

-MSB M# 413839 FR=SB01 TO=PCME SENT=02/21/92 08:32 AM
R# 376 BT=C DIV=0050 CC=00101 BY=SB01 AT=02/21/92 08:32 AM

TO: Ted Ballard	ETB	Steve Major	BMFH
Tom Burke	MFPC	Dale Sogge	FFUN
Jeff DiDomenico	ELB	Mark Robinson	PCME
Charlie Douglas	CMP1	Rusty Struble	RCB2
Paul Kotch	PRK1	Jim Watt	PCBA

CC: Tom Charbonneau (delivered separately)
Dave Czarn

FR: Steve Offiler SB01

SUB: Weekly Highlights

TI-NHTSA 004484

FORD MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

57 AND 57 VALIDATIONS: The decision has been made to significantly elevate the priority on these programs. All six are planned to progress more or less in parallel, but rearrangements can and will be made in order to finish 57PBL11-3 and 57PSF3-3 to avoid jeopardizing the 920415 date promised to Ford. The internal motivation for completing the other four ABAP is to expedite the changeover of 57Lx-x business to 87Lx-x, which improves company profits. We are presently working on the detailed timing, and in parallel Jeff has begun to co-ordinate device builds and equipment requirements. Additional resources required will be determined by the timing charts. The elevated priority of these six programs tends to place everything else on the back burner.

SILENT DEVICE: Initial meetings have been held with Mechanization to begin to explore production techniques for piloting/pinning (calibration) silent devices. Pending test results on the first lots of silent ultra-low-differential discs from the disc dept., we'll begin looking at force- and pressure-deflection curves to determine characteristics that would be correlatable to pinning technique, such as inflection points in the hatchet curves and determination of slope changes that define these points, etc. etc. Additionally, we'll be doing more work with the numerical approach originally proposed, where the ratio's of device differential vs. act. sigma across a range of calibrator settings produce a local peak at the center of the pinning window. Mechanization has taken a first-pass look at an automatic machine to collect hatchet-curve data on sensors to find the center of the pin window. The cost is very roughly \$80K.

DIAPHRAGM LIFE / MIBC TESTING: Progress on the current lots of diaphragm-life experiments has been halted by the validations. Some progress has been made: we have discovered that features which stretch the Kapton during crimp leave asymmetric strain patterns in the diaphragm (not teardrops, but actually worse); the lots using small round diaphragms constrained by the gasket (rather than clamped by the hex flange/washer) look quite good, and we plan to eventually cycle a lot of these; and the two-vs-three full round Kaptons running to determine drift performance has produced a leak in the two-pc lot.

Stan Homol has provided a bagful of miscellaneous 52PS and 57PS devices built in 1986. We plan to choose a few 52's from the bag (built on AMI) and open them up to look for teardrops.

Devices using ultrasonic-welded movable terminal assemblies and 10B21 hexports have been built to undergo a hybrid impulse and Thermal Cycle test. This is designed to provide data on the life of these components at temperature, pressure, and cycling extremes. The hybrid test was originally conceived to expedite individual impulse and TC tests and distribute the temperature cycling throughout life cycling. This test is on hold.

While cycling production devices recently (looking for spring arm cracks at the pump) we had one PC device that went open-circuit at high temperature. It actually displayed continuity very briefly during release, which we attributed to bounce. The switching action seems to suggest the device was pinned very short. We opened the device, and discovered the base was calibrated to .092" (outside the .089" +/- .002 machine settings) and the T-pin was .142". Our calculations show this is at least .003" too short. We need to understand if thermal expansion is causing a pin-shift at high temp, and/or if temperature causes characteristic changes to the hatchet curve. This may lead to revised room-temp pinning to compensate, shooting for the high end of the window instead of the center.

Regards,
Steve O.

TI-NHTSA 004485

-MSG M#- 30705 FR-JW02 TO-GAMY SENT=02/24/92 02:00 PM
R#-069 ST-C DIV-0050 CC-00149 BY-JW02 AT=02/24/92 02:00 PM

February 24, 1992

To: Cheryl Bettinger	ATQC	Steve Offiler	SBO1
Tom Burke	MFPC	George Olear	AETL
Dave Czarn	ZARN	Elaine Rose	GAMY
Charlie Douglas	CMP1	Matt Sellers	PCME
Dick Gariepy	MFPC	Paul Sherman	NAPA
Rusty Struble	RCS2	Ed Smith	PCQA
Steve Major	SMFH	Gary Snyder	GHS1
Andy McGuirk	PCQA	Bill Sweet	PCME
Norn Freda	WHLZ	Beth Haskell	WHLZ
cc: Bill Congdon	MFPC	Martha Sullivan	CPPC
Tom Charboneau	TC	Ray Tourangeau	PCME
Chuck Stanfa	ATPA	Neil MacKinnon	NAPA

Fr: Jim Watt JW02

Re: ITT Teves Quality Audit Summary

I would like to take this opportunity to thank everyone involved with the recent ITT-Teves audit for their time and efforts. We scored very well with the auditor, earning a "world class supplier" rating. I have the total score sheet if anyone is interested.

Some ITT-Teves suggestions are as follows:

	Responsibility -----	Date -----
1. Introduce customer-specific QFD.	C. Douglas	1Qtr 92
2. Centralize gage R & R files.	P. Sherman	1Qtr 92
3. Expand AQP information in Quality manual.	J. Watt	2Qtr 92
4. Locked quarantine of all suspect material at Receiving Inspection.	C. Bettinger	1Qtr 92
5. Introduce production sign-off of new products to manufacturing.	C. Douglas	1Qtr 92
6. Incorporate use of PFMEAs at operator stations on-line.	B. Sweet	2Qtr 92

Please let me know if you have any questions on the visit summary.

Regards,

Jim msg: JW02 ext. 1719

TI-NHTSA 004486

FINAL INSPECTION 77P02-1

DATE: 2-24-92

CUSTOMER P/N F24C-9F924-48

MISC LOT 2-20
REEL #1
LOT #5
WASHER LOT 129

MAT. I.D. 74864-AC7-4
CUP LOT #11
CONV. LOT 134
QTY. 2000

MISC LOT 2-21
REEL #1
LOT #4
WASHER LOT 129

MAT. I.D. 74864-AC7-3
CUP LOT #11
CONV. LOT 134
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	132	128	129	133	137	131	132	132	127	131	127	128	129	125	139	135	131	134
RELEASE	67	62	65	60	69	63	59	64	64	64	70	66	68	65	69	67	73	64
DIFF.	66	66	64	73	68	68	73	68	63	65	69	62	61	60	64	68	59	68
2 VOLT IMP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3 CUR. LEAK	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4 PROOF	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5 IMPULSE	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
ACTUATION	130	132	130	135	140	—	—	—	—	135	130	130	130	130	—	—	—	—
RELEASE	66	65	65	60	80	—	—	—	—	70	80	70	70	70	—	—	—	—
VOLT IMP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CHRP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 BURST	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—
8 BOWSTROKE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CHRP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10 TERM. STG	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ACTUATION	—	—	—	—	—	—	—	130	130	—	—	—	—	—	—	—	140	135
RELEASE	—	—	—	—	—	—	—	65	65	—	—	—	—	—	—	—	80	70
VOLT IMP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
CUR. LEAK	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
PROOF	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
CHRP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓

TI-NHT8A 004488

FINISHED PRODUCTION ROUTING

WHITE CANARY Route to Finished State
PINK Route to Dept. Supervisor

DEVICE NUMBER

77PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.

2.

3.

4.

2-21

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

FEB 24 1992

Form 18902

DATE

2-22-92

DEPARTMENT

294

FINISHED PRODUCTION ROUTING

WHITE CANARY Route to Finished State
PINK Route to Dept. Supervisor

DEVICE NUMBER

77PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.

2.

3.

4.

2-20

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

FEB 24 1992

Form 18902

DATE

2-22-92

DEPARTMENT

294

-MSG Nf= 112259 FR=ZARN TO=GAMY SENT=02/26/92 03:08 PM
Rf=079 ST=C DIV=0050 CC=00101 BY=ZARN AT=02/26/92 03:08 PM

FEBRUARY 26, 1992

TO: RUSTY STRUBLE	RCS2	CC: TOM CHARBONEAU	TC
MIKE DeMATTIA	MD3	JOHN KOURTESIS	MDES
CHARLIE DOUGLAS	CMP1	STEVE MAJOR	SMFH
DICK GARIEPY	MFPC	ANDY McGUIRK	PCQA
PAUL KOTCH	PRK1	ED O'NEILL	EJON
JOE LAZARE	JNL8	NORM FREDA	WHL2
STEVE OFFILER	SBO1	GARY SNYDER	CPPC
MATT SELLERS	PCME	MARTHA SULLIVAN	CPPC
BILL SWEET	PCME	RAY TOURANGEAU	PCME
JIM WATT	PCQA	BILL CONGDON	MFPC
TERRY RODRIGUEZ	MFPC	STEVE MCCOOEY	MDES
		ELAINE ROSE	GAMY

FR: DAVE CZARN ZARN

SJ: FORD CRUISE CONTROL PRESSURE SWITCH START-UP MEETING

MEETING

THE NEXT MEETING IS SCHEDULED FOR:

DATE: 2/27/92 (THURSDAY)
TIME: 10:00 - 11:30 AM
PLACE: MARKETING CONFERENCE ROOM

CHARLIE WILL HOLD THE MEETING THURSDAY IN MY ABSENCE. I APOLOGIZE THAT THE LIST BELOW HAS NOT BEEN UPDATED TO INCLUDE ITEMS FROM OUR LAST MEETING.

77PS

Hexport:

*Make Hexport
MIO x 1.0.6*

. J512 GAGE R&R STUDY	SELLERS	01/23	ORIG.
		02/07	
. NOTIFY FORD OF CHANGE TO 10B21	DOUGLAS	on hold	
* ELCO EXPLANATION OF 10B21 COST	KOTCH	01/23	ORIG.
		02/13	REV.

Production Issues:

* PLAN FOR ADDRESSING FLAKE ISSUE	SELLERS/	02/13
	WATT	
. PLAN FOR DETERMINING IF CALIBRATING AT THE EXTREMES IS A YLD. OR LIFE PROB.	SELLERS	03/05
. UPDATE PRODUCTION COMPONENT AND ASM. DRAWINGS TO CURRENT DESIGN LEVEL	OFFILER	02/13

Sensor Assembly Machine:

. PRIORITIZE REMAINING UPGRADE ITEMS	SELLERS	ONGOING
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Base Assembly Machine:

TI-NHTSA 004490

. UPDATE PROGRESS OF ULTRASONICALLY
WELDED SPRING ARM/TERMINAL ASSEMBLY

SELLERS/ OFFILER ONGOING

Final Assembly Machine:

ISR:

- . PROVIDE QUARTERLY REPORTING OF ABOVE
- * CORRECT TERMINAL POSITION
- * RE-RUN P/C SAMPLES SO TERM'L POS'N
DATA CAN BE COLLECTED
- * MEASURE SAMPLES
- * SUBMIT DANA/PITTS PKGS

WATT start 03/31
SELLERS 01/16 ORIG.
02/13 REV.
SELLERS 01/16 ORIG.
02/13 REV.
SELLERS/ 01/17 ORIG.
ROSE 02/15 REV.
WATT 01/23 ORIG.
02/15 REV.

Diaphragm Life:

TARGET DATE FOR BUILDING P/C WITH FULL AMI CRIMP 02/24

- * UPDATE TEAM ON IMPLEMENTING FULL AMI
CRIMP AND TESTING OF MODIFIED DESIGNS OFFILER/ ONGOING
SELLERS

Ultra-Low Differential Switch MY93

- * ESTABLISH LIST OF ACTIONS REQ'D TO
START-UP ULTRA LOW DIFF'L SWITCH SELLERS 02/14
- * FIRM QUOTE FOR ULTRA-LOW DIFF'L SWITCH ^{OLD} SELLERS 02/27 changed
- . REPORT RESULTS TO FORD/TEVES OFFILER THD

Miscellaneous:

- . SEND LETTERS TO FORD/GM AND TIER 1'S;
3A THREAD GAGING WATT/ 1/30 ORIG.
CZARN 2/14 REV.

Production Plan:

- . MAINTAIN RUNNING TOTAL OF L/T (L2-3) STRUBLE ONGOING
SWITCHES LEADING TO 100K FOR AMORTIZATION
Status Date Total Shipped
Feb 06 17,850

- . UPDATE PRODUCTION PLANS STRUBLE ONGOING

	P/C 77PSL2-1	L/T 77PSL2-3
NOV	6.4	13.6
DEC	35	9
JAN	75	7
FEB	76.4	11.4
MAR	47.1	12.6

REGARDS,
DAVE CZARN \52B-FORD

TI-NHTSA 004491

FINAL INSPECTION 77PIL2-1

DATE: 2-26-92

CUSTOMER P/N F20C-WY24-40

DISC LOT 2-24
REEL #1
LOT #3
WASHER LOT 129 1-CUT

WAT. I.D. 74868-AC7-3
CUP LOT #11
CONV. LOT 135
QTY. 2000

DISC LOT 2-25
REEL #1
LOT #2
WASHER LOT 129 1-CUT

WAT. I.D. 74868-AC7-4
CUP LOT #11
CONV. LOT 135
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	125	124	116	130	128	121	128	126	126	124	126	125	123	126	126	121	125	125
RELEASE	58	55	55	57	61	48	57	59	52	69	57	60	55	41	37	53	61	64
DIFF.	67	69	61	73	67	73	71	67	76	55	69	65	68	45	69	68	64	61
2 VOLT DROP	---	---	---	---	---	L	L	---	---	---	---	---	---	---	L	L	---	---
3 CUR. LEAK	---	---	---	---	---	L	L	---	---	---	---	---	---	---	L	L	---	---
4 PROOF	---	---	---	---	---	L	L	---	---	---	---	---	---	---	L	L	---	---
5 IMPULSE	✓	✓	✓	✓	✓	---	---	---	---	---	---	---	---	---	---	---	---	---
ACTUATION	135	135	115	122	135	---	---	---	---	130	136	135	135	125	---	---	---	---
RELEASE	60	55	55	60	60	---	---	---	---	76	60	60	55	60	---	---	---	---
VOLT DROP	✓	✓	L	✓	✓	---	---	---	---	L	L	L	L	L	---	---	---	---
CUR. LEAK	✓	L	L	3	L	---	---	---	---	L	L	L	L	L	---	---	---	---
PROOF	✓	L	L	✓	✓	---	---	---	---	L	L	L	L	L	---	---	---	---
CREEP	✓	L	L	✓	✓	---	---	---	---	L	L	L	L	L	---	---	---	---
7 BURN	✓	✓	---	---	---	---	---	---	---	L	L	---	---	---	---	---	---	---
8 DIMENSION	---	---	---	---	---	---	---	L	L	---	---	---	---	---	---	---	L	L
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CREEP	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10 TORN STR	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ACTUATION	---	---	---	---	---	---	---	---	---	130	135	---	---	---	---	---	125	130
RELEASE	---	---	---	---	---	---	---	---	---	65	35	---	---	---	---	---	65	65
VOLT DROP	---	---	---	---	---	---	---	---	---	✓	✓	---	---	---	---	---	L	L
CUR. LEAK	---	---	---	---	---	---	---	---	---	L	L	---	---	---	---	---	L	L
PROOF	---	---	---	---	---	---	---	---	---	L	L	---	---	---	---	---	L	L
CREEP	---	---	---	---	---	---	---	---	---	L	L	---	---	---	---	---	L	L

TI-NHTSA 004493

FINISHED PRODUCTION ROUTING		WHITE CANARY PINK →	Route to Finished Store Route to Dept. Supervisor
DEVICE NUMBER 770562-1			
SPECIAL REQUIREMENT		TOTAL QUANTITY 9	
MANU. ORDER NUMBER		NO SUBTOTALS	
1. 2. 12-25 3. 4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 19282			
DATE 2-25-92		DEPARTMENT 294	

FINISHED PRODUCTION ROUTING		WHITE CANARY PINK →	Route to Finished Store Route to Dept. Supervisor
DEVICE NUMBER 770562-1			
SPECIAL REQUIREMENT		TOTAL QUANTITY 9	
MANU. ORDER NUMBER		NO SUBTOTALS	
1. 2. 2-24 3. 4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 19282			
DATE 2-25-92		DEPARTMENT 294	

FINAL INSPECTION 77982-1

DATE: 2-26-92

CUSTOMER P/N F2VC-WF924-AB

DISC LOT 2-26
REEL #1
LOT #1
WASHER LOT 129 1-CUT

NAT. I.D. 74868-AC7-4
CUP LOT #11
CONV. LOT 135
QTY. 2000

DISC LOT 2-27
REEL #1
LOT #4
WASHER LOT 129 1-CUT

NAT. I.D. 74868-AC7-4
CUP LOT #11
CONV. LOT 135
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	134	125	130	126	126	127	121	121	127	127	119	130	133	121	121	130	125	125
RELEASE	42	46	71	61	60	66	61	65	69	63	63	63	67	60	59	59	64	63
DIFF.	72	59	58	65	66	61	60	56	58	64	56	67	66	61	62	71	61	62
2 VOLT DROP	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
3 CUR. LEAK	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
4 PROOF	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
5 TYPULSE	OK	OK	OK	OK	OK	—	—	—	—	OK	OK	OK	OK	OK	—	—	—	—
ACTUATION	130	125	130	130	130	—	—	—	—	125	120	130	130	120	—	—	—	—
RELEASE	60	60	65	60	55	—	—	—	—	60	40	60	60	60	—	—	—	—
VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CREEP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 BURST	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—
8 DISINTEGR.	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CREEP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
10 TERM. SYN	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
ACTUATION	—	—	—	—	—	—	—	125	130	—	—	—	—	—	—	—	130	125
RELEASE	—	—	—	—	—	—	—	65	70	—	—	—	—	—	—	—	65	65
VOLT DROP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
CUR. LEAK	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
PROOF	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
CREEP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓

TI-NHTSA 004495

FINISHED PRODUCTION WHITE } Route to Finished Goods
 ROUTING CANARY }
 PINK } Route to Dept. Subvise

770512-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.
2. 2-24
3.
4.

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

187711
 ACCEPT
 FEB 26 1982

Form 18282

DATE 2-25-92

DEPARTMENT 294

FINISHED PRODUCTION WHITE } Route to Finished Goods
 ROUTING CANARY }
 PINK } Route to Dept. Subvise

770512-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.
2. 2-27
3.
4.

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

187723
 ACCEPT
 FEB 26 1982

Form 18282

DATE 2-25-92

DEPARTMENT 294

-MSG N#- 171821 FR=SB01 TO=CMF1 SENT=02/28/92 08:02 AM
R#-038 ST=C DIV=0050 CC=00101 BY=SB01 AT=02/28/92 08:02 AM
TO: Ted Ballard ETS Paul Kotch PRK1
Tom Burke MFPC Steve Major SMFH
Jeff DiDomenico ELB Dale Sogge FFUN
Charlie Douglas CMF1 Matt Sellers PCME
Norm Freda WHLZ Rusty Struble RCS2
Dick Gariapy MFPC Jim Watt PCQA

CC: Tom Charboneau (delivered separately)
Dave Czarn

FR: Steve Offiler SB01

SJ: Weekly Highlights

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FORD MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

57PS and 87PS VALIDATIONS: The timing chart to complete the six parallel validations has been completed. We're working to complete the background details (equipment preparation, co-ordination with TSL, etc) prior to receipt of 46412 and 46515 bases which will allow switch builds to commence. Jeff is co-ordinating the builds, and thus far we've got all the sensors taken care of. We're getting excellent support and co-operation from production.

SILENT DEVICE: Ted Ballard is beginning to work on the EEO for discs with "lowest attainable differential." These will be constructed like the previous prototype lots, using a pre-heat-treat snap sound. Mechanization is presently constructing a pressure/deflection (noncontact) system for the Disc Department, and they're looking into whatever modifications would be required in order to make this equipment suitable for ultra-low-diff discs. I've asked Ted to return the bag of ULD prototypes he borrowed a couple of weeks ago, so we may do some of our own F/d, P/d, and numerical pin-window techniques. The priority on these efforts is obviously impacted by the validation efforts.

PRODUCTION ISSUES: Disturbing news to report on the suspected high-temp pin shift issue. Matt delivered to us 12 devices which had been calibrated to a new target, .087" vs. the previous .089". This was intended to move the calibration to the high side of the window to counteract temperature shifts. When we characterized the devices, we found nine normal ones, two creep releases (which were expected) and one creep actuation (not expected). At high temperature, all three creepers exhibited the loss of continuity phenomenon! We have no hypothesis at present which would explain this behaviour. Keep in mind that these devices are representative of regular production, meaning that some statistical percentage of parts are shipping with this problem. It may not manifest itself in the field, but if it does, we can expect RMR's to begin in the southern states as the warm months approach. Incidentally, one of the twelve parts built with ultrasonic weld springs is also exhibiting this problem at high temp. As soon as we can, we plan to take a look at the contact transfer using a 'scope, since all the above is based on the erratic flashing action of a simple diode which is conducting a trace current through each device.

CUSTOMER ISSUES: We've got an urgent sample request from UTA in Britain. They need a total of 100 (25 ASAP) 57PSL11-2's for a Phase II VP build of CDW27. Apparently the power steering systems have already been shipped to the customer without switches installed, hence the urgency. We've got the correct-color 46412 bases, and all other required components to complete this build.

TI-NHTSA 004497

Regards,
Steve O.

TI-NHTSA 004497A

HIGHLIGHTS
Stephen B. Offler
Week Ending 92-02-28

Handwritten signature/initials



FORD MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

57PS and 87PS VALIDATIONS: The timing chart to complete the six parallel validations has been completed. We're working to complete the background details (equipment preparation, co-ordination with TSL, etc) prior to receipt of 46412 and 46515 bases which will allow switch builds to commence. Jeff is co-ordinating the builds, and thus far we've got all the sensors taken care of. We're getting excellent support and co-operation from production.

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PRODUCTION ISSUES: Disturbing news to report on the suspected high-temp pin shift issue. Matt delivered to us 12 devices which had been calibrated to a new target, .087" vs. the previous .089". This was intended to move the calibration to the high side of the window to counteract temperature shifts. When we characterized the devices, we found nine normal ones, two creep releases (which were expected) and one creep actuation (not expected). At high temperature, all three creepers exhibited the loss of continuity phenomenon! We have no hypothesis at present which would explain this behavior. Keep in mind that these devices are representative of regular production, meaning that some statistical percentage of parts are shipping with this problem. It may not manifest itself in the field, but if it does, we can expect RMR's to begin in the southern states as the warm months approach. Incidentally, one of the twelve parts built with ultrasonic weld springs is also exhibiting this problem at high temp. As soon as we can, we plan to take a look at the contact transfer using a 'scope, since all the above is based on the erratic flashing action of a simple diode which is conducting a trace current through each device. *TEMPERATURE?? TRIM? HOLE SENSING @ 120°*

*THIS
MIGHT
BE A
TEST LC
100-112*

CUSTOMER ISSUES: We've got an urgent sample request from UTA in Britain. They need a total of 100 (25 ASAP) 57PSL11-2's for a Phase II VP build of CDW27. Apparently the power steering systems have already been shipped to the customer without switches installed, hence the urgency. We've got the correct-color 46412 bases, and all other required components to complete this build.

Handwritten notes at bottom left

DATE 12-29-92

FINAL INSPECTION 779SL2-1

CUSTOMER P/N F2V0-9F924-AB

DISC LOT 2-32
 REEL #2
 LOT #5
 WASHER LOT 130 1-CUT

MAT. I.D. 74868-AB2-1
 CUP LOT #11
 CONV. LOT 135
 QTY. 2000

DISC LOT 2-33
 REEL #1
 LOT #1
 WASHER LOT 130 1-CUT

MAT. I.D. 74868-AC7-3
 CUP LOT #11
 CONV. LOT 135
 QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	119	122	125	125	122	119	129	114	122	116	128	123	119	126	124	117	122	123
RELEASE	45	46	47	48	46	45	50	42	51	57	60	57	57	61	53	53	57	51
DIFF.	74	76	77	76	76	74	78	72	71	61	63	66	61	65	70	64	65	72
2 VOLT DROP	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3 CUR. LEAK	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4 PROOF	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5 IMPULSE	OK	OK	OK	OK	OK	---	---	---	---	---	---	---	---	---	---	---	---	---
ACTUATION	N/A	120	120	120	120	---	---	---	---	---	---	---	---	---	---	---	---	---
RELEASE	10	40	40	120	40	---	---	---	---	---	---	---	---	---	---	---	---	---
VOLT DROP	---	✓	✓	✓	✓	---	---	---	---	---	---	---	---	---	---	---	---	---
CUR. LEAK	---	✓	✓	✓	✓	---	---	---	---	---	---	---	---	---	---	---	---	---
PROOF	---	✓	✓	✓	✓	---	---	---	---	---	---	---	---	---	---	---	---	---
CREEP	---	✓	✓	✓	✓	---	---	---	---	---	---	---	---	---	---	---	---	---
7 BURST	---	✓	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8 DIMENSIONAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CREEP	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10 TERM. STR.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ACTUATION	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
RELEASE	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
VOLT DROP	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
CUR. LEAK	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
PROOF	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
CREEP	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TI-NHTSA 004499

774
944 *Lot # 2-33* P.O. NO. *148* DATE *3/2/92*

QTY.	QTY.	ALLOWABLE DEF.	NO. OF DEF. FOUND	REMARKS
9		0	1	9
ORG.	ACTUAL	REASON		
		Continuity failure.		
		One terminal		
		inside of base is		
		not sealed		
		Date Code 2057		

MRE ACTION

Sent 100% BAM operator
Advised Tooling P.M. discussed
And will be adhered to

ENGINEERING

DISPOSITION AND/OR
CORRECTIVE ACTION☐ O.A.R. REG.

QUALITY SIGNATURE

REMARKS

THIS

REJECTION FOR THE SAME REASONS

WHITE = INSPECTION

CANARY = PURCHASING

PINK = QUALITY CONTROL

GOLD = HOLD

INSPECTION

FINISHED PRODUCTION WHITE Place in Finished Storage
 PRIMARY Place in Finished Storage
 PINK Place in Dept. Supervisor

DEVICE NUMBER **77D5L2-1**

SPECIAL REQUIREMENT	TOTAL QUANTITY 9
---------------------	----------------------------

MANU. ORDER NUMBER **2-33** NO SUBTOTALS

1.
2.
3.
4.

QUALITY CONTROL APPROVAL

IN PROCESS	IN PROCESS	FINAL

Form 1528a

DATE **2/23/92** DEPARTMENT **294**

FINISHED PRODUCTION WHITE Place in Finished Storage
 PRIMARY Place in Finished Storage
 PINK Place in Dept. Supervisor

DEVICE NUMBER **77D5L2-1**

SPECIAL REQUIREMENT	TOTAL QUANTITY 9
---------------------	----------------------------

MANU. ORDER NUMBER **2-32** NO SUBTOTALS

1.
2.
3.
4.

QUALITY CONTROL APPROVAL

IN PROCESS	IN PROCESS	FINAL
		

Form 1528a

DATE **2/23/92** DEPARTMENT **294**

TI-NHTSA 004501

FINAL INSPECTION 77PGL2-1

DATE: 2-28-92

CUSTOMER P/N F24C-WF24-18

DISC LOT 2-22
REEL # 1
LOT # 2
WASHER LOT 130 1-CUT

NAT. I.D. 79448-A-C-6-7 : DISC LOT 2-34
CUP LOT # 11 : REEL # 1
CONV. LOT 155 : LOT # 4
QTY. 2000 : WASHER LOT 130 1-CUT

NAT. I.D. 79448-A-C-7-4
CUP LOT # 11
CONV. LOT 155
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	128	123	120	129	139	127	125	120	126	125	122	134	126	126	127	129	128	130
2 RELEASE	62	56	57	57	62	62	61	55	59	54	57	50	55	63	59	55	57	51
3 DIFF.	66	67	62	65	76	65	64	65	67	69	64	64	70	63	68	74	71	78
4 VOLT DROP	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
5 CUR. LEAK	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
6 PROOF	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
7 IMPULSE	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
8 ACTUATION	130	120	130	125	120	—	—	—	—	130	135	135	120	125	—	—	—	—
9 RELEASE	55	55	55	60	55	—	—	—	—	55	55	62	50	55	—	—	—	—
10 VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—
11 CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—
12 PROOF	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—
13 CREEP	✓	✓	✓	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—
14 BURN	✓	✓	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15 INDICATOR	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
16 VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
17 CREEP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
18 THERM. STRE	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	—	—
19 ACTUATION	—	—	—	—	—	—	—	120	120	—	—	—	—	—	—	—	120	125
20 RELEASE	—	—	—	—	—	—	—	50	55	—	—	—	—	—	—	—	55	50
21 VOLT DROP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
22 CUR. LEAK	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
23 PROOF	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
24 CREEP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓

TI-NHTSA 004602

FINISHED PRODUCTION ROUTING

WHITE
ANY
Route to Finished Goods
NK → Route to Dept. Supervisor

DEVICE NUMBER

77PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.

2.

2-22

3.

4.

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

FEB 20 1992
ACTIVITY

Form 15282

DATE 2/28/92

DEPARTMENT 294

FINISHED PRODUCTION ROUTING

WHITE
CANARY
Route to Finished Goods
PINK → Route to Dept. Supervisor

DEVICE NUMBER

77PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.

2.

2-34

3.

4.

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

FEB 20 1992
ACTIVITY

Form 15282

DATE 2/28/92

DEPARTMENT 294

FINISHED PRODUCTION ROUTING

ITE } Route to Finished Store
ANY }
NR } Route to Dept. Supervisor

DEVICE NUMBER

77PSL24

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.

2.

2-22

3.

4.

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

APR 15 1992
FEB 28 1992

Form 18082

DATE 2/25/92

DEPARTMENT 294

FINISHED PRODUCTION ROUTING

WHITE } Route to Finished Store
CANARY }
PINK } Route to Dept. Supervisor

DEVICE NUMBER

77PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.

2.

2-34

3.

4.

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

APR 15 1992
MAR 2 1992

Form 18082

DATE 2/25/92

DEPARTMENT 294

FINAL INSPECTION 779L2-1.

DATE: 12-28-92

CUSTOMER P/N F24C-9F924-AB

DISC LOT 2-28
REEL #1
LOT #2
WASHER LOT 129 1-CUT

NAT. I.D. 74868-AC7-3
CUP LOT #11
CONV. LOT 155
QTY. 2000

DISC LOT 2-29
REEL #1
LOT #5
WASHER LOT 129 1-CUT

NAT. I.D. 74868-AC7-3
CUP LOT #11
CONV. LOT 155
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	116	116	115	123	123	121	123	121	125	122	125	118	121	126	118	117	124	119
RELEASE	44	49	51	51	51	47	51	30	52	54	60	57	59	55	55	49	60	57
DIFF.	72	47	49	72	72	74	72	71	73	48	45	41	62	71	63	68	64	62
2 VOLT DROP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3 CUR. LEAK	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4 PROOF	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5 IMPULSE	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	—	✓	—	—	—	—
ACTUATION	115	115	115	125	125	—	—	—	—	125	125	125	120	120	—	—	—	—
RELEASE	50	50	55	50	50	—	—	—	—	55	60	65	60	55	—	—	—	—
VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CREEP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 BUST	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—
8 DIMENSION	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CREEP	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10 THERM. STRT	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ACTUATION	—	—	—	—	—	—	—	—	—	120	120	—	—	—	—	—	120	115
RELEASE	—	—	—	—	—	—	—	—	—	30	30	—	—	—	—	—	40	35
VOLT DROP	—	—	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	✓	✓
CUR. LEAK	—	—	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	✓	✓
PROOF	—	—	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	✓	✓
CREEP	—	—	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	✓	✓

TI-NHTSA 004505

FINISHED PRODUCTION ROUTING WHITE } Route to Finished Goods
CANARY }
PINK } Route to Dept. Supervisor

77 PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.
2.
3.
4.

2-29

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

ACCEPT
FEB 28 1992

Form 18262

DATE

2-27-92

DEPARTMENT

294

FINISHED PRODUCTION ROUTING WHITE } Route to Finished Goods
CANARY }
PINK } Route to Dept. Supervisor

77 PSL2-1

SPECIAL REQUIREMENT

TOTAL QUANTITY

9

MANU. ORDER NUMBER

NO SUBTOTALS

1.
2.
3.
4.

2-28

QUALITY CONTROL APPROVAL

IN PROCESS

IN PROCESS

FINAL

ACCEPT
FEB 28 1992

Form 18262

DATE

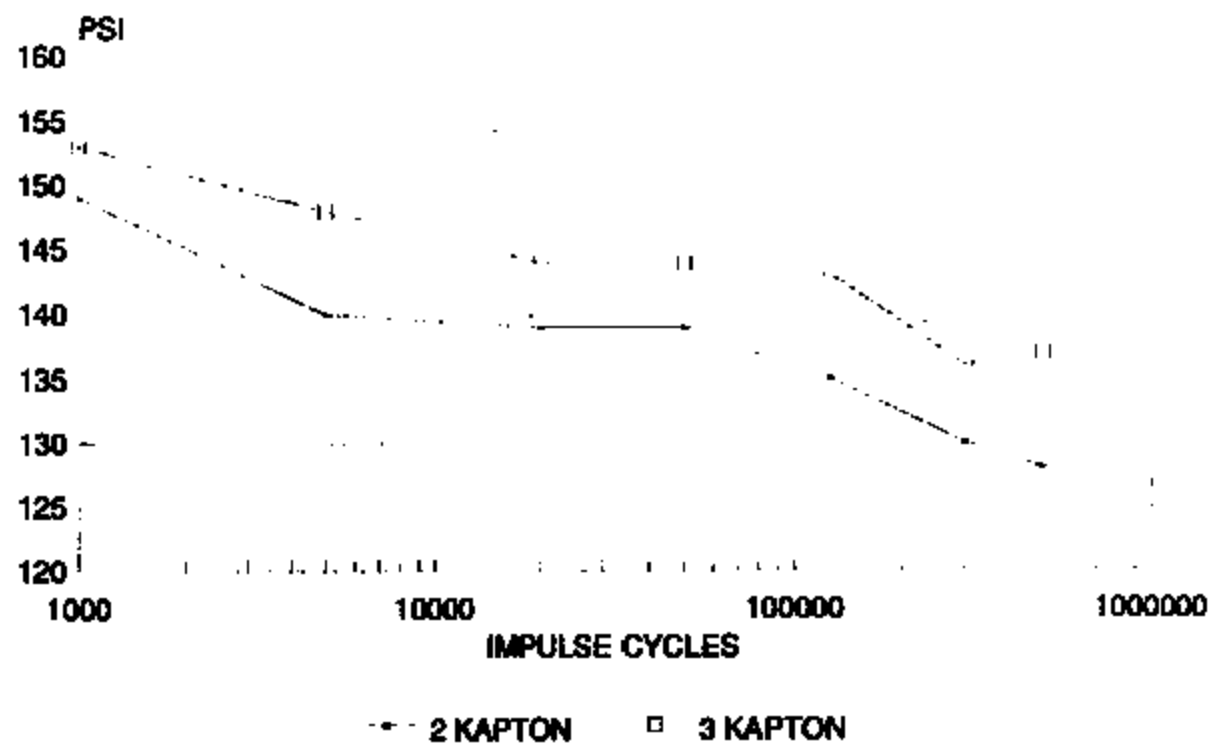
2-27-92

DEPARTMENT

294

TI-NHTSA 004506

2 vs. 3 ROUND KAPTON CALIBRATION SHIFT (ACT)



TI-NHTSA 004507

JAD 920229

28-Feb-92	4,000	10	9	-	Continuity failure, terminal inside of base is not staked. Date code 2057. Sorted lot 100%.
6-Mar-92	4,000	10	10	-	
10-Mar-92	4,000	10	10	-	
11-Mar-92	4,000	10	10	-	
12-Mar-92	4,000	10	10	-	
18-Mar-92	4,000	10	10	-	
23-Apr-92	2,000	5	5	-	
2-May-92	2,000	5	5	-	
3-May-92	2,000	5	5	-	
6-May-92	2,000	5	5	-	
14-Sep-92	2,000	5	5	-	
22-Sep-92	4,000	10	10	-	
30-Sep-92	4,000	10	10	-	
7-Oct-92	4,000	10	10	-	
7-Oct-92	4,000	10	10	-	
16-Oct-92	4,000	10	10	-	
21-Oct-92	2,000	5	5	-	
20-Oct-92	4,000	10	10	-	
29-Oct-92	4,000	10	10	-	
29-Oct-92	4,000	10	10	-	
30-Oct-92	4,000	10	10	-	
4-Nov-92	4,000	10	10	-	
10-Nov-92	4,000	10	10	-	
10-Nov-92	4,000	10	10	-	
11-Nov-92	4,000	10	10	-	
17-Nov-92	2,000	5	5	-	
20-Nov-92	4,000	10	10	-	
4-Dec-92	2,000	5	5	-	
9-Dec-92	2,000	5	5	-	
14-Dec-92	2,000	5	5	-	
16-Dec-92	4,000	10	10	-	
16-Dec-92	4,000	10	10	-	
16-Dec-92	4,000	10	10	-	
21-Dec-92	2,000	5	5	-	
21-Dec-92	4,000	10	10	-	
Totals	204,000	643	643	-	

TI-NHTSA 004508

TELEX 881214
FAX 212-336-0510
PHONE 212-336-0500
DUN 223-3136

ROME STRIP STEEL COMPANY, INC.
530 HENRY ST. BOX 189
ROME, NEW YORK 13440

COMPLIANCE #1

SALES CODE
78072416

0 1 0 0 0 0 0 0

DATE	INVOICE NO
03/02/92	14240

INVOICE TO: K. F. BASSLER CO., INC.
45 JOHN WILLIAM ST.
ATTLEBORO, MA

02703

SHIP TO: K. F. BASSLER CO., INC.
45 JOHN WILLIAM ST.
ATTLEBORO, MA

QUANTITY (LBS)	IN CLS	NO SLIT OR HOLE	FINISH COMPLETE	SHIPPED BY	WT NO	C	IN	F	X	SI	WT	CS	SO
11,366	072	08	PARI	R S S	F40019	05	29	011	012	01	01	03	

NOTE REQUIREMENTS OF:

1ST ORDER NO 14474

COLOR CODE

7MM X 25.40MM

04600 X 1.0000

00050-00050+005 -005

013 -013MM +127 -127MM

SEWER

9 50 MAX

SPR

NO3 SLIT

MAIL NO.

66012

COIL OR CUT

COIL

LENGTH/SPC

200 PIN 16 34

PREPAID

200 LBS

1600

SPACERS

500/096

WRAPPING

SHED

SHED

SPACERS

500/096

PAPER WRAP

SHED

SHED

SPACERS

500/096

SOLE

PER. RT

21 HI MAX

SHED

500/096

CRATES

WASTERS

SHED

SPACERS

500/096

BOX

CORNER

SHED

SPACERS

500/096

ALUM. KILN C-1008-112

TEST REPORT

(5,156 KG)

11,366

Certificate of Compliance

ATTN:

052 06280 33-030742

Notary Public, Onondaga County

My commission expires

DATE

I certify that the above figures are a true and correct copy of those contained in the records of this corporation.

[Signature]
ROME STRIP STEEL CO., INC.

TI-NHTSA 004509

#27406

-MSG ME- 283478 FR-ZARN TO-GAMY SENT-03/03/92 04:11 PM
RE-084 ST-C DIV-0050 CC-00101 BY-ZARN AT-03/03/92 04:11 PM

MARCH 3, 1992

TO: RUSTY STRUBLE	RCS2	CC: TOM CHARBONEAU	TC
MIKE DeMATTIA	MD3	JOHN KOURTESIS	MDES
CHARLIE DOUGLAS	CMP1	STEVE MAJOR	SMFH
DICK GARIEPY	MFPC	ANDY McGUIRK	PCQA
PAUL KOTCH	PRK1	ED O'NEILL	EJON
JOE LAZARZ	JML8	NORM FREDA	WHLZ
STEVE OFFILER	SB01	GARY SNYDER	CPFC
MATT SELLERS	PCME	MARTHA SULLIVAN	CPFC
BILL SWEET	PCME	RAY TOURANGEAU	PCME
JIM WATT	PCQA	BILL CONGDON	MFPC
TERRY RODRIGUEZ	MFPC	STEVE MCCOONEY	MDES
		ELAINE ROSE	GAMY

FR: DAVE CZARN ZARN

SJ: FORD CRUISE CONTROL PRESSURE SWITCH START-UP MEETING
MINUTES OF 2/27/92 MEETING

MEETING

THE NEXT MEETING IS SCHEDULED FOR:

DATE: 03/05/92 (THURSDAY)
TIME: 10:00 - 11:30 AM *****
PLACE: CAFETERIA CUBE *****NOTE CHANGE*****

77P9

Hexport:

Elco is returning their J512 gage for R&R study.

2A/3A gaging and 10B21 issues discussed with B. Pease (P/C);
verbally OK'd but wants change worked through Tier 1's. 10B21 SREA
left with J. Pelkey without discussion; needs follow-up.

* ELCO J512 GAGE R&R STUDY	SELLERS	03/19	
* ELCO EXPLANATION OF 10B21 COST	KOTCH	01/23	ORIG.
(\$.0075 savings)		02/27	COMP.
* F/U CALL TO JOHN PELKEY	CZARN	03/06	
* F/U WITH TIER 1'S	FRED A	03/12	
* J512 W/ SNUBBER QUOTE	SELLERS/	03/12	
	KOTCH		

Production Issues:

* PLAN FOR ADDRESSING FLAKE ISSUE	SELLERS/	02/13	COMP.
(Still need long term sol'n)	WATT		
* PLAN FOR DETERMINING IF CALIBRATING AT	SELLERS	03/05	
THE EXTREMES IS A YLD. OR LIFE PROB.			
* UPDATE PRODUCTION COMPONENT AND ASM.	OFFILER	02/13	ORIG.
DRAWINGS TO CURRENT DESIGN LEVEL		03/26	COMP.

Sensor Assembly Machine:

TI-NHTSA 004511

Handwritten notes:
2A
RETEST JAK
CR1 REF 100ms
HAVE PICK
SIR - 11/1/92

. PRIORITIZE REMAINING UPGRADE ITEMS

SELLERS ONGOING

Base Assembly Machine:

• UPDATE PROGRESS OF ULTRASONICALLY
WELDED SPRING ARM/TERMINAL ASSEMBLY

**SELLERS/ ONGOING
OFFILER**

Final Assembly Machine:

ISR:

* PROVIDE QUARTERLY REPORTING OF ABOVE
* CORRECT TERMINAL POSITION

WATT start03/11

SELLERS	01/16	ORIG.
	02/13	REV.
	02/27	COMP.
SELLERS	01/16	ORIG.
		COMP.
SELLERS/	01/17	ORIG.
ROSE		COMP.

* RE-RUN P/C SAMPLES SO TERM'L POS'N
DATA CAN BE COLLECTED
* MEASURE SAMPLES

(Tab dimension still undersized)

* SUBMIT DANA/PITTS PKGS

WATT ~~01/23~~ ORIG.
 02/15 REV.

Diaphragm Life:

TARGET DATE FOR BUILDING F/C WITH FULL AMI CRIMP

02/24

* UPDATE TEAM ON IMPLEMENTING FULL AMI CRIMP AND TESTING OF MODIFIED DESIGNS

OFFILER/ ONGOING
SELLERS

Ultra-Low Differential Switch NY93

* ASSIGN CHAMPION

CZARN/ 03/05
SWEET

* PLAN FOR SIMULATING PROD'N PROCESS

SELLERS 03/05

* ESTABLISH LIST OF ACTIONS REQ'D TO
START-UP ULTRA LOW DIFF'L SWITCH

SELLERS 02/14

* FIRM QUOTE FOR ULTRA-LOW DIFF'L SWITCH
 . REPORT RESULTS TO FORD/TEVES

SELLERS 02/27 changed
OFFILER TAD

Miscellaneous:

SEND LETTERS TO FORD/GM AND TIER 1'S;
3A THREAD GAGING

WATT/	01/10	ORIG.
CZARN	03/12	REV.

Production Plans:

MAINTAIN RUNNING TOTAL OF L/T (L2-3)
SWITCHES LEADING TO 100K FOR AMORTIZATION

Status Date	Total Shipped
Feb 27	25,704

STRUBLE ONGOING

• UPDATE PRODUCTION PLANS

STRUBLE ONGOING

	P/C	L/T
	77PSL2-1	77PSL2-3
NOV	6.4	13.6

Speed Letter. 44-902

GrayLine SNAP-A-WAY FORM

To ED Smith
FRAN SULLIVAN
MARIE West

Speed Letter.

From Jim Watt
CC = ~~Gina Roper~~
Math Sellers

Subject 77PS & A.M.E. Preventive Maintenance Audit

MESSAGE

Ed, please include the 77PS & A.M.E. (censor assembly) preventive maintenance (P.M.) requirements as part of our audit process. Appropriate Corrective Action Notices (C.A.N.'s) should be issued for discrepancies - Thanks

Date 3/5/92 Signed Jim Watt

REPLY

-See 1 FILE

-See 10 FILE

Date

Signed

Wilson Jones Company
MAILING ROOM 44-902
8 1/2 x 11 1/2 INCHES

RECIPIENT—RECEIVED BY NAME

SENDER—OFFICE AND REMAINING LOCATION

TI-NHTSA 004513

DEC	35	9
JAN	75	7
FEB	76.4	11.4
MAR	47.1	12.6

REGARDS,
DAVE CZARN G53-FORD

TI-NHTSA 004514

TELEX 881214
FAX 315-328-3310
PHONE 315-328-2800
CABLE 328-3128

ROME STRIP STEEL COMPANY, INC.
530 HENRY ST. BOX 189
ROME, NEW YORK 13440

COMPLIANCE #1

SALES CODE
08072016

INVOICE TO: K. F. BASSLER CO., INC.
45 JOHN WILLIAM ST
ATTLEBORO, MA

02703

SHIP TO: K. F. BASSLER CO., INC.
45 JOHN WILLIAM ST
ATTLEBORO, MA

01000000

DATE 03/04/92 INVOICE NO 14343

QUANTITY (LBS) 9,562
NO. CIL 060
NO. SLIT OR BOLS 07
INTERNAL COMPLETE COMP

SHIPPED BY
CAN REX

HY NO F40019 C 05 HR 29 P 011 012 01 01 03
AL WH CR CA

NOTE REQUIREMENTS OF:
CMT. ORDER NO 14474

ORDER CODE

SIZE 17MM X 25.40MM

ROLL NO
66012

INTERNAL COMPLETE
PREPAID

STRAPPING

PAPER WRAP

BOLS

CRATES

BOX

.04600 X 1.0000

REMARK

50 MAX

COIL OR CUT

200 LBS

THICK

DEPT SIZE

PER. WT

MASTERS

DOES

TOLERANCE

+00050-00050+005 -005

EDGE

NO3 SLIT

LENGTH SPEC

200 PIM 16 34

MARKING

SPACERS

SHEDS

SHALLO

CAPS

+013 -013MM +127 -127MM

CLASS - 1
ALUMINUM

MARK

CANBER
500/096

FLATNESS

ON

T-PCS

TEST REPORT

Certificate of Compliance

ATTEST:

052 06290 53 030742

Notary Public, Oneida County

My commission expires

DATE

3/5/92

I certify that the above figures are a true and correct copy of those contained in the records of this corporation.

[Signature]
ROME STRIP STEEL CO., INC.

TI-NHTSA 004515

44 27406

Speed Letter. 44-902

GrayLine

To ED Smith
FRAN SULLIVAN
Marie West

Speed Letter.

From Jim Watt
CC = Glenn Roper
Matt Sellers

Subject 77PS & A.M.I. Preventive Maintenance Audit

MESSAGE

Ed, please include the 77PS & A.M.I. (sensor assembly) preventive maintenance (P.M.) requirement as part of our audit process. Appropriate Corrective Action Notices (C.A.N.s) should be issued for discrepancies - Thanks

Date 3/5/92 Signed Jim Watt

REPLY

Wilson Jones Company
10000 Wilson Jones Road
Cincinnati, OH 45244

RECIPIENT—RETURN TO: WILSON JONES COMPANY

SENDER—SEND TO: WILSON JONES COMPANY, 10000 WILSON JONES ROAD, CINCINNATI, OH 45244

TI-NHTSA 004516

-MSG- HQ= 390833 FR=SB01 TO=PCME GENT=03/06/92 10:21 AM
R#037 ST=C DIV=0050 CC=00101 BY=SB01 AT=03/06/92 10:21 AM

TO:	Ted Ballard	ETB	Paul Katch	PRK1
	Tom Burke	MFPC	Steve Major	BMFH
	Jeff DiDomenico	ELB	Dale Sogge	FFUN
	Charlie Douglas	CMP1	Matt Salinger	PCME
	Nora Freda	MHLZ	Rusty Struble	RCS2
	Dick Gariepy	MFPC	Jim Watt	PCQA

CC: Tom Charboneau (delivered separately)
Dave Czern

FR: Steve Offiler SB01

BJ: Weekly Highlights

FORD NY '92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

57PS and 87PS VALIDATIONS: We are progressing on the established timeline. The two lots of 87PS's are already built, although there is a snag: no customer part numbers. These will have to be obtained and then hand-coded later. We expect the four lots of 57PS to be completed by production today, barring any unforeseen circumstance. The devices from each lot for the QC

TI-NHTSA 004518

dimensional study will be delivered as soon as they are built, and Jeff will begin the battery of characterizations tomorrow.

The environmental chamber for the new power steering cyclar has been returned to our group from the PSM people. Jeff is working to do the final setup to this cyclar, which includes some plumbing of the new manifolds (48 stations), and some programming of the TI315 which controls the entire machine. We'll be needed this resource early next week for Impulse testing, and soon thereafter for Thermal Cycle testing.

DESIGN & PRODUCTION ISSUES: The test of the ultrasonic welded movable terminals combined with the 10B21 hexports, undergoing the hybrid Impulse/Thermal Cycle test, has turned up three leakers to date, at 306K, 370K, and 382K. We rebuild these devices and return them to test. During rebuild it was discovered that one of the devices had a partially fractured spring arm, severed completely on one side of the rivet hole. All three showed varying degrees of the spring arm peeling away from the terminal.

