F924 AB 90-160 (1)		20 min	Brown / pos 2	J512	3/8-24M	Snap
F6LC 9F924 AA 200-300 (2)		40 min	Black / pos 1	J512	3/8-24M	Snap
F2AC 9F924 AA 90-200 (3)		20 min	Natural / pos 2	J512	3/8-24M	Quiet
F5BA 9F924 AA 90-160 (4)		20 min	Grey / pos 1	J512	3/8-24M	Quiet
F3TA 9F924 CA 200-300 (5)		40 min	Red / pos 1	J512	3/8-24M	Snap
94DA 9F924 AA 90-160 (6)		20 min	Natural / pos 2	o-ring	M10x1.0M	Quiet
F3DC 9F924 AA 90-160 (7)		20 min	Natural / pos 2	Snubber	3/8-24M	Quiet
94JA 9F924 AB 90-160 (8)		20 min	Grey / pos 1	o-ring	3/8-24M	Quiet

Vehicle -- Part Number Correlation

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

TI P/N Correlation to Above

- (1) 77PSL2-1
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- (3) 77PSL3-1
- (4) 77PSL3-2
- (5) 77PSL3-3
- (6) 77PSL4-1
- (7) 77PSL5-2
- (8) 77PSL6-1

TI-NHTSA 016261

Epstein, Sally

From: Douglas, Charles [c-douglas2@email.mc.t.com]
Sent: Monday, February 08, 1999 12:42 PM
To: McGuirk, Andy; Sullivan, Martha
Cc: Beringhaus, Steven; Rowland, Thomas
Subject: RE: Ford ISAC Meeting

 Usage Matrix - Speed
Control D

 Lowered out

Martha,

Andy asked me to provide as much of the consolidated information as I am aware of. Attached, please find two pieces of direct correspondence from myself to Ford delineating application usage information:

<<Usage Matrix - Speed Control Deactivation Pressure Switch>> <<Lincoln.doc>>

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- * Overview of switch design / function
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- * Assembly process flow for 77PS
- * Melt / Char temperature information related to Noryl GTX material and Repton
- * Design change matrix / history (will be carried out by Azis tonight)
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- * Ideas for fusing the switch in circuit (Discussion between Steve B. and Fred P.)

Information we owe / questions we have been asked:

- * Process change history (likely complete tomorrow)
- * Flash points for all components / materials used in switch
- * Are material specs submitted to Ford the same as the material specs used on the MY92/93 applications
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- * How do we control terminal positioning in production, any chance of the terminals to short?
- * Has our in-process testing showed any failures or concerns
- * Are there material differences between the different colored bases (will be answered by Design Change Matrix)
- * What testing / investigating is TI doing internally
- * Do we sell the brake switch outside of Ford applications (yes, Land Rover)
- * Provide color pictures of Econoline failure analysis report

Steve,

if there are other questions which Fred may have put to you directly that I am not aware of, or additional information we may have volunteered (i.e. in-line relay?) please add to this msg.

Regards,

Charlie

Charlie Douglas
(508) 236-3657 (F)
(508) 236-1598 (F)

TI-NHTSA 016262

c-douglas2@ti.com

From: Sullivan, Martha
Sent: Monday, February 08, 1999 9:02 AM
To: McGuirk, Andy
Cc: Douglas, Charles; Beringhouse, Steven; Rowland, Thomas
Subject: Ford ISAC Meeting

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

2/8/99



**TEXAS
INSTRUMENTS**

FACSIMILE TRANSMITTAL

TO: Name: Fred Porter
Location: Ford
Mail Station:
Phone Number: 313-845-3722
FAX Number: 313-390-4145

FROM: Steven Brighthouse
TEXAS INSTRUMENTS MS
Phone Number: 508-236-3378
FAX Number: 508-236-3153

Total number of pages (including header page): 3

COMMENTS:

TI-NHTSA 016264

Steven Bragdon
Design Engineering Manager
Transmission Department
Auburn, MA 02703

February 8, 1999

Ford,

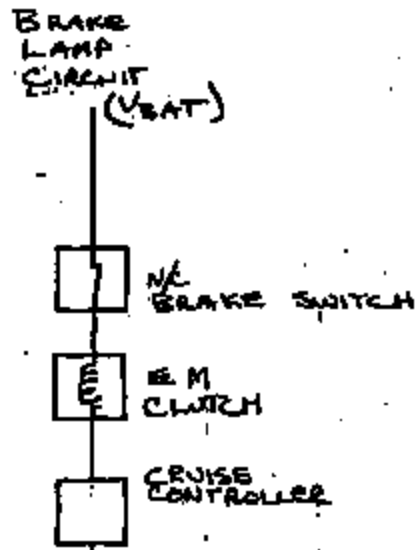
As we discussed over the phone Friday, per your request we looked at the possibility of adding a fuse in line with the cruise relay, however, we think a more appropriate solution might be to use a relay circuit (schematics attached). Our understanding of the application is that the brake pressure switch is a failure component to shut off the cruise control if the standard brake light switch fails. The brake relay themselves only needs to be powered when the cruise control is on. By placing a normally open relay in the circuit not only does the relay when the cruise control is engaged, the relay will only be powered when it needs to be, when the cruise control is enabled. If you are correct that the high current draw is the reason of (insert a relay would be a better solution than in line fuse because the relay prevents the high current situation from happening rather than reducing once it does occur. If you have any questions, please give me a call at 508-238-3172.