We have aborted the test of the production devices with the calibration shifted to .087". As previously reported, three of these devices had erratic action at high temperature, which was sometimes intermittent.

We have obtained devices from production that were built for a pin window study. Our intention is to use samples of these, especially the creepers at either end, to study the thermal shifts. However, Jeff's readings did not correlate well with the production tester. According to production, a cal. range from .085" thru .092" encompassed the window. Jeff found that all of the .092's were gross creepers, the .091's were generally creepers, and a couple of the .090's were marginal; however, from here down through .085 the devices acted normally. It is possible that the production tester is providing erroneous readings, which is tending to skew the pin window results, and may in fact be helping to cause the erratic action at high temp that we're chasing. We are presently planning to run samples from the .089 thru .092 lots up to high temperature for the purpose of observing any shifts that occur, to provide more information on the temperature shift phenomenon. An informal meeting is planned for later today or early next week to discuss these results.

SAMPLES: Loris Pimentel is assisting us with the stack of Ford-Europe (and other) sample requests. She's doing an excellent job. We are keying on CD92-TIH/015 which are the UTA-England samples urgently needed because they are holding up car builds. 25 of these devices will go out today, barring any unforeseen circumstance, with the remainder of 75 to follow soon thereafter.

Regards,
Steve O.

-MSG M# 390833 PR=SB01 TO=CMF1 SENT=03/06/92 10:21 AM
 R#068 ST=C DIV=0050 CC=00101 BY=SB01 AT=03/06/92 10:21 AM
 TO: Ted Ballard ETB Paul Kotch PRK1
 Tom Burke MFPC Steve Major SMFH
 Jeff DiDomenico ELB Dale Sogge FFUN
 Charlie Douglas CMF1 Matt Sellers PCME
 Norm Frada WHLZ Rusty Struble RCS2
 Dick Garlepy MFPC Jim Watt PCQA

CC: Tom Charboneau (delivered separately)
 Dave Czarn

FR: Steve Offiler SB01

SJ: Weekly Highlights

FORD MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

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4

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TI-NHTSA 004521

-MSG MW= 396254 FR=VAGB TO=COPY SENT=03/06/92 12:27 PM
BT=C DIV=0050 CC=00134 BY=VAGB AT=03/06/92 12:27 PM

TO: ANDRE CHARPENTIER MDEB

CC: DICK GRIEPE MFPC
DAVE CZARN IARN
STEVE OFFILER BBO1
JOHN KOURTESIS MDEB
BILL SWEET PCME
77PS SMWT MFPC
ED KADISEVSKIS MDEB

FR: ~~MATT~~ MJB2

SUBJECT: 77PS FUNCTION JESTER

ANDRE,

WE NEED TO DIFFERENTIATE BETWEEN ACTUATION AND RELEASE CREEP
SPEC'S. CURRENTLY WE USE 50msec. FOR BOTH ACTUATION AND RELEASE
CREEP AND THE SOFTWARE TIES THE TWO SPECS TOGETHER, NOT GIVING
SEPARATE DEFAULTS. WE WOULD LIKE TO HAVE THE CAPABILITY OF
SPECIFYING THEM AT DIFFERENT LEVELS.

PLEASE CONSIDER THE EFFORT INVOLVED TO GIVE US THIS CAPABILITY AND
RESPOND ASAP.

REGARDS . . . MATT
X1245

TI-NHTSA 004522

HIGHLIGHTS
Stephen B. Offiler
Week Ending 92-03-06

Handwritten signature/initials



FORD MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

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TI-NHTSA 004523

FORD CCPS - 77PS - MY92

Daily meetings addressing the high temperature issue have resulted in a workable interim c/a with a pinning target modification. High and low temperature testing is complete with acceptable results, and vibration will be completed early next week. Since the movement of the plastic base is known to be a contributor, we are evaluating potential mold parameter changes or minor design changes that may be quickly implemented to decrease movement. Alternative materials with better temperature stability will also be considered.

Silent switch development needs to be accelerated, and unfortunately may amplify the temperature shift problem. Dale Sogge is championing the effort, as it des into the needs of a M/C mounted switch. Sensor curves will be taken today or Monday to evaluate pin window.

We're now faced with a significant challenge and potential problem regarding the silent switch. Ford notified field sales today that noise/brake feel has been identified as a problem at the St. Thomas (Canada) plant, as they've started to build MY92.5 Crown Vic/Grand Marquis. An alert is being issued, and Ford has requested that we hand carry silent switches to a joint meeting at St. Thomas, tentatively scheduled for next Friday, 3/20. Ford will certainly be requesting an almost immediate start-up of silent switch production, if they feel this is a potentially significant customer issue. We will be putting a plan in place today to address this issue, but at this point, someone from Autleboro will likely be visiting Ford next week.

DOWNSIZED 77PS

Program direction needs to be established.

TI-NHTSA 004524

FINAL INSPECTION 77P82-1

DATE: 3-6-92

CUSTOMER P/N F20-0F24-00

DISC LOT 2-37
REEL #1
LOT #3
WASHER LOT 109 1-CUT

PAT. I.D. 74868-002-6
CUP LOT #11
CONV. LOT 156
QTY. 2000

DISC LOT 2-38
REEL #1
LOT #4
WASHER LOT 109 1-CUT

PAT. I.D. 74868-002-6
CUP LOT #11
CONV. LOT 156
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	113	113	119	112	121	114	115	113	114	115	115	114	110	107	106	108	119	111
RELEASE	46	48	48	48	48	44	47	48	38	59	74	75	50	85	83	64	51	48
DIFF.	67	63	71	64	73	70	68	65	76	56	41	39	40	22	23	44	68	63
2 VOLT DROP	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
3 CUR. LEAK	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
4 PROOF	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—
5 IMPULSE	OK	OK	OK	OK	OK	—	—	—	—	OK	OK	OK	OK	OK	—	—	—	—
ACTUATION	110	110	110	110	120	—	—	—	—	115	110	110	110	110	—	—	—	—
RELEASE	70	50	50	50	50	—	—	—	—	55	50	55	55	60	—	—	—	—
VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CREEP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 BURST	✓	✓	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—
8 DIRECTION	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	✓	✓
VISUAL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9 CREEP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
10 TERM. STG.	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
ACTUATION	—	—	—	—	—	—	—	115	120	—	—	—	—	—	—	—	120	115
RELEASE	—	—	—	—	—	—	—	50	45	—	—	—	—	—	—	—	55	50
VOLT DROP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
CUR. LEAK	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
PROOF	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓
CREEP	—	—	—	—	—	—	—	✓	✓	—	—	—	—	—	—	—	✓	✓

TI-NHTSA 004525

FINISHED PRODUCTION ROUTING		WHITE CANARY PINK	ROUTE TO Dept. Supervisor
77 PS L2-1			
SPECIAL REQUIREMENT	TOTAL QUANTITY		
	9		
MANU. ORDER NUMBER	NO SUBTOTALS		
1.			
2.	37		
3.			
4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 12252			
DATE 3-5-92	DEPARTMENT 294		

FINISHED PRODUCTION ROUTING		WHITE CANARY PINK	ROUTE TO Dept. Supervisor
77 PS L2-1			
SPECIAL REQUIREMENT	TOTAL QUANTITY		
	9		
MANU. ORDER NUMBER	NO SUBTOTALS		
1.			
2.	38		
3.			
4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 12252			
DATE 3-5-92	DEPARTMENT 294		

TI-NHTSA 004526

PRESSURE SWITCH DATA

Form 21605

TEST NO. 200-15-18

DEVICE 2 PS	DATE REQUESTED 5-7-92	REQUESTED BY Steve	REQUESTED COMPL. DATE OFF: 10/1
PERFORMED BY Jeffrey P. Donais	DATE STARTED	DATE COMPLETED	APPROVED BY

PROJECT TITLE: Ford NY '92 Electronic Speed Control Reactivity PS

CUSTOMER:

PURPOSE OF TEST: understand the nature of observed erratic switching at high temp.

PROCEDURE: Build devices with a range of base calibrations. Characterize transform-time over the range. Install an impulse cycling cycle as temp rises. Record approx. temp at which switching becomes erratic.

Definitions:

Gross Creep: At least 2 PSI diff. between temp and temp.

Creep: T-time > 50 ms

Marginal Creep: 10-5 to T-time < 50 ms

OK & T-time < 10-5

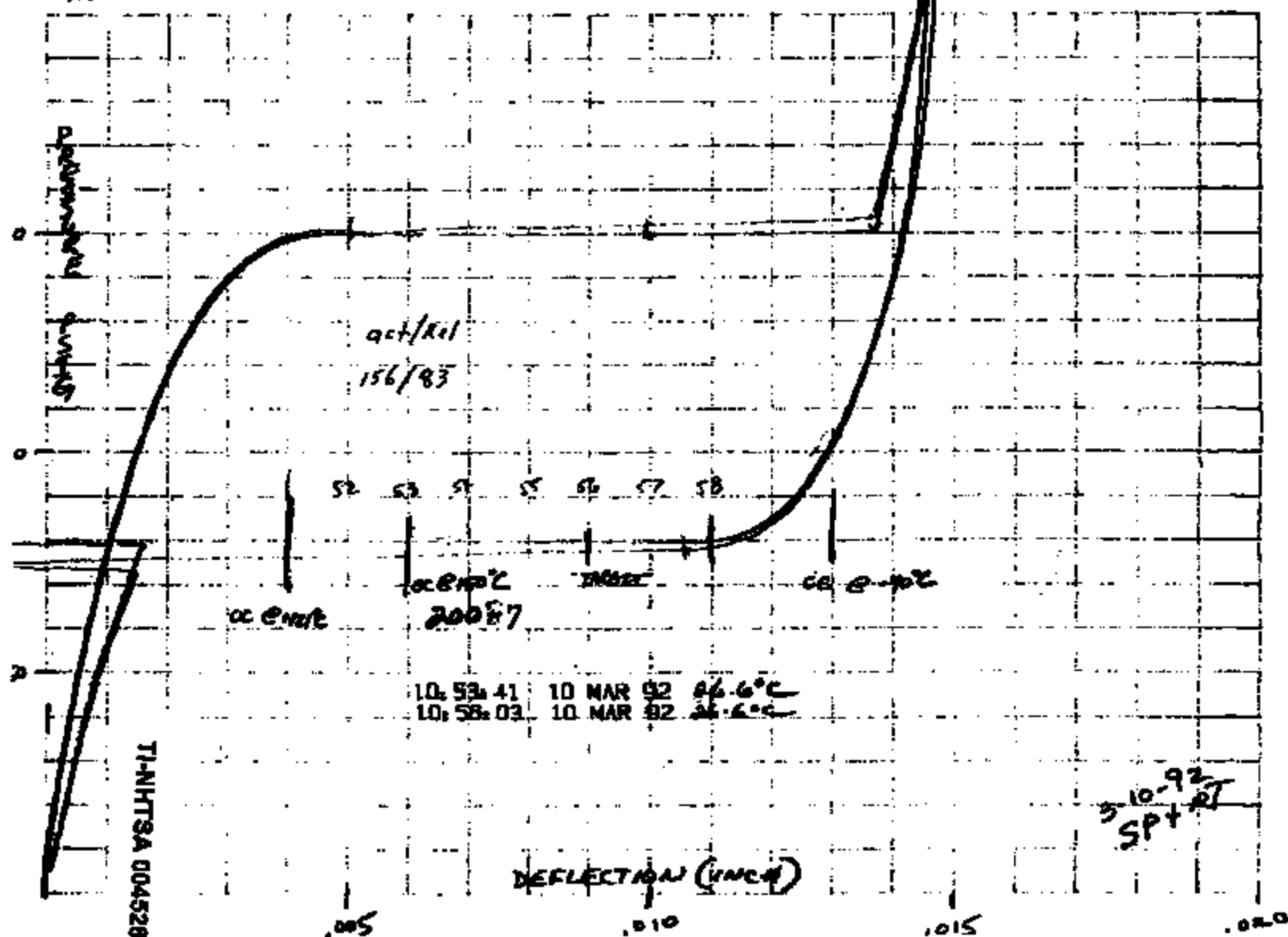
Device #	PSI Cal.	Act	Rel	Erratic Switching	Order	
				Adv. Temp	Flt Temp	PSI
200-15-01	93	Good Creep	OK	117	127	3
-02	92	"	"	117	127	1
200-15-03	92	Creep	OK	127	135	4
-04	92	"	"	117	126	2
200-15-05	91	OK	OK	127	150	5
-06	91	"	"			
200-15-07	90	OK	OK	146	150	6
-08	90	"	"	147	150	7
200-15-09	89	OK	OK			
-10	89	"	"			
200-15-11	88	OK	Good Creep			
-12	88	"	OK			
200-15-13	87	OK	Creep			
-14	87	"	OK			
200-15-15	86	OK	Creep			
-16	86	"	"			
200-15-17	85	OK	Good Creep			
-18	85	"	"			

TI-NHTSA 004527

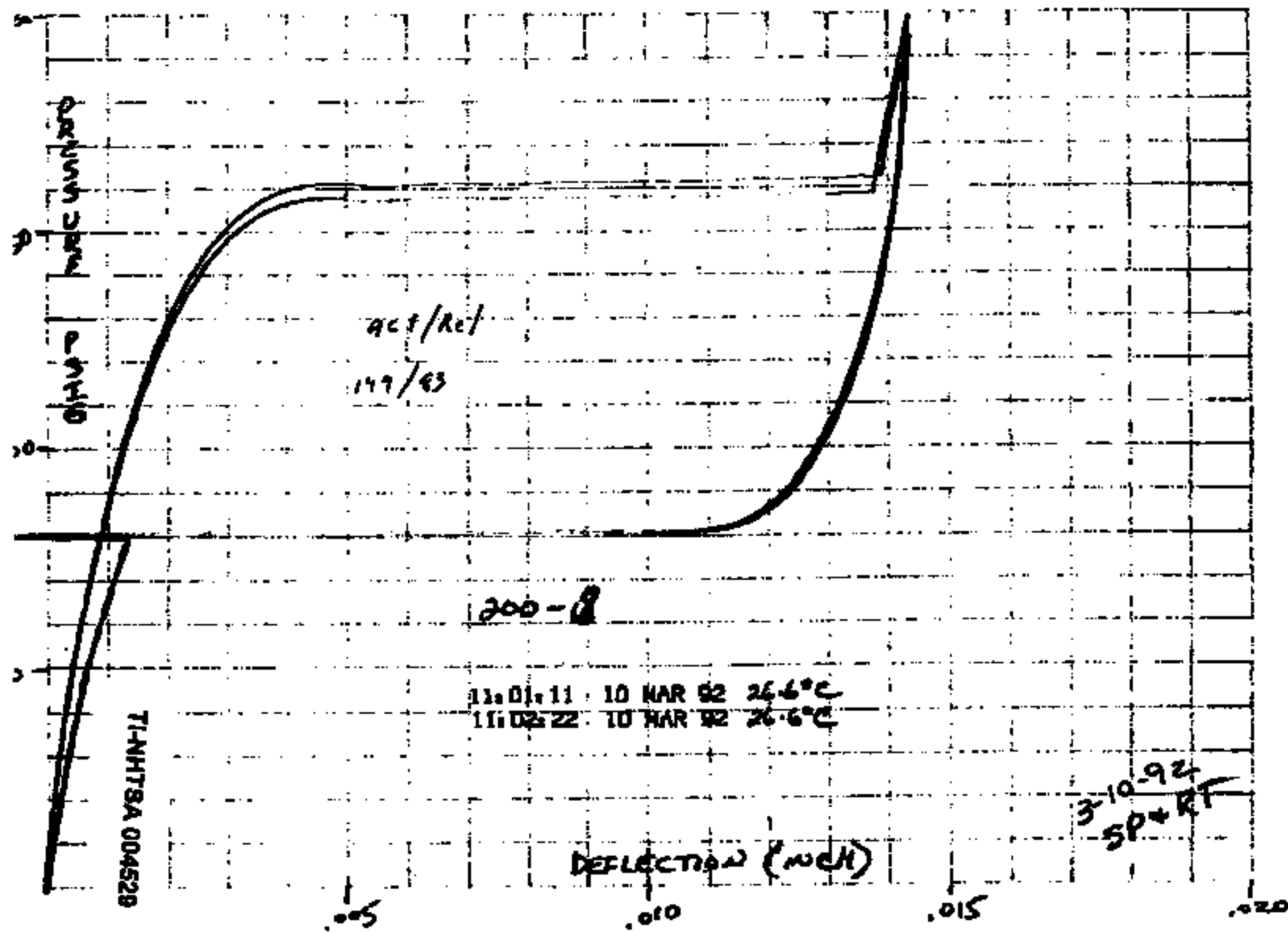
Reds 1st Cycle

Blue = 2nd cycle

Poss-Car Sen. 200-15-01



Poss-LAN 50 200-10-03



NOTE: P/C SENSORS W/
L/T BASES!

*

	TEST #
16 14 PIA 14 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 200.0; NRFD= 200.0	81
16 24 PIA 24 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 200.0; NRFD= 200.0	81
16 34 PIA 34 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	82
16 44 PIA 44 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	82
16-173.9; NRFD=141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	
16-173.9; NRFD=141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	
16 54 PIA 54 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	83
16 64 PIA 64 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	83
16 74 PIA 74 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	84
16 84 PIA 84 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	84
16-173.9; NRFD=141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	
16-173.9; NRFD=141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	
16-173.9; NRFD=141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	
16 94 PIA 94 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	85
16 104 PIA 104 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	85
16 114 PIA 114 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	85
16 124 PIA 124 14 14050124 BIN=CONT : NRFD=43.7; NRFD=47.4; LEAK RATE= 2.0 17 173.9; NRFD 141.9; LTR 30.0 NRFD; NRFD= 0.0; NRFD= 200.0	85

TI-NHTSA 004530

Sta: 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

-MAR-1992 15:05:36.62 OPER DOOR DID NOT CLOSE

37 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
38 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
39 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
40 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
41 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
42 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

89

89

89

89

43 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
44 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

89

45 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
46 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

90

47 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
48 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

90

49 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
50 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

90

51 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
52 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

90

53 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
54 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

90

55 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
56 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

91

57 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
58 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

91

59 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
60 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

91

61 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
62 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

91

63 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
64 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

91

65 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
66 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

92

67 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
68 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

92

69 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2
70 138.47 REL= 53.12 DIP= 85.3 PSI ACTOR= 0.4mm RELCH= 0.2

92

TI-NHT8A 004532

88 48: FIA 1: C=000000; BIN=8000; MRL=43.8; MRL=47.9; LEAK RATE= 2.0
89 156.91 REL= 50.4; DIP= 106.5 PSI; ACTOR= 1.0mm; HELDER= 0.1

92

88 49: FIA 1: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 157.01 REL= 57.7; DIP= 81.6 PSI; ACTOR= 1.4mm; HELDER= 0.5

93

88 50: FIA 1: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 157.01 REL= 47.0; DIP= 86.5 PSI; ACTOR= 15.0mm; HELDER= 0.1

93

88 51: FIA 1: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 157.01 REL= 16.0; DIP= 80.4 PSI; ACTOR= 3.0mm; HELDER= 0.3

93

88 52: FIA 1: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 157.01 REL= 11.0; DIP= 70.5 PSI; ACTOR= 10.1mm; HELDER= 0.1

93

88 53: FIA 1: C=000000; BIN=8000; MRL=43.7; MRL=47.7; LEAK RATE= 2.1
89 157.01 REL= 47.0; DIP= 100.4 PSI; ACTOR= 1.1mm; HELDER= 0.3

93

88 54: FIA 2: C=000000; BIN=8000; MRL=43.7; MRL=47.7; LEAK RATE= 2.1
89 158.01 REL= 57.8; DIP= 88.0 PSI; ACTOR= 3.5mm; HELDER= 0.1

94

88 55: FIA 2: C=000000; BIN=8000; MRL=43.7; MRL=47.7; LEAK RATE= 2.1
89 158.01 REL= 12.4; DIP= 90.5 PSI; ACTOR= 1.0mm; HELDER= 0.2

94

88 56: FIA 4: C=000000; BIN=8000; MRL=43.7; MRL=47.7; LEAK RATE= 2.1
89 158.01 REL= 37.8; DIP= 74.5 PSI; ACTOR= 18.2mm; HELDER= 0.3

94

88 57: FIA 1: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 158.01 REL= 12.8; DIP= 91.5 PSI; ACTOR= 11.1mm; HELDER= 0.5

94

88 58: FIA 1: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 158.01 REL= 58.8; DIP= 81.7 PSI; ACTOR= 38.0mm; HELDER= 0.3

94

88 59: FIA 2: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 158.01 REL= 14.3; DIP= 77.1 PSI; ACTOR= 100.0mm; HELDER= 0.5

95

88 60: FIA 4: C=000000; BIN=8000; MRL=44.1; MRL=47.3; LEAK RATE= 2.0
89 158.01 REL= 54.3; DIP= 70.5 PSI; ACTOR= 200.0mm; HELDER= 0.2

95

88 61: FIA 1: C=000000; BIN=8000; MRL=44.0; MRL=47.3; LEAK RATE= 1.7
89 158.01 REL= 51.2; DIP= 87.3 PSI; ACTOR= 148.0mm; HELDER= 1.1

95

88 62: FIA 2: C=000000; BIN=8000; MRL=44.0; MRL=47.3; LEAK RATE= 1.7
89 158.01 REL= 51.7; DIP= 82.5 PSI; ACTOR= 100.0mm; HELDER= 0.5

95

88 63: FIA 1: C=000000; BIN=8000; MRL=44.0; MRL=47.3; LEAK RATE= 1.7
89 158.01 REL= 54.9; DIP= 52.4 PSI; ACTOR= 200.0mm; HELDER= 0.6

95

88 64: FIA 4: C=000000; BIN=8000; MRL=44.0; MRL=47.3; LEAK RATE= 1.7
89 158.01 REL= 10.3; DIP= 58.8 PSI; ACTOR= 200.0mm; HELDER= 200.0

Dummy

1992 1509:13.20 OPER DOOR DID NOT CLOSE

TI-NHTSA 004533

-MSG N# 00457888 FR=ZARN TO=SB01 SENT=03/09/92 04:53 PM
R# 051 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/09/92 04:53 PM

MARCH 3, 1992

TO: STEVE OFFILER SB01
BILL SWEET WS4
MATT BELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONNOR MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/9/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: TUESDAY 3/10
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Base calibration target value was .089" until ~1 week ago; 50 ms creep max'm on actuation and release. Spec was changed to .087" - increasing the effective pin length by .002" - and the release creep spec was opened to 100 ms max'm; actuation remained at 50 ms maximum. Our testing still showed the low side of the range to be unacceptable, so we arrived today at a new target of .001" longer effective pin length. This value was determined by subtracting what is believed to be the worst case stack (.004") from the largest acceptable base calibration (.090"). It was decided to actually increase the pin length by .001", and maintain the same base measurement of .086". We will change the creep spec to 150 ms max'm release and 25 ms max'm actuation immediately, and begin collecting data for daily review.

.087

Worst case stack determined as +/- .002" for base calibration, +/- .0015" for the sensor assembly (to be verified) and +/- .001" for the pin.

~ .0015

Tom C. suggested a technique to determine if the effective change in pin length is in fact due to movement of the plastic base at temperature. We will be building the test samples tomorrow as a priority item.

TI-NHTSA 004534

IMMEDIATELY IMPLEMENT ON P/C (L2-1) ONLY:
PIN LENGTH = .143"
BASE CALIBRATION = .087"

SELLERS/
GARIEPY

TEST ALL SWITCHES AT 25ms MAX ACT'N & REL

RETEST ANY CREEP RELEASES ONLY - AT ^{150ms} 300ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

MEASURE 20 P/C AND 20 L/T SENSORS W/PINS
IN PLACE TO DETERMINE SENSOR VARIABILITY

PERIPOLI/
SELLERS

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS

KOURTESIS

RUN PIN WINDOW ON L/T; GIVE SWITCHES TO S.O.

SELLERS

REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES

OFFILER / JD

REVIEW L/T DATA TO DETERMINE NEW BASE CAL'N
TARGET VALUE

TEAM

DETERMINE HOW TO HI TEMP TEST AUDIT SWITCHES
IN PROD'N IF THE TEAM FINDS IT NECESSARY

SWEET

UNDERSTANDING THE PROBLEM CAUSE

RUN P/C SENSOR HATCHET CURVES

RUN R.T. AND 150C MEASUREMENTS OF DUMMY
SWITCHES TO DETERMINE AMT. OF SHIFT CAUSED
BY PLASTIC MOVEMENT

RUN SAME WITH ANNEALED BASES AND STEEL
CRIMP RINGS AS VARIABLES

REGARDS,
DAVE CIARN

1-hitamp

3 CONSIDERATIONS:

- LIFE? LESS; WORSE.....

- LINEAGE VS TEST ONLY

HOW PIN-WINDOW, VERY SHORT ALL THE
WAY TO OPEN KEY @ ROOM TEMP 10 TIMES

DEVICET THEY NEVER OPEN @ COLD TEMP
VERY LONG PINS - BACK DOWN TO
P.C. ~ 200 PSI OR L.T. ~ 350 PSI 80-90
w/.145 OFFSETS .95-.65

7 SETS OF RAW DATA'S TO FILL WITH CONNS

LATER, HAVE ORANGE HELP OUT IF PLASTIC IS INDICATED

RICH

TECH!

- PASTE ON UNIT ~ 1200 PM
- CASE W/ 1ST X
- AT CHAB
- INSTALL ON CYCLE
- RUN TO 150C / WASH

OFFILER / JD / RICH

OFFILER / JD

OFFILER / JD

CONV. W/ PAPER 3.

NOTE: PLASTIC DO NOT
HAVE PINS ITS, IMPROVE
ON INSULANCE & GUST
PAPER DELIMITATION

1/17 TE TYPICALLY MAKE
SHIFT FROM 1/17/2000

ANY PLASTIC. TYPICALLY AN
SHOULDER TO MAX COLD
TEMPERATURE, HOLD COLD FOR
TRY 400 AMP'S FOR 1-3HR
(DEPEND ON PART TOL) GET
AWAY W/ 1/2 INCH

- BUILD DUMMY SWITCHES...
NEED SPACERS (MIS)
- MEASURING THERMISTORS...
1ST VP RANGING (MIS)
- ANNUAL SWITCH ADJ'S
400°F 1/2 HR, COOL TO
FARMER'S FARM BARRICADE
900-523-7834
- BUILD MACHINES
AL OR / 1/2 INCH CR
- ANNUAL / 1/2 INCH
- 1/2 INCH - 1/2 INCH
- 1/2 INCH @ 150°C
- POST-MEAS.

TI-NHTSA 004535

22-141 50 SHEETS
22-142 100 SHEETS
22-143 200 SHEETS
22-144 300 SHEETS

7785 THERMAL SHIFT PHENOMENON

NO 920309

CC: MATT

- DEVICES FOR EXPERIMENT TAKEN FROM A PRODUCTION-LINE PIN-WINDOW GROUP. THESE ARE BUILT W/ FIXED PIN LENGTH (2.0005) AND VARYING WINDOW CAL - .005" TO .093" (2.0005) IN INCREMENTS OF .001
- PRODUCTION PRETESTING SHOWED A WINDOW OF .086 - .094
- SUPP'S CHART (AT MUCH SLOWER RAMP RATE) SHOWED .087 - .092
- TWO DEVICES AT EACH INCREMENT PLACED IN CCP3 CYCLER W/ MONITOR CRT (L.E.D.'S) CONNECTED. THE TEMPERATURE (AIR & FLUID) WAS RAISED TO +150°C (SPEE IS 181°C) THE TEMP AT WHICH EACH SWITCH BEGAN TO GO OPEN-CRT WAS RECORDED.
- THE "SHORT-PIN" (ACTUALLY HIGH CAL.) DEVICES @ .092 - .093 WERE FIRST TO LOSE CONTINUITY, AROUND 120°C. BY 150°C, DEVICES TO .090" HAD LOST CONTINUITY. ALL OTHERS REMAINED SWITCHING NORMALLY. NOTE THAT .090" IS BASICALLY THE CENTER OF BOTH PIN WINDOWS, LOTS + PROD. TECHNIQUE. CONT. RETURNED IN TEMP & IN TIME ORDER LOST.
- DOWN TO -40°C, ALL SWITCHED NORMALLY.
- IT APPEARS THAT SHORT-TERM, DRIVES' PINNING TARGET SHOULD BE SET TO THE HIGH-SIDE, EVEN AS FAR AS THE ONSET OF CRACK-REL.
- WE ARE WORKING WITH THE 1090'S THAT WENT AWAY @ 150°C TO CHARACTERIZE THE ACTUAL ROOM-TEMP CASE CAL (20,000") AND A R.T. CHART OF THE SENSOR MATCHET-CURVE. THIS WILL TELL US THE MAGNITUDE OF THE THERMAL SHIFT.
- NEXT, WE'LL EXPLORE POTENTIAL CONTRIBUTORS: CASE MATE'S EXPANSION, AL. CRIMP RING EXPANSION, SENSOR/SWITCH BRATING DIFFICULTIES, EXCESS ENV. SEAL COMPRESSION, HIGH-TEMP MATCHET KNEBS LIGHT-TRUCK SENSOR TOO

CURRENT TARGET =
-0.087
+1-.002

NEW TARGET 3/9/92

→ .087 → .086

MSEC	ACT	REL
25		150

143 pin.

ACTIONS

TI-NHTSA 004536

① 20 L2-1'S & 20 L2-2'S.

MEASURE PIN TO REF SURFACE ON CUP.

② Route on bases. Finished. What size?

③ Pin window + tick sensor > sensors to store 0

77PS THERMAL SHIFT PHENOMENON

- DEVICES FOR EXPERIMENT TAKEN FROM A PRODUCTION-LINE PIN-WINDOW GROUP. THESE WERE BUILT W/ FIXED PIN LENGTH (5.0005) AND VARYING SWITCH CAL - .086" TO .093" (5.0005) IN INCREMENTS OF .001
- PRODUCTION PRETEST TESTER SHOWED A WINDOW OF .086 - .094
- JEFF'S CHRG (AT MUCH SLOWER RAMP RATE) THREW .087 - .092
- THE DEVICES AT EACH MEASUREMENT PLACED IN CLPS W/ FLOW W/ MONITOR CRT (H.E.D.'s) CONNECTED. THE TEMPERATURE (AIR & FLUID) WAS RAISED TO +150°C (SPEC IS 121°C) THE TEMP AT WHICH EACH SWITCH BEGAN TO GO OPEN - CRT WAS RECORDED.
- THE "SHOOT-AN" (ACTUALLY HIGH CAL.) DEVICES @ .092 - .093 WERE FIRST TO LOSE CONTINUITY, AROUND 120°C. BY 150°C, DEVICES TO .090" HAD LOST CONTINUITY. ALL OTHERS REMAINED SWITCHING NORMALLY. NOTE THAT .090" IS ORIGINALLY THE CENTER OF BOTH PIN WINDOWS, LOTS A GOOD TECHNIQUE. CRT RECORDING ON TEMP IN THE ORDER LIST.
- DOWN TO -40°C, ALL SWITCHED NORMALLY.
- IT APPEARS THAT SHOOT-TEMP, DEVICES' FINISHING TARGET SHOULD BE SET TO THE HIGH-SIDE, WHEN AS FAR AS THE ONSET OF CRIST-REL.
- WE ARE WORKING WITH THE .090'S THAT WENT AWAY @ 150°C TO CHARACTERIZE THE ACTUAL ROOM-TEMP CASE CAL (TO .089") AND A R.T. CHRG OF THE FUTURE MATCHET-CURVE. THIS WILL TELL US THE MAGNITUDE OF THE THERMAL SHIFT.
- NEXT, WE'LL EXAMINE POTENTIAL CONTRIBUTORS: CASE MAT'L EXPANSION, AL. CRIMP RING EXPANSION, SENSOR/SWITCH SEATING DIFFICULTIES, EXCESS SW. SEAL COMPRESSION, HIGH-TEMP MATCHET CURVE
LIGHT-TEMP SWITCH TO

TI-NHTSA 004537

1

**SOCKET DRIVE 77PS
TEST/STATUS REPORT 3-9-92
#201-15-1**

A design approach to developing a socket driven 77ps for ford is shown in figure 1. It consist of an aluminum crimp ring with integral hex. The crimp ring is placed over the top of the assembly and then crimped to a washer. The crimp is a castellated crimp to lock the ring into the washer. The washer has 9/16" hex hole to mate with the hexport. The design of each part is attached.

TESTING

1) HEX TORQUE

The torque withstand of the hex configuration on the aluminum crimp ring was tested by building a hex in 6061-T6 aluminum in the model shop (#ex3355-105 rev d). Rev D has a 25mm hex across the flats. The design really requires a 22mm hex. The 25mm should be sufficient for a first pass estimate of the strength. The hex outer diameter was splined and keyed to a mounting plate. The part withstood 30ft-lbs without signs of damage. 30ft-lbs is the required 2x overload limit. The model shop part had high stresses in the corners of the hex because of the machining operations. The production part is intended to be a deep draw stamping. It should have equivalent or greater strength because of the work hardening and grain orientation.

Conclusion: The thin wall hex in drawn aluminum 6062 aluminum should be able to withstand the required torque.

2) CRIMP TORQUE

The torque withstand of the crimp configuration was tested separately. A fixture was built to hold the standard aluminum crimp ring. The hexport and washer were then inserted into the crimp ring. The ring was folded into each notch of the washer by impacting with a .250" wide steel plate, using a hammer. The final configuration is shown in figure 1c. Torque was then applied to the hexport while holding the fixture. There was no evidence of damage at 30ft-lbs applied twice in each direction. Yielding occurred at 50-60ft-lbs. The yield was at the crimp corners where the washer was shearing the crimp ring. The washer had very sharp corners which dug into the crimp ring. There was also yielding at the pins used to prevent ring rotation.

It was also noted that the hexport rotated 30degrees relative to the steel washer. This was because of the loose fit required from the washer allowed large rotation before the engaging the side of the hex. The fit had about .005" per side clearance. No yielding of the washer or hexport occurred in spite of the concentrated load at the corners of the hexport.

After 30ft-lbs of torque was applied the washer was able to rotate back and forth within the crimp ring. This occurred because the crimp did not fold tightly enough into the washer and the crimp ring bulged out at the corners of the washer. The sharp corners of the washer reformed the ring making the crimp loose.

TI-NHTSA 004538

Conclusion: The ring to crimp configuration needs further design work. The washer corners need to be rounded. The shape of the crimp tool needs to be developed using actual die sets. Efforts should be made to decrease the depth of the notches in the crimp.

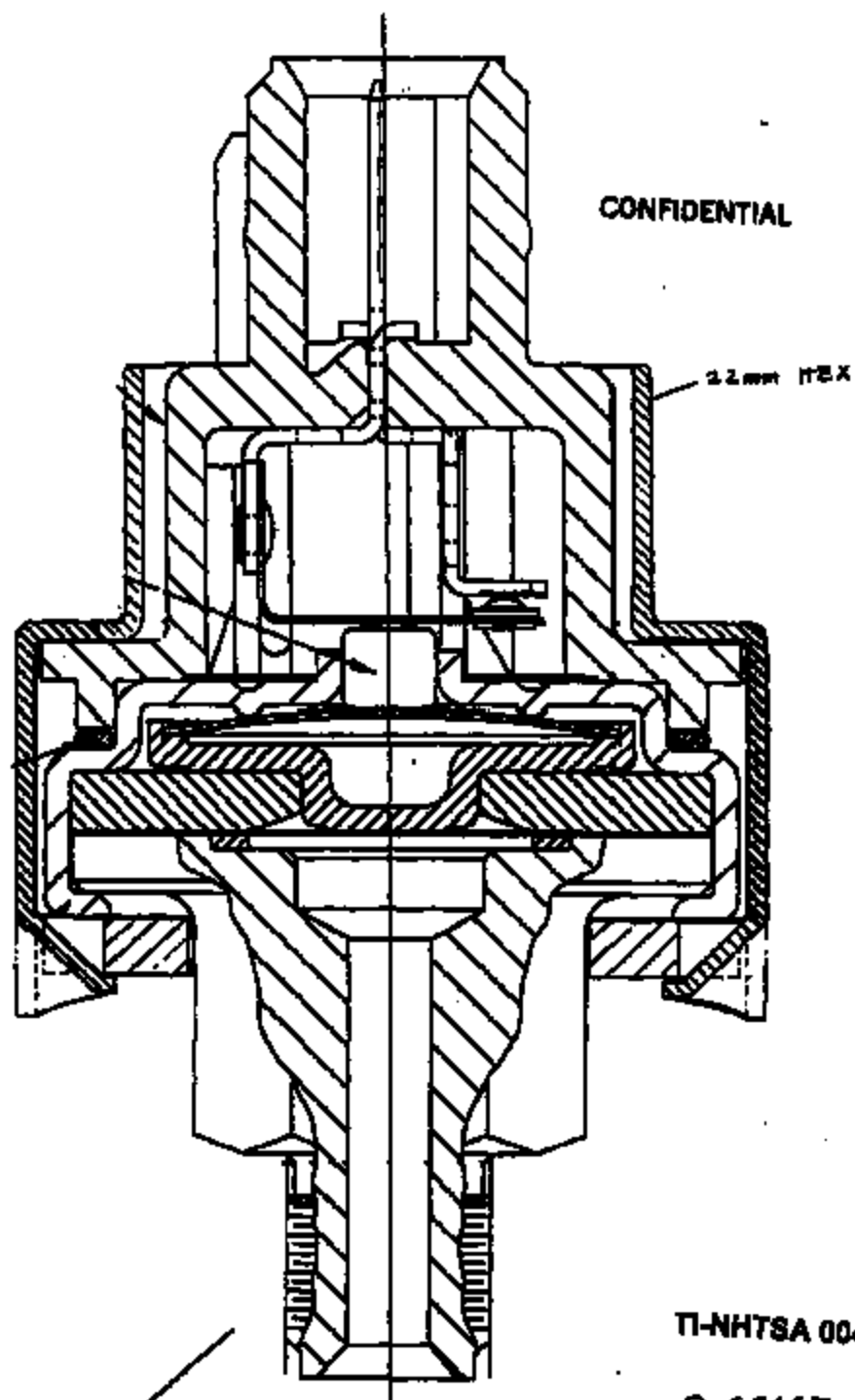
The washer to hexport fit needs lots of work. Because of the radius at the base of the hexport it is difficult to achieve a tight fit to the washer. The loose fit is insufficient for torque application over the whole tolerance range of parts. A possible solution is to change hexport to a "D" port. This would give long straight sides for the washer to engage on. The washer could then be relieved at the corners. The hexport would also have to have no radius at the base of the "D". This may not be achievable in a cold headed part.

ADDITIONAL INFORMATION

The single piece hex and crimp ring (ex3355-112) was quoted at \$81.80/M at 250,000 units by Ken-tron Mfg., Inc. This is close to the existing crimp ring (#74797-1) price of .04/ea. the washer is expected to be between \$.01-.02 each.

There is a high additional cost to reconfigure the line because the crimp ring must be inserted from the top and crimped on the bottom, exactly opposite how the line is tooled now.

DRS82-20, 3-9-92



TI-NHTSA 004540

D. SODGE
2/20/92

FIGURE 1

EX3355-105	TITLE HEX RING	REV D	DATE 5082 1/8/72
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CONFIDENTIAL

NOTE 1: INCLUDES PLATING THICKNESS
 MATERIAL THICKNESS: 0.0012 ± .005 (.015 ± .0015")
 MINIMUM TENSILE: 30 KSI AT FLANGE O.D.

- 3	CDA 260 BRASS	NONE
- 2	1008 STEEL	0.005" - 0.010" zinc plating w/ chrome chroming
EX3355-105-1	5052 ALUMINUM	NONE

DATE 1/8/72 BY D.L. [Signature]	T.I.	EX3355-105
--	-------------	-------------------



HEX RING

LOAD CAPTURED BY THESE
CORNERS. ONLY VERY LOCAL
YIELDING OCCURRED.



HOLDING PLATE

CONFIDENTIAL

-MSG M# 457902 FR=ZARN TO=MJB2 SENT=03/09/92 04:51 PM
R#182 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/09/92 04:51 PM
& RGT2 CMP1 MDES PL

MARCH 3, 1992

TO: STEVE OFFILER SBD1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/9/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: TUESDAY 3/10
TIME: 3:30
PLACE: CAFETERIA CUBE

(4) Utem Material Quote.

1. A. 80 → 90 145 pin FIRST
Base on 18.90 → 100 3 each
142 pin
3 each L2-1's
Comp Built.

2. Above 200ms timer possible?
Andre C.

3. Report on Release creep fallout.

Elev. temp - 150°C 60 min
TEST.
- Check Light
- O.K. - day's O.K.
- fail - ???

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Base calibration target value was .089" until ~1 week ago; 50 ms creep max'm on actuation and release. Spec was changed to .087" - increasing the effective pin length by .002" - and the release creep spec was opened to 100 ms max'm; actuation remained at 50 ms maximum. Our testing still showed the low side of the range to be unacceptable, so we arrived today at a new target of .001" longer effective pin length. This value was determined by subtracting what is believed to be the worst case stack (.004") from the largest acceptable base calibration (.090"). It was decided to actually increase the pin length by .001", and maintain the same base measurement of .086". We will change the creep spec to 150 ms max'm release and 25 ms max'm actuation immediately, and begin collecting data for daily review.

Worst case stack determined as +/- .002" for base calibration, +/- .0015" for the sensor assembly (to be verified) and +/- .001" for the pin.

Tom C. suggested a technique to determine if the effective change in pin length is in fact due to movement of the plastic base at temperature. We will be building the test samples tomorrow as a priority item.

SHORT TERM ACTIONS

TI-NHTSA 004543

- IMMEDIATELY IMPLEMENT ON P/C (L2-1) ONLY:
PIN LENGTH = .143"
BASE CALIBRATION = .087"

SELLERS/
GRIEPEY

Comp

TEST ALL SWITCHES AT 25ms MAX ACT'N & REL

RETEST ANY CREEP RELEASES ONLY - AT ^{150ms} 100ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

- COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS SWEET
- MEASURE 20 P/C AND 20 L/T SENSORS W/PINS IN PLACE TO DETERMINE SENSOR VARIABILITY PERIPOLI/ SELLERS
- EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N AND REL CREEP LIMITS KOURTESIS
- RUN PIN WINDOW ON L/T; GIVE SWITCHES TO S.O. SELLERS
- REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES OFFILER
- REVIEW L/T DATA TO DETERMINE NEW BASE CAL'N TARGET VALUE TEAM
- DETERMINE HOW TO HI TEMP TEST AUDIT SWITCHES IN PROD'N IF THE TEAM FINDS IT NECESSARY SWEET

Intw Comp .4mils
5 L2-3
pin and sensor

Comp

UNDERSTANDING THE PROBLEM CAUSE

- RUN P/C SENSOR HATCHET CURVES OFFILER
- RUN R.T. AND 150C MEASUREMENTS OF DUMMY SWITCHES TO DETERMINE AMT. OF SHIFT CAUSED BY PLASTIC MOVEMENT OFFILER
- RUN SAME WITH ANNEALED BASES AND STEEL CRIMP RINGS AS VARIABLES OFFILER

REGARDS,
DAVE CZARN

\1-hitemp

148/87 → 0 55 offset

140/85 →

143/87 → 56 offset

~~143/87~~

-MSG MH= 457888 FR=ZARN TO=MJS2 SENT=03/09/92 04:53 PM
R#=183 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/09/92 04:53 PM

MARCH 3, 1992

TO: STEVE OFFILER BBO1
BILL SWEET W84
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RBT2
ANDY MCGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CHPI
JOHN KOURTESIS NDES
PAUL LESSER PL

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/9/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

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TIME: 3:30
PLACE: CAFETERIA CUBE

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DISCUSSION:

Base calibration target value was .089" until ~1 week ago; 50 ms creep max'm on actuation and release. Spec was changed to .087" - increasing the effective pin length by .002" - and the release creep spec was opened to 100 ms max'm; actuation remained at 50 ms maximum. Our testing still showed the low side of the range to be unacceptable, so we arrived today at a new target of .001" longer effective pin length. This value was determined by subtracting what is believed to be the worst case stack (.004") from the largest acceptable base calibration (.090"). It was decided to actually increase the pin length by .001", and maintain the same base measurement of .086". We will change the creep spec to 150 ms max'm release and 25 ms max'm actuation immediately, and begin collecting data for daily review.

Worst case stack determined as +/- .002" for base calibration, +/- .0015" for the sensor assembly (to be verified) and +/- .001" for the pin.

Tom C. suggested a technique to determine if the effective change in pin length is in fact due to movement of the plastic base at temperature. We will be building the test samples tomorrow as a priority item.

SHORT TERM ACTIONS

① devices in the A.M.
② Call Andre C. on tester data.

③ L2-1 L2-3 11:30pm
87-92 85-92
window (Des) window (Des)

TI-NHTSA 004545

PIN LENGTH = .143"
BASE CALIBRATION = .087"

SELLERS/
GRIEPEY

TEST ALL SWITCHES AT 25ms MAX ACT'N & REL

RETEST ANY CREEP RELEASES ONLY - AT 100ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

- COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS SWEET
- MEASURE 20 P/C AND 20 L/T SENSORS W/PINS IN PLACE TO DETERMINE SENSOR VARIABILITY PERIPOLI/SELLERS
- EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N AND REL CREEP LIMITS KOURTESIS
- RUN PIN WINDOW ON L/T; GIVE SWITCHES TO S.O. SELLERS
- REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES OFFILER
- REVIEW L/T DATA TO DETERMINE NEW BASE CAL'N TARGET VALUE TEAM
- DETERMINE HOW TO HI TEMP TEST AUDIT SWITCHES IN PROD'N IF THE TEAM FINDS IT NECESSARY SWEET

UNDERSTANDING THE PROBLEM CAUSE

- RUN P/C SENSOR HATCHET CURVES OFFILER
- RUN R.T. AND 150C MEASUREMENTS OF DUMMY SWITCHES TO DETERMINE AMT. OF SHIFT CAUSED BY PLASTIC MOVEMENT OFFILER
- RUN SAME WITH ANNEALED BABES AND STEEL CRIMP RINGS AS VARIABLES OFFILER

REGARDS,
DAVE CZARN

\1-hitemp

Annealed @
400°F 1/2 hour

Base Growth @ temp. Normal → .003

Annealed more change → .0045

*No Affective Change when
using Aluminum rings.

Soaked @ 150°C

-MSG NM= 00457888 FR=ZARN TO=SBQ1 SENT=03/09/92 04:53 PM
RM=051 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/09/92 04:53 PM

MARCH 9, 1992

TO: STEVE OFFILER SBQ1
BILL SWEET WS4
MATT SELLERS MUS2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL

FR: DAVE CZARN ZARN

RE: DCP6 HIGH TEMP ISSUE - MINUTES OF 3/9/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: TUESDAY 3/10
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration case) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Base calibration target value was .089" until "1 week ago; 50 ms creep max'm on actuation and release. Spec was changed to .087" - increasing the effective pin length by .002" - and the release creep spec was opened to 100 ms max'm; actuation remained at 50 ms maximum. Our testing still showed the low side of the range to be unacceptable, so we arrived today at a new target of .001" longer effective pin length. This value was determined by subtracting what is believed to be the worst case stack (.004") from the largest acceptable base calibration (.090"). It was decided to actually increase the pin length by .001", and maintain the same base measurement of .086". We will change the creep spec to 150 ms max'm release and 25 ms max'm actuation immediately, and begin collecting data for daily review.

.087

Worst case stack determined as +/- .002" for base calibration, +/- .0015" for the sensor assembly (to be verified) and +/- .001" for the pin.

-.0005

Tom G. suggested a technique to determine if the effective change in pin length is in fact due to movement of the plastic base at temperature. We will use only the test samples tomorrow, and a priority item.

TI-NHTSA 004547

- IMMEDIATELY IMPLEMENT ON P/C (L2-1) ONLY:
PIN LENGTH = .143"
PAGE CALIBRATION = .087"

ELLERS/
CARTER

TEST ALL SWITCHES AT 25000 MAX ACTION & RE.

RETEST ANY CREEP RELEASES ONLY AT ^{150-psi} ~~200-psi~~ LIMIT
(CREEP ACTIVATION FAILURES NOT TO BE RE-TESTED)

- COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS

SWEET

- MEASURE TO P/C AND 20 L/T SENSORS W/PINS
IN PLACE TO DETERMINE SENSOR VARIABILITY

PERIPOLI /
SHELLERS

- EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'NS AND REL CREEP LIMITS

KOURTESIS

1. RUN PIN WINDOW ON L/T, GIVE SWITCHES TO S.C.

SELLERS

- REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES

OFFILER / JD

- REVIEW L/T DATA TO DETERMINE NEW BASE CAL'N
TARGET VALUE

TEAM

4. DETERMINE HOW TO HI TEMP TEST MUDIT SWITCHES
IN PRODD'N IF THE TEAM FINDS IT NECESSARY

SWEET

UNDERSTANDING THE PROBLEM CAUSE

- ~~✓~~ RUN P/C SENSOR HATCHET CURVES

- ➔ RUN R.T. AND 150C MEASUREMENTS OF DUMMY SWITCHES TO DETERMINE AMT. OF SHIFT CAUSED BY PLASTIC MOVEMENT .

- RUN GAME WITH ANNEALED BABES AND STEEL CRIMP RINGS AS VARIABLES

NEEDLES,
DAVE CLARK

System

3. CONCLUSIONS

— LIFE ? (SING; WHISTLING)

— LAMINATE 1/2" THICK

new pin-window, with three all the
way to open left & right temp. & sticks

→ ROULETTE WAS HEAVY OPEN @ COLD HUMP
VERY LONG PINS - BACK DOWN TO
P.C. ~ 200 PSI IN L.T. ~ 350 PSI 80-70

4/145 OFFICERS, 1st. 45

44-75475 SP RAN- RMA'S TO CALL INTO SPAIN

- LATER, HAVE ORANGE HND BUT IF BARK IS IMPAIRED

OFFICER /32/ RICH

OFFILER / J

OFFILER / ID

END OF PAGE 2

WRE: AGENTS IS NOT
HAVE FROM STE, IMPROVING
IN MOTION & STATE
AGREEMENTS

IT IS THEREFORE REQUESTED
THAT YOU BE KEPT ADVISED

THEY STAYED IN STANBULES ON
SUNDAY TO MAKE SURE THEY
WERE SAFE, THEN THEY FLEW
THE 4300 4500 FEET 1-3000
(SOME OF THE FEET) SET
AWAY ON THE

- BOLD SUMMER 1965
WED THURS 1/15
- MONTAGNE PIONEER
LET BY RARE MONT 1/20
- ANNUAL SWIM ADV
ADVIS 1/20, 1/20
- PARADE: FARMER 1/20
1965-1965-1965

- 2000-2001
- 2002-2003
- 2004-2005
- 2006-2007
- 2008-2009
- 2010-2011
- 2012-2013
- 2014-2015
- 2016-2017
- 2018-2019
- 2020-2021
- 2022-2023
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- 2240-2241
- 2242-2243
- 2244-2245
- 2246-2247
- 2248-2249
- 2250-2251
- 2252-2253
- 2254-2255
- 2256-2257
- 2258-2259
- 2260-2261
- 2262-2263
- 2264-2265
- 2266-2267
- 2268-2269
- 2270-2271
- 2272-2273
- 2274-2275
- 2276-2277
- 2278-2279
- 2280-2281
- 2282-2283
- 2284-2285
- 2286-2287
- 2288-2289
- 2290-2291
- 2292-2293
- 2294-2295
- 2296-2297
- 2298-2299
- 2300-2301
- 2302-2303
- 2304-2305
- 2306-2307
- 2308-2309
- 2310-2311
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- 2372-2373
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- 2380-2381
- 2382-2383
- 2384-2385
- 2386-2387
- 2388-2389
- 2390-2391
- 2392-2393
- 2394-2395
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- 2398-2399
- 2400-2401
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- 2442-2443
- 2444-2445
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- 2448-2449
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- 2486-2487
- 2488-2489
- 2490-2491
- 2492-2493
- 2494-2495
- 2496-2497
- 2498-2499
- 2500-2501
- 2502-2503
- 2504-2505
- 2506-2507
- 2508-2509
- 251

TLNHTBA 004548

→ add
How many.

→ Change to $\frac{.087''}{143 \text{ pin}}$
How many 2/25/92

→ change .087
143 pin
How many
3/10/92

22-141 50 SHEETS
22-142 100 SHEETS
22-143 200 SHEETS
22-144 300 SHEETS

MATT -

WHILE PULLING TOGETHER INFO ON WHAT WAS
SHIPPED, WHEN, IS IT POSSIBLE TO ALSO MONITOR
TO WHOM & WHICH CAR/TRUCK THE DEVICES
ENDED UP ON? I'D LIKE TO ASSESS THE
LIKELIHOOD THAT THE DEVICE WILL EVER SEE
SIGNIFICANTLY HIGH TEMP, WHICH IS TOTALLY
DEPENDENT ON SWITCH LOCATION IN A GIVEN
CARLINE, WHICH I HAVE NO INFO ON
(YET) THX



92030

TI-NHTSA 004560

PRESSURE SWITCH DATA

Form 21605

TEST NO. 203-15-25

DEVICE	DATE REQUESTED	REQUESTED BY	REQUESTED COMPL. DATE
PERFORMED BY	DATE STARTED	DATE COMPLETED	APPROVED BY

PROJECT TITLE: PLANT M.Y. 92 ELECTRONIC SPEED CONTROL deACTIVATE P.S.
LIGHT TRUCK

CUSTOMER:

PURPOSE OF TEST: TO UNDERSTAND THE NATURE OF OBSERVED ERRATIC
SWITCHING AT ELEVATED TEMP.

PROCEDURE: Production build devices with a range of base calibrations.
CHARACTERIZE TRANSFER-TIME OVER THE RANGE. INSTALL AN
IMPULSE CYCLER. CYCLE AS TEMP. RISES. RECORD APPROX. TEMP
AT WHICH SWITCHING BECOMES ERRATIC.

DEFINITIONS: GRAB CRISP: AT FIRST 12% DIPP BETWEEN SWAP & SENT.

CRISP: T-TIME 7.50 MS

ORIGINAL CRISP: 10 CRISP < T-TIME < 50 CRISP

OK: T-TIME < 10 M.SEC.

Device #	Base Calib	ACT	REL	off set	SWITCHING		CYCLES	RETURN OF CONTINUITY
					ANALOG TEMP	FLUID TEMP		
203-15-	83	.9	CRISP CR					
-2	83	.9	CRISP CR					
-3	84	.9	CRISP CR					
-4	84	.9	CRISP CR					
-5	85	1.0	.7					
-6	85	.9	.1					
-7	86	.9	.9					
-8	86	1.0	.7					
-9	87	.9	1.0					
-10	87	1.0	0.7					
-11	88	1.0	0.7					
-12	88	1.0	0.6					
-13	89	1.1	0.6					
-14	89	1.1	0.3	56				
-15	90	1.2	0.6					
-16	90	1.1	0.4	58				
-17	91	1.2	0.2					
-18	91	1.8	0.6	59				
-19	92	1.3	0.8					
-20	92	1.2	0.3	61	OFF-ON	OFF-ON		
-21	93	CRISP A	0.6		146-147	146-147	4	5/30
Y-203	93	AT	0.7	60	146-147	146-147	3	4740
-23	93	CRISP A	0.7		146-147	146-147	3	4740
-24	94	CRISP CA	0.2	61	146-147	146-147	1	3750
-25	94	CRISP CA	1.1		146-147	146-147	2	4265

TI-NHTSA 004551

PRESSURE SWITCH DATA

Form 21605

TEST NO. 203-15-25

DEVICE CCPS	DATE REQUESTED 3-10-92	REQUESTED BY STUR OFFICE	REQUESTED COMPL. DATE
PERFORMED BY RICH TURNER	DATE STARTED 3-11-92	DATE COMPLETED 3-11-92	APPROVED BY JOHN CARRAN

PROJECT TITLE: **PROD MY 92 ELECTRONIC Speed Control diaphragm P.S.**
LIGN-TPUCS

CUSTOMER:

PURPOSE OF TEST: **TO UNDERSTAND THE NATURE OF OBSERVED ERRATIC SWITCHING AT ELEVATED TEMP.**

PROCEDURE: **PRODUCTION build devices with a RANGE OF GAGE CALIBRATIONS. CHARACTERIZE TRANSFER-TIME OVER THE RANGE. INSTALL ON FANUSE CYCLES. CYCLE AS TEMP. RISES. RECORD APPROX. TEMP AT WHICH SWITCHING BECOMES ERRATIC.**

DEFINITIONS: **GAGE CAP: AT LEAST 10% DIFF BETWEEN SWAP & CONT.**

CRIP: T-TIME 7.50 MS

ANOMAL CAP: 10% DIFF TO T-TIME 5.50 MS

OE: T-TIME 10.00 MS

DEVICE #	GAGE CALIB	ACT.	REL	ERRATIC SWITCHING					RETURN OF CONTINUITY
				ANOMAL TEMP	FLUID TEMP	ORDER FAILURE	Cycles		
203-15-1	83	.8	GAGE CA						
-2	83	.9	GAGE CA						
-3	84	.9	GAGE A						
-4	84	.9	GAGE A						
-5	85	1.0	.9						
-6	85	.9	1.1						
-7	86	.9	.9						
-8	86	1.0	.9						
-9	87	.9	1.0						
-10	87	1.0	0.9						
-11	88	1.0	0.9						
-12	88	1.0	0.5						
-13	89	1.1	0.6						
-14	89	1.1	0.3						
-15	90	1.2	0.6						
-16	90	1.1	0.4						
-17	91	1.2	0.2						
-18	91	1.8	0.6						
-19	92	1.3	0.3						
-20	92	1.3	0.3						
-21	93	GAGE A	0.6	OFF-ON	OFF-ON				
-22	93	1.1	0.4	148-138	152-147	4	512	1	
-23	93	GAGE A	0.3	148-134	148-144	3	4700	2	
-24	94	GAGE CA	0.2	148-117	129-123	1	3252	4	
-25	94	GAGE CA	1.1	148-123	140-129	2	4265	3	

TI-NHTSA 004552

PRESSURE SWITCH DATA

FORM 21605

TEST NO. *W-15-10*

DEVICE <i>CCPS</i>	DATE REQUESTED <i>3/8/92</i>	REQUESTED BY <i>Steve Off-101</i>	REQUESTED COMPL. DATE
PERFORMED BY <i>Jeffrey D. Acciaio</i>	DATE STARTED <i>3/10/92</i>	DATE COMPLETED	APPROVED BY

PROJECT TITLE:

CUSTOMER:

PURPOSE OF TEST: *Thermal Expansion of bases*

PROCEDURE: *Cramp bases to dummy sensors. Measure gap base to container, change at room temp and at 150°C.*



Device #	Base	Cramp Rod	RT. Measurement	150°C Measurement	Δ	$\bar{X}_0$
211-15-01	Normal	Aluminum	.1428	.1458	+.0030	.0025"
-02			.1487	.1425	+.0025	
-03			.1457	.1497	+.0030	
211-15-04	Normal	Steel	.1450	.1492	+.0040	.0029"
-05			.1450	.1471	+.0021	
-06			.1450	.1476	+.0026	
211-15-07	Assembled	Aluminum	.1419	.1463	+.0044	.0045"
-08			.1425	.1462	+.0037	
-09			.1406	.1468	+.0062	
211-15-10	Assembled	Steel	.1430	.1478	+.0048	.0041"
-11			.1409	.1459	+.0050	
-12			.1410	.1448	+.0038	
 AVERAGE / INCREASED THERMAL EXPANSION OF BASES.						

TI-NHTSA 004553

TRUCKS
2-3

3/10/92
PASCAR

83- 95
84- 96
85- 95.5
86- 96
87- 95.5
88- 95
89- 96
90- 95
91- 95.5
92- 95.5

93- 95
94- 95.5
95- 96
96- 96
97- 95
98- 95.5
99- 96
90- 95
91- 95.5
92- 95.5

$\bar{x}$ 95.5

σ .397

96
96
96
96.5
96.5
96
96.5
96
96
96
96.5
96.5
96
96
96
96.5
96.5
96
96.5
96.5
96

$\bar{x}$ 96.2

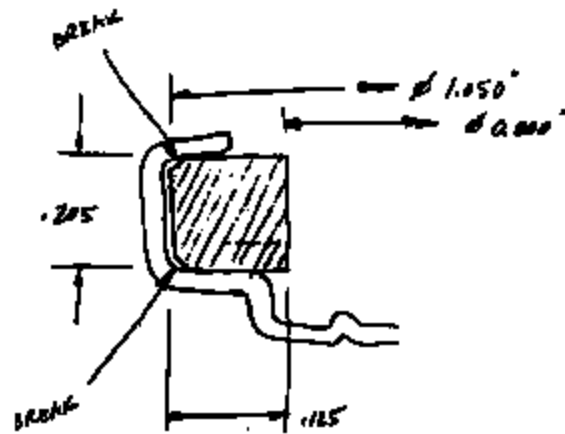
σ .255



10 920710

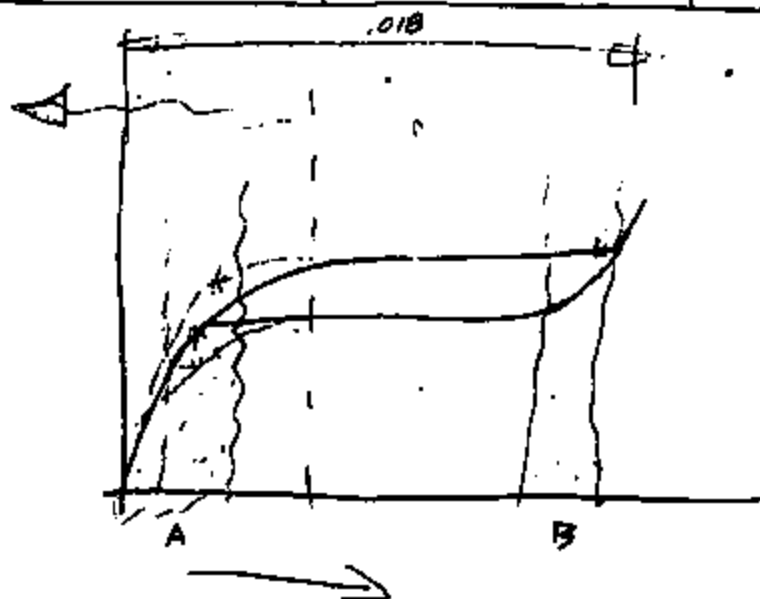
SENSE PUMPS

25-141 20 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS



TI-NHTSA 004555

22-141
22-142
22-143
22-144



② A - CREEP ACT, LOW ACT, SHORT PIN/ LONG BASE CAL
(MOST SUSCEPTIBLE TO THERMAL SHIFT (?))

② B - CREEP REL, HIGH ACT, LONG PIN/ SHORT BASE CAL

PT .086 - .094 ~~THRESHOLD~~

JD .087 - .092

WT RAMP RATE DIFFERENTIAL (?)

100% CR ACT. WRAPE
~ 120%

0.010 FAIL @ 150%

ALL REST OKAY

ALL OKAY - 40°C.

TI-NHTSA 004566

FINAL INSPECTION 77PIL2-1

DATE: 3-10-92

CUSTOMER P/N F2V-8F924-48

DISC LOT 2-35
REEL #1
LOT #4
WASHER LOT 109 1-CUT

MAT. I.D. 74868-A-C-7
CUP LOT # 11
CONV. LOT 156
QTY. 2000

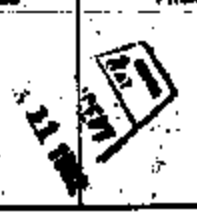
DISC LOT2-36
REEL # 1
LOT # 1
WASHER LOT 109 1-CUT

MAT. I.D. 74868-AC-1-6
CUP LOT # 11
CONV. LOT 156
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	134	122	118	116	112	115	115	117	106	106	117	116	116	117	114	117	114	114
RELEASE	62	60	57	60	64	65	62	55	54	58	72	63	66	54	58	59	63	58
DIFF.	51	41	49	56	47	50	52	61	52	52	44	52	55	63	56	57	50	55
2 VOLT DROP	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
3 CUR. LEAK	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
4 PROOF	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
5 IMPULSE	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
ACTUATION	115	120	115	115	110	—	—	—	—	110	110	115	120	110	—	—	—	—
RELEASE	60	60	55	55	60	—	—	—	—	60	60	55	55	55	—	—	—	—
VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
ICREP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 BURST	✓	✓	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—
8 INDOOR	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 ICREP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
10 THERM. SHOCK	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
ACTUATION	—	—	—	—	—	—	—	120	100	—	—	—	—	—	—	—	110	115
RELEASE	—	—	—	—	—	—	—	50	50	—	—	—	—	—	—	—	50	50
VOLT DROP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
CUR. LEAK	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
PROOF	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
ICREP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK

TI-NHTSA 004557

FINISHED PRODUCTION ROUTING		WHITE CANARY FINK → Route to Dept. Supervisor	Route to Finished Goods
DEVICE NUMBER 77P52-1			
SPECIAL REQUIREMENT	TOTAL QUANTITY 9		
MANU. ORDER NUMBER		MO SUBTOTALS	
1. 2-36 2. 3. 4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 1000		DATE 3/10/82	
DEPARTMENT 294			

FINISHED PRODUCTION ROUTING		WHITE CANARY FINK → Route to Dept. Supervisor	Route to Finished Goods
DEVICE NUMBER 77P52-1			
SPECIAL REQUIREMENT	TOTAL QUANTITY 9		
MANU. ORDER NUMBER		MO SUBTOTALS	
1. 2. 2-35 3. 4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 1000		DATE 3/10/82	
DEPARTMENT 294			

TI-NHTSA 004558

PRESSURE SWITCH DATA

Form 21605

TEST NO. 202-15-12

DEVICE <i>CCPS</i>	DATE REQUESTED <i>3/8/92</i>	REQUESTED BY <i>Steve Offici</i>	REQUESTED COMPL. DATE
PERFORMED BY <i>Jeffrey D. Anderson</i>	DATE STARTED <i>5/14/92</i>	DATE COMPLETED	APPROVED BY
PROJECT TITLE:			

CUSTOMER:

PURPOSE OF TEST: *Thermal Expansion of Bases*

PROCEDURE: *Crimp bases to dummy switches. Measure gap from to cartons, change at room temp and at 150°C.*



Device	Base	Crimp Req	RT. Measurement	150°C Measurement	Δ	Z_0			
202-15-01	Normal	Aluminum	.1438	.1458	+.0020				
-02			.1437	.1435	+.0021	.0021"			
-03			.1457	.1487	+.0030				
202-15-04	Normal	Steel	.1450	.1482	+.0030				
-05			.1450	.1471	+.0021	.0021"			
-06			.1450	.1476	+.0026				
202-15-07	Normal	Aluminum	.1419	.1463	+.0044				
-08			.1415	.1463	+.0048	.0045"			
-09			.1416	.1468	+.0052				
202-15-10	Normal	Steel	.1430	.1472	+.0042				
-11			.1409	.1454	+.0045	.0041"			
-12			.1410	.1458	+.0048				

TI-NHTSA 004559

PRESSURE SWITCH DATA

Form 31605

TEST NO. 23-15-25

DEVICE CCPS	DATE REQUESTED 3-13-92	REQUESTED BY STEVE OFFICE	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-13-92	DATE COMPLETED 3-13-92	APPROVED BY [Signature]
PROJECT TITLE Prod. M.Y. 72 31-TC : 72nd Control Directorate A1 L12-2700-1			

CUSTOMER:

PURPOSE OF TEST: **TO UNDERSTAND THE NATURE OF OBSERVED ERRATIC SWITCHING AT ELICATED TEMP.**

PROCEDURE: **PRODUCTION build devices with a range of base calibrations. CHARACTERIZE TRANSFER-TIME OVER THE RANGE. INSTALL ON TEMPER CYCLES. Cycle AS TEMP RISE. RECORD APPROX. TEMP AT WHICH SWITCHING BECOMES ERRATIC.**

DEFINITIONS: **BASE CALIB: AT LEAST 10% DIFF BETWEEN SWAP POINT.**

CRIP: T-TIME 7.50 MS

ORIGINAL CALIB: 10 MS. $\leq$ T-TIME $\leq$ 50 MS.

OR: T-TIME $\leq$ 10 MS.

Device #	Base Calib	Act.	Rel	ERRATIC SWITCHING			Cycles	RETURN OF CONTINUITY
				Ambient Temp	Fluid Temp	Order of Failure		
23-15-1	83	.8	CRIP CA					
-2	83	.9	CRIP CA					
-3	84	.9	CRIP CA					
-4	84	.9	CRIP CA					
-5	85	1.0	.9					
-6	85	.9	1.1					
-7	86	.9	.9					
-8	86	1.0	.7					
-9	87	.9	1.2					
-10	87	1.0	0.7					
-11	88	1.0	0.7					
-12	88	1.0	0.5					
-13	89	1.1	0.6					
-14	89	1.1	0.3					
-15	90	1.2	0.6					
-16	90	1.1	0.4					
-17	91	1.2	0.3					
-18	91	1.8	0.6					
-19	92	1.3	0.3					
-20	92	1.3	0.3					
-21	93	CRIP CA	0.4	148-138	152-147	4	3.20	1
-22	93	CRIP CA	0.4					
-23	93	CRIP CA	0.3	148-134	148-142	3	4780	2
-24	94	CRIP CA	0.2	142-117	129-123	1	22.2	4
-25	94	CRIP CA	1.1	148-123	140-129	2	4565	3

TI-NHTSA 004560

JNT
DuPont Electronics

March 11, 1992

Ms. Agnes Cardozo
TEXAS INSTRUMENTS
MS 12-02
34 Forest St.
P. O. Box 119
Attleboro, MA 02703

Dear Agnes:

Thank you for agreeing to meet for a detailed discussion of the applications for Kapton® polyimide film products, at Attleboro on Wednesday, March 18. As part of Du Pont's commitment to continuing improvement of our products and services, information exchanges like this have proven valuable to refining and tailoring our offering to meet customer's needs.

Accompanying me will be Harry Gumm, Technical Services Specialist for Kapton®. Harry has had several years experience in various aspects of film manufacturing and handling. His responsibilities have recently been expanded to include development of new applications, and he is well versed in Du Pont's current activities around new and upgraded polyimide film products.

Please call me at 203-871-7426 if you have any questions or have a specific area you wish to address.

Harry and I look forward to meeting with you on the 18th.

Sincerely,

Edward C. McKenzie

Edward C. McKenzie
Sales Representative

TI-NHTSA 004581

FINAL INSPECTION 77982-1

DATE: 3-11-92

CUSTOMER P/N F2UC-9F924-AB

DISC LOT 3-4
REEL # 1
LOT # 2
WASHER LOT 109 1-CUT

NAT. I.D. 74060-AC-1-6
CUP LOT 811
CONV. LOT 156
QTY. 2000

DISC LOT 3-5
REEL # 2
LOT # 2
WASHER LOT 109 1-CUT

NAT. I.D. 74060-AC-1-7
CUP LOT # 11
CONV. LOT 156
QTY. 200

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	124	120	125	122	122	118	129	127	116	122	117	117	117	120	121	121	113	111
RELEASE	51	56	55	73	50	55	48	57	50	49	49	50	74	58	59	75	61	63
DIFF.	73	66	70	49	67	62	61	70	50	52	47	57	43	62	62	46	51	48
2 VOLT DROP	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
3 CUR. LEAK	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
4 PROOF	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
5 IMPL. SK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
ACTUATION	125	125	125	125	125	—	—	—	—	120	125	125	120	125	—	—	—	—
RELEASE	55	55	55	60	60	—	—	—	—	60	60	60	65	60	—	—	—	—
VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
CREEP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 SHUNT	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—
8 SHORTCIRCUIT	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
VISUAL	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CRIMP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
10 THER. SH.	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
ACTUATION	—	—	—	—	—	—	—	120	110	—	—	—	—	—	—	—	115	115
RELEASE	—	—	—	—	—	—	—	30	30	—	—	—	—	—	—	—	35	40
VOLT DROP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
CUR. LEAK	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
PROOF	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
CREEP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK

TI-NHTSA 004562

FINISHED PRODUCTION ROUTING		WHITE CANARY PINK	Route to Finished Store Route to Dept. Supervisor
DEVICE NUMBER MMPSL-1			
SPECIAL REQUIREMENT		TOTAL QUANTITY 9	
MANU. ORDER NUMBER		NO SUBTOTALS	
1. 3-5 2. 3. 4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 18262			
DATE 3-11-92		DEPARTMENT 294	

FINISHED PRODUCTION ROUTING		WHITE CANARY PINK	Route to Finished Store Route to Dept. Supervisor
DEVICE NUMBER MMPSL-2			
SPECIAL REQUIREMENT		TOTAL QUANTITY 9	
MANU. ORDER NUMBER		NO SUBTOTALS	
1. 3-4 2. 3. 4.			
QUALITY CONTROL APPROVAL			
IN PROCESS	IN PROCESS	FINAL	
			
Form 18262			
DATE 3-11-92		DEPARTMENT 294	

TI-NHTSA 004563

MSG# 00341866 FR=ZARN TO=SB01 SENT=03/11/92 04:49 PM
 PR=000 ST=C DIV=0050 CC=00101 PY=ZARN AT=03/11/92 04:49 PM

FROM: 11/15/92
 TO: STAFF OFFICER SB01
 BILL SWEET WS4
 KATY SELLERS MGS2
 JIM WATT PCQA
 DICK GARTNEY MFC

TO: TOM CHARBONEAU TC
 RAY TOURANDEAU RGT2
 ANDY MCGUIRK PCQA
 GILL CONGDON MFC
 CHARLIE DOUGLAS CMP1
 JOHN KOURTESIS MDES
 PAUL LESSER PL
 STEVE WALTERS MLDG

FROM: DAVE DIARN ZARN

RE: COPS HIGH TEMP ISSUE - MINUTES OF 3/11/92 MEETING

Meetings will be held daily at 0:30 in the cafeteria until the issue is resolved.

 INT MEETING:

DATE: THURSDAY 3/12
 TIME: 0:30
 PLACE: CAFETERIA CUBE

DISC: Devices calibrated to the "long pin" (actually high calibration) side of the pin window exhibit loss of continuity at elevated temperatures. Problem is believed to be primarily related to thermal expansion/warping of the base reducing the effective pin length.

DISCUSSION:
 The window completely; window is ~7 mils in width vs. the 5 mil width of the P/C switches which is characteristic of the rebus cup configuration. Elevated temp testing showed all switches pinned within the window to maintain continuity at 150 C; those outside the window (on low end) lost continuity at lower temperatures. Conclusion is that the L/T switch is more robust due to larger window. We've decided to use the same base and pin dimensions as P/C (.037"/.143") to avoid errors in production; although the data shows that we could tolerate a 1 to 2 mil shorter pin length.

One movement shown to contribute to a ~3 mil change in effective pin length with non-annealed (i.e., standard) bases and ~4.5 mils with annealed bases. Test will be repeated with bases only (no terminals) before conclusions are drawn.

SHORT TERM ACTIONS

- NEW ITEM OR COMPLETED ITEM
- PRIORITY ITEM

ATTACHED "LONG PIN" MATRIX TO D.O.

--- ? TO ALT WAT'S (WATL, HENNA, etc)
 --- ENAH (ALL AS CTS, what's showing??)
 --- JD: H-Temp dummy's w/ 57 both WAT'S

NOTE: - VLD DEVICE, IF SMALLER PIN -
 WINDOW, WILL BE IMPOSSIBLE TO PIN
 - 3, 5, 63 OFFSETS, H-Temp VLD'S
 - AC- 48" E 2T.
 - 1 WAT'S E 171 + 152L
 - 2 WAT'S E 171 + 152L

TI-NHTSA 004564

7 ELLERS Rec'd 42072

IMMEDIATELY IMPLEMENT ON F/C and L/T

PIN LENGTH = .143"

BASE CALIBRATION = .067"

SELLERS/
GARIENY

TEST ALL SWITCHES AT 25ms MAX ACT'N & REL

RETEST ANY CREEP RELEASES ONLY - AT 150ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS

KOURT.

RUN PIN WINDOW ON L/T, GIVE SWITCHES TO S.O.

SELLERS
comp.
OFFILER
comp.
TEAM
comp.

REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES

REVIEW L/T DATA TO DETERMINE NEW BASE CAL
TARGET VALUE

PROVIDE 7 WIRE HARNESS COMPONENTS TO
B. SWEET

OFFILER
comp.
SWEET

PREPARE TEMP. TEST STATION FOR USE
BY 3/16

WRITE HX TEMP AUDIT TEST PROCEDURE

SWEET

PROVIDE "SHORT PIN" MATRIX TO S.O.

SELLERS

HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)

OFFILER

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS

OFFILER } 280W S/S, DUMMY SWITCHES,
1st pass comp } ANALYSIS vs. WING, W/D TOWN

REQUEST CELENESE VISIT W/E 3/20
TO DISCUSS PLASTIC MOVEMENT

CZARN/ } VISITING 10th 2:15
WALTERS } IN CAP. BIL

GARDS,
ME CZARN

I-hitemp

TI-NHTSA 004585

MSG MW= 00341866 FR=ZARN TO=SB01 SENT=03/11/92 04:49 PM
RW=066 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/11/92 04:49 PM

MARCH 11, 1992

TO: STEVE OFFICER SED1
BILL SWEET W34
MATT SELLERS M052
JIM WATT P00A
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK P00A
BILL CONGDON MFPC
CHARLIE DOUBLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/11/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: THURSDAY 3/12

TIME: 3:30

PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperatures. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Pin window completed; window is ~7 mil in width vs. the 3 mil width of the P/C switches which is characteristic of the rebump cup configuration. Elevated temp testing showed all switches pinned within the window to maintain continuity at 150 C; those outside the window (on low end) lost continuity at lower temperatures. Conclusion is that the L/T switch is more robust due to larger window. We've decided to use the same base and pin dimensions as P/C (.037"/.143") to avoid errors in production, although the data shows that we could tolerate a 1 to 2 mil shorter pin length.

Base movement shown to contribute to a ~3 mil change in effective pin length with non-annealed (i.e., standard) bases and ~4.5 mils with annealed bases. Test will be repeated with bases only (no terminals) before conclusions are drawn.

SHORT TERM ACTIONS

1 = NEW ITEM OR COMPLETED ITEM
2 = PRIORITY ITEM

1 PROVIDE "LONG PIN" MATRIX TO S.O.

SELLERS Rec'd 920912

TI-NHTSA 004588

— ? TO ALT MAT'L'S (WHEEL, 4/11/92, ETC)
— ENH (ALL ON CTS, WHAT'S SHIPING??)
— JD: MI-TEMP DUMMY'S w/ 57 BOTH MAT'L'S

NOTE: 1- VLD DEVICE, IF SMALLER PIN -
2- WINDOW, WILL BE IMPOSSIBLE TO PIN

3- 51, 52, 53 OFFSETS, MI-TEMP VIB'S
4- AC- 48'S E RT.
5- SWEEP E 121 + 130'S

6- E6 BURNING ADL TO SHIFTED PINS HIGH
FMEA AT WEL

RT. 12
150°C

IMMEDIATELY IMPLEMENT ON P/C and L/T:

PIN LENGTH = .143"
BASE CALIBRATION = .087"

SELLERS/
GARIEPY

TEST ALL SWITCHES AT 25ms MAX ACT'N & REL

RETEST ANY CREEP RELEASES ONLY - AT 150ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS

KOURT.

RUN PIN WINDOW ON L/T; GIVE SWITCHES TO S.O.

SELLERS

REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES

comp.

OFFILER

REVIEW L/T DATA TO DETERMINE NEW BASE CAL
TARGET VALUE

comp.

TEAM

comp.

PROVIDE 7 WIRE HARNESS COMPONENTS TO
B. SWEET

OFFILER

comp.

PREPARE TEMP. TEST STATION FOR USE
BY 3/16

SWEET

WRITE HI TEMP AUDIT TEST PROCEDURE

SWEET

PROVIDE "SHORT PIN" MATRIX TO S.O.

SELLERS

HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)

OFFILER

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS

OFFILER } REPAIR SW'S, dummy switches,
1st pass comp } ANALYZE vs. WORK, W/O THERM

REQUEST CELANESE VISIT W/E 3/20
TO DISCUSS PLASTIC MOVEMENT

CZARN/ } VISITING 10th 3:15
WALTERS } IN CAF. B12

EGARDS,
AVE CZARN

S-hitemp

TI-NHTSA 004567

-MSG MH= 00521098 FR=ZARN TO=SBQ1 SENT=03/11/92 09:54 AM
RH=059 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/11/92 09:54 AM

MARCH 11, 1992

TO: STEVE OFFICER SBQ1
BILL SWEET WS-
MATT SELLERS NS2
JIM WATT PCQA
DICK GARLEY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU ROT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/10/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: WEDNESDAY 3/11
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Base calibration target changed to .087" with a .143" pin; i.e., a .056" offset. For future discussions, we will refer to this offset as a baseline. Increasing the offset increases the arm pre-load and can be achieved either by decreasing the base calibration or increasing the pin length.

Sensors measured w/ pin in place showed sigmas of ~.4 mils - slightly better than anticipated. Assumption of 4 mil total stack for base/pin/sensor is valid, and in fact a bit conservative.

Concern raised about low temperature performance. We need to confirm that the low temp does not significantly increase the effective pin length, resulting in a switch that does not open. Testing of devices at the "long pin" extremes is top priority.

150 ms creep release spec still results in yield loss (actual % not available for meeting); switches will be held for future disposition as a longer creep time (at least 200 ms) should be acceptable. Tester can only screen to 200 ms max'm presently. Yield results will be reviewed daily.

Tentative plan for high temp auditing:

. 7 switches/day - soak at 150C and 0 psig for 30 minutes - all must maintain contact.

TI-NHTSA 004568

3 sensor hatchet curves used to estimate pre-load shift; estimated 1-2 mils at 120C and an additional 3-4 mils at 150C.

SHORT TERM ACTIONS

- = NEW ITEM OR COMPLETED ITEM
- = PRIORITY ITEM

PROVIDE "LONG PIN" MATRIX TO S.O.

SELLERS # MATT - .050" ID 100"
FINISHED THU A.M.

LOW TEMP EVAL'N W/ "LONG PIN" MATRIX
REDUCE PRESSURE TO 100 ACT + 10%

OFFILER

- 2 IMMEDIATELY IMPLEMENT ON P/C (L2-1) ONLY:
PIN LENGTH = .143"
BASE CALIBRATION = .087"

SELLERS/
GARIEPY
comp.

TEST ALL SWITCHES AT 25ms MAX ACT'N & REL

RETEST ANY CREEP RELEASES ONLY - AT 150ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

- 2 MEASURE 20 P/C AND 20 L/T SENSORS W/PINS
IN PLACE TO DETERMINE SENSOR VARIABILITY

PERIPOLI/
SELLERS
comp.

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS

KDURT.

- 2 RUN PIN WINDOW ON L/T; GIVE SWITCHES TO S.O.

SELLERS

- 2 REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES

OFFILER

REVIEW L/T DATA TO DETERMINE NEW BASE CAL
TARGET VALUE

TEAM

DETMN. HOW TO HI TEMP TEST AUDIT SWITCHES
IN PROD'N IF THE TEAM FINDS IT NECESSARY

SWEET
comp.

- 2 PROVIDE 7 WIRE HARNESS COMPONENTS TO
B. SWEET

OFFILER

PREPARE TEMP. TEST STATION FOR USE
BY 3/16

SWEET

PROVIDE "SHORT PIN" MATRIX TO S.O.

SELLERS

HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)

OFFILER

UNDERSTANDING THE PROBLEM CAUSE

2 RUN P/C SENSOR HATCHET CURVES

OFFILER
comp.

2 RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS

OFFILER

2 RUN SAME WITH ANNEALED BABES AND STEEL
SPRING RINGS AS VARIABLES

OFFILER

2 RUN SAME WITH STEEL SPRING RINGS DESIGN MODS

OFFILER

TI-NHTSA 004569

-MSG M# 00521098 FR=ZARN TD=RGT2 SENT=03/11/92 09:54 AM
R# 121 ST=C DIV=0050 CC=01340 BY=ZARN AT=03/11/92 09:54 AM

MARCH 11, 1992

TO: STEVE OFFILER SBD1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL

FR: DAVE CZARN ZARN

RE: CCPB HIGH TEMP ISSUE - MINUTES OF 3/10/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: WEDNESDAY 3/11
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Base calibration target changed to .087" with a .143" pin; i.e., a .056" offset. For future discussions, we will refer to this offset as a baseline. Increasing the offset increases the arm pre-load and can be achieved either by decreasing the base calibration or increasing the pin length.

Sensors measured w/ pin in place showed signs of ~.4 mils - slightly better than anticipated. Assumption of 4 mil total stack for base/pin/sensor is valid, and in fact a bit conservative.

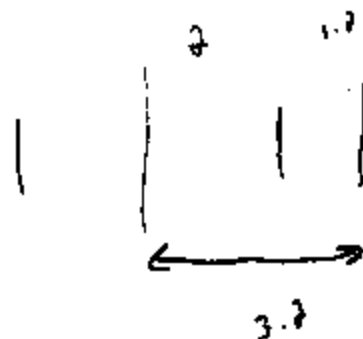
Concern raised about low temperature performance. We need to confirm that the low temp does not significantly increase the effective pin length, resulting in a switch that does not open. Testing of devices at the "long pin" extremes is top priority.

150 ms creep release spec still results in yield loss (actual % not available for meeting); switches will be held for future disposition as a longer creep time (at least 200 ms) should be acceptable. Tester can only screen to 200 ms max'm presently. Yield results will be reviewed daily.

Tentative plan for high temp auditing:

- . 7 switches/day - soak at 150C and 0 paig for 30 minutes - all must maintain continuity
- . Any failures to be retested at 121C at T-B-D calibration limits

P/C sensor hatchet curves used to estimate pre-load shift; estimated 3-



TI-NHTSA 004570

4 mils at 120C and an additional 3-4 mils at 150C.

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

P	PROVIDE "LONG PIN" MATRIX TO B.O.	SELLERS
P	LOW TEMP EVAL'N W/ "LONG PIN" MATRIX	OFFILER
*	IMMEDIATELY IMPLEMENT ON P/C (L2-1) ONLY: PIN LENGTH = .143" BASE CALIBRATION = .087"	SELLERS/ DARIEPY comp.
	TEST ALL SWITCHES AT 25ms MAX ACT'N & REL	
	RETEST ANY CREEP RELEASES ONLY - AT 150ms LIMIT (CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)	
.	COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
*	MEASURE 20 P/C AND 20 L/T SENSORS W/PINS IN PLACE TO DETERMINE SENSOR VARIABILITY	PERIPOLI/ SELLERS comp.
.	EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N AND REL CREEP LIMITS	KOURT.
.	RUN PIN WINDOW ON L/T; GIVE SWITCHES TO B.O.	SELLERS
.	REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES	OFFILER
.	REVIEW L/T DATA TO DETERMINE NEW BASE CAL TARGET VALUE	TEAM
*	DETMN. HOW TO HI TEMP TEST AUDIT SWITCHES IN PROD'N IF THE TEAM FINDS IT NECESSARY	SWEET comp.
*	PROVIDE 7 WIRE HARNESS COMPONENTS TO B. SWEET	OFFILER
*	PREPARE TEMP. TEST STATION FOR USE BY 3/16	SWEET
*	PROVIDE "SHORT PIN" MATRIX TO B.O.	SELLERS
*	HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	OFFILER

UNDERSTANDING THE PROBLEM CAUSE

.	RUN P/C SENSOR HATCHET CURVES	OFFILER comp.
.	RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS	OFFILER
.	RUN SAME WITH ANNEALED BASES AND STEEL CRIMP RINGS AS VARIABLES	OFFILER
*	SPK W/CELANESE RE: MOLDING OR DESIGN MODS TO REDUCE PLASTIC MOVEMENT	OFFILER

REMARKS

TI-NHT8A 004571

MSG NO= 00521098 FR=ZARN TO=6801 SENT=03/11/92 09:54 AM
R4=059 ST=C DIV=0050 CC=00101 8Y=ZARN AT=03/11/92 09:54 AM

WCH 11, 1992

1: STEVE OFFILER S801
BILL SWEET W84
MATT SELLERS HJ82
JIM WATT PCQA
DICK GAREPY MFPC

2: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McQUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL

3: DAVE CZARN ZARN

4: CCPS HIGH TEMP ISSUE - MINUTES OF 3/10/92 MEETING

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XT MEETING:

DATE: WEDNESDAY 3/11

TIME: 3:30

PLACE: CAFETERIA CUBE

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DISCUSSION:

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ms creep release spec still results in yield loss (actual % not reliable for testing); switches will be held for future disposition as a longer creep time (at least 200 ms) should be acceptable. Tester can y screen to 200 ms max'm presently. Yield results will be reviewed ly.

tective plan for high temp auditing:

* switches/day - spec at 150C and 100C for 10 minutes - all must maintain continuity

TI-NHT8A 004572

1 sensor hatchet curves used to estimate pre-loaded shift; estimated 5-
mils at 120C and an additional 3-4 mils at 150C.

ORT TERM ACTIONS

- = NEW ITEM OR COMPLETED ITEM
- = PRIORITY ITEM

PROVIDE "LONG PIN" MATRIX TO S.O.

SELLERS -- MATT - .000" @ .100"
FINISHED THU A.M.

LOW TEMP EVAL'N W/ "LONG PIN" MATRIX
REDUCE INSTRUCTIONS TO NO ACT + 10%

OFFILER

IMMEDIATELY IMPLEMENT ON P/C (L2-1) ONLY:
PIN LENGTH = .143"
BASE CALIBRATION = .087"

SELLERS/
GARIPEY
comp.

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RETEST ANY CREEP RELEASES ONLY - AT 150ms LIMIT
(CREEP ACTUATION FAILURES NOT TO BE RE-TESTED)

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

MEASURE 20 P/C AND 20 L/T SENSORS W/PINS
IN PLACE TO DETERMINE SENSOR VARIABILITY

PERIPOLI/
SELLERS
comp.

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS

KOURT.

RUN PIN WINDOW ON L/T; GIVE SWITCHES TO S.O.

SELLERS

REPEAT ELEVATED TEMP. TEST ON L/T SWITCHES

OFFILER

REVIEW L/T DATA TO DETERMINE NEW BASE CAL
TARGET VALUE

TEAM

DETERM. HOW TO HI TEMP TEST AUDIT SWITCHES
IN PROD'N IF THE TEAM FINDS IT NECESSARY

SWEET
comp.

PROVIDE 7 WIRE HARNESS COMPONENTS TO
B. SWEET

OFFILER

PREPARE TEMP. TEST STATION FOR USE
BY 3/16

SWEET

PROVIDE "SHORT PIN" MATRIX TO S.O.

SELLERS

HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)

OFFILER

UNDERSTANDING THE PROBLEM CAUSE

RUN P/C SENSOR HATCHET CURVES

OFFILER
comp.
OFFILER

RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS

RUN SAME WITH ANNEALED BASES AND STEEL
CRIMP RINGS AS VARIABLES

OFFILER

SPK W/CELANESE RE: MOLDING OR DESIGN MODS

OFFILER

TI-NHTSA 004573

HI TEMP TESTING STAGE
BOARDS
WE CARM

Temp

- ? DO WE HAVE L.T. 1800 TEST DATA (50, RT)
- ? WHAT DOES CTE SHIFTS CALCULATE TO (50)
- REPEAT DUMMY TEST; 48 IN. ELEMENTS MEAS. TO PLASTIC
DO AGAIN W/ MULTIPLE CYCLES
- REUSE DUMMY TEST PARTS (PRIC.) BACK @ R.T. AGAIN
- ? MOLD 77'S W/ "OLD" 16622 GAF MAT'L
STRENGTH / CHANGE WITH IS PROCESS "OPTIMIZED" ?

TI-NHTSA 004574

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March 11, 1992

Ms. Agnes Cardozo
TEXAS INSTRUMENTS
MS 12-02
34 Forest St.
P. O. Box 119
Attleboro, MA 02703

Dear Agnes:

Thank you for agreeing to meet for a detailed discussion of the applications for Kapton® polyimide film products, at Attleboro on Wednesday, March 18. As part of Du Pont's commitment to continuing improvement of our products and services, information exchanges like this have proven valuable to refining and tailoring our offering to meet customer's needs.

Accompanying me will be Harry Gumm, Technical Services Specialist for Kapton®. Harry has had several years experience in various aspects of film manufacturing and handling. His responsibilities have recently been expanded to include development of new applications, and he is well versed in Du Pont's current activities around new and upgraded polyimide film products.

Please call me at 203-871-7426 if you have any questions or have a specific area you wish to address.

Harry and I look forward to meeting with you on the 18th.

Sincerely,

Edward C McKenzie

Edward C. McKenzie
Sales Representative

Share the power of our resources.

TI-NHTSA 004576

-MSG ME- 523946 PR-ZARN TO-GANY SENT=03/11/92 10:44 AM
RE=095 ST=C DIV=0050 CC=00101 BY-ZARN AT=03/11/92 10:44 AM

MARCH 11, 1992

TO: RUSTY STRUBLE	RCS2	CC: TOM CHARBONEAU	TC
MIKE DeMATTIA	MD3	JOHN KOURTESIS	MDIS
CHARLIE DOUGLAS	CNP1	STEVE MAJOR	SMFH
DICK GARIEPY	MFPC	ANDY McGUIRK	PCQA
PAUL KOTCH	PRK1	ED O'NEILL	EJON
JOE LAZARZ	JMLS	NORM FREDA	WHLZ
STEVE OFFILER	SBO1	GARY SWYDER	CPFC
MATT SELLERS	PCME	MARTHA SULLIVAN	CPFC
BILL SWEET	PCME	RAY TOURANGEAU	PCME
JIM WATT	PCQA	BILL CONGDON	MFPC
TERRY RODRIGUEZ	MFPC	STEVE MCCOKEY	MDIS
		ELAINE ROSE	GANY

FR: DAVE CZARN ZARN

SJ: FORD CRUISE CONTROL PRESSURE SWITCH START-UP MEETING
MINUTES OF 3/03/92 MEETING

MEETING

THE NEXT MEETING IS SCHEDULED FOR:

DATE: 03/12/92 (THURSDAY)
TIME: 10:00 - 11:30 AM
PLACE: MTG. CONF. RM.

7798

Harport:

* HAVE ELCO RTN J512 GAGE FOR STUDY	KOTCH	03/16	
* ELCO J512 GAGE R&R STUDY	SELLERS	03/26	
* F/U TO UNDERSTAND 10B21 COST	SWEET	03/26	
* F/U CALL TO JOHN PELKEY	CZARN	03/06	ORIG.
		03/12	REV.
* F/U WITH TIER 1'S	FREDA	03/12	
* J512 W/ SNUBBER QUOTE	SELLERS/	03/12	
	KOTCH		

Production/Quality Issues:

DIAPHRAGM LIFE

HIGH TEMP LOSS OF CONTINUITY
(Separate mtgs are being held daily)
* ADD P-TEST REPORT AUDIT TO ENSURE
CREEP VALUES ARE SPEC'ED CORRECTLY
(Spec is 25 ms - Act'n; 150 ms - Rel)

ROSE 03/19

TI-NHTSA 004577

RUR's

4 L/T switches returned; system reportedly inoperable - "no continuity" is probable cause. (Note: This is believed to be a room temp check; i.e., not tied to the high temp issues presently under investigation.) We found no functional problems; will request further info regarding threshold voltages for "open" and "closed" states.

DRAWINGS TO CURRENT DESIGN LEVEL

03/26 REV.

Sensor Assembly Machine:

. PRIORITIZE REMAINING UPGRADE ITEMS	SELLERS	ONGOING
--------------------------------------	---------	---------

Base Assembly Machine:

. UPDATE PROGRESS OF ULTRASONICALLY WELDED SPRING ARM/TERMINAL ASSEMBLY	SELLERS/ OFFILER	ONGOING
--	---------------------	---------

Final Assembly Machine:

ISR:

. PROVIDE QUARTERLY CpK REPORT	WATT start	03/31	
* COMPILE ACTUATION DATA ON 50 P/C LOTS; GRAND AVE. AND SIGMA OF AVE.	RODRIGUEZ	03/13	
* HAVE HOLDING MEASURE TAB DIM'N	SELLERS	03/13	
* SUBMIT DANA/PITTS PKGS	WATT	01/23	ORIG.
		03/19	REV.

Ultra-Low Differential Switch MY93

* ASSIGN CHAMPION	CEARN/ SWEET	03/05	ORIG. REV.
* PLAN FOR SIMULATING PROD'N PROCESS	SELLERS	03/05	ORIG.
		03/13	REV.
* ESTABLISH LIST OF ACTIONS REQ'D TO START-UP ULTRA LOW DIFF'L SWITCH	SELLERS	02/14	ORIG.
		03/13	REV.
* FIRM QUOTE FOR ULTRA-LOW DIFF'L SWITCH	SELLERS	02/27	ORIG.
		T-B-D	
. REPORT RESULTS TO FORD/TEVES	OFFILER	TBD	

Miscellaneous:

. SEND LETTERS TO FORD/GM AND TIER 1'S; 3A THREAD GAGING	WATT/ CEARN	01/30 03/12	ORIG. REV.
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Production Plan:

. MAINTAIN RUNNING TOTAL OF L/T (L2-3) SWITCHES LEADING TO 100K FOR AMORTIZATION	STRUBLE	ONGOING
Status Date	Total Shipped	
Feb 27	25,704	
. UPDATE PRODUCTION PLANS	STRUBLE	ONGOING

	P/C 77PSL2-1	L/T 77PSL2-3
NOV	6.4	13.6
DEC	35	9
JAN	75	7
FEB	76.4	11.4
MAR	47.1	12.6

REGARDS,
DAVE CEARN Q54-FORD

TI-NHTSA 004578

PRESSURE SWITCH DATA

Form 21605

TEST NO. 204-15-23

DEVICE CCPS	DATE REQUESTED 3-10-92	REQUESTED BY Steve OFFICE	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-12-92	DATE COMPLETED	APPROVED BY Dave EARN

PROJECT TITLE: **Feed 1479 pressure speed Control Direct valve PS**

CUSTOMER:

PURPOSE OF TEST: **To see whether or not there is a calibration shift at cold temp.**

PROCEDURE: Receive devices from production. Characterize transfer times in order to test a range from no act creep, to release creep to no continuity change at all. Install on cyclor manifold. Monitor switching as temp is lowered to -40°C.

Low Temp. tests not have significant effect on
transfer times (approx .002" from RT to -40°C)

0-400 psi

1475 psi

LEAKAGE switching

(PIN/CAL)

Device #	Res Call	Act	Rel	ANALYST	Flow Temp	Stage of Failure	Offset	
204-15-1	80	no continuity change		Run Time	Run Time	Electrically	65	
-2	80	no continuity change				bad	65	
-3	81	no continuity change				"	64	
-4	81	no continuity change				"	64	
-5	82	intermittent continuity change				"	63	
-6	82	intermittent continuity change				"	63	
-7	83	High Actuation		-13	24	1	62	
-8	83	High Actuation		-40	-15	4	62	
-9	84	High Actuation		-27	7	2	61	
-10	84	High Actuation		-27	7	3	61	
✓ -11	85	0.9	CRACK CATCH REL				60	
✓ -12	85	0.8	CRACK CATCH				60	
MANUAL 13	85	0.8	CRACK CATCH				60	
✓ 14	86	0.9	CRACK CATCH				59	
✓ 15	86	0.8	CRACK CATCH				59	
✓ 16	87	0.9	CRACK CATCH				58	
✓ 17	87	0.9	CRACK CATCH				68	
✓ 18	88	0.9	12.7				57	
MANUAL 19	88	1.0	2.0				57	
MANUAL 20	88	NO SWAP					57	
✓ 21	88	0.9	26.4				57	
✓ 22	89	1.0	1.1				56	
✓ 23	89	1.0	1.6				56	

TI-NHTSA 004579

PRESSURE SWITCH DATA

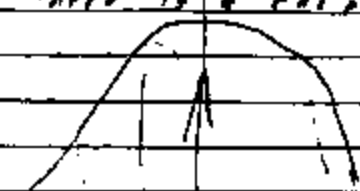
Form 21605

TEST NO. 204-15-

DEVICE CCPS	DATE REQUESTED 3-10-92	REQUESTED BY Steve Office	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-12-92	DATE COMPLETED	APPROVED BY DAVE CRAM
PROJECT TITLE: Ford NY 191 Pressure spec Control Deact. rate PS			

CUSTOMER:

PURPOSE OF TEST: To see whether or not there is a calibration shift at cold temp.