Regards,
Steven Bragdon

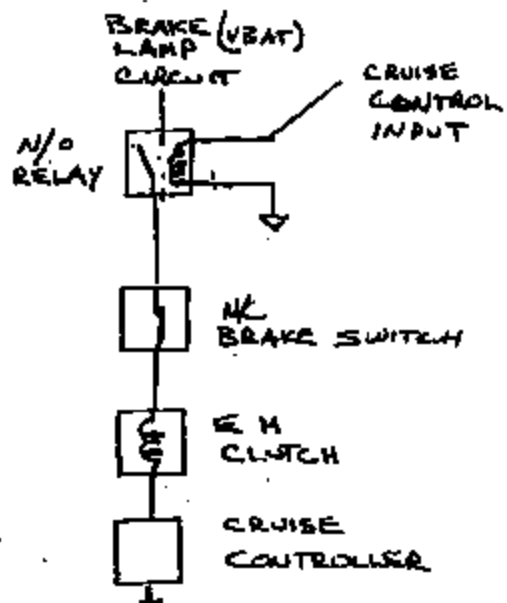
PRODUCED BY FORD
FORD MOTOR COMPANY
FORD MOTOR COMPANY
FORD MOTOR COMPANY
FORD MOTOR COMPANY

3713 1252

PASSIVE



PROPOSED



Steve Bragdon, TI 1/27/99

3713 1251

TI-NHTSA 016266

PRODUCED BY FOR

FEB-08-98 MON 03:55 PM TEXAS INSTRUMENTS

FAX NO. 5082363153

P.01



**TEXAS
INSTRUMENTS**

FACSIMILE TRANSMITTAL

TO:

Name: Fred Potter

Location: Ford

Mail Station:

Phone Number: 313-845-3722

FAX Number: 313-390-4145

FROM:

Steven Bridgman

TEXAS INSTRUMENTS MS

Phone Number: 508-236-3378

FAX Number: 508-236-3153

Total number of pages (including header page): 3

COMMENTS:

FEB 08 '98 14:51

411000000

POST 01

Steven Beringhaus
Design Engineering Manager
Teac Instrument Incorporated
Andover, MA 02703

February 8, 1999

Fred,

As we discussed over the phone Friday, per your request we looked at the possibility of adding a fuse in line with the pressure switch, however, we think a more appropriate solution might be to use a relay circuit (schematic attached). Our understanding of the application is that the brake pressure switch is a fail-safe component to shut off the cruise control if the standard brake light switch fails. The brake switch therefore only needs to be powered when the cruise control is on. By placing a normally open relay in the circuit and only closing the relay when the cruise control is activated, the switch will only be powered when it needs to be, when the cruise control is enabled. If you are correct that the high current draw is the source of ignition a relay would be a better solution than an in line fuse because the relay prevents the high current situation from happening rather than reacting once it does occur. If you have any questions, please give me a call at 508-236-3378.

Regards,
Steven Beringhaus

PRESNT

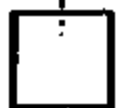
BRAKE LAMP CIRCUIT (VBAT)



N/C BRAKE SWITCH



EM CLUTCH



CRUISE CONTROLLER



PROPOSED

BRAKE LAMP CIRCUIT (VBAT)

N/O RELAY



CRUISE CONTROL INPUT



N/C BRAKE SWITCH



EM CLUTCH



CRUISE CONTROLLER

Steve Berghouse, TI 2/4/99

Epstein, Sally

From: Rahman, Aziz [arhman@gmail.mc.n.com]
Sent: Tuesday, February 09, 1999 9:58 PM
To: McGuirk, Andy; Douglas, Charles; Beringhaus, Steven; Dague, Bryan; Baker, Gary; Baumann, Russ; Sullivan, Martha; Sharpe, Robert; Rowland, Thomas
Subject: 77P8 - 2/6/99 Summary

Had a fairly productive Day 1 at Ford today. Major highlights:

- Technical Review meeting set for Thursday, 2/11/99, TI participation undecided.
 - * Audience: Luxury Car Chief Engineers, Luxury Car Chief Buyer
 - * Agenda: Lincoln Town Car Underhood Fires
 - * Expect further clarity on Total # of fires, Locationally what quadrant, what subset is switch, connector, harness & relay pack.
 - * Key expected outcome: Management will provide advice on near term direction.
 - * Fred is planning to present switch case in an 8D format.
- Core Team meeting set for Wednesday 2/10/99, TI will participate
 - * Prepare groundwork for 2/11 8D
 - * Update team on Ford/TI actions to date
- Central Research Lab Visit
 - * Switches under investigation:
 - * Memphis Switch - From vehicle with fire event
 - * Switch A - From vehicle with fire event,
 - * Switch B - From vehicle with fire event - switch not available due to pending legal issues
 - * Switch C - From vehicle with fire event
 - * Switch D - From 97 Crown Vic Police Car, leaker, cruise inop
 - * Switch E - vehicle n/a, non leaker, non issue switch, for reference
 - * Switch F - vehicle n/a, leaker, cruise intermittent
 - * Steve LaFouche has completed his assessment of the "Memphis" switch, which was initially jointly analyzed by Ford/TI at TI. His analysis points out the tears in the Kapton diaphragm. Additionally, Kapton appears to be quite brittle. This brittleness will be discussed later below. I will fax a copy of his report on the Memphis switch to Bryan tomorrow.
 - * Switches A & C were severely damaged, to the point of starting to melt the crimp ring. Very little analysis possible. Fred opined that it was possible that these switches were not the source of the fire. Per Fred, to date, 2 switches are known sources. The Memphis switch and another?
 - * Switches D & F are primarily being looked at to assess Kapton status. Possible tears evident in optical photos. SEM will be available tomorrow.
- Building 5 Lab Visit
 - * Allan Janotick is Fred's technician and is running the 24V resistivity test. The connector cavity is filled with non-aged Brake Fluid. System is powered up through one of the terminals and grounded via the crimp ring (I would have preferred the hexport).
 - * Current draw being checked with an ammeter in series. Ranging between 4.45 mA and 8.74 mA.
 - * Plan is to expose switch to hot temps in a chamber.
- General Discussions:
 - * Possible actions:
 - * Remove power to switch by removal of connector. High customer impact as cruise control function will be disabled. Could possibly satisfy NHTSA as an immediate action.
 - * Reviewed relay concept, with favorable reception. Need to find CC feed in vicinity.
 - * Reviewed power on IGW only. Shared history on ITT approach. Will meet with speed control people tomorrow.
 - * Kapton Wear

TI-NHTSA 016289

* This is gaining momentum as an explanation of tear patterns observed in switches. Fred would like to understand if the wear on the Memphis switch is at "6 sigma limit". We will analyze other non-fire parts tomorrow to see what the wear distribution looks like. We need to compare a significant number of switches from vehicles, lab tests, production impulse tests etc.

* We need a solid method to quantify kapton wear. We are looking at ways to map the topology of a kapton surface. We also need a method to quantify "brittleness" of worn kapton. Any ideas? It will not be possible to do any destructive tests.

* Whatever resolution is arrived at for the situation at hand, Fred is heading towards "improving switch robustness". He wants Dupont brought in the loop to understand aging of kapton, specially in aged brake fluid with water. Is there a "magic diaphragm material?"

* Switch D 97 Crown Vic Police Car, had FZAC, quiet switch. Fred is leaning to dismiss snap vs quiet theory for increased kapton wear.

- Actions from 2/9/99

1. Provide Steve L with 2 switches from 92/93 Town Cars with varying mileage for Kapton wear study - Aziz
2. Complete subjective "Brittleness" evaluation for above two parts + Memphis part + parts D & F - Steve L
3. Complete Kapton Topography study with Cadeyes on all parts above except Memphis part. - Steve L
4. Obtain update on 2 resistivity tests in progress at TI - Bryan/Aziz
5. Document data to date from Allen Janotik test - Aziz
6. Follow up with Dupont on change in Kapton properties with time/temp in aged Brake Fluid - Bryan/Aziz
7. Assess revising present Allan J. test to expose switch to high temp. - Aziz
8. Review history of other diaphragm materials as backup. Bryan, we had done some evaluation with elastomeric, stainless steel and PEEK diaphragms way back. Please see if you can resurrect any data.

Bryan, I will call you tomorrow for an update on our resistivity tests. Additionally please dig up any data we may have relative to kapton aging in brake fluid. Dave Czarn and John Brennan did extensive for Nissan, but probably used power-strg fluid.

I do not have a phone # yet, but am sitting across the desk from Fred. You may contact me via Rob.

More tomorrow.

Regards
Aziz.

Morris, Irene

From: Rahman, Aziz
Sent: Tuesday, February 09, 1999 11:57 PM
To: McGuirk, Andy; Douglas, Charles; Beringhaus, Steven; Dague, Bryan; Baker, Gary; Baumann, Russ; Sullivan, Martha; Sharpe, Robert; Rowland, Thomas
Subject: 77PS - 2/8/99 Summary

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