PROCEDURE: Receive devices from production. Characterize transfer times in order to test a range from No act. creep, to release creep to No Continuity change at all. Install on cyclor mag. 10. Monitor switching as temp. is lowered to -40°C.

145 pins used

43
87
12
St. Normal

Device #	Room Call	Act	Fid	Pressure Switching	Temp	Temp	Temp	Temp
304-15-1	80	No Continuity Change		Room Temp	Room Temp	2.10	65 Office	
-2	80	No Continuity Change						
-3	81	No Continuity Change						
-4	81	No Continuity Change						
-5	82	Pressure Continuity Change						
-6	82	Pressure Continuity Change						
-7	83	High Act. rate		-13.62	24	1		
-8	83	High Act. rate		-40.62	-15	4		
-9	87	High Act. rate		-27.61		2		
-10	87	High Act. rate		-27.61		6		
✓ -11	85	0.9	GROSS CREEP					
✓ -12	85	0.8	GROSS CREEP					
✓ -13	85	0.8	GROSS CREEP					
✓ -14	86	0.9	GROSS CREEP		59			
✓ -15	86	0.8	GROSS CREEP					
✓ -16	87	0.9	GROSS CREEP		58			
✓ -17	87	0.9	GROSS CREEP					
✓ -18	88	0.9	12.7		57			
✓ -19	88	1.0	2.0					
✓ -20	88	NO SWAP						
✓ -21	89	0.9	26.4					
✓ -22	89	1.0	1.1		56			
✓ -23	89	1.0	1.5					

TI-NHTSA 004580

PRESSURE SWITCH DATA

Form 21605

TEST NO. 204-15-

DEVICE CCPS	DATE REQUESTED 3-12-92	REQUESTED BY STEVE OFFICE	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-12-92	DATE COMPLETED	APPROVED BY DNP CARM
PROJECT TITLE: Feed 11/71 Electronic speed Control Reaction-rate PS			

CUSTOMER:

PURPOSE OF TEST: **To see whether or not there is a calibration shift at cold temp.**

PROCEDURE: **Receive devices from production. Characterize transfer times in order to Test a range from No net creep, release creep to No continuity change at all. Tested on cyclic manifold. Monitor switching as temp. is lowered to -40°C.**

Device #	Bar Code	ACT	RD	Reaction Time			Shift	
				Initial Temp	Final Temp	Change of Pressure		
204-15-1	80	No Continuity Change		Room Temp	Room Temp	20.000	05	
-2	81	No Continuity Change				20.000	04	
-3	81	No Continuity Change				20.000	04	
-4	81	No Continuity Change				20.000	03	
-5	82	Pressure Change				20.000	03	
-6	82	Pressure Change				20.000	03	
-7	83	High Activation		-13	24	1	02	
-8	83	High Activation		-40	-15	4		
-9	84	High Activation		-27	7	3	01	
-10	84	High Activation		2	7	3		
✓ -11	85	0.9	CRACK CHOP RD				60	
✓ -12	85	0.9	CRACK CHOP	OK D	400 PSI			
✓ -13	85	0.9	CRACK CHOP	OK	-40°C			
✓ -14	86	0.9	CRACK CHOP				57	
✓ -15	86	0.9	CRACK CHOP					
✓ -16	87	0.9	CRACK CHOP				58	
✓ -17	87	0.9	CRACK CHOP					
✓ -18	88	0.9	12.7				57	
✓ -19	88	1.0	2.0					
✓ -20	88	NO SWAP						
✓ -21	88	0.9	26.4					
✓ -22	89	1.0	1.1				56	
✓ -23	89	1.0	1.5					
							65	
							54	
							53	
							52	

TI-NHTSA 004582

FINAL INSPECTION 77PBL2-1

DATE: 3-12-92

CUSTOMER P/N F240-9FY24-AB

DISC LOTS 3-6
REEL 8 1
LOT 8 3
WASHER LOT 93 1-CUT

NAV. I.D. 74868-A-C-1-7
CUP LOT 8 11
CONV. LOT 154
QTY. 2000

DISC LOTS 3-7
REEL 8 1
LOT 8 2
WASHER LOT 93 1-CUT
NAV. I.D. 74868-A-C-1-4
CUP LOT 8 11
CONV. LOT 154
QTY. 2000

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	129	117	122	124	136	127	130	120	118	124	119	137	129	118	129	135	130	135
RELEASE	55	60	48	46	65	52	49	48	50	59	49	71	56	50	42	53	35	58
TIME	73	57	78	78	71	74	81	71	68	75	70	66	72	67	67	82	74	76
2 VOLT DROP	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
3 SCUR. LEAK	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
4 PROOF	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—
5 IMPULSE	OK	OK	OK	OK	OK	—	—	—	—	OK	OK	OK	OK	OK	—	—	—	—
ACTUATION	120	120	120	120	130	—	—	—	—	130	120	135	130	120	—	—	—	—
RELEASE	60	55	50	55	65	—	—	—	—	55	55	60	60	50	—	—	—	—
VOLT DROP	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
SCUR. LEAK	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
PROOF	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
IMPULSE	✓	✓	✓	✓	✓	—	—	—	—	✓	✓	✓	✓	✓	—	—	—	—
7 TIME	OK	OK	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—
8 DETENTION	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
VIBRATION	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
9 CRISP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
10 TERM.	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
ACTUATION	—	—	—	—	—	—	—	120	115	—	—	—	—	—	—	—	125	130
RELEASE	—	—	—	—	—	—	—	45	40	—	—	—	—	—	—	—	30	35
VOLT DROP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
SCUR. LEAK	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
PROOF	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK
CRISP	—	—	—	—	—	—	—	OK	OK	—	—	—	—	—	—	—	OK	OK

TI-NHTSA 004583

FINISHED PRODUCTION ROUTING
 WHITE: Route to Fin.
 CANARY: Route to Dept. Supervisor
 PINK: Route to Dept. Supervisor

DEVICE NUMBER
 77PSL2-1

SPECIAL REQUIREMENT TOTAL QUANTITY
 9

MANU. ORDER NUMBER NO SUBTOTALS
 7

1.
 2.
 3.
 4.

QUALITY CONTROL APPROVAL

IN PROCESS	IN PROCESS	FINAL
		

Form 18288
 DATE 3/12/92 DEPARTMENT 294

ROUTING
 CANARY: Route to Fin.
 PINK: Route to Dept. Supervisor

DEVICE NUMBER
 77PSL2-1

SPECIAL REQUIREMENT TOTAL QUANTITY
 9

MANU. ORDER NUMBER NO SUBTOTALS
 3-6

1.
 2.
 3.
 4.

QUALITY CONTROL APPROVAL

IN PROCESS	IN PROCESS	FINAL
		

Form 18288
 DATE 3-12-92 DEPARTMENT 294

TI-NHTSA 004584

-MSG M# 554710 FR-DT1 TO-ETB SENT=03/12/92 08:03 AM
R# 333 ST-C DIV=0050 CC=00101 BY-DT1 AT=03/12/92 08:03 AM

MARCH 12, 1992

TO: TED BALLARD ETE
JOHN KOURTESIS JKOU
STEVE OFFILER SBO1
MATT SELLERS PCME
BILL SWEET PCME

CC: TOM CHARBONEAU TC
CHARLIE DOUGLAS CPFC
ED KADISHVSKIS EKAD
GARY SNYDER CPFC
DALE SOGGE AELB
RICH TURNER ELB

FR: DAVE CZARN EARN

SJ: CCPS SILENT SWITCH DEVELOPMENT
=====

EFFECTIVE IMMEDIATELY, DALE SOGGE WILL CHAMPION THE SILENT SWITCH DEVELOPMENT EFFORT. THE CHARTER WILL BE TO LAY THE GROUND WORK FOR STARTING PRODUCTION IN LOW VOLUME FOR MY93 AND HIGH VOLUME FOR MY94 AND BEYOND. IT WILL INCLUDE FINALIZING THE DESIGN REQUIREMENTS AND IDENTIFYING THE NEEDS FOR DISC AND DEVICE PRODUCTION.

SOME THOUGHTS THAT I HAVE ON THE SUBJECT:

DISC SPEC/DESIGN ISSUE

- DOES IT MEET NEEDS; IE., DOES IT REMAIN "QUIET" OVER LIFE?
- WILL LOWER DIFFERENTIAL MEAN LOWER CROWN HEIGHT AND LOSS OF PRE-LOAD IN SENSOR? WILL IT RESULT IN FEEDING PROBLEMS; OR DIFFICULTY IN DETECTING INVERTED DISCS?

DISC/SENSOR TESTING

- OBJECTIVE SHOULD BE TO KEEP IT AS SIMPLE AS POSSIBLE; IE., TAKE STATIC MEASUREMENTS (VS. F-d OR P-d CURVES) IF POSSIBLE.

DEVICE TESTING

- NOT KNOWING WHERE THE DEVICE IS "PINNED" WILL AMPLIFY THE "NO CONTINUITY AT ELEVATED TEMP" PROBLEM; NEED A WAY TO SKEW TOWARDS CREEP RELEASE SIDE OR, BETTER YET, SOLVE THE NO CONTINUITY PROBLEM.

GENERAL

- NEED TO ARRIVE AT A SOLUTION FOR LOW VOLUME MY93 PRODUCTION (<20K, SHO TAURUS). THIS MAY OR MAY NOT BE THE LONGER TERM SOLUTION FOR MY94 AND BEYOND.
- NEED TO DEVELOP A PLAN WHICH ADDRESSES THINGS LIKE

DISC SPEC FINALIZATION/VERIFICATION
DISC MEASUREMENT TECHNIQUE

TI-NHTSA 004585

MSG NM= 008 4710 PR=071 IG=8801 SENT=03/12/92 08:03 AM
R#067 STFC DIV=0080 CC=00001 ST=071 AT=03/12/92 08:03 AM

ARCH 11, 1992

0. TED BALLARD ETB
JOHN MOFFETTS BKOL
STEVE OFFICER S801
MATT HALLER PCME
MIL. WAZET PCME

1. TOM CHARBONEAU TC
CHARLIE DOUGLAS CPPC
ED KADISEVSKIS EKAD
GARY SNYDER CPPC
DALE SOGGE AELS
RICH TURNER ELB

2. DAVE CZARN ZARN

3. CCPS SILENT SWITCH DEVELOPMENT

EFFECTIVE IMMEDIATELY, DALE SOGGE WILL CHAMPION THE SILENT SWITCH DEVELOPMENT EFFORT. THE CHAPTER WILL BE TO LAY THE GROUND WORK FOR STARTING PRODUCTION IN LOW VOLUME FOR MY93 AND HIGH VOLUME FOR MY94 AND BEYOND. IT WILL INCLUDE FINALIZING THE DESIGN REQUIREMENTS AND IDENTIFYING THE NEEDS FOR DISC AND DEVICE PRODUCTION.

ONE THOUGHTS THAT I HAVE ON THE SUBJECT:

ISC SPEC/DESIGN ISSUE

DOES IT MEET NEEDS, IE., DOES IT REMAIN "QUIET" OVER LIFE?
WILL LOWER DIFFERENTIAL MEAN LOWER CROWN HEIGHT AND LOSS OF
PRE-LOAD IN SENSOR? WILL IT RESULT IN FEEDING PROBLEMS; OR
DIFFICULTY IN DETECTING INVERTED DISCS?

ISC/SENSOR TESTING

OBJECTIVE SHOULD BE TO KEEP IT AS SIMPLE AS POSSIBLE, IE., TAKE
STATIC MEASUREMENTS (VS. F-d OR P-d CURVES) IF POSSIBLE.

DEVICE TESTING

NOT KNOWING IF THE DEVICE IS "PINNED" WILL AMPLIFY THE "NO
CONTINUITY AT INVERTED TEMP" PROBLEM; NEED A WAY TO SKEW TOWARDS
CREEP RELEASE OR, BETTER YET, SOLVE THE NO CONTINUITY
PROBLEM.

GENERAL

NEED TO ARRIVE AT A SOLUTION FOR LOW VOLUME MY93 PRODUCTION
(C20K, 8HD TAURUS). THIS MAY OR MAY NOT BE THE LONGER TERM
SOLUTION FOR MY94 AND BEYOND.

NEED TO DEVELOP A PLAN WHICH ADDRESSES THINGS LIKE

DISC SPEC FINALIZATION/VERIFICATION
DISC MEASUREMENT TECHNIQUE
SENSOR MEASUREMENT TECHNIQUE

TI-NHTSA 004586

THEY ARE GOING TO BE PUTTING INTO ROAD. LIT WAS ASSUMED
THAT CHANGEOVER TO ALL SWITCHES; HOWEVER, NO LIT SWITCHES WERE
REMOVED UNTIL MY93. SO WE SHOULD BE ABLE TO NEGOTIATE A MY93
CONTRACT TO THE SIGNATURE. PRESUMABLY, WHEN WE GIVE LIT
A 100,000 FOR THE COST ALLOC, THEY WILL RE-THINK THE MY93
ALLOCATION.

THANKS,
J. J. JONES

*MSG MH= 00000670 FR=ZARN TO=SB01 SENT=03/13/92 09:33 AM
RH=071 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/13/92 09:33 AM

MARCH 13, 1992

TO: STEVE OFFILER SB01
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARTNEY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMF1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/12/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: FRIDAY 3/13
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Temperature effect on pin length is estimated as:

R.T. to +120C = +3 - 4 mils
+120 to +150C = +3 - 4 mils
R.T. to -40C = ~-2 mils

Based on this data, the near term corrective action of selecting 56 mil offset is believed to be acceptable.

Elevated temperature vibration test will be conducted with "worst case" (52 mil) offset at 121 and 150C; will vibrate in vertical axis, 2 to 3 sweeps at 1000 Hz while monitoring contact chatter.

Steve will review the engineering spec and the DFMEA as a check to ensure we don't compromise other performance areas using the present offset.

~10% of switches exceed current 150ms release spec; switches are being held while the creep release spec is being reviewed.

Japanese visit scheduled for Wed, 3/18 - 3:15PM - B12 cafeteria; will provide prints/parts/background info to Japanese prior to visit.

TI-NHTSA 004580

- = NEW ITEM OR COMPLETED ITEM
- = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
 CREEP SPEC = 25 ms MAX'M ACTUATION
 150 ms MAX'M RELEASE

PROVIDE "LONG PIN" MATRIX TO S.O.	SELLERS
LOW TEMP EVAL'N W/ "LONG PIN" MATRIX	comp. OFFILER
PROVIDE "SHORT PIN" MATRIX TO S.O.	comp.
HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	SELLERS
REVIEW SPEC AND DFMEA	OFFILER
COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	OFFILER
EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N AND REL CREEP LIMITS	SWEET
PREPARE TEMP. TEST STATION FOR USE BY 3/16	KOURT.
WRITE HI TEMP AUDIT TEST PROCEDURE	SWEET
VIBRATION TEST W/52 MIL OFFSET	SWEET

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES	OFFILER
REPEAT ABOVE WITH 57PS BASES MADE FROM BOTH 4300 AND 1662Z PBT	OFFILER
REQUEST CELANESE VISIT W/E 3/20 TO DISCUSS PLASTIC MOVEMENT	CZARN/ WALTERS
SEND PRINT/PARTS/BACKORD INFO TO CELANESE	comp. CZARN
ALTERNATIVE PLASTICS ?	CZARN/ WALTERS
ROUGH CALCUL'N OF PIN LENGTH CHANGE BASED ON LINEAR THERMAL EXP'N DIFFERENCES	OFFILER

EDARDS,
AVE CZARN
4-hitemp

PRESSURE SWITCH DATA

Form 21605

145 55 90 52 541
TEST NO. 205-15

DEVICE CCPS	DATE REQUESTED 3-13-92	REQUESTED BY STEVE OFFICER	REQUESTED COMPL. DATE
PERFORMED BY Rich TURNER	DATE STARTED 3-13-92	DATE COMPLETED	APPROVED BY Dave CARR
PROJECT TITLE: Ford MY91 Electronic Speed Control Deactivate PS			

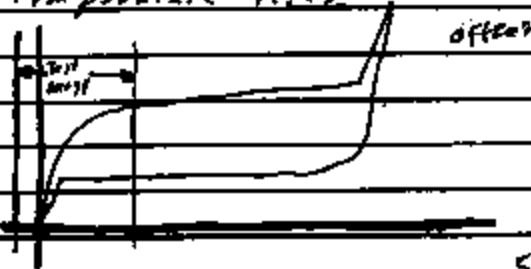
CUSTOMER:

PURPOSE OF TEST: **To see at what temperature calibration shift begins. Is it linear or does it occur at some threshold.**

PROCEDURE: **Acquire devices ranging from no continuity to good. Install on cyclor manifold and cycle as temperature rises.**

- Transfer pin: 142

- Cycle Pressures: 0-1450 PSI



ERRATIC SWITCHES

Device #	Base Cable	ACT	REL		Ambient Temp	Fluid Temp	Order of Failure	Monitor Circuit	Offset
205-15-1	91	20.9	0.4	Not used					
2	91	18.6	1.1	not used					
✓ 3	91	4.2	0.2		149	146	10	1	0.51
✓ 4	91	13.2	0.4		147	144	9	2	0.51
✓ 5	92	GRASS APT	0.4 (40PSI)		149	132	9	3	0.50
✓ 6	92	GRASS APT	0.4 (40PSI)		149	130	7	4	0.50
✓ 7	93	GRASS APT	2.3 (50PSI)		121	106	5	5	0.47
✓ 8	93	" "	0.1 (65PSI)		121	109	6	6	0.47
9	94	11.5	2.0 (40PSI)	Not used					
✓ 10	94	GRASS APT	1.3 (80PSI)		121	76	4	7	0.44
✓ 11	94	" "	1.6 (50PSI)		120	71	2	8	0.44
✓ 12	95	" "	4.3 (40PSI)		121	76	3	9	0.47
✓ 13	95	" "	1.1 (40PSI)	Not used					
✓ 14	95	" "	0.3 (50PSI)		65	33	1	10	0.47
✓ 15	96	" "	GRASS APT		100 Cent.			11	0.46
✓ 16	96	" "	" "		00 Cent.			12	0.46
✓ 17	97	No continuity			No cent.			13	0.45
✓ 18	97	No continuity			100 Cent.			14	0.45
		Room Temp characteristics			Heated Characteristics				
	142								
	45								

TI-NHTSA 004502

RAV T

PRESSURE SWITCH DATA

Form 21605

TEST NO. 205-15

DEVICE CCPS	DATE REQUESTED 3-13-92	REQUESTED BY STEVE OFFICER	REQUESTED COMPL. DATE
PERFORMED BY Rich TURNER	DATE STARTED 3-13-92	DATE COMPLETED	APPROVED BY Dave CZARN.

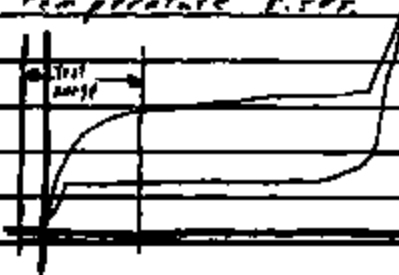
PROJECT TITLE: Ford MY'91 Electronic Speed Control Deactivate PS

CUSTOMER:

PURPOSE OF TEST: To see at what temperature calibration shift begins. Is it linear or does it occur at some threshold.

PROCEDURE: Acquire devices ranging from no continuity to good. Install on cycles manifold and cycle as temperature rises.

- Transfer pin: 142
- Cycle Pressures: 0-1450 PSI



EXHAUST SWITCHING									
Device #	Base Calib	ACT	P/L		AMBIENT TEMP	FLUID TEMP	ORDER OF FAILURE	MONITOR CIRCUIT	off set
205-15-1	91	20.9	0.7	Not used					
2	91	18.6	1.1	not used					
✓ 3	91	4.2	0.2		149	146	10	1	.051
✓ 4	91	13.2	0.4		149	144	9	2	.051
✓ 5	92	GRASS MAT	0.4 (40 PSI)		149	132	8	3	.050
✓ 6	92	GRASS MAT	0.4 (40 PSI)		149	130	7	4	.050
✓ 7	93	GRASS MAT	2.3 (50 PSI)		121	106	5	5	.049
✓ 8	93	" "	0.1 (65 PSI)		121	109	6	6	.049
✓ 9	94	11.5	2.0 (65 PSI)	Not used					
✓ 10	94	GRASS MAT	1.3 (80 PSI)		121	76	4	7	.049
✓ 11	94	" "	1.6 (80 PSI)		120	71	3	8	.049
✓ 12	95	" "	0.3 (65 PSI)		121	76	2	9	.047
✓ 13	95	" "	1.1 (65 PSI)	Not used					
✓ 14	95	" "	0.3 (65 PSI)		65	33	1	10	.047
✓ 15	96	" "	GRASS MAT		120	60		11	.046
✓ 16	96	" "	" "		120	60		12	.046
✓ 17	97	No continuity			No Cor.	No Cor.	Mandatory check	13	.045
✓ 18	97	No continuity			No Cor.	No Cor.		14	.045
Room Temp characteristics					Heated Characteristics				

TI-NHTSA 004594

TI-NHTSA 004594

PRESSURE SWITCH DATA

Form 21605

TEST NO. 215-15-24

DEVICE C100	DATE REQUESTED	REQUESTED BY W. C. R.	REQUESTED COMPL. DATE
PERFORMED BY Sgt. R. J. D.	DATE STARTED 3/11/91	DATE COMPLETED 3/24/91	APPROVED BY
PROJECT TITLE: Ford 117 '91 Filonine Speed Control Controller BS			

CUSTOMER:

PURPOSE OF TEST: Measure Thermal expansion of 46515 base welded
in 1/4 inch and 1/2 inch

PROCEDURE: 1) Measure base reference surface at room temp and 150°C on both ends of each material.
2) Using dummy sensors to insert at each material, measure cap temp to base steel at room temp and 150°C.

Location	Test Temp	Material	Pressure	Temp	Δ	$\bar{x}$	
10-11-01	1	ENGIN	.0270	.0250	.0020	2.0014"	Bases ONLY
-02	1		.0265	.0250	.0015		
-03	1		.0270	.0250	.0020		
-04	1		.0270	.0250	.0020		
-05	1		.0270	.0250	.0020		
-06	1		.0270	.0250	.0020		
10-11-02	1	WHEEL	.0280	.0265	.0015	2.0024"	Bases ONLY
-03	1		.0280	.0265	.0015		
-04	1		.0280	.0265	.0015		
-05	1		.0280	.0265	.0015		
-06	1		.0280	.0265	.0015		
-07	1		.0280	.0265	.0015		
10-11-03	2	ENGIN	.0280	.0215	.0065	2.0026"	Expanded to dummy sensors
-04	2		.0285	.0215	.0070		
-05	2		.0290	.0210	.0080		
-06	2		.0290	.0215	.0075		
-07	2		.0290	.0215	.0075		
-08	2		.0290	.0215	.0075		
215-15-19	1	WHEEL	.0285	.0275	.0010	2.0028"	Expanded to dummy sensors
-20	2		.0285	.0275	.0010		
-21	3		.0285	.0275	.0010		
-22	3		.0285	.0275	.0010		
-23	3		.0285	.0275	.0010		
-24	3		.0285	.0275	.0010		

TI-NHTSA 004595

HILITES

Steve Offici

W/E 920313

VALIDATION: Problems in printing both high-priority 5783-3 & 57411-3. We experienced a large fallout for creep, both out and in. The consensus is that the base we received from production were good very poorly / inconsistently. Two other complications are that the designer has been down, and production has been extremely busy. This has made it difficult to quickly rebuild/repin the fallout parts. Louis is making progress now, and with O.T. tomorrow should complete the build and initial characterizations of these two lots. Assuming we begin the SS testing on these two lots by next Monday, we'll be roughly 7 days behind the published schedule (see D). Reasoning to meet this is not out of the question. Additionally, we're late in delivering 6 dimensional parts / lot and prints is Quality.

SA-18665: Vol. build problems above are also impacting customer sample builds. We're late on C092-2, but 920311; C092-TH/009 due today, and we'll likely miss C092-TH/003 due Monday. We have F of A samples on 920324, but the difficulty here is that they want 100 per cent. robust designs. We were able to ship the 25 highest-priority parts of 100 due on C092-TH/010, but the remainder of 75 which is still due ASAP have been held up by production problems with A001872.

THREATS: DEPT: (Too much detail to other meeting room)

STAGE: No further action (yet) with First Cycle Syndrome & looking for some peace. Trying to plan priority on this item.

Steve Offici
920313

TI-NHTSA 004596

MSG NM= 00000670 FR=ZARN TO=GS01 SENT=03/12/92 09:33 AM
R#071 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/12/92 09:33 AM

AFCH 13, 1992

01 STEVE OFFILER GS01
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPE MFPC

02 TOM CHARBONNEAU TC
RAY TOURANGEAU RGT2
ANDY MCGUIRK PCQA
BILL CONDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG

03 DAVE ZARN ZARN

04 COPS HIGH TEMP ISSUE - MINUTES OF 3/12/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

EXT MEETING:

DATE: FRIDAY 3/13
TIME: 3:30
PLACE: CAFETERIA CUBE

SUBJ: Devices calibrated to the "short pin" (actually high calibration ass) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Temperature effect on pin length is estimated as:

R.T. to +120C = +3 - 4 mils
+120 to +150C = +3 - 4 mils
R.T. to -40C = ~-2 mils

Based on this data, the near term corrective action of selecting 56 mil offset is believed to be acceptable.

Elevated temperature vibration test will be conducted with "worst case" (52 il) offset at 121 and 150C; will vibrate in vertical axis, 2 to 3 sweeps at psig while monitoring contact chatter.

Dave will review the engineering spec and the DFMEA as a check to insure we don't compromise other performance areas using the present offset.

10% of switches exceed current 150ms release spec; switches are being -10 while the drop release spec is being reviewed.

Steve - will be scheduled for Wed. 3/13 3:30 PM in cafeteria; will be on phone/approved info to call out until 10:00.

TI-NHTSA 004597

= NEW ITEM OR COMPLETED ITEM
= PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
RESP SPEC = 25 ms MAX'M ACTUATION
150 ms MAX'M RELEASE

PROVIDE "LONG PIN" MATRIX TO S.O.	SELLERS
LOW TEMP EVAL'N W/ "LONG PIN" MATRIX	comp.
	OFFILER
	comp.
PROVIDE "SHORT PIN" MATRIX TO S.O.	SELLERS
HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	OFFILER
REVIEW SPEC AND DFMEA	OFFILER
COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N AND REL CREEP LIMITS	KOURT.
PREPARE TEMP. TEST STATION FOR USE BY 3/16	SWEET
WRITE HI TEMP AUDIT TEST PROCEDURE	SWEET
VIBRATION TEST W/52 MIL OFFSET	OFFILER

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES	OFFILER
REPEAT ABOVE WITH 57PS BASES MADE FROM BOTH 4300 AND 1662Z PBT	OFFILER
REQUEST CELANESE VISIT W/E 3/20 TO DISCUSS PLASTIC MOVEMENT	CZARN/ WALTERS
SEND PRINT/PARTS/BACKORD INFO TO CELANESE	comp. CZARN
ALTERNATIVE PLASTICS ?	CZARN/ WALTERS
ROUGH CALCUL'N OF PIN LENGTH CHANGE BASED ON LINEAR THERMAL EXP'N DIFFERENCES	OFFILER

EDARDS,
AVE CZARN
4 ntemp

TI-NHTSA 004598

-MSG M# 00027905 FR=ZARN TO=SRG1 SENT=03/14/92 07:43 AM
R# 074 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/14/92 07:43 AM

MARCH 14, 1992

TO: STEVE OFFILER SRG1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDS

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/13/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: MONDAY 3/16
TIME: 3:30
PLACE: CAFETERIA CUBE

(ISSUE: Devices calibrated to the "short pin" (actually high calibration case) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

WE'VE MADE GOOD PROGRESS IN GAINING A BETTER UNDERSTANDING OF THE PROBLEM AND IN PUTTING AN INTERIM CORRECTIVE ACTION IN PLACE. I FEEL, HOWEVER, THAT WE CAN BE DOING A BETTER JOB OF NOT LETTING SOME OF THESE ITEMS SLIP. PLEASE MAKE SURE WE'RE KEEPING THESE ITEMS AS A TOP PRIORITY AND THAT I'M INFORMED IF THERE'S SOMETHING IMPEDING THEIR COMPLETION. TYPICALLY, NO DATES ARE GIVEN BELOW AND THE EXPECTATION IS THAT THEY'LL BE COMPLETED OR AT LEAST UNDERWAY THE NEXT DAY. I'M CONFIDENT THAT IF WE KEEP THE EMPHASIS ON THIS PROBLEM, WE CAN MAKE IT A "QUICK VICTORY" AND MOVE ON...

Elevated temperature vibration test will be conducted with "worst case" (52 mil) offset at 121 and 150C; will vibrate in vertical axis, 2 to 3 sweeps at 2 psig while monitoring contact chatter.

Steve will review the engineering spec and the DFMEA as a check to ensure we don't compromise other performance areas using the present offset.

TI-NHTSA 004509

Japanese visit scheduled for Wed. 3/18 - 3:15PM - B12 cafeteria;
arts/bckgrd was sent to Japanese today.

SHORT TERM ACTIONS

- NEW ITEM OR COMPLETED ITEM
- PRIORITY ITEM

RESET FOR ALL SWITCHES = .086"
DEEP SPEC = 25 ms MAX'M ACTUATION
150 ms MAX'M RELEASE

PROVIDE "SHORT PIN" MATRIX TO S.O.
(need 52 to 54 mil offsets)
HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)
REVIEW SPEC AND DFMEA
VIBRATION TEST W/52 MIL OFFSET

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS
(was completed and needed to be booted at time of meeting)

PREPARE TEMP. TEST STATION FOR USE
BY 3/16

WRITE HI TEMP AUDIT TEST PROCEDURE

SELLERS (ON THE WAY) 8 @ .032
4 @ .53/54
OFFILER → ADD TO RICH'S TEST
START @ 7:00 AM RICH
OFFILER → CHIEF DUBLED VALUES
FOR HUMIDITY H₂O
ABSORPTION
SWEET

KOURT.

SWEET

SWEET

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS - ANNEALED
AND NOT-ANNEALED BASES

REPEAT ABOVE WITH 57PS BASES MADE FROM
BOTH 4300 AND 1662Z PBT

INSTRUMENT SWITCH W/T COUPLE AND
INCLUDE IN TEMP. TESTING

discussed the need to have a good reference temperature, since the
difference between ambient and fluid temperature makes it difficult to know
the actual device temp.)

REQUEST JAPANESE VISIT W/E 3/20
TO DISCUSS PLASTIC MOVEMENT

SEND PRINT/PARTS/BACKGRD INFO TO JAPANESE

ALTERNATIVE PLASTICS ?

SAMPLE P/C BASE IN ULTEM
(BROWN/ULTEM 2200 OR 2300 IF POSSIBLE)
ROUGH CALCUL'N OF PIN LENGTH CHANGE
BASED ON LINEAR THERMAL EXP'N DIFFERENCES

OFFILER } ? WHY RUN THESE
FAST - HUMIDITY TOO

OFFILER

OFFILER

CZARN/
WALTERS

comp.

CZARN

comp.

CZARN/
WALTERS

SELLERS/
WALTERS

OFFILER

→ - 70 X 115 0.5 TO 1.5
MILS PER TC

REGARDS,

TI-NHTSA 004600

MARCH 14, 1992

TO: STEVE OFFILER SB01
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU ROT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER FL
STEVE WALTERS MLDD

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/13/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: MONDAY 3/16
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

WE'VE MADE GOOD PROGRESS IN GAINING A BETTER UNDERSTANDING OF THE PROBLEM AND IN PUTTING AN INTERIM CORRECTIVE ACTION IN PLACE. I FEEL, HOWEVER, THAT WE CAN BE DOING A BETTER JOB OF NOT LETTING SOME OF THESE ITEMS SLIP. PLEASE MAKE SURE WE'RE KEEPING THESE ITEMS AS A TOP PRIORITY AND THAT I'M INFORMED IF THERE'S SOMETHING IMPEDING THEIR COMPLETION. TYPICALLY, NO DATES ARE GIVEN BELOW AND THE EXPECTATION IS THAT THEY'LL BE COMPLETED OR AT LEAST UNDERWAY THE NEXT DAY. I'M CONFIDENT THAT IF WE KEEP THE EMPHASIS ON THIS PROBLEM, WE CAN MAKE IT A "QUICK VICTORY" AND MOVE ON...

Elevated temperature vibration test will be conducted with "worst case" (52 mil) offset at 121 and 150C; will vibrate in vertical axis, 2 to 3 sweeps at 0 psig while monitoring contact chatter.

Steve will review the engineering spec and the DFMEA as a check to ensure we don't compromise other performance areas using the present offset.

Less than 1% of switches tested 3/12 exceed current 150ms release spec; switches are being held while the creep release spec is being reviewed.

Celanese visit scheduled for Wed. 3/18 - 3:15PM - B12 cafeteria; parts/bcgkrd was sent to Celanese today.

TLNHTSA 004801

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
CREEP SPEC = 25 ms MAX/M ACTUATION
150 ms MAX/M RELEASE

P	PROVIDE "SHORT PIN" MATRIX TO S.O. (need 32 to 34 mil offsets)	SELLERS
P	HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	OFFILER
P	REVIEW SPEC AND DFMEA	OFFILER
P	VIBRATION TEST W/52 MIL OFFSET	OFFILER
.	COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
.	EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N AND REL CREEP LIMITS (was completed and needed to be booted at time of meeting)	KDURT.
.	PREPARE TEMP. TEST STATION FOR USE BY 3/16	SWEET
.	WRITE HI TEMP AUDIT TEST PROCEDURE	SWEET

UNDERSTANDING THE PROBLEM CAUSE

.	RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES	OFFILER
.	REPEAT ABOVE WITH 37PS BASES MADE FROM BOTH 4300 AND 1662Z PBT	OFFILER
*	INSTRUMENT SWITCH W/T/COUPLE AND INCLUDE IN TEMP. TESTING (discussed the need to have a good reference temperature, since the difference between ambient and fluid temperature makes it difficult to know the actual device temp.)	OFFILER
.	REQUEST CELANESE VISIT W/E 3/20 TO DISCUSS PLASTIC MOVEMENT	CZARN/ WALTERS comp.
*	SEND PRINT/PARTS/BACKGRD INFO TO CELANESE	CZARN comp.
*	ALTERNATIVE PLASTICS ?	CZARN/ WALTERS
*	SAMPLE P/C BASE IN ULTEM (BROWN/ULTEM 2200 OR 2300 IF POSSIBLE)	SELLERS/ WALTERS
*	ROUGH CALCUL'N OF PIN LENGTH CHANGE BASED ON LINEAR THERMAL EXP'N DIFFERENCES	OFFILER

REGARDS,
DAVE CZARN
15-hitemp

TI-NHTSA 004602

MSG MSG=00027905 FR=ZARN TO=SB01 SENT=03/14/92 07:43 AM
R#074 ST=C DIV=0080 CC=00101 ST=ZARN AT=03/14/92 07:43 AM

ARCH 14, 1992

TO: STEVE OFFILER SB01
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCGA
DICK GARIEPY MFPC

TO: TOM CHAPONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCGA
BILL CONDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS NLDO

TO: DAVE ZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/13/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

EXT MEETING:

DATE: MONDAY 3/16
TIME: 3:00
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration ass) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

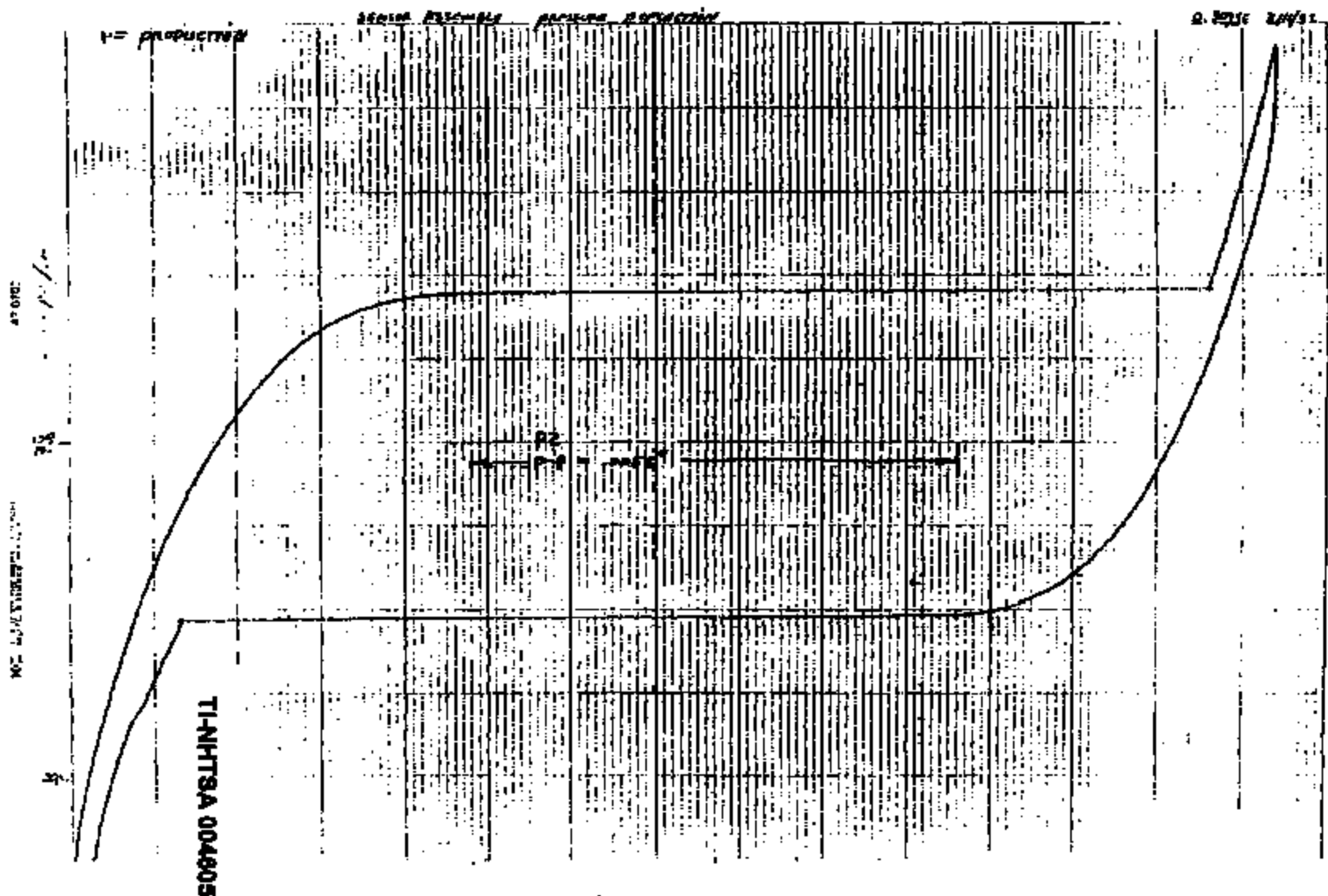
WE'VE MADE GOOD PROGRESS IN GAINING A BETTER UNDERSTANDING OF THE PROBLEM AND IN PUTTING AN INTERIM CORRECTIVE ACTION IN PLACE. I FEEL, HOWEVER, THAT WE CAN BE DOING A BETTER JOB OF NOT LETTING SOME OF THESE ITEMS SLIP. PLEASE MAKE SURE WE'RE KEEPING THESE ITEMS AS A TOP PRIORITY AND THAT I'M INFORMED IF THERE'S SOMETHING IMPEDING THEIR COMPLETION. TYPICALLY, NO DATES ARE GIVEN SLOW AND THE EXPECTATION IS THAT THEY'LL BE COMPLETED AT LEAST UNDERWAY THE NEXT DAY. I'M CONFIDENT THAT IF WE KEEP THE EMPHASIS ON THIS PROBLEM, WE CAN MAKE IT A QUICK VICTORY" AND MOVE ON...

Elevated temperature vibration test will be conducted with "worst case" (52:1) offset at 121 and 150C; will vibrate on vertical axis, 2 to 3 sweeps at peak while monitoring contact chatter.

We will review the engineering spec and the DMEA as a check to make sure we don't compromise other performance items using the present offset.

TI-NHTSA 004603

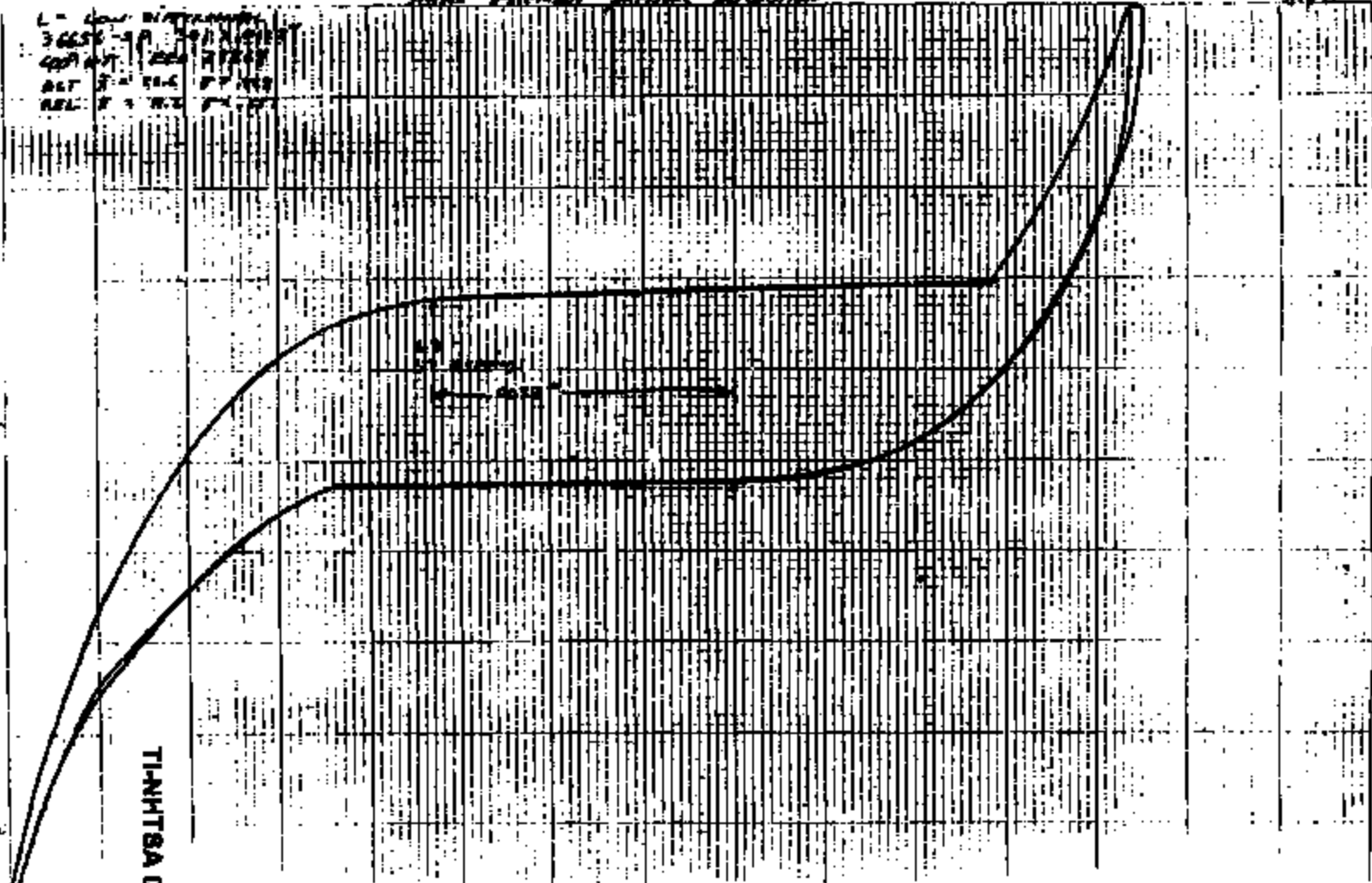
~~TO THIS~~ 0.5 TO 1.5
MILES NORTH



L = Low: 36656-9A 400A 80T 80L

SWAMP & SLOWLY MOVING WATER

2/1/82

[illegible]

TI-NHTSA 004808

PRESSURE SWITCH DATA

Form 21605

TEST NO. 209-15-12

DEVICE CCPS	DATE REQUESTED 3/16/92	REQUESTED BY Steve OFFLER	REQUESTED COMPL. DATE
PERFORMED BY Jeffrey P. Benenico	DATE STARTED 3/11/92	DATE COMPLETED	APPROVED BY
PROJECT TITLE: Ford 14'92 Electronic Speed Control Deactivate PS			

CUSTOMER:

PURPOSE OF TEST: **Evaluate expansion of bases at temperature. Test matrix to include annealed vs. virgin 77 PS bases (brown 4300) and 57 PS base made at 4300 vs. 57 PS base made at 1662R (also brown)**

PROCEDURE: **Crimp empty bases to dummy sensors. Measure distance from cap head to the floor of the terminal cavity. Heat units to 150°C and repeat measurements.**

	Base #	Annealed	Material	Run Temp	150°C	Δ	$\bar{X}_a$	Note
-01	77 PS	Y	4300	.4742	.4930	.0187	>.0139	Reached dummy 2.5 mils
-02	77 PS	Y		.4742	.4740	.0002		
-03	77 PS	Y		.4740	.4792	.0052		
-04	57 PS	N	4300	.4746	.4904	.0158	>.0154	Lowest DATA IS HIGHEST FROM (IT SHOWS 44 MILS - 0.440)
-05	77 PS	N		.4750	.4906	.0156		
-06	77 PS	N		.4751	.4910	.0159		
-07	57 PS	N	4300	.7230	.7282	.0052	>.0041	
-08	57 PS	N		.7231	.7282	.0051		
-09	57 PS	N		.7238	.7278	.0040		
-10	57 PS	N	1662R	.7235	.7285	.0050	>.0054	
-11	57 PS	N		.7234	.7272	.0038		
-12	57 PS	N		.7238	.7284	.0046		

TI-NHTSA 004607

PRESSURE SWITCH DATA

Form 21605

TEST NO. 209-15-12

DEVICE <i>CCPS</i>	DATE REQUESTED <i>3/16/92</i>	REQUESTED BY <i>Steve Offley</i>	REQUESTED COMPL. DATE
PERFORMED BY <i>Jeffrey A. Bonnell</i>	DATE STARTED <i>3/16/92</i>	DATE COMPLETED	APPROVED BY
PROJECT TITLE: <i>Ford NY92 Electronic Speed Control Reactivate PS</i>			

CUSTOMER:

PURPOSE OF TEST: *Evaluate expansion of bases at temperature. Test matrix to include annealed vs. virgin 77 PS bases (brown 4300) and 57 PS base made of 4300 vs. 57 PS base made of 1662R (aka brown)*

PROCEDURE: *Crimp empty bases to dummy sensor. Measure distance from end loop to the face of the terminal cavity. Heat units to 150°C and repeat measurements.*

	Base	Annealed	Material	Room Temp	150°C	Δ	$\bar{X}_n$	Note
-01	77 PS	Y	4300	.7743	.7780	.0037	>.0037	Cracked during crimp
-02	77 PS	Y		.7742	.7780	.0038		
-03	77 PS	Y		.7740	.7782	.0042		
-04	77 PS	N	4300	.7746	.7789	.0043	>.0043	
-05	77 PS	N		.7750	.7786	.0036		
-06	77 PS	N		.7751	.7790	.0039		
-07	57 PS	N	4300	.7230	.7282	.0052	>.0051	
-08	57 PS	N		.7231	.7282	.0051		
-09	57 PS	N		.7238	.7278	.0040		
-10	57 PS	N	1662R	.7235	.7285	.0050	>.0050	
-11	57 PS	N		.7234	.7272	.0038		
-12	57 PS	N		.7238	.7269	.0031		

TI-NHTSA 004808

cc: Elaine R.

TEXAS INSTRUMENTS



March 16, 1992

Kelsey-Hayes Company
9475 Center Road
Fenton, Michigan 48430

Attn: Mr. Thomas G. Dan
Supplier Quality Assurance

Subj: Part Number 12590701 Pressure Switch (F2VC-9F924-AB)
ISIR Approval

Ref: Your 03/09/91 Telephone Call

Dear Tom,

Enclosed, please find the approved ISIR signed by Ford SOA
for the Kelsey-Hayes print number 12590701.

After reviewing the ISIR, please let me know if you
have any questions or if I can be of any further assistance.

Regards,

Jim Watt
SQA Engineer
Precision Controls Department
Control Products Division

cc: Dave Czarn, MS 12-29; Charlie Douglas, MS 12-33
Rita Gunia, Kelsey-Hayes Purchasing Dept., Fenton, Mi.
Andy McQuirk, MS 12-27
Norm Freda, TI Farmington Hills, Michigan

encl: ISIR No. 112384

MSG #00072019 FR=ZARN TO=SB01 SENT=03/16/92 04:46 PM
R#000 ST=C LIV=0050 CC=00101 BY=ZARN AT=03/16/92 04:46 PM

NRCH 16, 1992

01: STAVE OFFILER SB01
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
BOB GARECY MFPC

02: TOM CHARBONEAU TC
RAY TOURANGEAU RDT2
ANDY MCQUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER FL
STEVE WALTERS MLDS

03: DAVE CZARN ZARN

04: COPS HIGH TEMP ISSUE - MINUTES OF 3/16/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

EXT MEETING:

DATE: TUESDAY 3/17
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration spec) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Have reviewed the engineering spec and determined that the only other area of potential concern (besides vibration) is the humidity test, where the base material could change dimensionally when exposed to moisture. Although we don't believe moisture absorption is a concern with the PBT, we will review it with the Celanese rep Wednesday.

About 1% of switches tested 3/13 exceed current 150ms release spec; about the same level of failures in the "continuity" category perhaps due to actuation >10% above the maximum specified. Bill Sweet to re-test at higher pressure.

Use calibration check funneled by .5 mils on low end; from +/-2 mils to +/-1.5 mils. Fallout can be sent back through the machine. Matt will report on results.

SHORT TERM ACTIONS

NEW ITEM OR COMPLETED ITEM
PRIORITY ITEM

TI-NHTSA 004610

PROVIDE "SHORT PIN" MATRIX TO S.O. (rings 52 to 54 mil offsets)	SELLERS
HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	OFFILER
REVIEW BMSO	OFFILER comp.
REVIEW DFMEA	OFFILER
VIBRATION TEST W/52 MIL OFFSET	OFFILER
SAMPLE P/C BASE IN ULTEM (BROWN/ULTEM 2200 OR 2300 IF POSSIBLE)	SELLERS/ WALTERS
COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK STATION WINDOW	SELLERS
EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT ACT'N. AND REL CREEP LIMITS	KOURT. comp.
PREPARE "CMP. TEST STATION FOR USE BY 3/16 (operator training needed)	SWEET comp.
WRITE HI TEMP AUDIT TEST PROCEDURE	SWEET comp.
UNDERSTANDING THE PROBLEM CAUSE	
RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES (77's/ no terminals) & REPEAT ABOVE WITH 57PS BASES MADE FROM BOTH 4300 AND 1662Z PBT	OFFILER
INSTRUMENT SWITCH W/T COUPLE AND INCLUDE IN TEMP. TESTING	OFFILER comp.
ALTERNATIVE PLASTICS ?	CZARN/ WALTERS
ROUGH CALCUL'N OF PIN LENGTH CHANGE BASED ON LINEAR THERMAL EXP'N DIFFERENCES	OFFILER
ECARDS, AVE CZARN A-nitemp	

High temp mtg

3/16/92

- ① 5 base ASSY's → 52, 091 base
4 base ASSY's ea. → 53 and 54 ~~091 base~~
143 52 090 bases
089 base

② PFMEA

③ Continuity Failures
- test on hand tester.

④ 7742-3 pin window.

⑤ Bill Smart on high temp test procedure.

⑥ Toll order on Witem.

2700 or 2300
Brown.

MSG MH= 00072019 FR=ZARN TO=SB01 SENT=03/16/92 04:46 PM
R#080 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/16/92 04:46 PM

MARCH 16, 1992

TO: STEVE OFFILER SB01
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPEY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McQUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS NDEB
PAUL LESSER PL
STEVE WALTERS MLDG

FR: DAVE CZARN ZARN

RE: COPS HIGH TEMP ISSUE - MINUTES OF 3/16/92 MEETING

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING!

DATE: TUESDAY 3/17
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Steve reviewed the engineering spec and determined that the only other area of potential concern (besides vibration) is the humidity test, where the base material could change dimensionally when exposed to moisture. Although we don't believe moisture absorption is a concern with the PBT, we will review it with the Celanese rep Wednesday.

About 1% of switches tested 3/13 exceed current 150ms release spec; about the same level of failures in the "continuity" category perhaps due to actuation >10% above the maximum specified. Bill Sweet to re-test at higher pressure.

Base calibration check funneled by .5 mils on low end; from +/-2 mils to +/-2/-1.5 mils. Fallout can be sent back through the machine. Matt will report on results.

SHORT TERM ACTIONS

• = NEW ITEM OR COMPLETED ITEM
• = PRIORITY ITEM

TI-NHTSA 004613

PROVIDE "SHORT PIN" MATRIX TO S.O.
(need 52 to 54 mil offsets)
HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)
REVIEW SPEC

SELLERS

OFFILER

OFFILER

comp.

OFFILER

OFFILER

REVIEW DFMEA
VIBRATION TEST W/52 MIL OFFSET

SAMPLE P/C BASE IN ULTEM
(BROWN/ULTEM 2200 OR 2300 IF POSSIBLE)

SELLERS/

WALTERS

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK
STATION WINDOW

SELLERS

EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS

KOURT.

comp.

PREPARE TEMP. TEST STATION FOR USE
BY 3/16

SWEET

comp.

(operator training needed)

WRITE HI TEMP AUDIT TEST PROCEDURE

SWEET

comp.

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS - ANNEALED
AND NOT-ANNEALED BASES (77's/ no terminals)
& REPEAT ABOVE WITH 57PS BASES MADE
FROM BOTH 4300 AND 1662Z PBT

OFFILER

INSTRUMENT SWITCH W/T COUPLE AND
INCLUDE IN TEMP. TESTING

OFFILER

comp.

ALTERNATIVE PLASTICS ?

CZARN/

WALTERS

OFFILER

ROUGH CALCUL'N OF PIN LENGTH CHANGE
BASED ON LINEAR THERMAL EXP'N DIFFERENCES

REGARDS,
AVE CZARN
6-hitemp

TI-NHTSA 004614

2-1 GARYEY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/16/92 MEETING

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DATE: TUESDAY 3/17
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Steve reviewed the engineering spec and determined that the only other area of potential concern (besides vibration) is the humidity test, where the base material could change dimensionally when exposed to moisture. Although we don't believe moisture absorption is a concern with the PET, we will review it with the Celanese rep Wednesday.

About 1% of switches tested 3/13 exceed current 150ms release spec; about the same level of failures in the "continuity" category perhaps due to actuation >10% above the maximum specified. Bill Sweet to re-test at higher pressure.

Base calibration check funneled by .5 mils on low end; from +/-2 mils to +2/-1.5 mils. Fallout can be sent back through the machine. Matt will report on results.

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .036"
CREEP SPEC = 25 ms MAX/M ACTUATION
150 ms MAX/M RELEASE

P PROVIDE "SHORT PIN" MATRIX TO S.O.
(need 52 to 54 mil offsets)
P HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)
P REVIEW SPEC

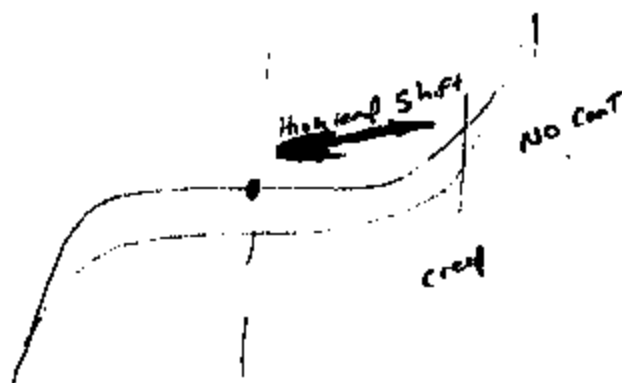
P REVIEW DFMEA
P VIBRATION TEST W/52 MIL OFFSET

SELLERS

OFFILER

OFFILER
comp.
OFFILER
OFFILER

TI-NHTSA 004815



- P SAMPLE P/C BASE IN ULTEM
(BROWN/ULTEM 2200 OR 2300 IF POSSIBLE)
- COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS
- * REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK
STATION WINDOW
- * EXPEDITE P-TESTER MODS TO ALLOW DIFFERENT
ACT'N AND REL CREEP LIMITS
- * PREPARE TEMP. TEST STATION FOR USE
BY 9/16
(operator training needed)
- * WRITE HI TEMP AUDIT TEST PROCEDURE

SELLERS/
WALTERS

SWEET

SELLERS

KOURT.
comp.

SWEET
comp.

SWEET
comp.

UNDERSTANDING THE PROBLEM CAUSE

- RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS - ANNEALED
AND NOT-ANNEALED BASES (77's/ no terminals)
& REPEAT ABOVE WITH 57PS BASES MADE
FROM BOTH 4300 AND 1662Z PBT
- * INSTRUMENT SWITCH W/T COUPLE AND
INCLUDE IN TEMP. TESTING
- * ALTERNATIVE PLASTICS ?
- * ROUGH CALCUL'N OF PIN LENGTH CHANGE
BASED ON LINEAR THERMAL EXP'N DIFFERENCES

OFFILER

OFFILER
comp.

CZARN/
WALTERS
OFFILER

REGARDS,
DAVE CZARN
16-hitemp

-MSG M# 49636 FR=VAGS TO=COPY SENT=03/16/92 09:25 AM
ST=C DIV=0050 CC=00134 BY=VAGS AT=03/16/92 09:25 AM

TO: ANDRE CHARPENTIER MDES

CC: DICK GRIEPE MFPC
DAVE CZARN ZARN
BILL SWEET PCME
77PS SMWT MFPC

FR: MATT [REDACTED] MJB2

SUB: 77PS FUNCTION TESTER

ANDRE,

THANKS FOR YOUR RAPID RESPONSE TO OUR REQUESTED PROGRAM CHANGES.

WE WOULD LIKE TO REQUEST ALSO THAT THE CREEP CHECK ON/OFF SELECTION
BE DIS-CONTINUED FOR OPERATOR USE ONLY. WE WOULD LIKE TO RETAIN THE
ABILITY TO TURN OFF THIS FUNCTION, BUT COULD WE POSSIBLE PLACE THE
SELECTION BUTTON ON ANOTHER SCREEN TO PREVENT IN-ADVERTENT DIS-
ABLING. PERHAPS YOU COULD PLACE IT OUT OF THE WAY ON THE
DIAGNOSTICS SCREEN?

PLEASE EVALUATE AND LET US KNOW. YOU CAN USE THE PREVIOUS WORK
ORDER TO CHARGE TIME TO.

REGARDS . . . MATT
X1245

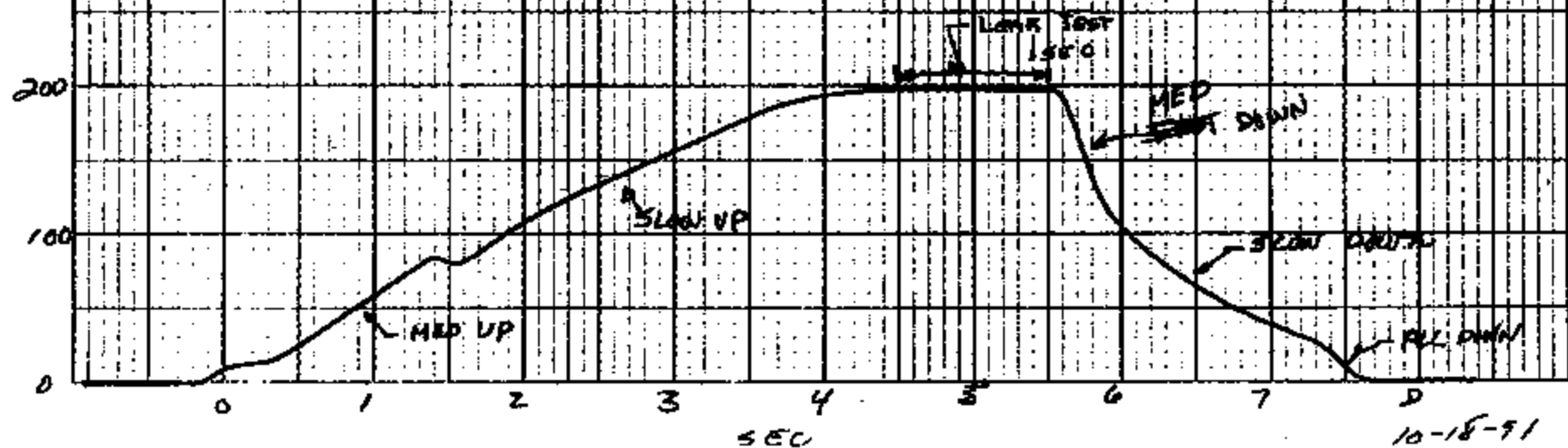
TI-NHTSA 004617

500 PSI TRANSDUCER

L₀ ACT = 90H₁ ACT = 160H₁ REC = 110L₀ REC = 90

Ramp Rate = 50

NOTE: ~~DATA~~ VALUES PLANNED
FOR GEAR OFF = EXHAUST



FUNCTION TESTER
PROCESS SPECIFICATION SUPPLEMENTAL INFORMATION
SUBJECT TO CHANGE, NOTE REVISION
REVISION: A 4/24/92

TESTING PROCEDURE INFORMATION
BY DEVICE TYPE:

77PSL2-1

TO FUNCTION TEST THESE DEVICES YOU MUST USE THE SELECT PART NUMBER SCREEN TO PULL UP DEFAULT SPECIFICATIONS. THE SPECIFICATIONS THAT YOU SHOULD TEST THESE DEVICES TO ARE:

MAX. ACTUATION	180 PSI	PRECYCLE COUNT	2
MIN. ACTUATION	90 PSI	PREC. PRESSURE	800
MAX. RELEASE	120 PSI	RAMP RATE	50
MIN. RELEASE	20 PSI	LEAK RATE	10
MAX. DIFFERENTIAL			
MIN. DIFFERENTIAL			
CREEP CHECK	ON		
ACTUATION CREEP MAX	150 MSEC.		
RELEASE CREEP MAX	25 MSEC		

THESE TEST SPECIFICATIONS SHOULD AUTOMATICALLY BE SET WHEN YOU PROPERLY SELECT THIS PART NUMBER. IF NOT CONTACT YOUR ENGINEER.

77PSL2-3

TO FUNCTION TEST THESE DEVICES YOU MUST USE THE SELECT PART NUMBER SCREEN TO PULL UP DEFAULT SPECIFICATIONS. THE SPECIFICATIONS THAT YOU SHOULD TEST THESE DEVICES TO ARE:

MAX. ACTUATION	300 PSI	PRECYCLE COUNT	2
MIN. ACTUATION	200 PSI	PREC. PRESSURE	800
MAX. RELEASE	180 PSI	RAMP RATE	50
MIN. RELEASE	40 PSI	LEAK RATE	10
MAX. DIFFERENTIAL			
MIN. DIFFERENTIAL			
CREEP CHECK	ON		
ACTUATION CREEP MAX	150 MSEC.		
RELEASE CREEP MAX	25 MSEC		

THESE TEST SPECIFICATIONS SHOULD AUTOMATICALLY BE SET WHEN YOU PROPERLY SELECT THIS PART NUMBER. IF NOT CONTACT YOUR ENGINEER.

**FUNCTION TESTER
PROCESS SPECIFICATION SUPPLEMENTAL INFORMATION
SUBJECT TO CHANGE, NOTE REVISION
REVISION:A 4/24/92**

77PSL3-1

TO FUNCTION TEST THESE DEVICES YOU MUST USE THE SELECT PART NUMBER 77PSL2-1 TO PULL UP DEFAULT SPECIFICATIONS. THEN PROGRAM MANUALLY THE SPECIFICATIONS BELOW:

MAX. ACTUATION	150 PSI	PRECYCLE COUNT	2
MIN. ACTUATION	110 PSI	PREC PRESSURE	800
MAX. RELEASE	140 PSI	RAMP RATE	50
MIN. RELEASE	80 PSI	LEAK RATE	10
MAX. DIFFERENTIAL	45 PSI		
MIN. DIFFERENTIAL	15 PSI		
CREEP CHECK	OFF		
ACTUATION CREEP MIN	200 MSEC.		
RELEASE CREEP MIN	200 MSEC.		

THESE TEST SPECIFICATIONS ARE NOT AUTOMATICALLY SET IN ANY DEFAULTS. YOU MUST CALL UP A 77PSL2-1 AND MANUALLY CHANGE TO THE SPECIFICATIONS LISTED ABOVE.

PLEASE ENSURE THAT THE CREEP CHECK IS TURNED OFF TO RUN THESE DEVICES. WHEN FUNCTION TESTING DEVICES YOU MUST MONITOR THE PRINT OUT FOR EACH DEVICE. IF A DEVICE SHOWS A CREEP ACTUATION OR CREEP RELEASE VALUE LESS THAN 200 MSEC. YOU MUST REMOVE THAT DEVICE FROM THE UNLOAD CONVEYOR AND PLACE IN THE PROPER BIN FOR THESE DEVICES. THEY MUST NOT BE SHIPPED AS GOOD PRODUCT. THIS IS A TEMPORARY SET-UP PENDING SOFTWARE UPDATES.

-MSG MH= 276256 FR=VAGB TO=CCPY SENT=03/24/92 06:57 AM
ST=C DIV=0050 CC=00134 BY=VAGB AT=03/24/92 06:57 AM

TO: ANDRE CHARPENTIER MDES

CC: DAVE CZARN ZARN
BILL SWEET PCME
JOHN KOURTESIS MDES

FR: MATHIAS ~~XXXXXXXXXX~~ MJ82

SJ: 77PS FUNCTION TESTER

ANDRE,

DOES THE 77PS PRESSURE TESTER AT ANY POINT IN THE FUNCTION TEST
CYCLE LOOK FOR CONTINUITY AT "ZERO" PRESSURE? I KNOW WE CURRENTLY
TAKE A LOOK IMMEDIATELY AFTER THE SECOND 800PSI PRE-CYCLE, BUT DO
WE ALSO LOOK AT INITIAL CLOSURE OF THE POGO PINS?

IF THE ANSWER IS NO, THEN I WOULD REQUEST THAT YOU EVALUATE IF THIS
IS FEASIBLE. WE WILL NEED TO START VERIFYING THAT DEVICES ARE
INITIALLY PINNED LONG ENOUGH TO PROVIDE ZERO PRESSURE CONTINUITY.

REGARDS . . . MATT
X1245

TI-NHTSA 004621

-MSG MH= 131633 FR=VAGB TO=COPY BENT=03/19/92 10:45 AM
BT=C DIV=0050 CC=00134 BY=VAGB AT=03/19/92 10:45 AM

TO: WAYNE CARLSON WCAR
LOU CAMARA MDES

CC: DICK GARIEPY MFPC
JOHN KOURTESIS MDES
BILL SWEET PCME
77PB SMWT MFPC
ANDRE CHARPENTIER MDES

FR: MATT ~~SEWERS~~ MJS2

SJ1 77PB FUNCTION TESTER

WAYNE/LOU,

THERE ARE A FEW PROGRAM ISSUES ON THE 77PB FINAL ASSEMBLY MACHINE
THAT I WOULD LIKE AN UPDATE ON.

- 1.) MWO # 253088005 REQUESTED A "STOP ON FAULT" CHANGE TO EACH
STATION, WITH THE EXCEPTION OF SEAL AND PIN LOADING, TO
STOP ONLY AFTER TWO FAULTS IN A ROW.
- 2.) IF THE SENSOR LOADER CHECK PROBE DETECTS A MISSING OR
MIS-PLACED SENSOR, THE ENV. SEAL LOADER WILL STILL INSTALL
A SEAL ON THE BAD NEST. HOWEVER, THE NEST FOLLOWING THE BAD
NEST, EVEN THOUGH IT WAS DETECTED GOOD BY THE SENSOR CHECK,
WILL NOT RECEIVE AN ENV. SEAL. IS THIS A SHIFT REGISTER ERROR?

PLEASE DISCUSS AND ADVISE ASAP.

REGARDS . . . MATT
X1245

TI-NHTSA 004622

-MSG M#- 84123 FR=ACHR TO=MJS2 SENT=03/17/92 07:28 AM
R#-191 ST=C DIV=0050 CC=00157 BY=ACHR AT=03/17/92 07:28 AM

To: ~~Master Sergeant~~ MJS2

CC: Dick Garlepy MFPC
Dave Czarn ZARN
Bill Sweet PCME
77PS SMWT MFPC
John Gormley JGOR
John Kourtesis JKOU

From: Andre Charpentier ACHR

Subj: 77PS FUNCTION TESTER

The creep check ON/OFF selection will fit on the DIAGNOSTIC screen. I will do this along with the other changes. One of your other requests was to increase the max creep time to 1 second. This will also be done on the previous work order. At the present time, the max creep time is set for 163 milliseconds.

Regards,

Andre Charpentier ACHR/X3682

TI-NHTSA 004623

MECHANIZATION WORK ORDER

SHT. 1 OF 2

FORM 20222

Date Requested _____

☐ Proposal☐ Design☒ Build

ASAP

REQ'D. PRODUCT PRINT NOS.
SUPPLIED LISTRequested By fromDate 12/10/82 Mail Stn. Tel. Ext. 124Approved By B. J. J. J.DEPARTMENT ProcDEVICE 77PS

Date Entered _____

By MECHANIZATION _____

Project No.

253088005

Product Code 088CC 253

PROJECT DESCRIPTION

1	
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14	

① - Modify 77PS Function Tester Software to Allow operator to specify Actuation and release creep max. limits differently.

② - Default Settings Change to Actuation → 25 msec max. Release → 150 msec max.

③ - Add "Free Disc" spec. data on lot print-out.

④ - Make Fixture by Fixture printout An option only.

⑤ - Exclude dummies From Lot Statistics.

ADDITIONAL REMARKS, INFORMATION, SKETCH

MECH. TITLE _____

MECHANICAL

EST. HRS. _____

ELECTRICAL

EST. HRS. _____

PROJ. MGR. _____

PROJ. MGR. _____

ENG. _____

ENG. _____

DES. _____

TECH/DRAFT _____

BUILD EST. HRS. _____

BUILD EST. HRS. _____

BUILD CC _____

DATE _____

BUILD CC _____

DATE _____

DESIGN REVIEW ☐ DATE _____DWG. SIGN OFF ☐ DATE _____

DESIGN CLOSED TO BUILD DATE _____

BY _____

ORDER CLOSED DATE _____

BY _____

GEN. ASSY. DWG. NO. ASSIGNED _____

UNLD CLOSED

DATE _____

WHITE - MECHANIZATION COPY

YELLOW - ORIGINATOR'S COPY

TI-NHT8A 004624

MECHANIZATION WORK ORDER

SHT. 2 OF 2

FORM 20222

☐ Proposal
☐ Design
☐ Build

Date Requested _____

Requested By (name) _____

Date _____ Mail Sts. Tel. Ext. _____

Date Entered _____

By MECHANIZATION _____

Project No.

253088005

Product Code _____

CC _____

 RECD. PRODUCT PRINT NOS.
 SUPPLIED LIST

1	
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12	
13	
14	

PROJECT DESCRIPTION

(C) Change Final Assembly machine Stop on Fault
 Algorithm as follows:

Station Stop After This number Faults

Crimp Ring 2 in a row

Sensor Assy 2 in a row

Env. Seal Stop on 1

Tra Pin Stop on 1

Base 2 in a row

ADDITIONAL REMARKS, INFORMATION, SKETCH

MECH. TITLE _____

MECHANICAL

EST. HRS. _____

ELECTRICAL

EST. HRS. _____

PROJ. MGR. _____

PROJ. MGR. _____

ENG. _____

ENG. _____

DES. _____

TECH/DRAFT _____

BUILD EST. HRS. _____

BUILD EST. HRS. _____

BUILD CC _____

BUILD CC _____

DATE _____

DATE _____

DESIGN REVIEW ☐ DATE _____DWG. SIGN OFF ☐ DATE _____

DESIGN CLOSED TO BUILD DATE _____ BY _____

ORDER CLOSED DATE _____ BY _____

GEN. ASSY. DWG. NO. ASSIGNED _____

BUILD CLOSED DATE _____

WHITE - MECHANIZATION COPY

YELLOW - ORIGINATOR'S COPY

TI-NHTSA 004625

THE SWITCH DATA

Form 21605

TEST NO. 206-15

PERFORMED BY Phil Turner	DATE REQUESTED 3-17-92	REQUESTED BY Steve Oriller	REQUESTED COMPL. DATE
	DATE STARTED 3-17-92	DATE COMPLETED	APPROVED BY DAVE CERN

PROJECT TITLE: **FORD MY '92 ELECTRONIC SPEED CONTROL DEACTIVATE P.S.**CUSTOMER: **INTERNAL**PURPOSE OF TEST: **TO DETERMINE THE EFFECT OF TEMPERATURE ON CALIBRATION SHIFT**

- PROCEDURE: ① Install a thermometer on a test device; monitor device temp.
 ② Cycle 0 to 1450 PSI at 2 Hz.
 ③ Temp. cycle devices 30°C to 150°C
 ④ Record temp. at which continuity is broken (as temp. rises) + temp. at which continuity is made as temp. decreases
 ⑤ Temp. cycle 30°C to 150°C 5 times; record data on 1st and fifth cycles

0 TO 150°C							150° TO 30°	
NOTE: Thermocouple installed on device 3-15-92								
Device #	ACT	REL	OFFSET	Device Temp	Order of Failure	Number Cycles	Device Temp	Order of Return
206-19	1.1	0.7	.054	100°C	NO FAILURE	15	NO FAILURE	
-20	1.1	0.7	.054			16		
-21	1.1	0.7	.053			17		
-22	1.1	0.7	.053			18		
-23	1.1	0.7	.053			19		
-24	1.1	0.7	.053			20		
-3	4.2	0.2	.057	120°C	18	1	120°C	1
4	13.2	0.4	.056	100°C	9	2	120°C	2
5	GRASS AT	0.4	.050	100°C	8	3	100°C	3
6	GRASS	0.4	.050	100°C	7	4	100°C	4
7	GRASS	0.3	.049	80°C	6	5	80°C	6
8	"	0.1	.049	80°C	4	6	80°C	7
10	"	1.2	.048	60°C	5	7	70°C	5
11	"	1.6	.048	50°C	3	8	70°C	8
12	"	0.2	.042	40°C	2	9	NO-CONT	NO CONT
14	"	1.1	.042	30°C	16	10	30°C	9
15	"	0.2	.040	NO CONTINUITY		11		
16	"	GRASS	.046	INITIALLY		12	NO-CONT.	
17	NO CONTINUITY		.045	30°C	17	13		
18	"	"	.045	30°C	18	14		
Room Temp								
.006" EXTENSION OF BASE FROM SET - 120°C								
NO ADDITIONAL SHIFT UP TO 150°C								
TLNLTSA 004828								

TI-NHTSA 004626

PRESSURE SWITCH DATA

FORM 21605

TEST NO. 210-15-20

DEVICE

CCPS

DATE STARTED

3-17-92

TESTED BY

STEVE OFFICER

REQUESTED COMPL.

DATE

PERFORMED BY

RICH TURNER

DATE STARTED

3-17-92

DATE COMPLETED

3-27-92

APPROVED BY

DAVE CLARK

PROJECT TITLE: FORD MY '92 ELECTRONIC SPEED CONTROL DEACTIVATE P.S.

CUSTOMER:

INTERNAL

PURPOSE OF TEST:

TO DETERMINE THE EFFECT OF TEMPERATURE ON CALIBRATION
SHIFT

PROCEDURE:

- ① INSTALL A THERMOCOUPLE ON A TEST DEVICE; MONITOR DEVICE TEMP.
- ② CYCLE 1 TO 1450 PSI AT 2 Hz.
- ③ TEMP. CYCLE DECREASES 30°C TO 150°C
- ④ RECORD TEMP. AT WHICH CONTINUITY IS BROKEN (AS TEMP. RISES) +
TEMP. AT WHICH CONTINUITY IS MADE AS TEMP. DECREASES
- ⑤ TEMP. CYCLE 30°C TO 150°C 5 TIMES; RECORD DATA ON 1ST AND FIFTH CYCLES

30 TO 150°C

150° TO 30°

NOTE: Thermocouple installed in device 205-15-16

Device #	ACT	REL	OFFSET	DEVIAT TEMP	ORDER OF FAILURE	WIRING CIRCUIT	Device Temp	SEVERE OF REMARKS
205-15-19	1.1	0.7	.054	100°C	NO FAILURE	15	NO FAILURES	
20	1.1	0.7	.054			16		
21	1.1	0.7	.053			17		
22	1.1	0.7	.053			18		
23	1.1	0.7	.052			19		
24	1.1	0.7	.052			20		
3	4.2	0.2	.051	120°C	10	1	120°C	1
4	13.2	0.4	.051	120°C	9	2	120°C	2
5	GRASS MT	0.4	.050	100°C	8	3	100°C	3
6	GRASS	0.4	.050	100°C	7	4	100°C	4
7	GRASS	2.3	.049	80°C	6	5	80°C	5
8	"	0.1	.049	80°C	4	6	80°C	6
10	"	1.3	.048	60°C	5	7	70°C	5
11	"	1.6	.048	50°C	3	8	70°C	3
12	"	0.3	.047	40°C	2	9	NO CONT.	
14	"	1.1	.047	30°C	24	10	30°C	9
15	"	0.3	.046	NO CONTINUITY		11		
16	"	GRASS	.046			12	NO CONT.	
17	NO CONTINUITY		.045	INITIALLY		13		
18	"	"	.045	30°C	25	14		
Room Temp				First Cycle				

TI-NHTSA 004627

PRESSURE SWITCH DATA

Form 21605

TEST NO. 210-15-20

DEVICE CCPS	DATE REQUESTED 3-17-92	REQUESTED BY STUE OFFICER	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-17-92	DATE COMPLETED 3-18-92	APPROVED BY DAVE CARM
PROJECT TITLE: Ford MY'92 Electronic Speed Control Deactivate P.S.			

CUSTOMER: **INTERNAL**PURPOSE OF TEST: **TO DETERMINE THE EFFECT OF TEMPERATURE ON CALIBRATION SHIFT**

- PROCEDURE
- ① INSTALL A Thermocouple on a TEST device; MONITOR device TEMP.
 - ② Cycle 0 TO 1450 PSF AT 2 Hz.
 - ③ Temp. cycle device's 30°C TO 150°C
 - ④ Record Temp. at which continuity is broken (as Temp. Rises) + Temp. at which continuity is made as Temp. decreases
 - ⑤ Temp. cycle 30°C TO 150°C 5 times; Record data on 1st and fifth cycles.

30 TO 150°C

150° TO 30°

NOTE: Thermocouple mounted on device # 203-15-16

Device #	ACT	REL	OFFSET	Device Temp	Order of Failure	Multiple Cycles	Device Temp	Order of Recovery
203-15-19	1.1	0.7	.054	100°C	} NO FAILURE	15		
-20	1.1	0.7	.054	"		16		
-21	1.1	0.7	.053	"		17		
-22	1.1	0.7	.053	"		18		
-23	1.1	0.7	.053	"		19		
-24	1.1	0.7	.052	"	} NO FAILURE	20		
3	4.2	0.2	.051	120°C	10	1	120°C	1
4	13.2	0.4	.051	120°C	9	2	120°C	2
5	6000 PSI	0.4	.050	100°C	8	3	100°C	3
6	6000 PSI	0.4	.050	100°C	7	4	100°C	4
7	6000 PSI	2.3	.049	80°C	6	5	90°C	6
8	"	0.1	.049	80°C	4	6	80°C	7
10	"	1.3	.048	60°C	5	7	70°C	5
11	"	1.6	.048	50°C	3	8	70°C	8
12	"	0.3	.047	40°C	2	9	NO-CONT	
14	"	1.1	.047	30°C	14	10	30°C	9
15	"	0.3	.046	NO CONTINUITY		11		
16	"	0.000	.046			12		
17	NO CONTINUITY		.046	INITIALLY		13		
18	"		.045	90°C	14	14		
Rise Temp								

TI-NHTSA 004629

150°C TO 150°C				150°C TO 30°C	
DEVICE #	DEVICE TEMP	ORDER OF FAILURE	MONITOR CIRCUIT	DEVICE TEMP	ORDER OF RETURN
205-15-19	154°C	76	15	150°C	16
-20	150°C	20	16	140°C	20
-21	150°C	19	17	140°C	18
-22	150°C	15	18	140°C	19
-23	150°C	18	19	140°C	15
-24	140°C	17	20	130°C	17
-3	110°C	1	1	120°C	1
-4	110°C	2	2	100°C	2
-5	100°C	3	3	100°C	3
-6	90°C	4	4	90°C	3
-7	80°C	6	5	60°C	7
-8	60°C	5	6	50°C	6
-10	60°C	7	7	50°C	8
-11	50°C	8	8	50°C	5
-12	30°C	9	9	↓ 50°C	9
-14	NO -	10	10	↓ 50°C	10
-15	CONTINUITY	11	11		
T.C. -16	INITIALLY	12	12	↓ 50°C	12
-17	↓	13	13		
-18		14	14		

3. REACTIVE CONTINUITY - 90% - 50%
 2. 90% - 50% DATA MAINTAINED CONTINUITY

PRESSURE SWITCH DATA

Form 21605

TEST NO. 206-15

DEVICE CCPS	DATE REQUESTED 3-17-92	REQUESTED BY Steve Apple	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-17-92	DATE COMPLETED	APPROVED BY DAVE CARM
PROJECT TITLE Ford MY'92 Electronic Speed Control Diagnostic P.S.			

CUSTOMER: **INTERNAL**PURPOSE OF TEST: **TO DETERMINE THE EFFECT OF TEMPERATURE ON CALIBRATION
SHIFT**

- PROCEDURE: ① INSTANT A Thermocouple in a test device; monitor device temp.
 ② Cycle 1 to 1450 PSI at 2 Hz.
 ③ Temp. cycle device 30°C to 150°C.
 ④ Record Temp at which continuity is broken (as Temp. Rises) +
 Temp. at which continuity is made as Temp. decreases.
 ⑤ Temp. cycle 30°C to 150°C 5 times; Record data on up and down cycles.

0 TO 150°C

150° TO 30°

NOTE: Thermocouple inserted in device 3-18-92

Device #	Act	Rel	Offset	Device Temp	Order of Phase	Number of Cycles	Device Temp	Order of Phase
20515-19	1.1	0.7	.054	100°C		15		
-20	1.1	0.7	.054			16		
-21	1.1	0.7	.053		NO	17		
-22	1.1	0.7	.053		Failure	18		
-23	1.1	0.7	.053			19		
-24	1.1	0.7	.053			20		
3	1.2	0.2	.051	120°C	10	1	130°C	1
4	1.2	0.4	.051	120°C	9	2	120°C	2
5	GRAB	0.4	.050	100°C	8	3	100°C	3
6	GRAB	0.4	.050	100°C	7	4	100°C	4
7	GRAB	0.3	.049	80°C	6	5	90°C	6
8	"	0.1	.049	80°C	4	6	80°C	7
10	"	1.8	.048	60°C	5	2	70°C	5
11	"	1.6	.048	50°C	3	3	70°C	3
12	"	0.3	.047	40°C	2	4	NO-CONT	NO-CONT
14	"	1.1	.047	30°C	10	10	30°C	9
15	"	0.3	.046	NO CONTINUITY	17			
16	"	GRAB	.046			12		
17	NO CONTINUITY		.046	INITIALLY	13			
18	"		.046	30°C	3	14		
	Room Temp							

TI-NHTSA 004831

PRESSURE SWITCH DATA

Form 21605

TEST NO. 210-15-20

DEVICE CCPS	DATE REQUESTED 3-17-92	REQUESTED BY STING OFFICER	REQUESTED COMPL. DATE
PERFORMED BY Rich Turner	DATE STARTED 3-17-92	DATE COMPLETED 3-27-92	APPROVED BY DAVE CZARN

PROJECT TITLE: **Ford MY'92 Electronic Speed Control Deactivate P.S.**CUSTOMER: **INTERNAL**PURPOSE OF TEST: **TO DETERMINE THE EFFECT OF TEMPERATURE ON CALIBRATION SHIFT**PROCEDURE: ① **INSTALL A THERMOCOUPLE ON A TEST DEVICE | MONITOR DEVICE TEMP.**② **Cycle 1 to 1450 PSI AT 2 Hz.**③ **Temp. cycle devices 30°C TO 150°C**④ **RECORD TEMP AT WHICH CONTINUITY IS BROKEN (AS TEMP. RISES) + TEMP. AT WHICH CONTINUITY IS MADE AS TEMP. DECREASES**⑤ **Temp. cycle 30°C TO 150°C 5 TIMES | RECORD DATA ON 1ST AND FIFTH CYCLES**

				30 TO 150°C			150° TO 30°		
Device #	ACT	REL	OFFSET	Device Temp	Order of Pairing	Number in Pair	Device Temp	Order of Pairing	
20515-19	1.1	0.7	.054	150°C	NO PAIRING	15	NO PAIRING		
20	1.1	0.7	.054	"		16			
21	1.1	0.7	.053	"		17			
22	1.1	0.7	.053	"		18			
23	1.1	0.7	.053	"		19			
24	1.1	0.7	.053	"		20			
3	4.2	0.2	.051	120°C	10	1	130°C	1	
4	13.2	0.4	.051	120°C	9	2	120°C	2	
5	GRASS	0.4	.050	100°C	8	3	100°C	3	
6	GRASS	0.4	.051	100°C	7	4	100°C	4	
7	GRASS	2.3	.049	80°C	6	5	90°C	6	
8	"	0.1	.049	80°C	4	6	80°C	7	
10	"	1.3	.048	60°C	5	7	70°C	5	
11	"	1.6	.048	50°C	3	8	70°C	8	
12	"	0.3	.047	40°C	2	9	NO-CONT.		
14	"	1.1	.047	30°C	26	10	30°C	9	
15	"	0.3	.046	NO CONTINUITY		11			
16	"	GRASS	.046	INITIALLY		12			
17	NO CONTINUITY		.046	30°C	3	13			
18	"	"	.045			14			
Room Temp				First Cycle					

TI-NHTSA 004832

(OVER)

PRESSURE SWITCH DATA

Form 21605

TEST NO. 206-15

DEVICE CCPS	DATE REQUESTED 3-17-92	REQUESTED BY Steve OFFICER	REQUESTED COMPL. DATE
PERFORMED BY Rich TURNER	DATE STARTED 3-17-92	DATE COMPLETED	APPROVED BY DAVE EZARN

PROJECT TITLE: **Ford MY'92 ELECTRONIC SPEED CONTROL DEACTIVATE PS.**CUSTOMER: **INTERNAL**PURPOSE OF TEST: **TO DETERMINE THE EFFECT OF TEMPERATURE ON CALIBRATION SHIFT**PROCEDURE: ① **INSTALL A THERMOCOUPLE ON A TEST DEVICE; MONITOR DEVICE TEMP.**② **Cycle 1 TO 1450 RSE AT 2 Hz.**③ **Temp. cycle devices 30°C TO 150°C**④ **Record Temp. at which continuity is broken (as Temp. Rises) + Temp. at which continuity is made as Temp. decreases**⑤ **Temp. cycle 30°C TO 150°C 5 times; Record data on 1st and fifth cycles**

A TO 150°C							150° TO 30°	
NOTE: Thermocouple installed in device# 205-15-16								
Device #	ACT	REL	OFFSET	Device Temp	Order of Failure	Initial Elapsed	Device Temp	Order of Return
205-15-14	1.1	0.7	.054	150°C	} NO FAILURE	15	} NO FAILURE	
-20	1.1	0.7	.054	↑		16		
-21	1.1	0.7	.053	↑		17		
-22	1.1	0.7	.053	↑		18		
-23	1.1	0.7	.052	↑		19		
-24	1.1	0.7	.052	↑		20		
3	4.2	0.2	.051	120°C	10	1	120°C	1
4	13.2	0.4	.051	120°C	9	2	120°C	2
5	GRASS AT	0.4	.050	100°C	8	3	100°C	3
6	GRASS	0.4	.050	100°C	7	4	100°C	4
7	GRASS	2.3	.049	80°C	6	5	80°C	6
8	"	0.1	.049	80°C	4	6	80°C	7
10	"	1.3	.048	60°C	5	7	70°C	5
11	"	1.6	.048	50°C	3	8	70°C	8
12	"	0.3	.047	40°C	2	9	NO-CONT	
14	"	1.1	.047	30°C	14	10	30°C	9
15	"	0.3	.046	NO CONTINUITY		11	} NO-CONT	
16	"	GRASS	.046	INITIALLY		12		
17	NO CONTINUITY		.045	30°C		13		
18	"	"	.045	30°C		14		
Room Temp							(14) min	offset
							87.01	larger offset
							80.01	
TI-NHTSA 004634								

TI-NHTSA 004634

FINAL INSPECTION 770L2-1

DATE 13-18-92

CUSTOMER P/N FZVC-FF924-00

DISC LOT 3-8
REEL 92
LOT 85
WASHER LOT 130 1-CUT

INT. I.D. 74068-AC2-8
CUP LOT 911
CONV. LOT 136
QTY. 2400

DISC LOT 3-9
REEL 91
LOT 84
WASHER LOT 130 1-CUT

INT. I.D. 74068-AC1-6
CUP LOT 911
CONV. LOT 136
QTY. 2100

TEST	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
1 ACTUATION	124	137	139	140	131	126	133	129	137	141	142	130	142	142	139	137	141	131
RELEASE	59	60	66	72	62	59	60	60	59	64	56	54	59	71	63	64	66	60
DIFF.	77	69	73	68	69	67	73	69	79	77	86	96	83	71	76	73	75	71
2 VOLT DROP																		
3 CUR. LEAK																		
4 PROOF																		
5 IMPULSE	OK	OK	OK	OK	OK					OK	OK	OK	OK	OK				
ACTUATION	138	130	140	140	130					140	140	130	140	140				
RELEASE	60	60	60	55	60					60	60	55	55	60				
VOLT DROP	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓				
CUR. LEAK	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓				
PROOF	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓				
IMPULSE	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓				
7 INDEX	✓	✓								✓	✓							
8 THERMAL																		
VIBRA.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9 CORP																		
10 THER. SHOCK																		
ACTUATION								125	135							140	130	
RELEASE								60	60							60	60	
VOLT DROP								✓	✓							✓	✓	
CUR. LEAK								✓	✓							✓	✓	
PROOF								✓	✓							✓	✓	
IMPULSE								✓	✓							✓	✓	

TI-NHTSA 004636

FINISHED PRODUCTION ROUTING		WHITE CANARY	Route to Finished Goods
		PINK	Route to Dept. Supervisor
77PSL2-1			
SPECIAL REQUIREMENT	TOTAL QUANTITY		
MANU. ORDER NUMBER		NO SUBTOTALS	
1. 9			
2.			
3.			
4.			
QUALITY CONTROL APPROVAL			
IN PROCESS		FINAL	
			
Form 19288			
DATE 3-17-92		DEPARTMENT 294	

FINISHED PRODUCTION ROUTING		WHITE CANARY	Route to Finished Goods
		PINK	Route to Dept. Supervisor
77PSL2-1			
SPECIAL REQUIREMENT	TOTAL QUANTITY		
MANU. ORDER NUMBER		NO SUBTOTALS	
1. 3-8			
2.			
3.			
4.			
QUALITY CONTROL APPROVAL			
IN PROCESS		FINAL	
			
Form 19288			
DATE 3-17-92		DEPARTMENT 294	

TI-NHTSA 004637

-MBG MM= 00172517 FR=ZARN TO=SB01 SENT=03/19/92 12:23 PM
RN=094 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/19/92 12:23 PM

MARCH 19, 1992

TO: STEVE OFFICER SB01
BILL SWEET WB4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McQUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMPI
JOHN KOURTESIS MDEB
PAUL LESSER PL
STEVE WALTERS MLDB
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE ZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/17 AND 3/18/92 MTGS

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: TUESDAY 3/19
TIME: 3:15
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperatures. Problem is believed to be primarily related to thermal expansion/warping of the base reducing the effective pin length.

DISCUSSION:

We've concluded that most - if not all - movement is occurring in the base. Follow up testing with bases crimped to dummy sensors showed similar results for base movement w/temperature. (Annealing did not change results significantly (in fact, the annealed bases cracked during crimping), indicating that the movement is a CTE phenomenon rather than internal stress relaxation. The way in which the flange is loaded after crimping also likely has an effect.

Frank Jaarsma (Project Leader/Tech. Service) and Ron Yurachek (Sr. Account Mgr.) of Hoechst Celanese visited 3/18 to discuss temperature stability issue. Their recommendation is to change material to Fortron (40% GF PPS) which has significantly lower CTE. Warpage/movement at temperature is not likely to be improved with different PBT formulations (i.e., different fillers/modifiers), but Frank agreed to discuss this specific issue with the group directly responsible for PBT development.

TI-NHTSA 004839

= NEW ITEM OR COMPLETED ITEM
= PRIORITY ITEM

RESET FOR ALL SWITCHES = .056"
KEEP SPEC = 25 ms MAX'M ACTUATION
150 ms MAX'M RELEASE

PROVIDE "SHORT PIN" MATRIX TO S.O.
(need 52 to 54 mil offsets)
HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
(REPEAT TEMP CYCLE 5 TIMES)
REVIEW DFMEA
VIBRATION TEST W/52 MIL OFFSET
SAMPLE 40% GF FORTRON (COLOR T-B-D) AND
BLK NORYL GTX800 IN PROD'N
MOLD W/ OFFSET KEY P/C BASE
(NEED PARTS BY 3/23)
SAMPLE P/C BASE IN NAT'L ULTEM
2200 IN PROTO MOLD MODIFIED TO
INCLUDE HEATERS

SELLERS
comp.
OFFILER

OFFILER
OFFILER
WALTERS

SELLERS/
WALTERS

COLLECT YIELD DATA PER ABOVE LIMITS FOR
REVIEW AT DAILY MEETINGS

SWEET

REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK
STATION WINDOW

SELLERS

RETEST "CONTINUITY" FALLOUT @ HIGHER
UPPER PRESSURE LIMIT

SWEET

UNDERSTANDING THE PROBLEM CAUSE

RUN TESTS WITH DUMMY SWITCHES
TO DETERMINE AMT. OF PLASTIC
MOVEMENT @ VARIOUS TEMPS - ANNEALED
AND NOT-ANNEALED BASES (77's/ no terminals)
& REPEAT ABOVE WITH 57PS BASES MADE
FROM BOTH 4300 AND 1662Z PBT

OFFILER
comp.

REPEAT THERMAL EXPANSION TEST W/
1. CYLINDRICAL PORTION OF BASE ONLY
2. ENTIRE BASE - NOT CRIMPED TO SENSOR
3. BASE MODIFIED WITH LARGER SENSOR NESTING
DIAMETER, CRIMPED TO DUMMY SENSOR
WITHOUT THE ENVIRON. SEAL

OFFILER

ALTERNATIVE PLASTICS ?

CZARN/
WALTERS
comp.

REGARDS,
AVE CZARN
7-hitemp

TI-NHTSA 004640

MSG NO= 00167220 00=VAGE 00=3801 SENT=05/19/92 10:17 AM
FROM=01=2 DTP=150 00=0000. BY= 438 01=00. 0002 0011 AM

TO: JIM WALTERS	ALOG
JOHN LEAH	ALOG
FROM: BILL SWEET	PCME
NORA ROY	ALOG
DAVE CZARN	ZARK
STEVE OFFLER	3801
ATT: MATT BELLERS	PCME

SUB: 46515-2 MODIFIED MATERIAL TOLL ORDERS

AS YOU ARE AWARE THERE ARE PRESENTLY TWO OUTSTANDING TOLL ORDER REQUEST TO SAMPLE THE 46515-2 BASE MOLD WITH ALTERNATE MATERIALS. IT IS OUR UNDERSTANDING THAT THE TOOL IS OUT FOR CHROMING AND WILL RETURN EITHER LATER TODAY OR TOMORROW.

PLEASE ENSURE THAT THESE TOLL ORDERS ARE PROCESSED WITH THE HIGHEST PRIORITY WHEN THE TOOL RETURNS AS THIS IS A CUSTOMER RELATED ISSUE FOR PRECISION CONTROLS.

AS A REMINDER - THE TWO ORDERS ORIGINALLY ASKED FOR THE -2 VERSION IN BOTH NORYL GTX 830 BLACK, AND ULTEM 2200/2300 NATURAL. WE SINCE LEARNED THAT ULTEM CANNOT BE SAMPLED IN THIS MOLD DUE TO LACK OF HEATING. YESTERDAY WE MET WITH CELANESE AND AS A RESULT OF GAINING ADDITIONAL INFORMATION ON OTHER MATERIALS WE NOW WANT TO CHANGE THE REQUESTED MATERIALS.

NEW REQUEST

- 1.) THE NORYL GTX 830 BLACK TOLL ORDER SHOULD STAY THE SAME.
- 2.) THE ULTEM 2200/2300 TOLL ORDER SHOULD BE CHANGED TO FORTRON, 40% GLASS FILLER. THIS FORTRON MATERIAL WILL NEED TO BE POST BAKED AS DISCUSSED DURING THE CELANESE MEETING. PLEASE MODIFY TOLL ORDER ACCORDINGLY.
- 3.) WE WOULD ALSO LIKE TO ADD ANOTHER REQUEST. PLEASE EVALUATE MODIFYING THE 46515 SINGLE CAVITY PROTOTYPE MOLD TO ALLOW PROCESSING OF ULTEM. WHAT'S INVOLVED AND HOW QUICKLY CAN IT BE ACCOMPLISHED. WE NEED TO SOMEHOW HAVE THIS MATERIAL SAMPLED RATHER QUICKLY.

PLEASE CLOSE BACK WITH ME ASAP ON THESE ITEMS.

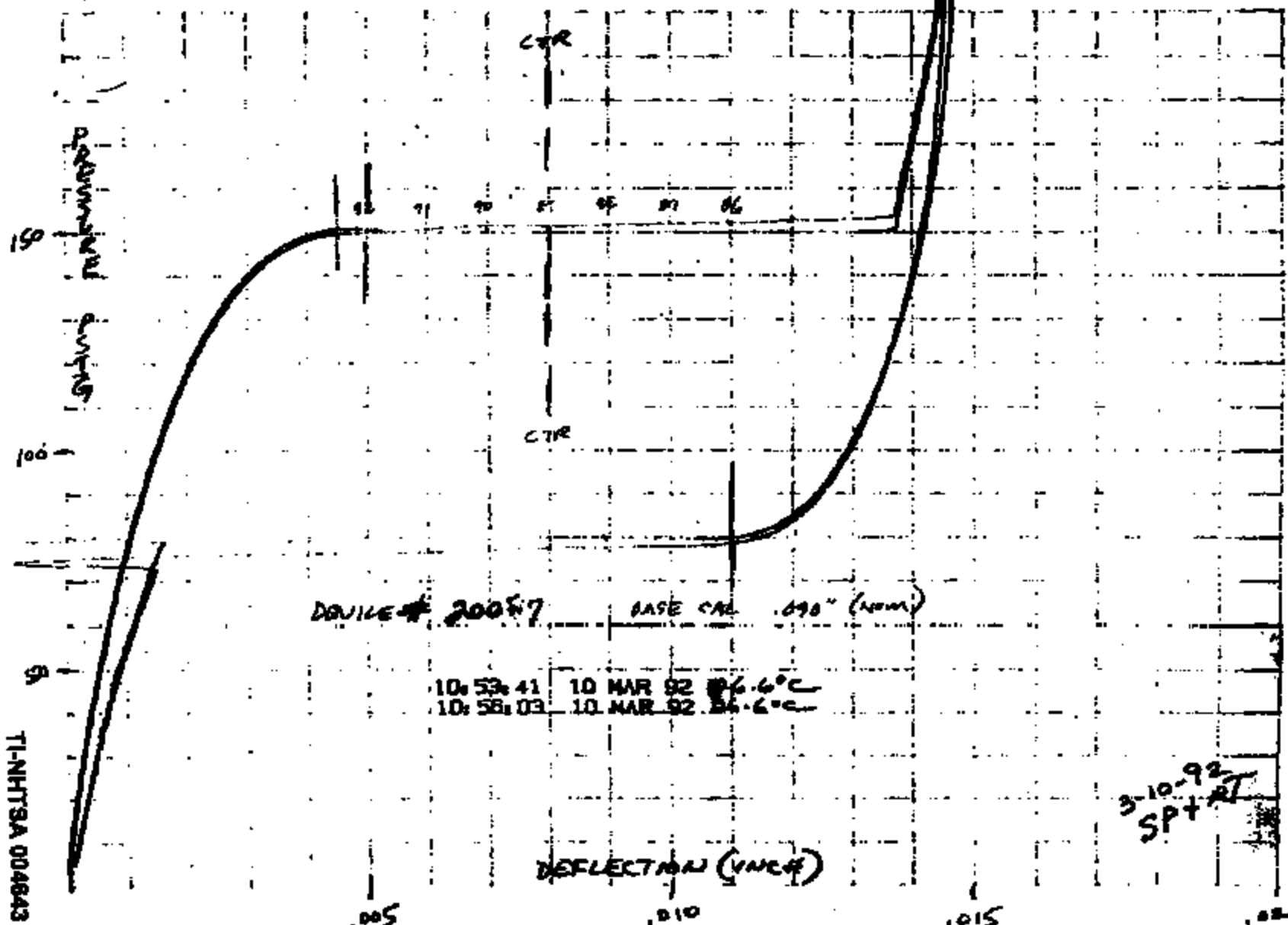
REGARDS...MATT
11PM

TI-NHTSA 004842

PASS-CAR SENSOR 100-15-B

Red = 1st Cycle

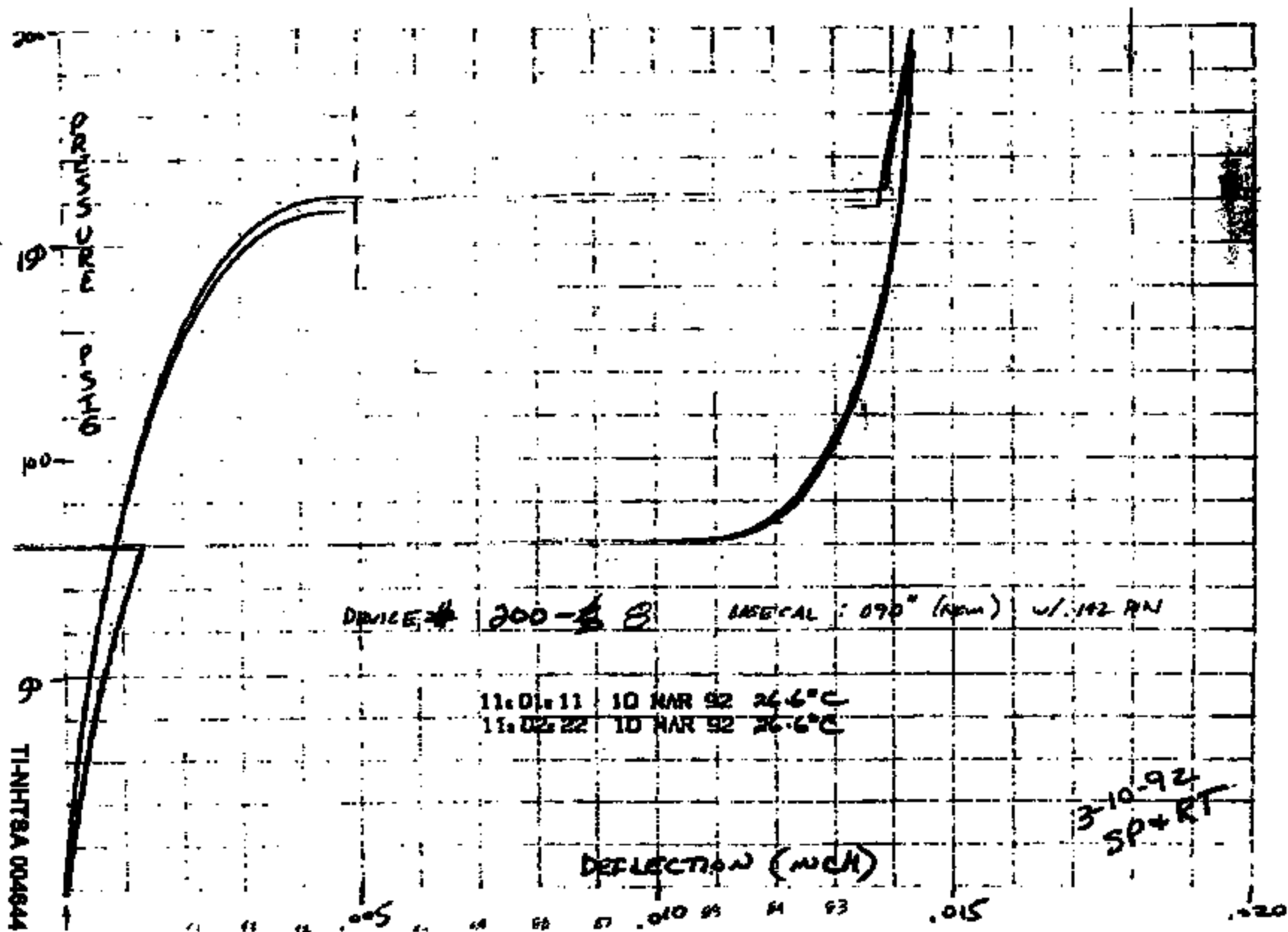
Blue = 2nd cycle



TI-NHTSA 004843

3-10-92
SP+RT

Poss-Car Scan 200-15-0



-MSG M# 172517 FR=ZARN TO=MJB2 SENT=03/19/92 12:23 PM
R# 193 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/19/92 12:23 PM

MARCH 19, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WB4
~~MATT SWEET~~ MJB2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY MCGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS NDES
PAUL LESSER PL
STEVE WALTERS MLDG
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPB HIGH TEMP ISSUE - MINUTES OF 3/17 AND 3/18/92 MTGS

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NEXT MEETING!

DATE: TUESDAY 3/19
TIME: 3:15
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

We've concluded that most - if not all - movement is occurring in the base. Follow up testing with bases crimped to dummy sensors showed similar results for base movement w/temperature. Annealing did not change results significantly (in fact, the annealed bases cracked during crimping), indicating that the movement is a CTE phenomenon rather than internal stress relaxation. The way in which the flange is loaded after crimping also likely has an effect.

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SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

TI-NHTSA 004645

OFFSET FOR ALL SWITCHES = .056"
CREEP SPEC = 25 ms MAX'M ACTUATION
150 ms MAX'M RELEASE

P	PROVIDE "SHORT PIN" MATRIX TO S.O. (need 52 to 54 mil offsets)	SELLERS comp.
P	HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 3 TIMES)	OFFILER
P	REVIEW DFMEA	OFFILER
P	VIBRATION TEST W/52 MIL OFFSET	OFFILER
P	SAMPLE 40% GF FORTRON (COLOR T-B-D) AND BLK NORYL GTX830 IN PROD'N MOLD W/ OFFSET KEY P/C BASE (NEED PARTS BY 3/23)	WALTERS
P	SAMPLE P/C BASE IN NAT'L ULTEM 2200 IN PROTO MOLD MODIFIED TO INCLUDE HEATERS	SELLERS/ WALTERS
.	COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
.	REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK STATION WINDOW	SELLERS
*	RETEST "CONTINUITY" FALLOUT @ HIGHER UPPER PRESSURE LIMIT	SWEET

UNDERSTANDING THE PROBLEM CAUSE

.	RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES (77's/ no terminals) & REPEAT ABOVE WITH 57PS BASES MADE FROM BOTH 4300 AND 1662Z PBT	OFFILER comp.
*	REPEAT THERMAL EXPANSION TEST W/ 1. CYLINDRICAL PORTION OF BASE ONLY 2. ENTIRE BASE - NOT CRIMPED TO SENSOR 3. BASE MODIFIED WITH LARGER SENSOR NESTING DIAMETER, CRIMPED TO DUMMY SENSOR WITHOUT THE ENVIRON. SEAL	OFFILER
*	ALTERNATIVE PLASTICS ?	CZARN/ WALTERS comp.

REGARDS,
DAVE CZARN
17-hitemp

TI-NHTSA 004645

-MSD MM= 172517 FR=ZARN TO=COPY SENT=03/19/92 12:23 PM
ST=C DIV=0050 CC=00101 BY=ZARN AT=03/19/92 12:23 PM

MARCH 19, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McQUIRK PCQA
BILL CONDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPB HIGH TEMP ISSUE - MINUTES OF 3/17 AND 3/18/92 MTGB

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DATE: ~~TUESDAY~~ ^{3:30} 3/19
TIME: 3:15
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is believed to be primarily related to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

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SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM

TI-NHTSA 004847

 OFFSET FOR ALL SWITCHES = .056"
 CREEP SPEC = 25 ms MAX'M ACTUATION
 150 ms MAX'M RELEASE

P PROVIDE "SHORT PIN" MATRIX TO S.O. (need 52 to 54 mil offsets)	SELLERS comp.
P HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	OFFILER
P REVIEW DFMEA	OFFILER
P VIBRATION TEST W/52 MIL OFFSET	OFFILER
P SAMPLE 40% OF FORTRON (COLOR T-B-D) AND BLK NORYL GTX930 IN PROD'N MOLD W/ OFFSET KEY P/C BASE (NEED PARTS BY 3/23)	WALTERS
P SAMPLE P/C BASE IN NAT'L ULTEM 2200 IN PROTO MOLD MODIFIED TO INCLUDE HEATERS	SELLERS/ WALTERS
• COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
• REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK STATION WINDOW	SELLERS
• RETEST "CONTINUITY" FALLOUT @ HIGHER UPPER PRESSURE LIMIT	SWEET

UNDERSTANDING THE PROBLEM CAUSE

• RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES (77's/ no terminals) & REPEAT ABOVE WITH 57PS BASES MADE FROM BOTH 4300 AND 1442Z PBT	OFFILER comp.
• REPEAT THERMAL EXPANSION TEST W/ 1. CYLINDRICAL PORTION OF BASE ONLY 2. ENTIRE BASE - NOT CRIMPED TO SENSOR 3. BASE MODIFIED WITH LARGER SENSOR NESTING DIAMETER, CRIMPED TO DUMMY SENSOR WITHOUT THE ENVIRON. SEAL	OFFILER
• ALTERNATIVE PLASTICS ?	CZARN/ WALTERS comp.

REGARDS,
 DAVE CZARN
 17-hits

→ power long pins, small 60 pin-S4K 44.
 (A) 250K Impulse Test "3 Tychi switches.
 (A) Jett. while sitting on hot surface
 (A) Call George O'Brien
 (A) ...

TI-NHTSA 004648

comp.

UNDERSTANDING THE PROBLEM CAUSE

- * RUN TESTS WITH DUMMY SWITCHES TO DETERMINE AMT. OF PLASTIC MOVEMENT @ VARIOUS TEMPS - ANNEALED AND NOT-ANNEALED BASES (77°s/ no terminals) & REPEAT ABOVE WITH 57PS BASES MADE FROM BOTH 4300 AND 1662Z PBT
- * INSTRUMENT SWITCH W/T COUPLE AND INCLUDE IN TEMP. TESTING
- * ALTERNATIVE PLASTICS ?
- * ROUGH CALCUL'N OF PIN LENGTH CHANGE BASED ON LINEAR THERMAL EXP'N DIFFERENCES

OFFILER

OFFILER
comp.

CZARN/
WALTERS
OFFILER

REGARDS,
DAVE CZARN
16-nhtemp

* Run test w/ cut back pins of base to
1/2 in. length of flange mounted on
1/2 in. base of plastic

* Run test w/ base only

* Modify a base by increasing size of pins & by p. over
amb. removal, remove seal to avoid fault

-MSG MW= 72019 FR=ZARN TO=CCPY SENT=03/16/92 04:46 PM
BT=C DIV=0050 CC=00101 BY=ZARN AT=03/16/92 04:46 PM

MARCH 16, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WSA
MATT SELLERS MJB2
JIM WATT PCGA
DICK GRIEPE MFPC

CC: TOM CHARBONNEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCGA
BILL CONDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG

FR: DAVE CZARN ZARN

RE: CC'S HIGH TEMP ISSUE - MINUTES OF 3/16/92 MEETING

TI-NHTSA 004849

Jeffrey DiDomenico
Weekly Highlights for Steve Offler.
03/20/92

FORD MY92 ELECTRONIC SPEED CONTROL DEACTIVATE PS

57PS AND 87PS VALIDATIONS:

Validation testing has been significantly impacted by the thermal shift issue. Validation of the six devices in parallel is no longer feasible. Therefore, validation of the 87PS test groups and the 57PSF9-1 are being pushed out in favor of 57PSL11-3 and F3-3 promised to Ford by 4/15. Pushed-out validations will be delayed by approximately three weeks.

CUSTOMER SAMPLES:

Three urgent sample orders for silent Pass-Car devices (77PSL3-2, WIN58) are scheduled to ship today. These will go out on time, however, one of the sample orders requires PIST/PIPC evaluation. Quality will not have sufficient time to complete this on time. Also, since we have no silent discs within Pass-Car calibrations, these devices are being built with prototype Light Truck disc and will produce devices with actuations in the 170 range (spec. 90 - 160). Charlie Douglas has informed the customers of this fact and have agreed to accept the parts.

Sample orders for 57/87PSL11-2's have been delayed due to miscellaneous AMI and 52PS line problems. Sensors are expected today. Loris Pimentel will be working Saturday in order to keep us on schedule. — ASK'D 1988!

Sample orders are being received for devices with new customer P/N's. Some of these P/N's contain unique characters which we do not have for our coder. To date we have been coding these parts by hand for small orders. This technique will be inadequate for larger sample orders or orders requiring PIST/PIPC. We should make an effort to predict future P/N requirements and get these letters ordered (or order the whole alphabet).

THERMAL SHIFT ISSUE:

We plan to piggy-back impulse of .045 - .054 offset parts with the 57PS validation impulse test. Following this the CCPS cycler will have very limited availability for thermal shift test due to 57PS validation.

We will continue to utilize Rich Turner for thermal shift testing whenever he is available. Report of T-shift test results here would be superfluous.

TI-NHTSA 004650

-MSG NR= 00215449 FR=ZARN TO=SB01 SENT=03/20/92 03:27 PM
R*=100 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/20/92 03:27 PM

MARCH 20, 1992

TO: STEVE OFFILER SB01
BILL SWEET W84
MATT SELLERS M82
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU ROT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLOG
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCP8 HIGH TEMP ISSUE - MINUTES OF 3/17 AND 3/18/92 MTGS

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: MONDAY 3/23
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Switches with 43 to 54 mil offsets were thermally characterized after 4 temp cycles from 30 to 150C. The effect of thermal cycling was not significant; appears to have changed the effective pin length by an additional (-) 1 mil. We decided, due to some inconsistency in the data, to disassemble 1 or 2 (untested) switches representing each offset to take actual measurements. In addition, we plan to conduct a 250k unpowered impulse test on the 43 to 54 mil offset switches and re-run the thermal characterization to determine what effect - if any - pressure cycling has on effective pin length.

1. Czarn reviewed the DFMEA for areas that may be affected by pinning switches to the long side. The two most obvious were overstressed contact arm and reduced contact gap. The in-process impulse test should highlight if the former is a problem. A 25k cycle powered impulse test will be conducted with 60 mil offset devices @ room temp to determine

TI-NHTSA 004651

- = NEW ITEM OR COMPLETED ITEM
- = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
 KEEP SPEC = 25 ms MAX'M ACTUATION
 150 ms MAX'M RELEASE

HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX
 (REPEAT TEMP CYCLE 5 TIMES)
 REVIEW DFMEA

OFFILER
 comp.
 OFFILER
 comp.

VIBRATION TEST W/52 MIL OFFSET
 SAMPLE 40% OF FORTRON (COLOR T-B-D) AND
 BLK NORYL DTX830 IN PROD'N
 MOLD W/ OFFSET KEY P/C BASE
 (NEED PARTS BY 3/23)

OFFILER
 WALTERS

SAMPLE P/C BASE IN NAT'L ULTEM
 2200 IN PROTO MOLD MODIFIED TO
 INCLUDE HEATERS

SELLERS/
 WALTERS

COLLECT YIELD DATA PER ABOVE LIMITS FOR
 REVIEW AT DAILY MEETINGS

SWEET

REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK
 STATION WINDOW

SELLERS

RETEST "CONTINUITY" FALLOUT @ HIGHER
 UPPER PRESSURE LIMIT

SWEET

ADD CONTINUITY CHK AT 0 PSIG TO P-TESTER

SELLERS

MEASURE OFFSET ON SWITCHES FROM 45 TO 54
 MIL OFFSET LOT (SEE DISCUSSION NOTE ABOVE)

OFFILER

250K CYCLE IMPULSE TEST 45 TO 54 MIL
 OFFSET LOT

OFFILER

25K POWERED IMPULSE TEST 60 MIL OFFSET LOT

OFFILER

REPEAT THERMAL CHARACT. AFTER IMPULSE
 ON ABOVE 2 LOTS

OFFILER

UNDERSTANDING THE PROBLEM CAUSE

- REPEAT THERMAL EXPANSION TEST W/
1. CYLINDRICAL PORTION OF BASE ONLY
 2. ENTIRE BASE - NOT CRIMPED TO SENSOR
 3. BASE MODIFIED WITH LARGER SENSOR NESTING
DIAMETER, CRIMPED TO DUMMY SENSOR
 WITHOUT THE ENVIRON. SEAL

OFFILER

?

COARDS,
 EVE GZARN
 8-ritemp

MSG MH= 00206892 FR=DVIL TO=SB01 SENT=03/20/92 12:17 PM
R#098 ST=C DIV=0050 CC=00101 BY=DVIL AT=03/20/92 12:17 PM

TO: MATT SELLERS PCMC
STEVE OFFILER SB01

CC: BILL SWEET PCMC STAN HOMOL SH2
DAVE CZARZ ZARN JOE LAZARZ JMLB
RUSTY STUBLE RCS2 BOB CORREA RMC1
DIRK SEIDEL DIRK ARLENE LOTTI ARLO
BILL ARCHIBALD AF00 JOSEPH KERR J2K

FROM: DENIS VILLIARD DVIL

SUBJECT: 74797-1 ALUMINUM RINGS/WAX TUMBLING

MATT, AS QUESTIONED IN YOUR MESSAGE #531175, THE POSSIBLE EXPANSION OF OUR EQUIPMENT TO INCREASE LOT SIZES FOR THE WAX TUMBLING OPERATION IS NO LONGER A FEASIBLE OPTION. WE HAVE BEEN FORCED TO UTILIZE ALL REMAINING SPACE IN OUR TUMBLING OPERATION TO LOCATE CHEMICAL PROCESS TANKS TO SUPPORT OUR GLASS TO METAL SEAL OPERATION. PRIORITY WAS GIVEN TO THIS OPERATION BECAUSE OF SAFETY AND ENVIRONMENTAL CONCERNS AND TOTAL DOLLAR VALUE OF PRODUCT INVOLVED.

YOUR COMMENT REGARDING A CONTINUING NEED FOR THIS PROCESSING BRINGS TO MIND A SECOND, AND MORE PREPRESSING CONCERN, RELATED TO THIS PART. THE WAX TUMBLING, AS I UNDERSTAND, IS MEANT TO FACILITATE OUR ASSEMBLY PROCEDURE. WE HAVE ESTABLISHED A PROCESS SPECIFICATION WHICH DELINEATES SPECIFIC AMOUNTS OF WAX, WOODEN PEGS (WHICH ARE USED TO TRANSFER THE WAX TO THE RINGS) AND RINGS TO BE USED IN THE PROCESS. WE DO NOT, HOWEVER, HAVE A SPECIFICATION NOR METHOD TO MEASURE WHAT IS CONSIDERED "ACCEPTABLE" PRODUCT TO OUR OPERATION. WE CURRENTLY HAVE RMR# 7414 NOW IN B-11 FOR "INSUFFICIENT WAX", YET THE PRODUCT ROUTE SHEET INDICATES THAT THE MATERIAL UNDERWENT TUMBLING AND I AM UNABLE TO DISTINGUISH THE DIFFERENCE BETWEEN THESE PIECES AND PARTS THAT ARE RETRIEVED FROM THE TUMBLING BARREL.

WE WOULD COULD EASILY INCREASE THE AMOUNT OF WAX, ALTER THE PEG QUANTITY, ETC., TO TRY AND IMPROVE OUR RESULTS, BUT ARE FACED WITH THE CONTINUING QUESTION, "HOW MUCH WAX IS SUFFICIENT?"

WE HAVE CONDUCTED INTERNAL PROCESS AUDITS TO VERIFY THAT THE TUMBLING OPERATOR IS FOLLOWING THE DESIGNATED PROCEDURE.

IN SUMMARY, WE NEED TO ESTABLISH A MUTUALLY AGREED UPON SPECIFICATION TO DEFINE CAPABILITY FOR THESE PARTS IF WE ARE TO CONTINUE TO SUPPORT OUR PRODUCT LINE.

REGARDS,

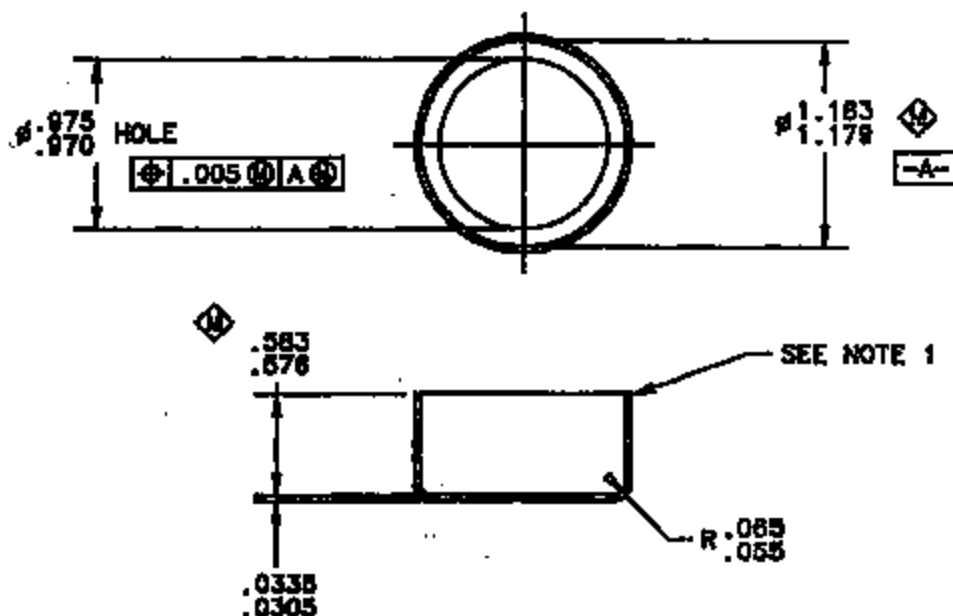
TI-NHTSA 004653

TOTAL

CRIMP RING

KEY.

74797



NOTES:

- NOTES:
1. PINCH OFF RADIUS ALLOWED.
2. .002 MAX. BURN ALLOWED.
3. PARTS TO BE SHIPPED, ISSUED, AND STORED IN SEALED PLASTIC BAGS.
4. MATERIAL CERTIFICATION REQUIRED WITH EACH SHIPMENT.

CERTIFIED PRINT
Parts Made To This Print Must Conform To

ENG. STD. E9898 REV. E

Date JAN 31 1991

WHETHER THIS PRINT HAS THE INFORMATION COR-
RECTLY INDICATED IN IT OR NOT, AGAINST THE
INTERESTS OF NEEDY WOMEN AND GIRLS (NOT OFFICERS)
OR INSTEAD THE INTERESTS OF ANY OF THE ABOVE
OR OTHERWISE BE INDIVIDUALLY CARED & GUARANTEED

TI-NHTSA 004654

SUPERSEDES DMC. 74797 REV. A DATED 11-2-90

74797-1	ALUMINUM 6062	
PART NO.	MATERIAL	FINISH

000000 - 000000 000000 - 000000
000000 000000 000000 000000
000000 000000 000000 000000

DE 143

NY 11-2-88
CH. 1-30-88
ENG. 1-30-88



TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703



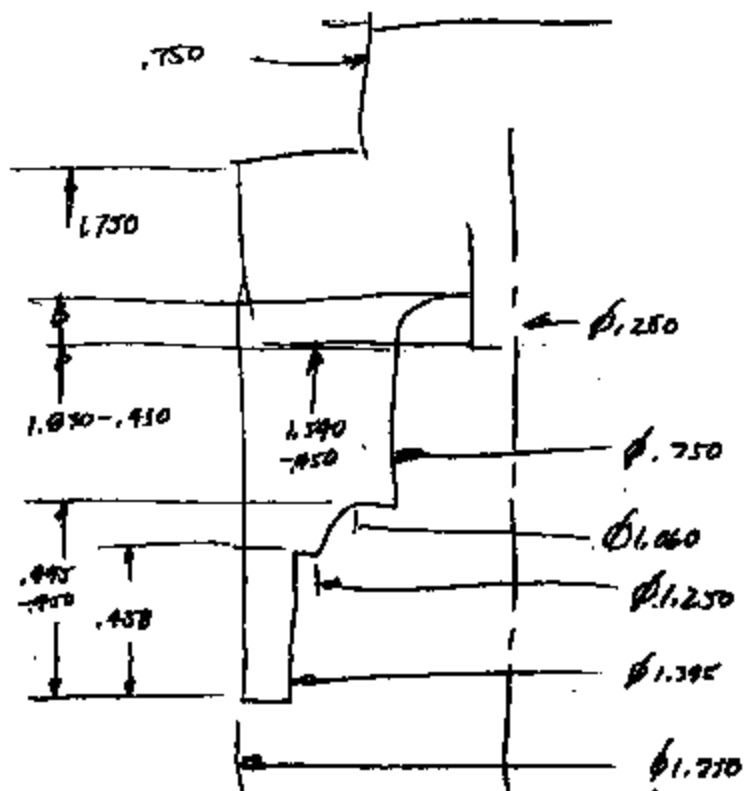
CONTROL PRODUCTION

**LIVEL
NICK
A**

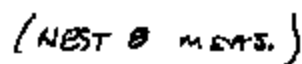
ENVL NO.

74797

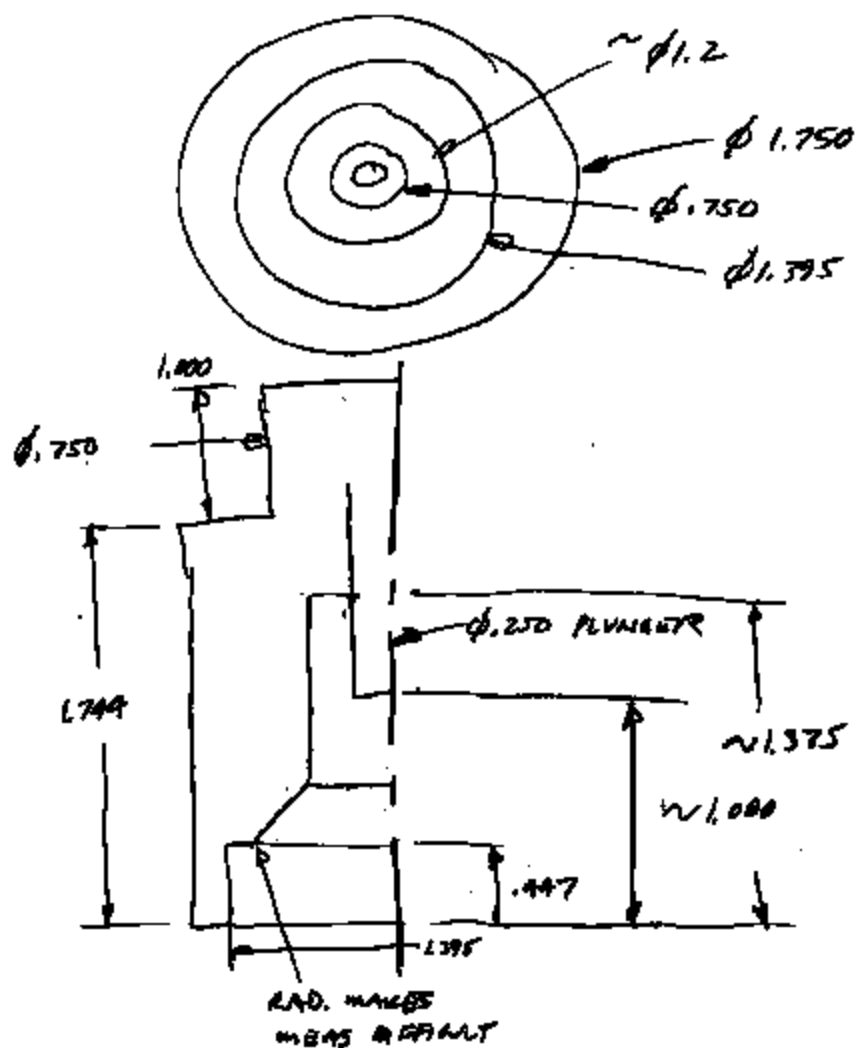
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STATION	PRE	FINAL
8	SLIGHT DEFL.	—
28	"	SLIGHT DEFL.



★ 通 用 圖 樣

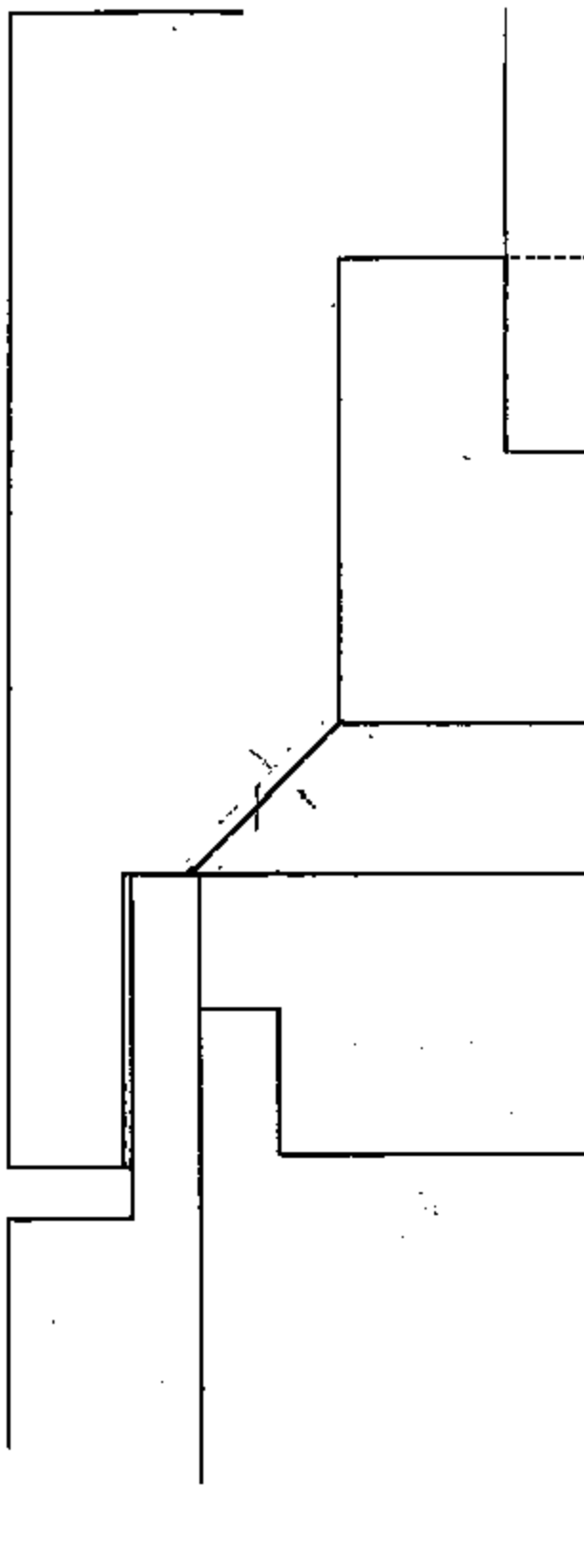


NOTE: #6 NEST ON H-L DOES NOT LIFT ON STAGE I
#7 " " LIFTS SLIGHTLY

TI-NHTSA 004657

★ 11-11-11

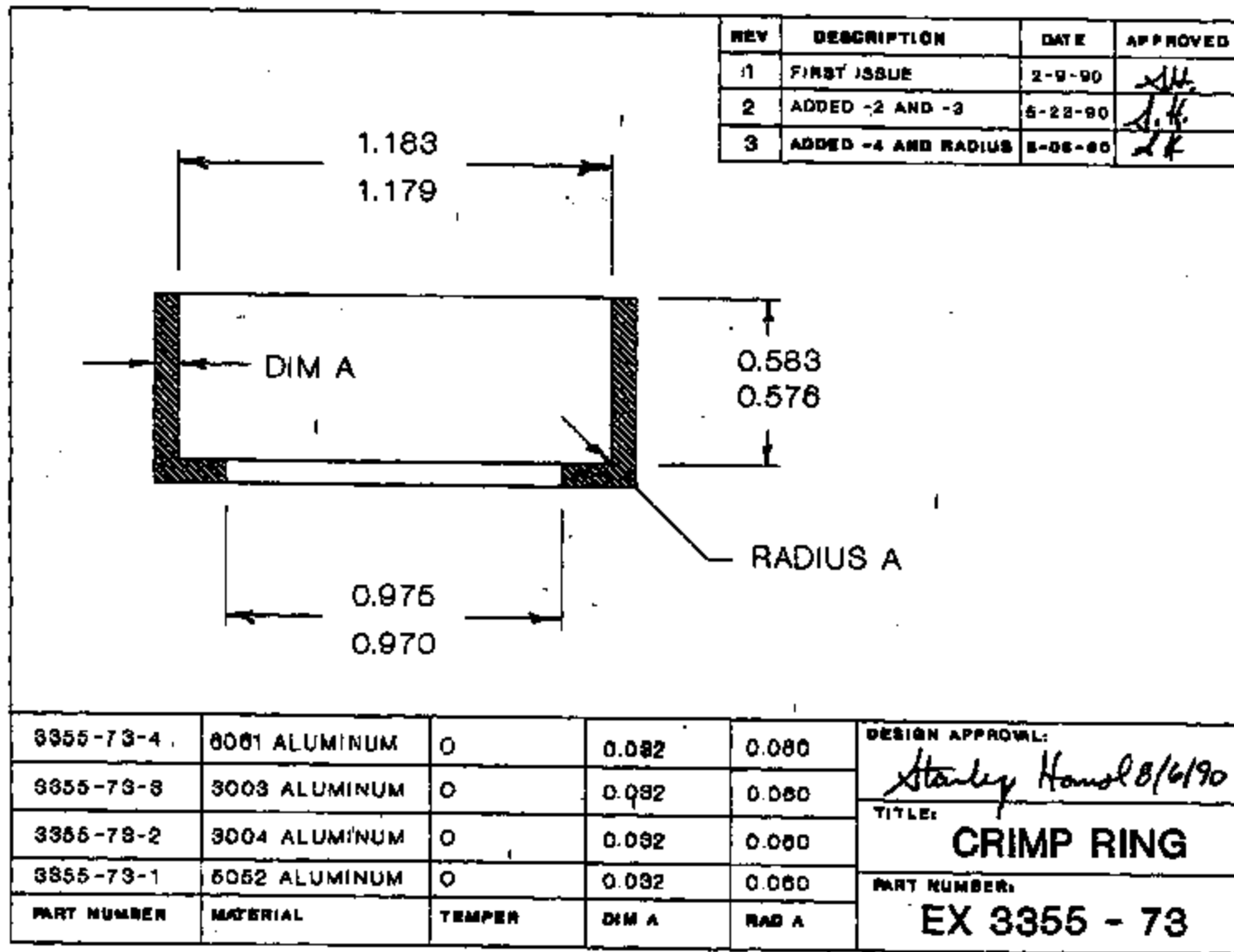
(LOOK @
FINAL
TOO)



TI-NHTSA 004658

TI-NHTSA 004659

THIS IS
THE
ONE



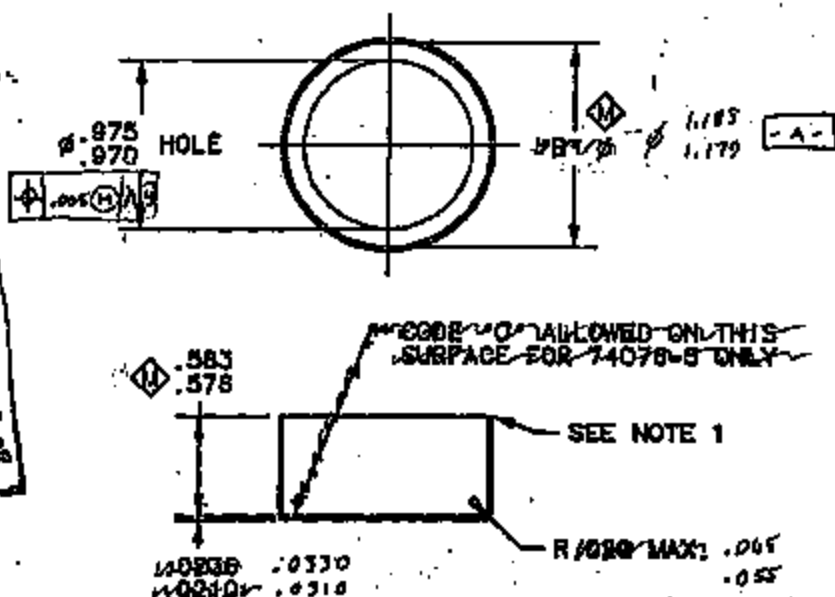
TITLE

CRIMP RING

"V"

74076
74797

CERTIFIED PRINT
Parts Made To This Print Must Conform To
ING. STD. E9898 REV. E
Date OCT 4 1990
WHEN THIS PRINT AND THE INFORMATION CONTAINED THEREIN IS TO BE USED AGAINST THE NEEDS OF THE UNITED STATES GOVERNMENT OR ANY OF ITS AGENCIES, COMPANIES OR INDIVIDUALS SUBCONTRACTORS.



NOTES:

1. PINCH OFF RADIUS ALLOWED.
2. .002 MAX. BURR ALLOWED.
3. ALL DIMENSIONS APPLY AFTER PLATING.
4. PARTS TO BE SHIPPED, ISSUED, AND STORED IN SEALED PLASTIC BAGS.
5. MATERIAL CERTIFICATION REQUIRED WITH EACH SHIPMENT.

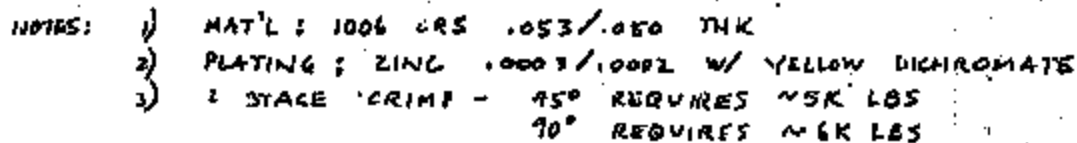
74797-1	ALUMINUM 5052		
74076-B	1008 1010 C.R. STEEL	1.181-1.185	ZINC PLATE .00031-.00041 WITH YELLOW CHROMATE
74076-S	1008 1010 C.R. STEEL	1.181-1.185	CADMIUM PLATE .0002-.0003 WITH CLEAR CHROMATE
74076-4	1008 1010 C.R. STEEL	1.181-1.185	ZINC PLATE .00031-.00041 WITH BLUE CHROMATE
74076-3	1010 C.R. STEEL HARDNESS 90-110 DPH	1.181-1.185	ZINC PLATE .00031-.00041 WITH BLUE CHROMATE
74076-2	30B3-H14 OR 3004-H14 AL	1.174-1.178	
74076-1	1010 C.R. STEEL HARDNESS 90-110 DPH	1.174-1.178	ZINC PLATE .0002-.0003 WITH BLUE CHROMATE
PART NO.	MATERIAL	"B" DIM.	FINISH

THIS DWG. SUPERSEDES 74076 REV. "U" DATED 3/20/89

REV. 1	BY TOM DALL 10-17-89	CH.	ENG. 10/20/89	43-89	TEXAS INSTRUMENTS ATTLEBORO, MASSACHUSETTS 01703	KLUXON CENTRAL PRODUCTS DIVISION	QWL SIZE A	REV. NO. 74076 74797
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TI-NHT8A 004660

22-141	50 SHEETS
22-142	100 SHEETS
22-143	200 SHEETS



4

Technical drawing of a mechanical part showing dimensions and tolerances:

- Overall width: $\phi 1.047$
- Distance from left edge to centerline: .863
- Radius dimension: .090 MAX R
- Radius dimension: .030 MAX R
- Radius dimension: .090 MAX R
- Dimension from right edge to centerline: .067
- Overall height: $\phi .797$

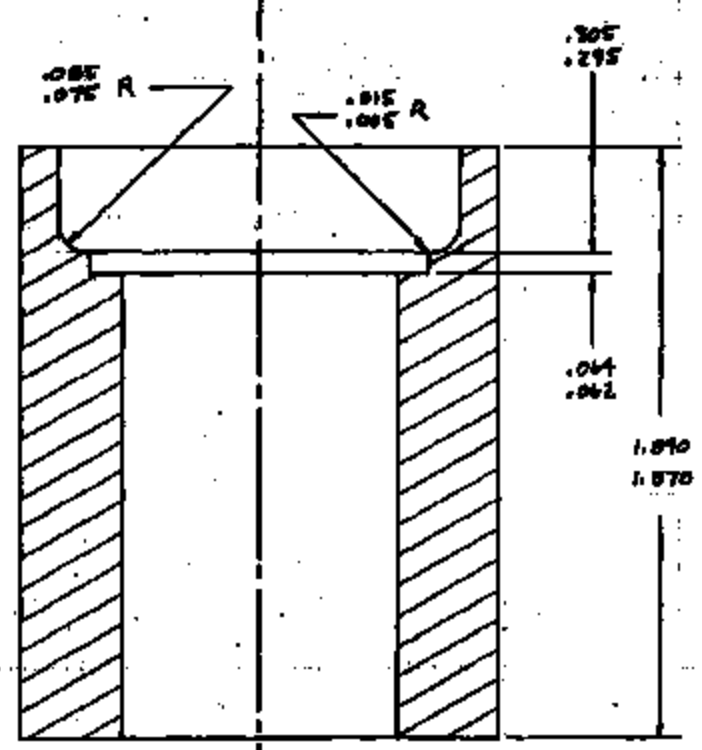
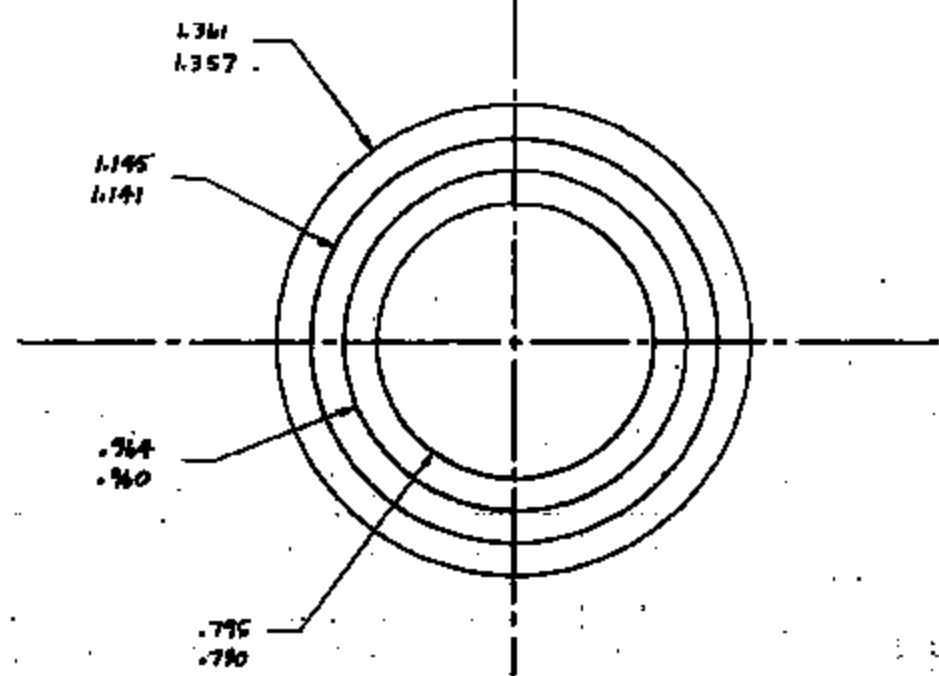
ALL DIM'S SHOWN AT NOMINAL

TI-NHTSA 004652

10/26/09

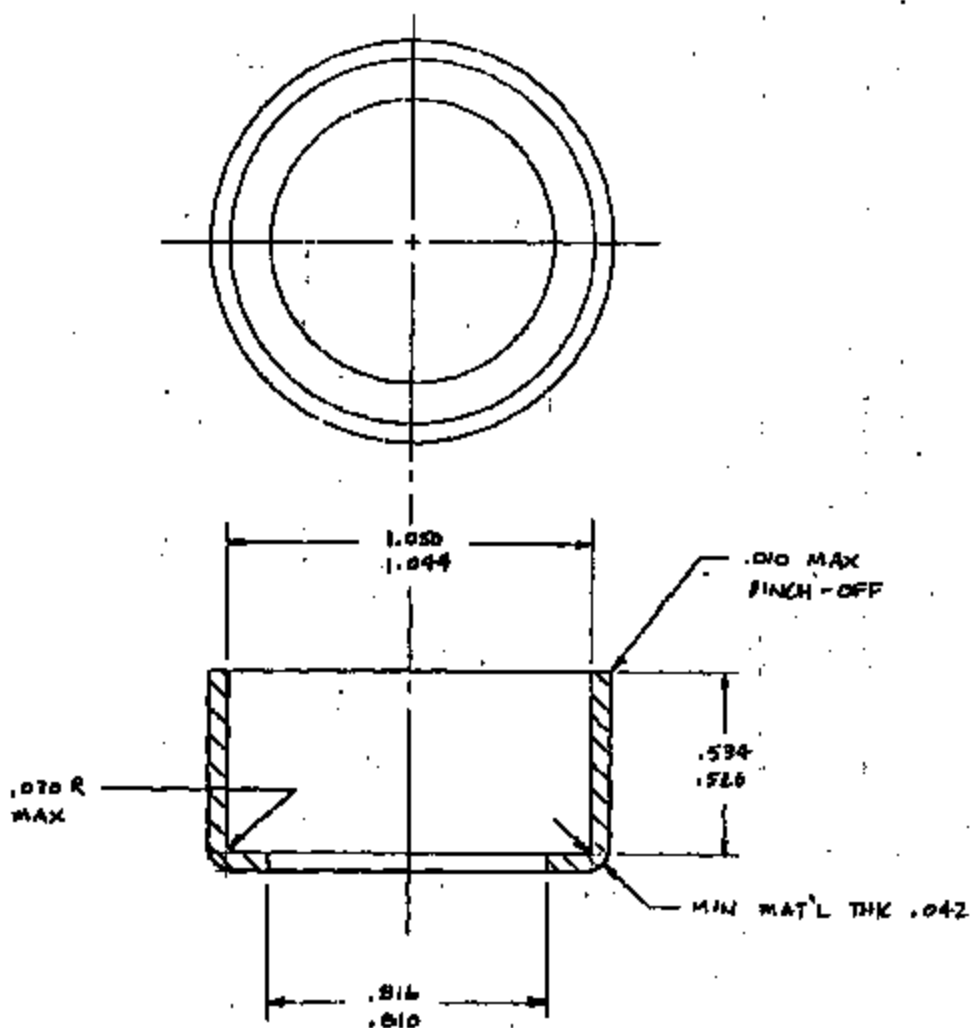
CRIMP TOOL
STYLE III

22-141 24 DIMENTS
22-142 200 DIMENTS
22-143 200 DIMENTS
22-144 200 DIMENTS



22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS

TITLE: CRIMP RING
BY: S. OFFICER
DT: 1-23-89
NO: BX 3423-17

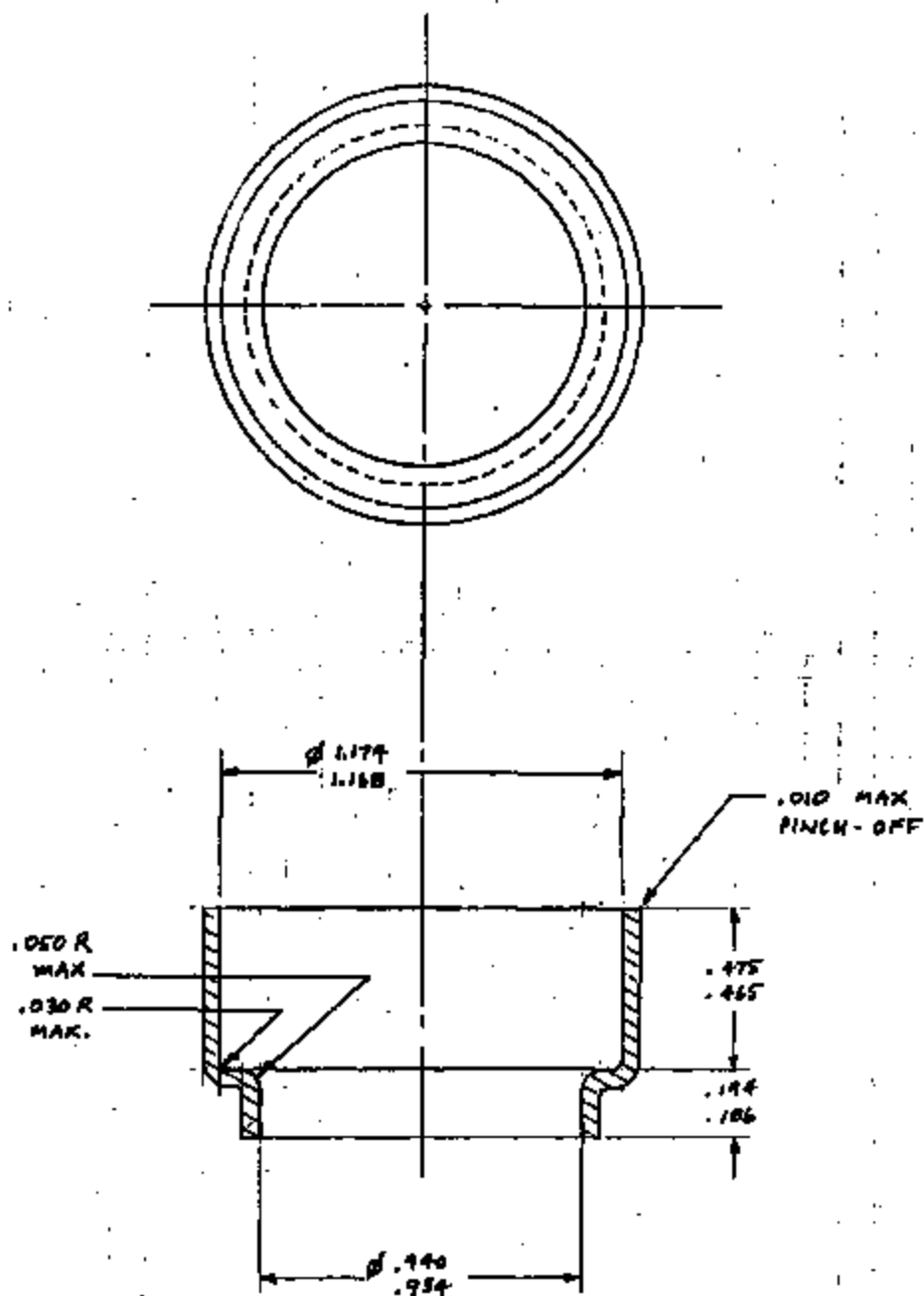


- NOTES
- 1) MAT'L: 1006 CRS, .053/.050 THK
 - 2) PLATING: ZINC .0003/.0002 W/ YELLOW DICHROMATE
 - 3) 2 STAGE CRIMP:
 - 1ST TO 45° REQUIRES ~5000 LBS
 - 2ND TO 90° REQUIRES ~6000 LBS

TI-NHTSA 004664

22-161 38 SHEETS
22-162 100 SHEETS
22-164 200 SHEETS

TITLE: CRIMP RING II
BY: S. OFFILER
DT: 6-26-89
NO: EX 3423-31

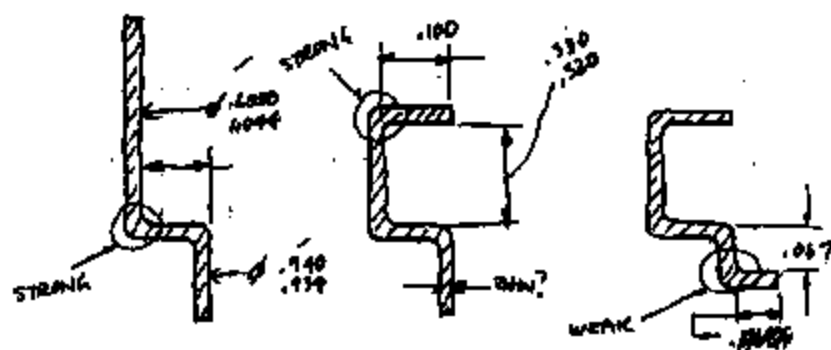
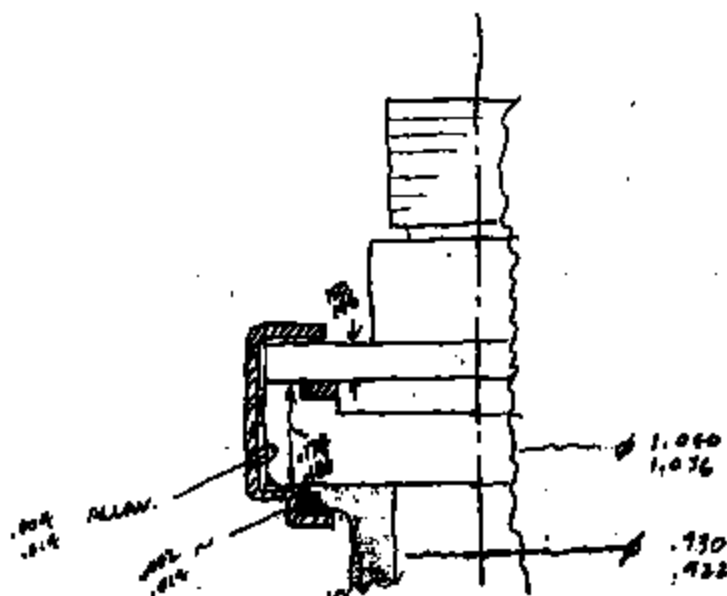


- NOTES:
- 1) MAT'L: 1006 CRS .053/.050 THK
 - 2) PLATING: ZINC .0003/.0002 w/ YELLOW SICHROMATE
 - 3) CRIMP (UPPER PORTION) 2 STAGE - 45° REQUIRES ~5K LBS
90° " ~6K LBS
 - 4) CRIMP (LOWER PORTION) TCD

TI-NHTSA 004865

"COMPLEX" CRIMP RING FOR USE W/ STEP-LESS D.S.

ASSUME USE OF WASKET



VIRGIN

CRIMP 1

CRIMP 2

(SENSOR ASSY)

(COMPLETE)

MEASURE F/D
ON X-Y ?

RAME DISC - TO -
DISC SEAT -
THRU PIN HOLE
(UNDER PRESSURE ?)

$$\frac{1.065}{2} - \frac{.012}{2} = .116$$

.116 - .85 =
what is
base step ?

$$\frac{1.038 N}{2} - \frac{.936 N}{2} = .051$$

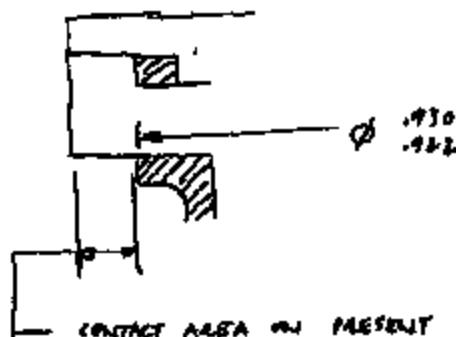
$$.116 - .051 = .065$$

23-141 40 SHEETS
23-142 100 SHEETS
23-143 200 SHEETS
23-144 300 SHEETS



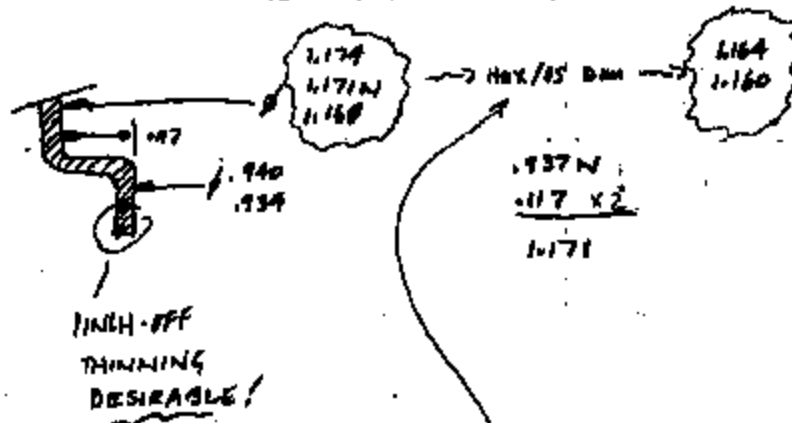
80 617

2



$$\frac{1.047 \text{ N}}{2} - \frac{.013 \text{ N}}{2} = .117$$

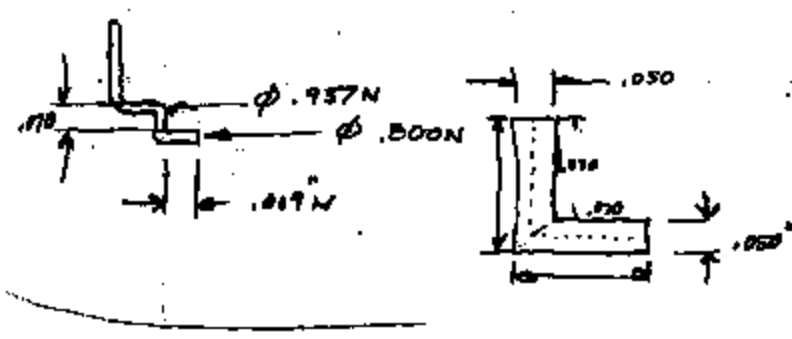
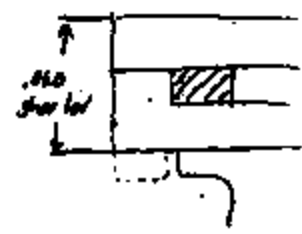
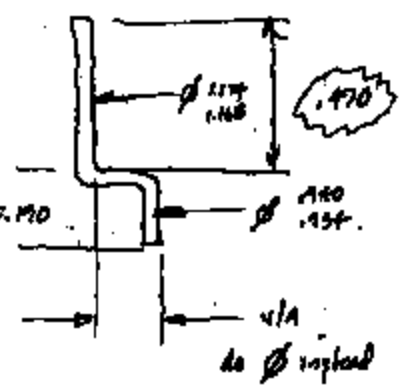
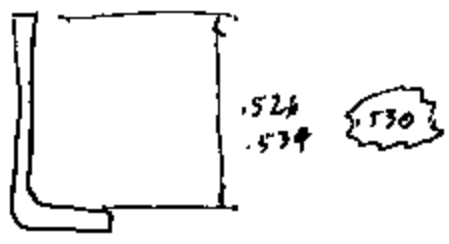
ASSUME NO CHG TO BASE DIM: 2



CR	1.030 / 1.044	}	.004
DS + HBX	1.040 / 1.036		.014

70 6/26

23-161 20 DIMS
23-162 180 DIMS
23-164 200 DIMS



11
1095
1095
J98

CR 152242 ~~cont~~

9/14/88 DBS

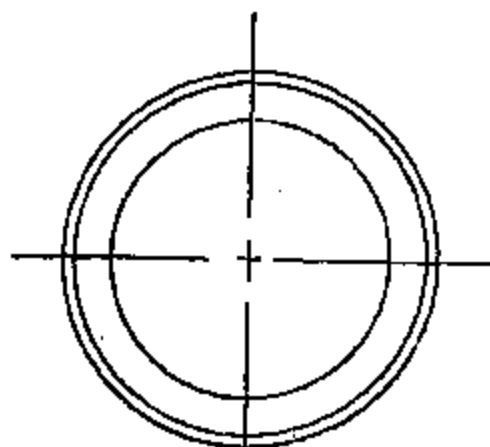
6X3423-17

D. STREET 7/13/88

80 4/23/07

CRIMP RING

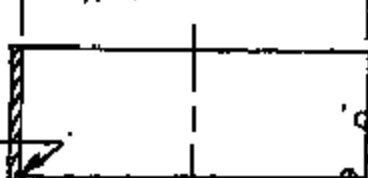
ALUMINUM SHEETS
FABRIKOR



.030 R

~~.015~~
MAX

1.044
1.050



~~.015~~
~~.017~~
.016
.010

.010 MAX PINCH OFF

.491
~~.506~~
.534
.526

.530" NOM

$$\left(\frac{1.047}{2}\right) - \left(\frac{.813}{2}\right) = .117 \text{ NOM}$$

.447 NOM

MAT'L: 1006 CRS ZINC PLATE ~~DO NOT PLATE~~

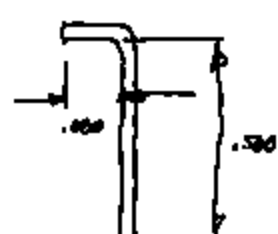
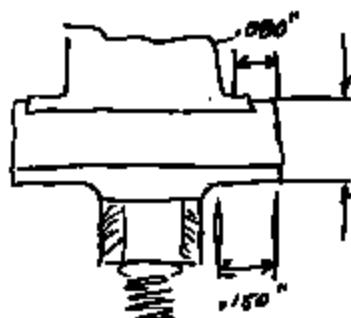
DO NOT PLATE

.050

TI-NHTSA 004889

So 1/23/89

57 PS:



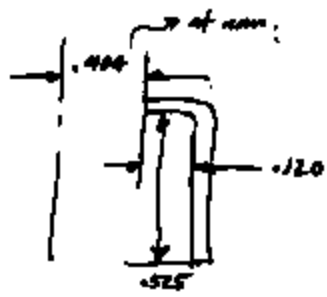
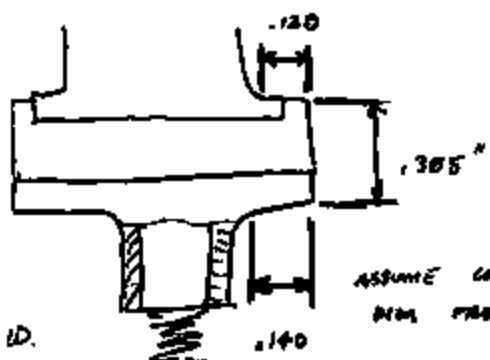
OD: 1.060" (measured)

CR

∴ ID CR = 1.065"

$1.065 - (2)(.00075) = .905$ h/w

CLPS:

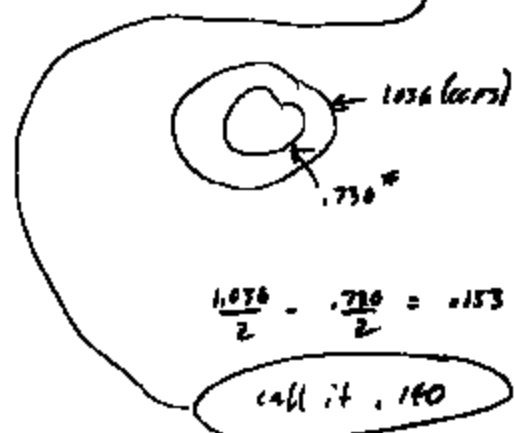


OD: (spec)

1.036 / 1.040

CR 1.044 / 1.030 ID.
(1.047 mm)

ASSUME END-HEADED ∴ CALC DIM FROM 57 PART



$$\frac{1.058}{2} - \frac{.770}{2} = .144 \text{ max}$$

(note .150 used above)

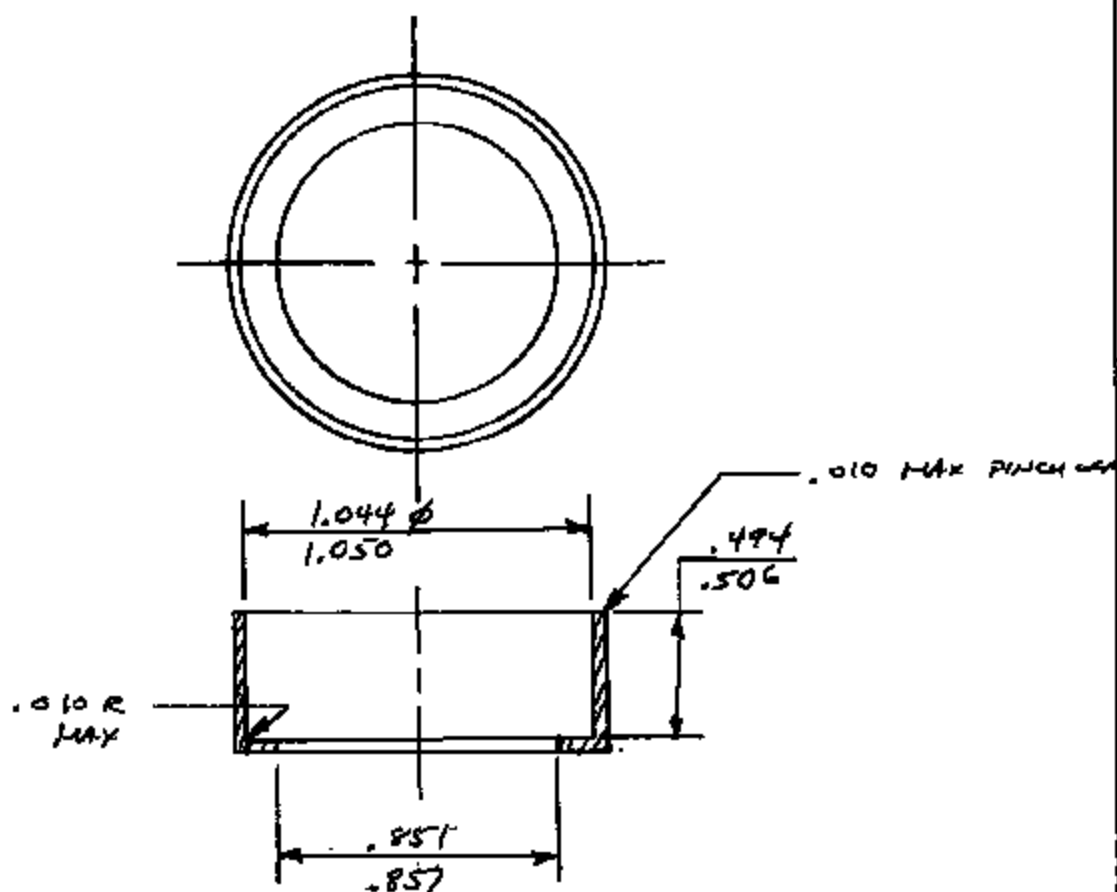
TI-NHTSA 004670

CRIMP RING

EX 3423-17

D. STROTT 7/13/77

ASSEMBLY
DRAWING
7-14-77



MAT'L: 1006 CRS ZINC PLATE .0002/.0003 w/ YELLOW DICHROMATE
.040/.042 THK

TI-NHT8A 004871

CR 152242 REV 1

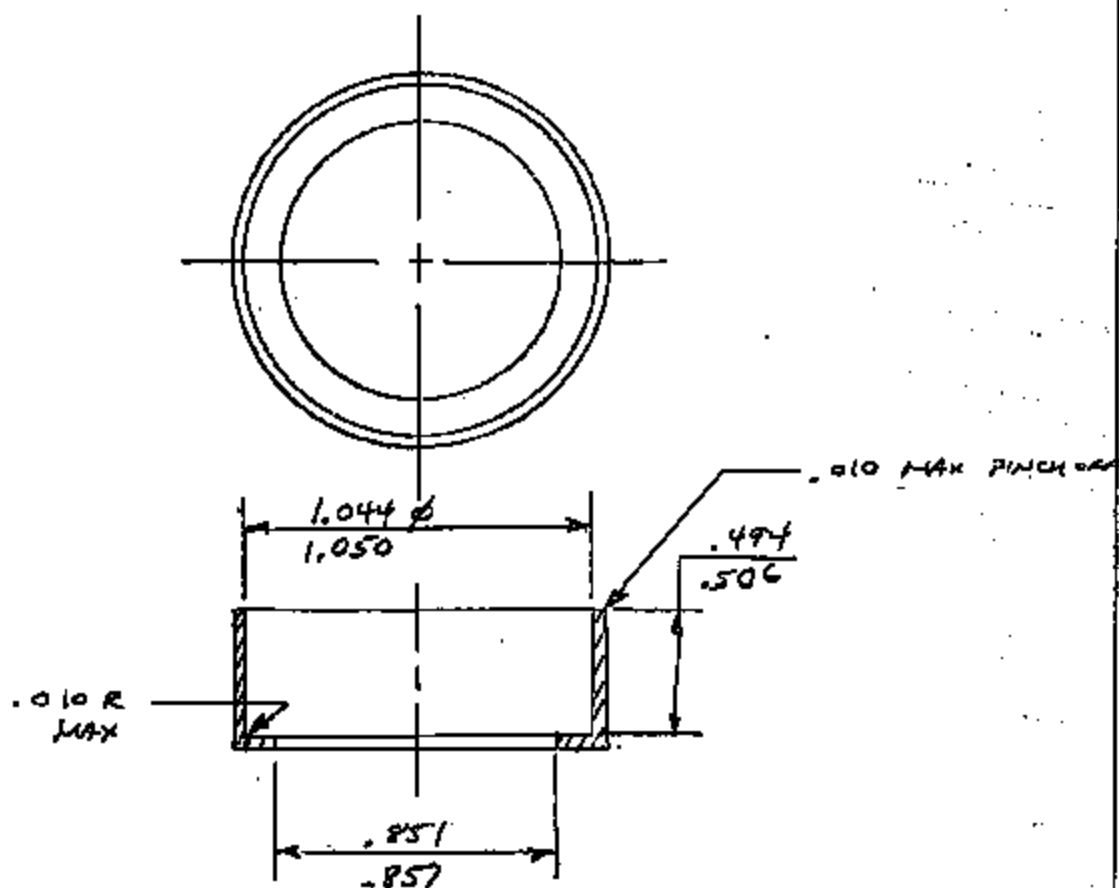
9/14/84 DBS

6X3423-17

D. STREET 7/13/84

CRIMP RING

ASME Y12.100-100
REVISION 10-1-84



MAT'L: 1006 CRS ZINC PLATE .0002/.0003 w/ YELLOW DICHROMATE
.040/.042 THK

TI-NHTSA 004872

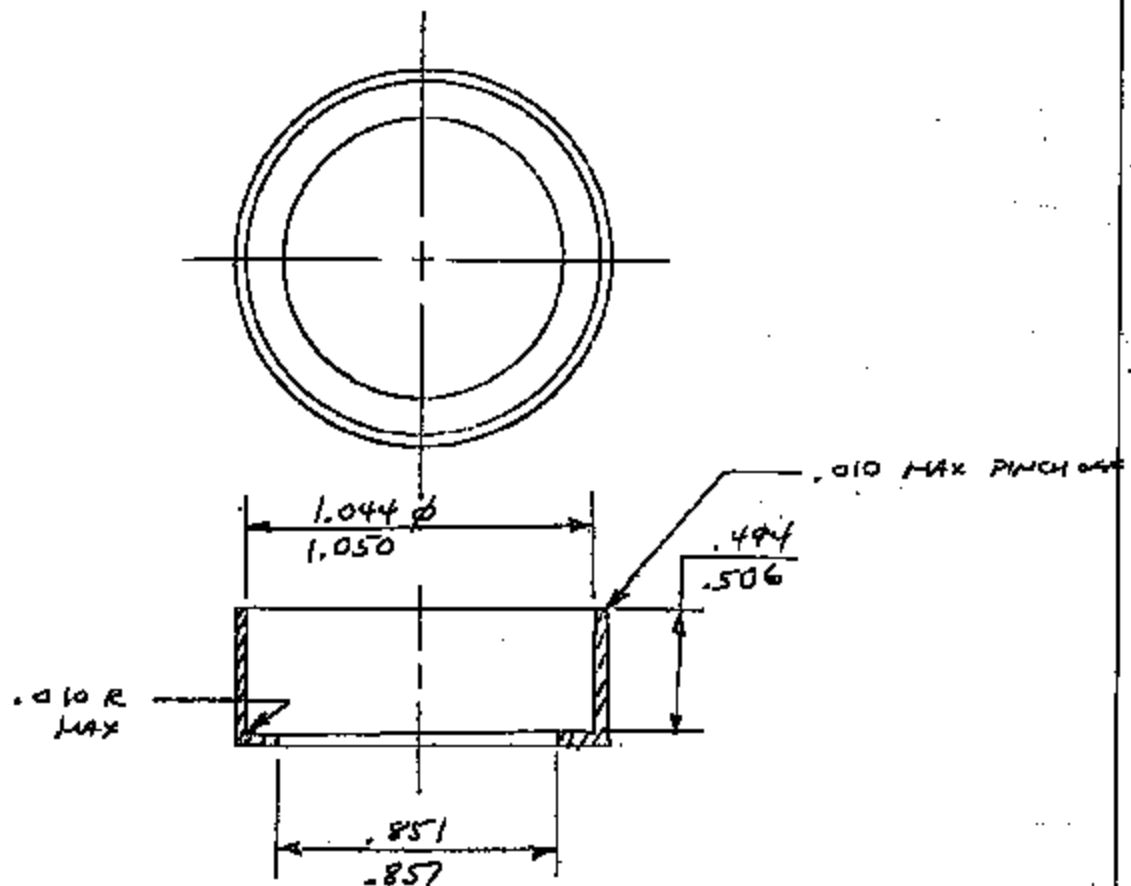
CR 152242 REV 1

9/14/88 DBS

EX 3423-17

D. STROK 7/13/88

CRIMP RING



MAT'L: 1006 CRS ZINC PLATE .0002/.0003 w/ YELLOW DICHROMATE
.040/.042 THK

TI-NHTSA 004673

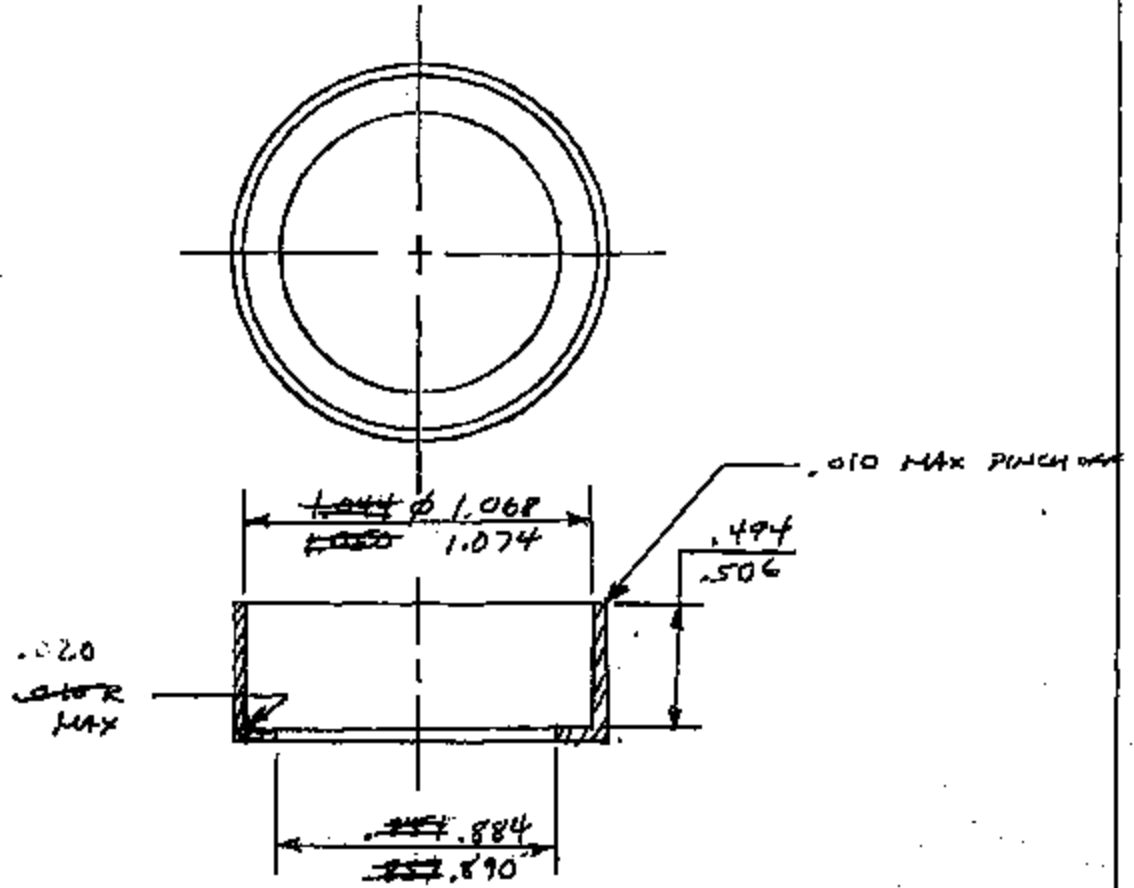
NOT
IN SYSTEM 10/19

CRIMP RING

EX 3423-17-2

D. STROK 7/13/84

FOR STPS/CCPS



MAT'L 1006 CRS ZINC PLATE .0002/.0003 w/ YELLOW DICHROMATE
.040/.042 THK

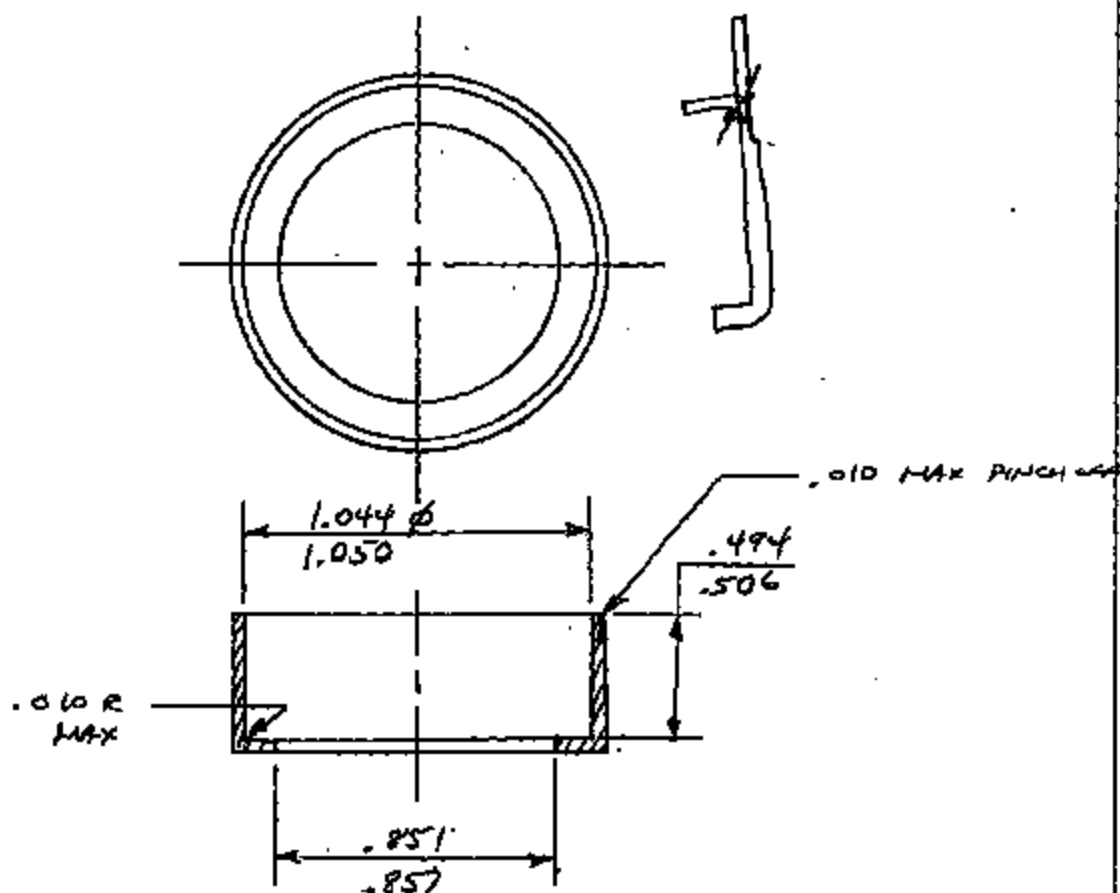
TI-NHTSA 004674

CRIMP RING

EX 3423-17-1

D. STROTT 7/13/88

42-103 THE INSTITUTE
ANTHONY



MAT'L: 1006 CRS ZINC PLATE .0002/.0003 w/ YELLOW DICHROMATE
.040/.042 THK

TI-NHTSA 004875

-MSG ## 215449 FR=ZARN TO=COPY SENT=03/20/92 03:27 PM
ST=C DIV=0050 CC=00101 BY=ZARN AT=03/20/92 03:27 PM

MARCH 20, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU ROT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDO
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPB HIGH TEMP ISSUE - MINUTES OF 3/17 AND 3/19/92 MTGS

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: MONDAY 3/23
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Switches with 45 to 54 mil offsets were thermally characterized after 4temp cycles from 30 to 150C. The effect of thermal cycling was not significant; appears to have changed the effective pin length by an additional (-) 1 mil. We decided, due to some inconsistency in the data, to disassemble 1 or 2 (untested) switches representing each offset to take actual measurements. In addition, we plan to conduct a 250k unpowered impulse test on the 45 to 54 mil offset switches and re-run the thermal characterization to determine what effect - if any - pressure cycling has on effective pin length.

D. Czarn reviewed the DFMEA for areas that may be affected by pinning switches to the long side. The two most obvious were overstressed contact arm and reduced contact gap. The in-process impulse test should highlight if the former is a problem. A 25k cycle powered impulse test will be conducted with 60 mil offset devices @ room temp to determine if the latter is a problem.

SLAP TERN ACTIONS

TI-NHTSA 004676

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
CREEP SPEC = 25 ms MAX/M ACTUATION
150 ms MAX/M RELEASE

P HIGH TEMP EVAL'N W/ "SHORT PIN" MATRIX (REPEAT TEMP CYCLE 5 TIMES)	OFFILER comp.
P REVIEW DFMEA	OFFILER comp.
P VIBRATION TEST W/52 MIL OFFSET	OFFILER
P SAMPLE 40% GF FORTRON (COLOR T-B-D) AND BLK NORYL Q7X830 IN PROD'N MOLD W/ OFFSET KEY P/C BASE (NEED PARTS BY 3/23)	WALTERS
P SAMPLE P/C BASE IN NAT'L ULTEM 2200 IN PROTO MOLD MODIFIED TO INCLUDE HEATERS	SELLERS/ WALTERS
. COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
. REPORT ON S.A.M. YIELDS W/TIGHTENED CHECK STATION WINDOW	SELLERS
. RETEST "CONTINUITY" FALLOUT @ HIGHER UPPER PRESSURE LIMIT	SWEET
* ADD CONTINUITY CHK AT 0 PBIG TO P-TESTER	SELLERS
* MEASURE OFFSET ON SWITCHES FROM 45 TO 54 MIL OFFSET LOT (SEE DISCUSSION NOTE ABOVE)	OFFILER
* 250K CYCLE IMPULSE TEST 45 TO 54 MIL OFFSET LOT	OFFILER
* 25K POWERED IMPULSE TEST 60 MIL OFFSET LOT	OFFILER
* REPEAT THERMAL CHARACT. AFTER IMPULSE ON ABOVE 2 LOTS	OFFILER

UNDERSTANDING THE PROBLEM CAUSE

P REPEAT THERMAL EXPANSION TEST W/ OFFILER
1. CYLINDRICAL PORTION OF BASE ONLY
2. ENTIRE BASE - NOT CRIMPED TO SENSOR
3. BASE MODIFIED WITH LARGER SENSOR NESTING
DIAMETER, CRIMPED TO DUMMY SENSOR
WITHOUT THE ENVIRON. SEAL

REGARDS,
DAVE CZARN
13-hitamp

TI-NHT8A 004677

MSG #00015449 FR=ZARN TO=BB01 SENT=03/00/92 00127 54
344 DT=0 DIV=0030 CC=00101 BY=ZARN AT=03/00/92 00127 54

ADCP 00, 1992

1. GUYE OFFILER SB01
JILL SWEET WSC
PATR BELLER M052
JIM WAT PCQA
RON GARTER MFPC

2. TOM CHANBONEAU TC
RAY FOURANGEAU ROT2
ANDY MCQUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLOG
JEFF DIDOMENICO ELB
RICH TURNER ELB

R: DAVE CZARN ZARN

E: COPS HIGH TEMP ISSUE - MINUTED AT 3/17 AND 3/18/92 MTGS

Settings will be held daily at 9:30 in the cafeteria until the issue is resolved.

EXT MEETING

DATE: MONDAY 3/23
TIME: 9:30
PLACE: CAFETERIA CUBE

CRUE: Devices calibrated to the "short pin" (actually high calibration) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the case reducing the effective pin length.

DISCUSSION:

Switches with 45 to 54 mil offsets were thermally characterized after 4 temp cycles from 30 to 150C. The effect of thermal cycling was not significant; appears to have changed the effective pin length by an additional (-) 1 mil. We decided, due to some inconsistency in the data, to disassemble 1 or 2 (untested) switches representing each offset to take actual measurements. In addition, we plan to conduct a 250k unpowered impulse test on the 45 to 54 mil offset switches and re-run the thermal characterization to determine what effect - if any - pressure cycling has on effective pin length.

1. Czarn reviewed the DFMEA for areas that may be affected by pinning switches to the long side. The two most obvious were overstressed contact area and reduced contact gap. Unpowered impulse test should be run on the former to a failure point. The latter should be tested by unpowered impulse test. The test should include test of the contact area and gap. The test should be run at 150C to determine the effect of thermal expansion on the contact area and gap.

TI-NHTSA 004678

NEW PARTS OF COMPLETED ITEM
PARTICULAR ITEM

 FBET FOR ALL SWITCHES = .056"
 SET SWCC = 25 MS MAXIMUM ACTUATION
 .50 MS MAXIMUM RELEASE

HIGH TEMP EVAL'N W/ "SHORT PIN" MATERIAL (REPEAT TEMP CYCLE 3 TIMES) REVIEW DAMAGE	OFFILER comp. OFFILER comp.
VIBRATION TEST W/52 MIL OFFSET SAMPLE 40% OF PORTION (COLOR T-B-D) AND BLK NORYL GTX830 IN PROD'N MOLD W/ OFFSET KEY P/C BASE (NEED PARTS BY 3/23) SAMPLE P/C BASE IN NAT'L ULTEM 2200 IN PROTO MOLD MODIFIED TO INCLUDE HEATERS	OFFILER WALTERS SELLERS/ WALTERS
COLLECT YIELD DATA PER ABOVE LIMITS FOR REVIEW AT DAILY MEETINGS	SWEET
REPORT ON S.A.M. YIELDS W/TIGHTENED CHECK STATION WINDOW	SELLERS
RETEST "CONTINUITY" FALLOUT & HIGHER UPPER PRESSURE LIMIT	SWEET
ADD CONTINUITY CHK AT 0 FBIG TO P-TESTER	SELLERS
MEASURE OFFSET ON SWITCHES FROM 43 TO 54 MIL OFFSET LOT (SEE DISCUSSION NOTE ABOVE)	OFFILER
250K CYCLE IMPULSE TEST 45 TO 54 MIL OFFSET LOT	OFFILER
25K POWERED IMPULSE TEST 60 MIL OFFSET LOT	OFFILER
REPEAT THERMAL CHARACT. AFTER IMPULSE ON ABOVE 2 LOTS	OFFILER

UNDERSTANDING THE PROBLEM CAUSE

 REPEAT THERMAL EXPANSION TEST W/
 1. CYLINDRICAL PORTION OF BASE ONLY
 2. ENTIRE BASE - NOT CRIMPED TO SENSOR
 3. BASE MODIFIED WITH LARGER SENSOR MOUNTING
DIAMETER, CRIMPED TO DUMMY SENSOR
 WITHIN THE ENVIRON. SEAL

OFFILER

?

CARDS,
 MC CLARK
 -h temp

TI-NHTSA 004679

PRESSURE SWITCH DATA

Form 21605

TEST NO. 215-15-24

DEVICE <i>CIPS</i>	DATE REQUESTED	REQUESTED BY <i>Doc Carr</i>	REQUESTED COMPL. DATE
PERFORMED BY <i>Sage Kingston</i>	DATE STARTED <i>3/22/91</i>	DATE COMPLETED <i>3/24/91</i>	APPROVED BY
PROJECT TITLE: <i>Feed MY '91 Electronic Speed Control Circuit into PS</i>			

CUSTOMER:

PURPOSE OF TEST: *Measure Thermal expansion of 46515 base milled with Fortran and Norgyl*

PROCEDURE: 1) Measure base reference surface at room temp and 150°C on base side of each material.
2) Using dummy sensors to bases of each material. Measure cap temp to base floor at Room Temp and 150°C.

NOTE: FORTAN CRACKED; NORYL DID NOT

→ DISCONTINUED INVESTIGATION OF FORTAN

Device #	Test Temp	Material	Room Temp	150°C	Δ	$\bar{X}_d$
215-15-01	1	Fortan	.0270	.0250	.0020	.0014"
-02	1		.0265	.0250	.0015	
-03	1		.0270	.0255	.0015	
-04	1		.0270	.0255	.0015	
-05	1		.0270	.0260	.0010	
-06	1		.0270	.0265	.0010	
215-15-07	1	Norgyl	.0285	.0265	.0020	.0024"
-08	1		.0285	.0265	.0020	
-09	1		.0280	.0265	.0015	
-10	1		.0280	.0265	.0015	
-11	1		.0280	.0265	.0015	
-12	1		.0280	.0265	.0015	
215-15-13	2	Fortan	.0270	.0215	.0055	.0026"
-14	2		.0275	.0215	.0060	
-15	2		.0270	.0210	.0060	
-16	2		.0270	.0215	.0055	
-17	2		.0270	.0225	.0045	
-18	2		.0270	.0215	.0055	
215-15-19	3	Norgyl	.0255	.0225	.0030	.0022"
-20	3		.0255	.0220	.0035	
-21	3		.0260	.0220	.0040	
-22	3		.0250	.0225	.0025	
-23	3		.0250	.0225	.0025	
-24	3		.0250	.0220	.0030	

Bases ONLY

.0021" - .0020"

Cracked + dummy sensors

.0022" - .0020"

TI-NHT8A 004680

PRESSURE SWITCH DATA

Form 21605

TEST NO. 215-15-24

DEVICE <i>CLPS</i>	DATE REQUESTED	REQUESTED BY <i>Dave Czarn</i>	REQUESTED COMPL. DATE
PERFORMED BY <i>Sean Keniston</i>	DATE STARTED <i>3/12/92</i>	DATE COMPLETED <i>3/24/92</i>	APPROVED BY
PROJECT TITLE: <i>Ford MY'92 Electronic Speed Control Deactivate PS</i>			

CUSTOMER:

PURPOSE OF TEST: *Measure Thermal expansion of 46515 base molded with Fortrac and Noryl*

PROCEDURE: 1) Measure base reference surface at room temp and 150°C. on bases made of each material.
2) Using dummy sensors to locate at each material. Measure Cap temp to base flange at Room Temp and 150°C.

Device #	Test Temp	Material	Room Temp Measurement	150°C Meas.	Δ	$\bar{X}_n$	
215-15-01	1	Fortrac	.0270	.0250	.0020	} .0014"	Bases ONLY
-02	1		.0265	.0250	.0015		
-03	1		.0270	.0255	.0015		
-04	1		.0270	.0255	.0015		
-05	1		.0270	.0260	.0010		
-06	1		.0270	.0260	.0010		
215-15-07	1	Noryl	.0285	.0265	.0020	} .0024"	crippled to dummy sensors
-08	1		.0285	.0265	.0020		
-09	1		.0290	.0265	.0025		
-10	1		.0280	.0265	.0015		
-11	1		.0280	.0260	.0020		
-12	1		.0280	.0260	.0020		
215-15-13	2	Fortrac	.0280	.0215	.0065	} .0026"	
-14	2		.0275	.0215	.0060		
-15	2		.0240	.0210	.0030		
-16	2		.0240	.0215	.0025		
-17	2		.0245	.0225	.0020		
-18	2		.0240	.0215	.0025		
215-15-19	3	Noryl	.0285	.0225	.0060	} .0028"	
-20	3		.0255	.0230	.0025		
-21	3		.0260	.0230	.0030		
-22	3		.0250	.0225	.0025		
-23	3		.0250	.0225	.0025		
-24	3		.0250	.0220	.0030		

(OVER)

TI-NHTSA 004882

-MSG MW# 261973 FR=ZARN TO=COPY SENT=03/23/92 03:50 PM
BT=C DIV=0050 CC=00101 BY=ZARN AT=03/23/92 03:50 PM

MARCH 23, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEFY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY MCGUIRK PCQA
BILL CONODON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/23 MTG

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: TUESDAY 3/24
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Steve Walters supplied bases made of Fortron PPS and Noryl modified PPO on Monday, 3/23. Thermal characterization of the individual bases and bases crimped into dummy sensors began today; results will be available for Tuesday's meeting. Steve noted that the Fortron parts were post-mold cured at 300F for 45 minutes; Celanex advises 275F minimum to achieve full crystallinity. (Note that the parts were post-mold cured because the mold cannot presently be heated to 275F.)

The prototype mold has been modified to add heaters to run Ultem; parts will be run Tuesday or Wednesday (need confirmation of data).

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

TI-NHTSA 004684

OFFSET FOR ALL SWITCHES = .054"

150 mm MAX/M RELEASE

P VIBRATION TEST W/52 MIL OFFSET OFFILER
(Test will be completed Tuesday, per George Clear.)

P SAMPLE 40% OF FORTRON (COLOR T-B-D) AND WALTERS
BLK NORYL GTX830 IN PROD'N comp.
MOLD W/ OFFSET KEY P/C BASE
(Thanks for the quick turn-around Steve.)

P SAMPLE P/C BASE IN NAT'L ULTEM SELLERS/
2200 IN PROTO MOLD MODIFIED TO WALTERS
INCLUDE HEATERS

. COLLECT YIELD DATA PER ABOVE LIMITS FOR SWEET
REVIEW AT DAILY MEETINGS

. REPORT ON S.A.M. YIELDS W/TIGHTENED CHECK SELLERS
STATION WINDOW

. RETEST "CONTINUITY" FALLOUT @ HIGHER SWEET
UPPER PRESSURE LIMIT

. ADD CONTINUITY CHK AT 0 PSIG TO P-TESTER SELLERS

. MEASURE OFFSET ON SWITCHES FROM 45 TO 54 OFFILER
MIL OFFSET LOT (SEE DISCUSSION NOTE ABOVE)

. 250K CYCLE IMPULSE TEST 45 TO 54 MIL OFFILER
OFFSET LOT

* 25K POWERED IMPULSE TEST 40 MIL OFFSET LOT OFFILER
comp.

. REPEAT THERMAL CHARACT. AFTER IMPULSE OFFILER
ON ABOVE 2 LOTS

UNDERSTANDING THE PROBLEM CAUSE

. REPEAT THERMAL EXPANSION TEST W/ OFFILER
1. CYLINDRICAL PORTION OF BASE ONLY
2. ENTIRE BASE - NOT CRIMPED TO SENSOR
3. BASE MODIFIED WITH LARGER SENSOR NESTING
DIAMETER, CRIMPED TO DUMMY SENSOR
WITHOUT THE ENVIRON. SEAL

. REPEAT THERMAL EXPANSION W/ALT. BASE MAT'LS OFFILER

REGARDS,
DAVE CZARN
19-hiteap

TI-NHT8A 004885

MSG # = 00261073 PR=ZARN TO=SSB1 SENT=06/23/91 00130 PM
PR=107 DT=C DIV=0050 CD=00101 BY=ZARN AT=06/23/91 00150 PM

FROM: D. 1992

1. DAVE OFFLER	ZSO1
BILL SWEET	MS4
WALT GELLERS	MSB2
JIM JAY	PCQA
BOB GARNERY	MFPC

2. TOM CHARBONEAU	TC
RAY FOURANGEAU	RGT2
ANDY McGUIRK	PCQA
BILL CONGDON	MFPC
CHARLIE DOUGLAS	CHP1
JOHN KOURTESIS	MOEB
PAUL LESSER	PL
STEVE WALTERS	KLDD
JEFF DIDOMENICO	ELB
RICH TURNER	ELB

RI DAVE CZARN ZARN

SI COPS HIGH TEMP ISSUE - MINUTES OF 3/23 MTO

meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

EXT MEETING:

DATE: TUESDAY 3/24
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration spec) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Steve Walters supplied bases made of Fortron PPS and Noryl modified PPO on Monday, 3/23. Thermal characterization of the individual bases and bases crimped into dummy sensors began today; results will be available for Tuesday's meeting. Steve noted that the Fortron parts were post-mold cured at 300F for 45 minutes; Calanex advises 275F minimum to achieve full crystallinity. (Note that the parts were post-mold cured because the mold cannot presently be heated to 275F.)

The prototype mold has been modified to add heaters to run Jitem; parts will be run Tuesday or Wednesday (need confirmation of date).

NEXT TERM ACTIONS

1. Jitem to be completed item
2. Jitem to be completed item

TI-NHTSA 004686

VIBRATION TEST W/52 MIL OFFSET
 test will be completed Tuesday, per George Clear.

OFFILER

{ 121% OKAY - ONE
 153% IN PROCESS

SAMPLE 40% OF FORTRON (COLOR T-B-D) AND
 BLK NORYL GTX830 IN PRODN
 HOLD W/ OFFSET KEY P/C BASE
 (thanks for the quick turn-around Steve.)

WALTERS
 comp.

SAMPLE P/C BASE IN NAT'L ULTEM
 2200 IN PROTO MOLD MODIFIED TO
 INCLUDE HEATERS

SELLERS/
 WALTERS

COLLECT YIELD DATA PER ABOVE LIMITS FOR
 REVIEW AT DAILY MEETINGS

SWEET

REPORT ON B.A.M. YIELDS W/TIGHTENED CHECK
 STATION WINDOW

SELLERS

RETEST "CONTINUITY" FALLOUT & HIGHER
 UPPER PRESSURE LIMIT

SWEET ~~---~~ ~~SUMMER-THRU (WITH PLANE)~~
 DISC; (NUMBER 1?)

ADD CONTINUITY CHK AT 6 PSIG TO C-TESTER

SELLERS

MEASURE OFFSET ON SWITCHES FROM 40 TO 54
 MIL OFFSET LOT (SEE DISCUSSION ABOVE)

OFFILER ~~---~~ ~~CONVIN OVER FALLOUT~~
 THRU; PLAN TEST....

BOOK CYCLE IMPULSE TEST 45 TO 54 MIL
 OFFSET LOT

OFFILER ~~---~~ STATUS ??

25% POWERED IMPULSE TEST 60 MIL OFFSET LOT

OFFILER ~~---~~ ONE
 comp.

REPEAT THERMAL CHARACT. AFTER IMPULSE
~~ON ABOVE 2 LOTS~~

OFFILER ~~---~~ CYCLE CONSTRAINT &
 VALIDATION

UNDERSTANDING THE PROBLEM CAUSE

1. REPEAT THERMAL EXPANSION TEST W/
2. CYLINDRICAL PORTION OF BASE ONLY
3. ENTIRE BASE - NOT CRIMPED TO SENSOR
4. BASE MODIFIED WITH LARGER SENSOR NESTING
 DIAMETER, CRIMPED TO DUMMY SENSOR
 WITHOUT THE ENVIRON. SEAL

OFFILER

4700
 NORYL
 FORTRON
 ULTEM

REPEAT THERMAL EXPANSION W/ALT. BASE MAT'LS

OFFILER

CHAND,
 AVE CLEAR
 1-11-1968

REMEASURE #215 BACK @ ROOM TEMP AGAIN 13-14
 #212 1-5
 #209 4-6

REPEAT #215 - XX - 11/11/12

TI-NHTSA 004687

{ RUBIN FORTRON/RUBIN IN HEATED PROTO MOLD ? --- SELLERS
 RUBIN THRU FOLD LINE - CRACKS? IMPACT TEST?

VALIDATION 'WINDOWS' FOR CCPS CYCLE FOR RUBIN OF THESE
 TESTS

MSG MSG= 00316838 FR=ZARN TO=8801 SENT=03/25/92 0645Z AM
 03/25/92 0700Z DTG=0050 CC=00101 33=ZARN AT=03/25/92 0645Z AM

FROM: 04, 1991

1: STEVE STEINER SMO1
 BILL SWEET W34
 MARY SELLERS M032
 JIM WATKINS F00A
 RICH GARNER MFC0

2: TOM D'ARRONEAU TC
 RAY TOURANGEAU RGT2
 ANDY McGUIRK PQQA
 BILL CONGOON MFC0
 CHARLIE DOUGLAS CHP1
 JOHN COURTESIS MDES
 PAUL LESSER PL
 STEVE WALTERS MLOG
 JEFF D'DOMENICO ELB
 RICH TURNER ELB

3: DAVE ZARN ZARN

4: COPS HIGH TEMP ISSUE - MINUTES OF 3/24 MTG

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

 EXT MEETING:

DATE: WEDNESDAY 3/25
 TIME: 3:30
 PLACE: CAFETERIA CUBE

TRUE: Devices calibrated to the "short pin" (actually high calibration side) side of the pin window exhibit loss of continuity at elevated temperatures. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Thermal characterization of the Fortron and Noryl showed improvement over the PB. Matt will request production quote for parts made from each material.

Results:

Range in reference dimension - RT to +150C

Bases only Crimped to sensor

TI-NHTSA 004888

	Bases only	Crimped to sensor	
300	.0021"	.0058"	
Noryl	.0024"	.0028"	
Fortron	.0014"	.0026"	(some bases cracked at flange)
Notes: (bases are not)	.0011"	.0035"	/ " " " " " ")
	.0010"	.0017"	

Photomicrographs of the bases were made to show the condition of the bases. The bases were found to be in good condition. The bases were found to be in good condition. The bases were found to be in good condition.

-MSO MB= 316838 FR=ZARN TO=CDPY SENT=03/25/92 06:52 AM
ST=C DIV=0050 CC=00101 BY=ZARN AT=03/25/92 06:52 AM

MARCH 24, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY MCGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDG
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/24 MTG

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: WEDNESDAY 3/25
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperatures. Problem is primarily due to thermal expansion/warping of the base reducing the effective pin length.

DISCUSSION:

Thermal characterization of the Fortron and Noryl showed improvement over the PB T. Matt will request production quote for parts made from each material.

Results:

Change in reference dimension - RT to +150C

	Bases only	Crimped to sensor
4300	.0021"	.0058"
Noryl	.0024"	.0028"
Fortron	.0014"	.0026"

(some bases cracked at flange)

The prototype mold has been modified to add heaters to run Ultem; parts will be run Tuesday or Wednesday (need confirmation of date). Will also run Fortron in heated mold.

TI-NHTSA 004690

MSG #4= 00326025 FR=SCBU TO=CBCL SENT=03/25/92 10:03 AM
 #4=107 BT=C CTO=0050 CO=00101 RT=0030 AT=03/03/92 10:01 AM

TO: Matt Sellers	PCME	Jim Watt	PCGA
Blaine Rose	BMPL	Steve Offiler	SBOL
FROM: Tom Ray	MLDG	Bill Sweet	PCME
Bill Anderson	AFCD	Andy McGuirk	PCGA
Mike Kern	KERN	Dave Czarn	ZARN
FROM: James Friedrichs	JFF		

FDLJ 00310- Angle 20 / 30 Deg. Section 26 MSG #261895.

Date: 03-23-92.

The original FAI used to approve this mold for production showed these dimensions:

		Cav A	Cav B	Cav C	Cav D
Spec. 20 / 30 Deg.	Front	30	30	30	30
4X	Left	30	30	30	30
	Right	30	30	30	30
	Back	30	30	30	30

One shot from the last production run was measured on a tool makers microscope as follows. Looking down on the part resting on the bottom diameter, measure the horizontal distance from the top edge of the sloped surface to the bottom edge of the sloped surface. With the part resting at a 60 Deg. angle, measure the total length of the sloped surface. Horizontal distance / total length = Sin of angle. Front = Changeable Polarity Tap Side. Following Results:

Cavity A	Front	Left	Right	Back
Horizon.	0.0366	0.0365	0.0337	0.0366
Length	0.0767	0.0768	0.0772	0.0750
Angle	28.5	28.4	30.1	29.2

Cavity B	Front	Left	Right	Back
Horizon.	0.0382	0.0384	0.0378	0.0392
Length	0.0764	0.0760	0.0775	0.0766
Angle	30.0	30.3	29.2	30.8

Cavity C	Front	Left	Right	Back
Horizon.	0.0394	0.0367	0.0390	0.0373
Length	0.0768	0.0762	0.0781	0.0766
Angle	30.9	28.8	30.0	29.1

Cavity D	Front	Left	Right	Back
Horizon.	0.0387	0.0387	0.0387	0.0387
Length	0.0767	0.0767	0.0767	0.0767
Angle	30.0	30.0	30.0	30.0

TI-NHTSA 004691

Horizontal Distance



Regards,

James C-3070

- R.I. UP TO 32°
- JAMES; UP TO 31°
- HOW CRITICAL IS THIS? NOT
- .005/.005 LONGING FOR .003 ENV ISUB

TI-NHTSA 004692

MSG NM= 00343534 FR=ZARN TO=SB01 SENT=03/25/92 03:40 PM
R#118 ST=C DIV=0030 CC=00101 BY=ZARN AT=03/25/92 03:40 PM

MARCH 25, 1992

TO: STEVE OFFILER SBO1
BILL SWEET WEA
MATT BELLERS COS2
JIM WATT PCQA
DUCK GARIOPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY MCGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDO
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/25 MTG

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: THURSDAY 3/26
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

High temp vibration test completed w/32 mil offset (shortest effective pin length). Spec = 5 - 50 - 5 hz @ 1.5mm displacement, 100 microseconds max chatter chosen for monitoring purposes. Results:

T = 121C all switches passed
on ramp up to 150C, one switch lost continuity at ~130C
T = 150C all remaining switches passed

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
CREEP SPEC = 25 ms MAXIMUM ACTUATION
TIME TO 30% RELEASE

TI-NHTSA 004693

IELDS:

TESTER neded updated #'s
A.M. " "

VIBRATION TEST W/52 MIL OFFSET

OFFILER

MEASURE OFFSET OF SWITCH THAT LOST CONTY
DURING VIBE TEST

COMP.

OFFILER ~~_____~~ (I HAVE PARTS)

SAMPLE P/C BASE IN NAT'L ULTEM
2200 IN PROTO MOLD MODIFIED TO
INCLUDE HEATERS

SELLERS/
WALTERS
COMP.

. SAMPLE FORTRON IN HEATED PROTO MOLD

SELLERS

PROD'N PRICING FOR FORTRON AND NORYL

SELLERS

TEST FORTRON AND NORYL ON PROD'N CRIMPER

SELLERS

RETEST "CONTINUITY" FALLOUT @ HIGHER
UPPER PRESSURE LIMIT

SWEET

ADD CONTINUITY CHK AT 0 PSIG TO P-TESTER

SELLERS

MEASURE DEEBET ON SWITCHES FROM 45 TO 54.
MIL OFFSET LOT... MEASURE SPACES... ~~_____~~

OFFILER ~~_____~~

OWLS 7.052

2.151

(I HAVE PARTS)

250K CYCLE IMPULSE TEST 45 TO 54 MIL
OFFSET LOT

OFFILER

COMP.

REPEAT THERMAL CHARACT. AFTER IMPULSE
ON ABOVE LOT (on Saturday, 3/28)

OFFILER

~~_____~~ COPY TO DAVE

45 TO 65 MIL OFFSET MATRIX - NORYL,
FORTRON, ULTEM, PBT (control) - by 4/3
~~Lo CO-D, PBT - BASE~~

SELLERS

UNDERSTANDING THE PROBLEM CAUSE

REPEAT THERMAL EXPANSION TEST W/

OFFILER

~~_____~~ COPY TO MTS (100)

1. CYLINDRICAL PORTION OF BASE ONLY
2. ENTIRE BASE - NOT CRIMPED TO SENSOR
3. BASE MODIFIED WITH LARGER SENSOR NESTING
DIAMETER, CRIMPED TO DUMMY SENSOR
WITHOUT THE ENVIRON. SEAL

REPEAT THERMAL EXPANSION W/ALT. BASE MAT'LS
(Noryl, Fortron completed; waiting for Ultem bases)

OFFILER

EGARDS,
AVE CZARN
at-temp

→ CYLINDER WINDOW FOR THERM EVAL? → APPROX WED 8TH

→ (VAL) ED; IS THERE EQUIV. CONSTRAINTS; ORDER
CONTINGENCY PLAN!

→ 175°C DEVICE RIN'D BY PELKEY, NEEDS REPORT,
TYPICAL W/ PELKEY..... THERM UPPER, IN PPM'S; MOVE TO
NEW MAT'L - CHIEF CAL INIT

TI-NHTSA 004694

-MSG MH= 343534 FR=ZARN TO=MJS2 SENT=03/25/92 03:40 PM
R#001 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/25/92 03:40 PM

MARCH 25, 1992

TO: STEVE OFFILER SBD1
BILL SWEET WS4
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McGUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLOG
JEFF DIDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/25 MTG

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: THURSDAY 3/26
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

High temp vibration test completed w/52 mil offset (shortest effective pin length). Spec = 5 - 50 - 5 Hz @ 1.5mm displacement, 100 microseconds max chatter chosen for monitoring purposes. Results:

T = 121C all switches passed
on ramp up to 150C, one switch lost continuity at ~130C
T = 150C all remaining switches passed

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .056"
CREEP SPEC = 25 ms MAX'M ACTUATION
150 ms MAX'M RELEASE

YIELDS:

P-TESTER naded updated #'s

3/31/92

1. pressure

2. SPC on Pin Height reference cup surface.

3. Retest Creep rel.
Get actuals & test @ -40°C with design.

TI-NHTSA 004695

B.A.M.

- P VIBRATION TEST W/52 MIL OFFSET
- MEASURE OFFSET OF SWITCH THAT LOST CONT'Y DURING VIBE TEST

OFFILER
comp.
OFFILER

27.50/KK
0025/K

- P SAMPLE P/C BASE IN NAT'L ULTEM
2200 IN PROTO MOLD MODIFIED TO
INCLUDE HEATERS

SELLERS/
WALTERS
comp.

- SAMPLE FORTRON IN HEATED PROTO MOLD
- PROD'N PRICING FOR FORTRON AND NORYL
- TEST FORTRON AND NORYL ON PROD'N CRIMPER
- RETEST "CONTINUITY" FALLOUT @ HIGHER
UPPER PRESSURE LIMIT
- ADD CONTINUITY CHK AT 0 PSIG TO P-TESTER
- MEASURE OFFSET ON SWITCHES FROM 45 TO 54
MIL OFFSET LOT
- 250K CYCLE IMPULSE TEST 45 TO 54 MIL
OFFSET LOT
- REPEAT THERMAL CHARACT. AFTER IMPULSE
ON ABOVE LOT (on Saturday, 3/28)
- 45 TO 65 MIL OFFSET MATRIX - NORYL,
FORTRON, ULTEM, PBT (control) - by 4/3

SELLERS

SELLERS

SELLERS

SWEET

SELLERS

OFFILER

OFFILER
comp.

OFFILER

SELLERS

use pin in center of
window. try to
vary

UNDERSTANDING THE PROBLEM CAUSE

- REPEAT THERMAL EXPANSION TEST W/
 - CYLINDRICAL PORTION OF BASE ONLY
 - ENTIRE BASE - NOT CRIMPED TO SENSOR
 - BASE MODIFIED WITH LARGER SENSOR NESTING
DIAMETER, CRIMPED TO DUMMY SENSOR
WITHOUT THE ENVIRON. SEAL

OFFILER

- REPEAT THERMAL EXPANSION W/ALT. BASE MAT'LS
(Noryl, Fortron completed; waiting for Ultem bases)

OFFILER

REGARDS,
DAVE CZARN
111-hitemp

(1) 12-Ultem
12-Hot mold Fortron } to Steve O.

Pins
140 - 157

-MSG# 343534 FR=ZARN TO=COPY * SENT=03/25/92 03:40 PM
ST=C DIV=0050 CC=00101 BY=ZARN AT=03/25/92 03:40 PM

MARCH 25, 1992

TO: STEVE OFFILER 3801
BILL SWEET W54
MATT SELLERS MJS2
JIM WATT PCQA
DICK GARIEPY MFPC

CC: TOM CHARBONEAU TC
RAY TOURANGEAU RGT2
ANDY McQUIRK PCQA
BILL CONGDON MFPC
CHARLIE DOUGLAS CMP1
JOHN KOURTESIS MDES
PAUL LESSER PL
STEVE WALTERS MLDB
JEFF DIDDOMENICO ELB
RICH TURNER ELB

FR: DAVE CZARN IARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/25 MTB

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: THURSDAY 3/26
TIME: 3:30
PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warping of the base reducing the effective pin length.

DISCUSSION:

High temp vibration test completed w/52 mil offset (shortest effective pin length). Spec = 5 - 50 - 5 hz @ 1.5mm displacement, 100 microseconds max chatter chosen for monitoring purposes. Results:

T = 121C all switches passed
on ramp up to 150C, one switch lost continuity at ~130C
T = 150C all remaining switches passed

SHORT TERM ACTIONS

* = NEW ITEM OR COMPLETED ITEM
P = PRIORITY ITEM

OFFSET FOR ALL SWITCHES = .036"
CREEP SPEC = 25 ms MAX'M RETUATION
150 ms MAX'M RELEASE

TI-NHTSA 004897

YIELDS:

P-TESTER needed updated #'s not running CCS in last couple of days
B.A.M. " " " 12th - all machine yld.

- P VIBRATION TEST W/52 MIL OFFSET OFFILER
comp.
- MEASURE OFFSET OF SWITCH THAT LOST CONT'Y DURING VIBE TEST OFFILER
- P SAMPLE P/C BASE IN NAT'L ULTEM SELLERS/
2200 IN PROTO MOLD MODIFIED TO WALTERS
INCLUDE HEATERS comp.
- SAMPLE FORTRON IN HEATED PROTO MOLD SELLERS
Comp.
- PROD'N PRICING FOR FORTRON AND NORYL SELLERS
- TEST FORTRON AND NORYL ON PROD'N CRIMPER SELLERS 21/22/23
- RETEST "CONTINUITY" FALLOUT @ HIGHER SWEET
UPPER PRESSURE LIMIT
- ADD CONTINUITY CHK AT 0 PSIG TO P-TESTER SELLERS
- MEASURE OFFSET ON SWITCHES FROM 45 TO 54 OFFILER
1/2/3
- 250K CYCLE IMPULSE TEST 45 TO 54 MIL, OFFILER
comp.
- REPEAT THERMAL CHARACT. AFTER IMPULSE OFFILER
ON ABOVE LOT (on Saturday, 3/28) comp. 3
- 45 TO 65 MIL OFFSET MATRIX - NORYL, SELLERS
FORTRON, ULTEM, PBT (control) - by 4/3

UNDERSTANDING THE PROBLEM CAUSE

- REPEAT THERMAL EXPANSION TEST W/ OFFILER
 - 1. CYLINDRICAL PORTION OF BASE ONLY
 - 2. ENTIRE BASE - NOT CRIMPED TO SENSOR
 - 3. BASE MODIFIED WITH LARGER SENSOR NESTING DIAMETER, CRIMPED TO DUMMY SENSOR WITHOUT THE ENVIRON. SEAL
- REPEAT THERMAL EXPANSION W/ALT. BASE MAT'LS OFFILER
(Noryl, Fortron completed; waiting for Ultem bases)
6 hot molded Fortron

REGARDS,
DAVE CIARN
111-hitemp

TI-NHT8A 004698

-MSG MH= 00316838 FR=ZARN TD=SB01 SENT=03/25/92 06:52 AM
 RH=114 BT=C DIV=0050 CC=00101 BY=ZARN AT=03/25/92 06:52 AM

MARCH 24, 1992

TO: STEVE OFFILER SB01
 BILL SWEET WS4
 MATT SELLERS MJB2
 JIM WATT PCQA
 DICK GRIEPE MFPC

CC: TOM CHARBONEAU TC
 RAY TOURANGEAU RBT2
 ANDY McGUIRK PCQA
 BILL CONGDON MFPC
 CHARLIE DOUBLAS CMP1
 JOHN KOURTESIS MDES
 PAUL LESSER PL
 STEVE WALTERS MLDG
 JEFF DIDOMENICO ELB
 RICH TURNER ELB

FR: DAVE ZARN ZARN

RE: CCPS HIGH TEMP ISSUE - MINUTES OF 3/24 MTG

Meetings will be held daily at 3:30 in the cafeteria until the issue is resolved.

NEXT MEETING:

DATE: WEDNESDAY 3/25
 TIME: 3:30
 PLACE: CAFETERIA CUBE

ISSUE: Devices calibrated to the "short pin" (actually high calibration base) side of the pin window exhibit loss of continuity at elevated temperature. Problem is primarily due to thermal expansion/warpage of the base reducing the effective pin length.

DISCUSSION:

Thermal characterization of the Fortron and Noryl showed improvement over the PB. Matt will request production quote for parts made from both material.

Results:

Change in reference dimension - RT to +150C

	Bases only	Crimped to sensor
300	.0021"	.0058"
Noryl	.0024"	.0028"
Fortron	.0014"	.0020"
Utem	.0011"	.0035"
	.0010"	.0017"

(some bases cracked at 150C)

(" " " " ")

(" " " " ")

TI-NHTSA 004690

NOTES: CRACKED ARE NHT

The prototype mold has been modified to add heaters to run Utem; parts will be due Tuesday or Wednesday (need confirmation of date). Will also

SHORT TERM ACTIONS

- = NEW ITEM OR COMPLETED ITEM
- * PRIORITY ITEM

FFSET FOR ALL SWITCHES = .056"
 REEP SPEC = 25 ms MAX'M ACTUATION
 150 ms MAX'M RELEASE

FIELDS:

- TESTER ~95% for P/C
- A.M. ~90% first calibration pass

VIBRATION TEST W/52 MIL OFFSET
 Test will be completed Wednesday, per George Olear.)

OFFILER

12/2 NO PROB

1-2
 ARE THEY IN
 ORIGINAL
 ORDER?

~134-154 LPPINUT
 ~150% ALL OTHERS ONLY
 (UNTIL END)

SAMPLE P/C BASE IN NAT'L ULTEM
 2200 IN PROTO MOLD MODIFIED TO
 INCLUDE HEATERS

SELLERS/
 WALTERS

CONVINCED ULTEM W/52 THE
 IN INK PATTERN

SAMPLE FORTON IN HEATED PROTO MOLD

SELLERS

PROD'N PRICING FOR FORTON AND NORYL

SELLERS

TEST FORTON AND NORYL ON PROD'N CRIMPER

SELLERS

→ MUST 1/5 PARTIAL
 CRACKING?

RETEST "CONTINUITY" FALLOUT @ HIGHER
 UPPER PRESSURE LIMIT

SWEET

Some due to snapped through discs; need to investigate.)

ADD CONTINUITY CHK AT 0 PSIG TO P-TESTER

SELLERS

MEASURE OFFSET ON SWITCHES FROM 45 TO 54
 MIL OFFSET LOT (SEE DISCUSSION NOTE ABOVE)

OFFILER

? W/52 100-100 CRIMP TEST?
 & THEN WHAT THREE/CABLE
 ABOVE 100 AND ABOVE 100
 LOOK @ SENSOR/DIN DIM'S

250K CYCLE IMPULSE TEST 45 TO 54 MIL
 OFFSET LOT

OFFILER

comp.

→ ABOVE TEMPERATURE SAT'Y
 W/52 100% THERE RIGHT?

REPEAT THERMAL CHARACT. AFTER IMPULSE
 ON ABOVE LOT

OFFILER

UNDERSTANDING THE PROBLEM CAUSE

- REPEAT THERMAL EXPANSION TEST W/
- 1. CYLINDRICAL PORTION OF BASE ONLY
- 2. ENTIRE BASE - NOT CRIMPED TO SENSOR
- 3. BASE MODIFIED WITH LARGER SENSOR NESTING
 DIAMETER, CRIMPED TO DUMMY SENSOR
 WITHOUT THE ENVIRON. SEAL

OFFILER

REPEAT THERMAL EXPANSION W/ALT. BASE MAT'LS
 45 TO 65 IN EACH OF 3 NEW MAT'LS RVS 4300
 LGARDS, YST NORYL FIRST
 AVE OZARN YST 4300 SECOND
 10-hitemp YST OTHER 2 AS SHOWN APPROPRIATE

OFFILER

SELLERS

W/52 WE TO BUILD TO
 CYLINDRICAL LIMITS



Supply Office
Climate Control Division

Ford Motor Company
Whitten Road Plant
14455 Whitten Road
Plymouth, MI 48170

March 26, 1992

To: J. Bros L. Klemczak
R. Douglas E. Lassila
J. Hanson T. O'Rourke
B. Was

Subject: Texas Instruments (T.I.) ISW Review and TQE Roundtable,
18 - 20 March 1992

1. The purpose of the subject visit to Texas Instruments' facility in Attleboro, Massachusetts, was to review and approve process modifications to several recent ISW submitted parts as well as discuss the TQE program and the likelihood of a future T.I. solicitation.
2. Part number F31H-19D594-A5, a pressure transducer, during ES testing (salt spray) conducted in January of this year was found to have 2 out of 20 samples that did not meet output requirements. Ford was notified on 8 January 1992, so as to insure that no devices were used in assemblies. Analysis of the two failed samples showed that moisture leaked into the electronics cavity via the environmental (RTV - Room Temperature Vulcanization) seal. In both cases, the leak started at one of the three crimp interrupts. Additional devices that did pass the test were also examined and had evidence of leakage starting around the crimp interrupt. The environmental seals on all these devices were examined and were determined to have a less than adequate amount of RTV in the crimp area, especially on the crimp interrupts. T.I. concluded that insufficient RTV, especially at the crimp interrupt, was the cause of moisture leakage into the electronics cavity which resulted in output anomalies. T.I. took immediate action and ran a series of controlled tests isolating and implementing the best fix option without impacting build schedule. New ISW submission parts were produced using 25% more RTV. These parts successfully passed ES - salt spray testing and showed no evidence of leak trails upon disassembly. As a result of these lessons learned during the ISW submission process, T.I. has modified their process by widening the RTV application nozzle. In order to not make this particular Ford part unique in set-up and operation, T.I. has increased the amount of RTV in all their transducers and switches. By making this the standard, rather than the exception, they will have precluded potential mix-up problems among similar operations.
3. Texas Instruments' currently holds a system survey score of 185, from Powertrain Operations in October 1986, well above the 180 minimum requirement for TQE consideration. Significant improvements have been made since and

TI-NHTSA 004701

additional Ford sourcing has been secured. Considered a prime candidate for TQE, by both SQA and Purchasing, T.I. was interested in additional information relative to solicitation. TQE Orientation Manuals were mailed out prior to my visit and a tentative schedule for submission was discussed. As a sidenote, T.I. received the highest rating given by the Ford Switch Commodity Team in August 1990.

4. ACTIONS/OBSERVATIONS:

- * CCD/SQA determine lead division for eventual T.I. TQE submission. (CCD will be lead division for TQE commodity solicitation.) 27 March 1992
- * CCD/SQA obtain back-up rating information from Switch Commodity Team. (Will be provided NLT 8 April 1992)
- * CCD/SQA investigate and determine feasibility of providing T.I. a sanitized, successful TQE submission package. Conveny review and routing procedures of TQE submission to preparation team members.
- * Since SQA's last review visit in the last quarter of 1991, the following process improvements have been implemented:
 - A. Decontamination tray added to hex-bolt assembly table. Prior to this SQA suggestion, metal hex-bolts were stacked on the table. Now a small covered well collects would-be particle debris.
 - B. Continuity test computer screen re-programmed so as to indicate good vs. bad parts more accurately. Previous display could show operator remnants of previous test and allow for operator acceptance of a rejected part.
 - C. RTV application increased for all switches. No "odd" application requirements.

5. Overall, T.I. has maintained an impressive grasp of continuous improvement. Incremental progress has been demonstrated with each review and is fortified by increased Ford sourcing. Dedicated and responsive management, team oriented cross functional team problem solving as evidenced via the recent RTV fix are the norm for T.I. Based on our recent discussions, a system survey will be conducted this year. CCD/SQA will work abreast T.I. in the road to TQE. They are a strong candidate and should be given commensurate attention. If you have any questions, please call me at 451-9083.

Michael J. Ott
Michael J. Ott
CCD/SQA

-MSG M#== 372799 FR=VAGS TO=COPY SENT=03/26/92 12:24 PM
ST=C DIV=0050 CC=00134 BY=VAGS AT=03/26/92 12:24 PM

TO: STEVE WALTERS MLDG
JIM KERN MLDG

CC: BILL SWEET PCME TOM CHARBONNEAU TC
NORM ROY MLDG RAY TOURANGEAU PCME
DAVE CZARN ZARN
STEVE OFFILER SBOI

FR: MATT BELLERS PCME

SJ: 46515-1,-2 MATERIAL COST QUOTES
=====

STEVE,

NOW THAT YOU DID SUCH A GOOD JOB OF SUPPLYING THE ALTERNATE MATERIAL TOLL ORDERS, WE WOULD LIKE TO REQUEST SOME QUOTES TO GO ALONG WITH THEM.

PLEASE QUOTE THE FOLLOWING IN YOUR STANDARD 48 HOUR TURN AROUND TIME:

PART NUMBER	MATERIAL
46515-1,-2	NORYL GTX 890 BLACK (-1), BROWN (-2) AND ALSO PLEASE LIST OTHER AVAILABLE COLORS AND THE ASSOCIATED COST FOR EACH.
46515-1,-2	FORTRON 40% FILLED BLACK (-1), BROWN (-2) AND LIST ALSO OTHER AVAILABLE COLORS AND ASSOCIATED COST.
46515-1,-2	ULTEM 2200 BLACK (-1), BROWN (-2) AND ALSO LIST OTHER AVAILABLE COLORS AND ASSOCIATED COST.

IT IS APPARENT THAT FORTRON AND ULTEM BOTH WILL REQUIRE SOME TOOLING UPGRADES TO ALLOW SUPPLEMENTAL HEATING DURING MOLDING. ADDITIONALLY, FAI'S ON BOTH INDICATE DIMENSIONAL ISSUES WILL PROBABLY RESULT IF WE CHANGE TO THESE NEW MATERIALS. THE TOOL WAS DESIGNED FOR PBT ALLOWANCES.

COULD YOU BALLPARK, FOR BUDGETARY REASONS ONLY, ANY TOOLING WORK THAT WOULD ALSO BE REQUIRED IF WE CHANGE TO EITHER NORYL, FORTRON, OR ULTEM.

TI-NHTSA 004703

OTHER QUESTIONS:

=====

1. HOW WOULD A CHANGE TO THESE MATERIALS AFFECT MAINTAINABILITY OF THE BASE MOLD. MORE RE-WORK, MORE DOWNTIME, REDUCED MOLD LIFE, ETC.
2. HOW WOULD EACH OF THE PROPOSED MATERIALS AFFECT MOLD CAPACITY.
3. HOW WOULD EACH OF THE PROPOSED MATERIALS AFFECT DIMENSIONAL CAPABILITIES ON IGP IDENTIFIED SPC DIMENSIONS.
4. ARE THERE ANY OTHER ITEMS WE SHOULD BE AWARE OF BEFORE MAKING A MATERIAL DECISION?

-MSG M# 370306 FR=ZARN TO=GAMY SENT=03/26/92 11:11 AM
R#-124 ST=C DIV=0050 CC=00101 BY=ZARN AT=03/26/92 11:11 AM

MARCH 26, 1992

TO: RUSTY STRUBLE	RCS2	CC: TOM CHARBONEAU	TC
MIKE DeMATTIA	MD3	JOHN KOURTESIS	MDES
CHARLIE DOUGLAS	CMP1	STEVE MAJOR	SMFH
DICK GARIEPY	MFPC	ANDY McGUIRK	PCQA
PAUL KOTCH	PRK1	ED O'NEILL	EJON
JOE LAZARZ	JNL8	NORM FREDA	WHLZ
STEVE OFFILER	SB01	GARY SNYDER	CPPC
MATT SELLERS	PCME	MARTHA SULLIVAN	CPPC
BILL SWEET	PCME	RAY TOURANGEAU	PCME
JIM WATT	PCQA	BILL CONGDON	MFPC
TERRY RODRIGUEZ	MFPC	STEVE MCCOOEY	MDES
		ELAINE ROSE	GAMY

FR: DAVE CZARN ZARN

SJ: FORD CRUISE CONTROL PRESSURE SWITCH START-UP MEETING
MINUTES OF 3/26/92 MEETING

MEETING

THE NEXT MEETING IS SCHEDULED FOR:

DATE:	04/02/92 (THURSDAY)	*****
TIME:	1:00 - 2:30 PM	
PLACE:	CPD CONF. RM.	PLS. NOTE ROOM & TIME CHANGE *****

77PS

Hexport:

Elco is still 100% sorting hexports for slivers/stringers. Elco c/a indicates that Elco and TI will evaluate a modification to the length and diameter of the bore closest to the internal gland side of the hexport. We don't know what Elco is doing at the moment; Paul, please champion the effort to get this resolved.

- * REPORT ON ELCO'S PROGRESS IN RESOLVING KOTCH ONGOING
SLIVER/STRINGER ISSUE
- * HAVE ELCO RETEST GAGE FOR STUDY KOTCH T-B-D
- * ELCO J512 GAGE FOR STUDY SELLERS T-B-D
- * ADD SLIVER/STRINGER INSPECTION TO IQP ROSE 03/19 COMP.
FOR P/N 36900

Production/Quality Issues:

DIAPHRAGM LIFE

HIGH TEMP LOSS OF CONTINUITY

(Separate mtgs are being held daily)

- * LOCK OUT "CREEP CHK DISABLE" FUNCTION SELLERS 03/26 ORIG.
FROM P-TESTER? 04/02 REV.

RMR's

4 L/T switches returned; system reportedly inoperable - "no continuity" is probable cause. It's possible (...and maybe even probable) that the switches were not at fault. However, I still

TI-NHTSA 004704

believe this is not an issue that we should let drop, as it may indicate a switch, system, or Ford assembly problem ! Jim agreed to pursue further.

* F/U WITH THE APPROPRIATE INDIVIDUAL TO DETERMINE IF THESE SWITCHES FUNCTION CORRECTLY IN THE SYSTEM.	FREDA	03/26	no conclusions
--	-------	-------	----------------

EASTERN AUTOMATION RIVETING OPERATION

(Mid-May targeted for changeover to new rivet operation)

. PROVIDE D. CZARN W/NEW RIVETS	SELLERS	03/19	COMP.
. SEND TO FORD/GET SREA APPROVAL	OFFILER	03/26	COMP.
* F/U WITH PEASE AND PELKEY RE: RIVET SREA SIGN-OFF	FREDA	04/02	

FLAKING/CLEANLINESS

Jim proposed an alternate approach to maintaining tote cleanliness whereby a recyclable liner is used in the totes for a T-B-D period of time and parts are transferred between totes by hand (rather than "dumping" from one tote to another). Pilot run will be conducted next week.

Matt's received a proposal for vacuuming sensors and final switches after crimping, to remove metal flakes and other particulate. Cost is \$5k/station x 2 stations.

. LONG TERM C/A	SELLERS/	ONGOING	
	WATT		
. ADD PM'S TO QC INSPECTION - ALL 77PS OP'S PLUS 52PS SENSOR ASM.	WATT/ SMITH	03/19	COMP.

DANA PRESSURE TEST CORRELATION

* CALL DANA TO REQUEST THAT CAL'N DATA BE PROVIDED FOR 42 SWITCHES; DISCUSS SPECIFICS OF TEST PROCEDURE	WATT	03/13	COMP.
* PROVIDE TEST PLAN TO BRUCE PEASE	* OFFILER	03/13	COMP.
* COMPLETE TESTING AND REPORT TO BRUCE	OFFILER/ WATT	04/16	

Sensor Assembly Machine:

. PRIORITIZE REMAINING UPGRADE ITEMS	SELLERS	ONGOING	
--------------------------------------	---------	---------	--

Base Assembly Machine:

Ultrasonic welder in-house until 4/03. Evaluation plan needs to be defined ASAP.

* DEFINE PLAN FOR EVALUATING U-S WELDER	SELLERS/ OFFILER/ McCOEY	03/27	
* BUILD PARTS	SELLERS	04/03	

Final Assembly Machine:

ISR:

TI-NHTSA 004705

Issues: Teves pkg. not approved because SPC data is needed on thread Pd and J512 chamfer OD (SC's on print). The latter is not measure directly; rather, the J512 gage procedure is used which measures a dimension that defines the angle and chamfer depth. Jim

will propose to Teves that this not be defined as a Significant Characteristic.

* GET HEXPORT CONTROL PLAN FROM MATT AND REVW TO SEE IF SPC DATA IS COLLECTED	WATT	03/16	COMP.
* UNDERSTAND REASON FOR TEVES' REQUEST AND RESPOND	WATT	03/20	COMP.
* PROPOSE ELIMINATION OF CHAMFER OD AS A SIGNIF. CHARACTERISTIC (TEVES)	WATT	04/02	
* PROVIDE QUARTERLY Cpk REPORT	WATT	03/31	
* SUBMIT DANA/PITTS PKGS	WATT	01/23	ORIG.
		04/02	REV.

Ultra-Low Differential Switch MY93

Dale Sogge will champion ultra-low differential switch efforts; items will be covered at separate meetings.

Miscellaneous:

* BUILD 35 L/T SWITCHES WITH 3A GAGED 10B21 HEXPORTS TO BE SUPPLIED BY KLAINE	ROSE/RODRIGUEZ	03/19	COMP.
* DISCUSS IDEA OF POSTING PFMEA's AT PROD'N OPERATIONS W/ TEVES; GET SAMPLE (discussed; will send sample)	WATT	03/26	ORIG.
* HOW DO WE PREPARE FOR A CLEANLINESS AUDIT FROM TEVES?	WATT	04/02	REV.
(Audit would look at cleanliness of switch only; i.e., not audit of production line cleanliness. No audit planned.)			
* TEVES CRITERIA FOR CONTAMINATION	WATT	04/09	
* RE-USABLE PACKAGING FROM TEVES?	WATT		

Production Plan:

MAINTAIN RUNNING TOTAL OF L/T (L2-3) SWITCHES LEADING TO 100K FOR AMORTIZATION	STRUBLE	ONGOING
Status Date Total Shipped		
Rusty, need update.....		
UPDATE PRODUCTION PLANS	STRUBLE	ONGOING

	P/C	L/T
	77PSL2-1	77PSL2-3
MAR	64.7	22.6
REGARDS,		41.412K
DAVE CZARN		SHIPPED to date
	155-PORD	

APR.	APR.
15.1	11.3

FAI OK
NORYL BASES?

will not

77 1271

Black not Brown

F58A-9F924-AH
77L3
Prototype
77 P/C - Quiet Switch
FAI - O.C.S.
angle at top
 $\pm 12^\circ$ to $\pm 7^\circ$
 $0.25 \times 40^\circ - 50^\circ$

-MSG N#- 526545 FR-AHOP TO-GANY SENT-04/01/92 07:00 AM
R#-130 ST-C DIV-0050 CC-00673 BY-AHOP AT-04/01/92 07:00 AM

MEMORANDUM:

March 31, 1992
92-128

4711PSL3-1

TO: ELAINE ROSE GANY
CC: NEIL MACKINNON MAPA
JOE PAVAO MAPA
FR: AL HOPKINS AHOP
SUBJECT: DISCOLORATION ON CONTACT
- TSL # 110790

CONCLUSIONS:

The discoloration is caused by a thin layer of silver sulfide (tarnish).

RESULTS AND DISCUSSION:

SEM-EDAX (Scanning Electron Microscope with Energy Dispersive

Analysis of X-Rays) analysis was performed originally. It showed a large amount of carbon, sodium and chlorine contamination. The pattern of this contamination didn't match that of the visual stain. I suspect that this contamination was the result of handling at one time or another.

The Auger analysis showed that the stained areas had excessive amounts of sulfur. We have often seen this color stain be caused by high levels of silver sulfide formed by atmospheric attack on silver plated surfaces (such as leadframes). I suspect, but am not sure, that it has something to do with the higher surface activity of a plated surface.

The data will be sent by Grace Dias (X3044) through the internal mail.

AL HOPKINS

MSG: AHOP

MS: 10-16

X3040

TI-NHTSA 004707

UNITED ALUMINUM CORPORATION

100 UNITED DRIVE • P.O. BOX 215 • NORTH HAVEN, CONNECTICUT 06473



CUSTOM ROLLED™ ALUMINUM SHEET

#74797

0021

SOLD TO: VA003
ATTN: DICK WHITNEY

VALENTINE TOOL & STAMPING INC.
171 WEST MAIN STREET
NORTON, MA 02766-0469

DATE March 27, 1992
CUST. PO# 14726
ORDER SPECS 5052-O .03200 x 2.312
UA ORDER# 166712D
SPECIFICATIONS ASTM B209, QQ-A-250/8

CHEMICAL COMPOSITION LIMITS

This is to certify the following chemical composition limits, based on an individual or blanket certification of analysis supplied to United Aluminum by its vendor(s):

	VENDOR CERTIFICATION	
	MIN	MAX
SILICON		0.25
IRON		0.40
COPPER		0.10
MANGANESE		0.10
MAGNESIUM	2.2	2.8
CHROMIUM	0.15	0.35
ZINC		0.10
OTHER ELEMENTS (EACH)		0.05
OTHER ELEMENTS (TOTAL)		0.15
ALUMINUM	REMAINDER	

MECHANICAL PROPERTY RESULTS

This is to certify that the following are the results of the mechanical property test(s) performed by United Aluminum, based on a minimum of one sample for the order:

TENSILE STRENGTH (KSI)	28.2
ELONGATION (%)	24

Any test results reported above are subject to the limitations of the testing process. All sales are subject to United Aluminum's Terms and Conditions contained on the reverse of its Sales Order Acknowledgement.

copyright (c) 1991 United Aluminum Corp.
MS SHIP SHIP 2

03/27/1992 14:22:15
00124-00002 05254

TI-NHTSA 004708

March 27, 1992

To: Tom Charboneau
Fr: Steve Offiler for Stan Homol for Dave Czarn
Re: Pressure Switch Group Weekly Highlights
Week ending March 27, 1992

[Handwritten signature]
920327

VOLVO

Base mold modifications were completed by AFCC, and FAI passed. Terminals stacked on production line with no apparent problems. Samples being prepared for seal integrity testing using the modified base and M5-13 preform. Multi-Seals indicates that the M5-13 preform costs the same as the DC-004.

Complete evaluation of alternate pre-forms	Amore	3/25
Release base mold modifications for improved flow	Spooner	comp.
Evaluate epoxy fill w/modified bases	Amore	3/27
Identify C/A to film deposits on terminals	Amore/Spooner	t-b-d

78PS - FORD F3LB HPCO

The meeting held at Ford last Friday to determine program direction resulted in a decision to use the HPCO switch solely on the VN58 (Econoline) platform for MY94. It appears that HPCO usage on this platform will be a trial run for further Light Truck usage in MY95. Sample orders will be continuing. Norm Freda is working to clarify Pass Car usage in MY95.

ZUA Pump-mounted P/S switch

It appears that Zua has replicated the Undia failure mode. They are eager to improved samples, with new thermoset base material and modified gasket. The heating test shows the device falls out of calibration when brought to 600°F and 22 lb. load applied.

NISSAN P/S

PBT was used to build the 3/13 samples; an alternative material (Fortron, Noryl, Ultem) should be evaluated for future samples, if needed. Evaluation of these materials is ongoing for the CCPS.

FORD CCPS - 77PS - MY92

Daily meetings addressing the high temperature issue continue. Follow up testing has confirmed that our interim corrective action of a modified pinning target is acceptable. Testing has also verified the major cause of the thermal shift to be base movement. We have received bases molded in Fortron, Noryl, and Ultem. Thermal shift characterizations are ongoing. While cracking was an issue with Fortron, it was molded cold. After heating the prototype mold for Ultem, some Fortron was rerun. We are presently working to characterize the thermal performance of these materials, using the base direct measurement techniques in addition to build of test lots of devices pinned at 45 to 65 mil offsets for thermal shift characterization. Cost estimates are due by 920330.

Regarding the noise issue on EN53, management at the St Thomas Assembly Plant has issued a Concern into Ford's system. They are requiring a Job 1 '93 permanent corrective action. Bruce Maeroff, manager of Pass Car Brake Eng. insisted an "8D" be forwarded to him today.

TI-NHTSA 004709

HIGHLIGHTS - 03/27/92 - Page 2

which Norm Freda will hand-carry. We have requests for 30 silent devices for STAP, and 20 for the SHO Taurus (Atlanta ?), all suitable-for-sale. We're presently making model-shop snubbers which will be built with regular low-diff discs for the SHO; actions TBD for STAP. We wish to avoid the ultra-low discs at this time due to their drastically reduced pin window, which aggravates the thermal shift concern.

Define Ultra-low diff disc processing	Ballard/ Sogge	04/10
Characterize discs, sensors	Sogge	03/30
Define device processing	Sogge/ Sellers	04/24

57PS and 87PS validation testing has been impacted by the thermal shift problem. We will do what's necessary to maintain the 4/15 completion of the two critical test programs, with completion of all testing by late May. A concern is that we have no time to recover from any additional problems. Daily meetings are being held to review actions required to meet the aggressive schedules and to allocate resources. Overtime for Jeff, Loris, and to some extent Sean and Rich will continue into May. (Watch out, Ron.)

DOWNSIZED 77PS

Program direction needs to be defined.

Determine needs for each platform	Sogge/ Freda	4/03
Set-up mtg to define program direction	Czam	3/27

SATURN VISIT

We were informed that they will change to R134A for MY94. They'd like a gasket material compatible with both R12 and R134A for MY93 devices. Ongoing testing of HNBR with R12/mineral oil will show if it is suitable for both refrigerants.

TI-NHTSA 004710

DATE 3/27/12

	DISC			PASSENGER CAR CUP				TRUCK CUP			
	ACT	REL	Δ	ACT	REL	PIN	WINDUP	ACT	REL	PIN	WINDUP
ULTRA LOW DIFF B-3 TRUCK DISC	27.9	26.5	1.4	168	131	2.1	13.4	276	220	1.9	21.3
LOW DIFF 3D TRUCK DISC	29.8	27.4	2.4	186	146	3.0	15.3	318	234	3.4	21.1
LOW DIFF 2D TRUCK DISC	30.0	27.4	2.6	178	138	2.8	12.5	304	228	3.7	20.0
MODERATE LOW DIFF B1 TRUCK DISC	29.7	25.4	4.3	181	145	4.2	15.6	310	226	4.2	21.2
PRODUCTION TRUCK DISC											
ULTRA LOW DIFF CAR DISC P2 600HP 2000IN FREQUENCY				133	101	3.6	15.9				
MODERATE LOW DIFF H LOT CAR DISC 600HP 2000IN FREQUENCY	22.6	19.6	3.0	136	96	3.3	12.5				
PRODUCTION CAR DISC			11	136	59	5.8	14.5				
LOW DIFF CAR DISC 6-1 FRO 22224 5000 2000IN HP	23.1	20.2	2.9	132	78	4.3	13.9				

TI-NHTSA 004711

DATE 5066E 3/11/92

	DISC			PASSENGER CAR CUP				TRUCK CUP			
	REL	REL	Δ	ACT	REL	FIN	TOTAL	ACT	REL	FIN	TOTAL
ULTRA LOW DIFF B-3 TRUCK DISC	27.9	26.5	1.4	168	131	2.1	13.1	226	220	1.9	21.3
LOW DIFF 3D TRUCK DISC	29.8	27.4	2.4	186	146	3.0	15.3	218	234	3.0	21.1
LOW DIFF 2D TRUCK DISC	20.0	27.9	2.6	178	138	2.8	12.5	244	228	3.7	20.0
MODERATE LOW DIFF B1 TRUCK DISC	29.5	25.9	4.3	181	145	4.2	15.6	216	226	4.2	21.2
PRODUCTION TRUCK DISC											
ULTRA LOW DIFF CAR DISC											
MODERATE LOW DIFF CAR DISC	23.6	19.6	3.0	136	96	3.3	12.5				
COAST .015" PROTECT											
PRODUCTION CAR DISC			11	136	59	5.8	14.5				

TI-NHTSA 004712

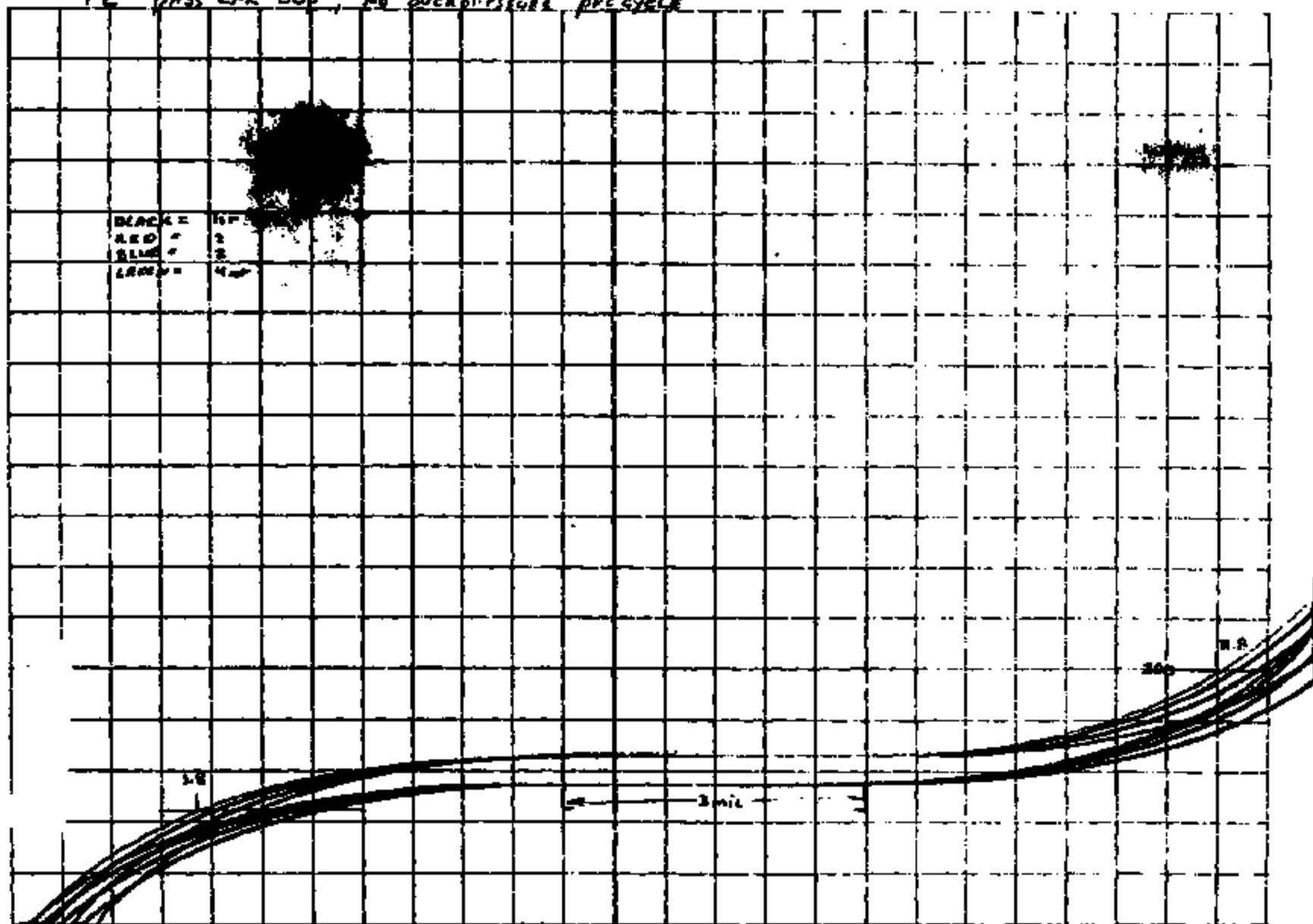
442



TI-NHTSA 004713

F2 PASS CPM SUP, NO OVERSTRESS PRE CYCLE

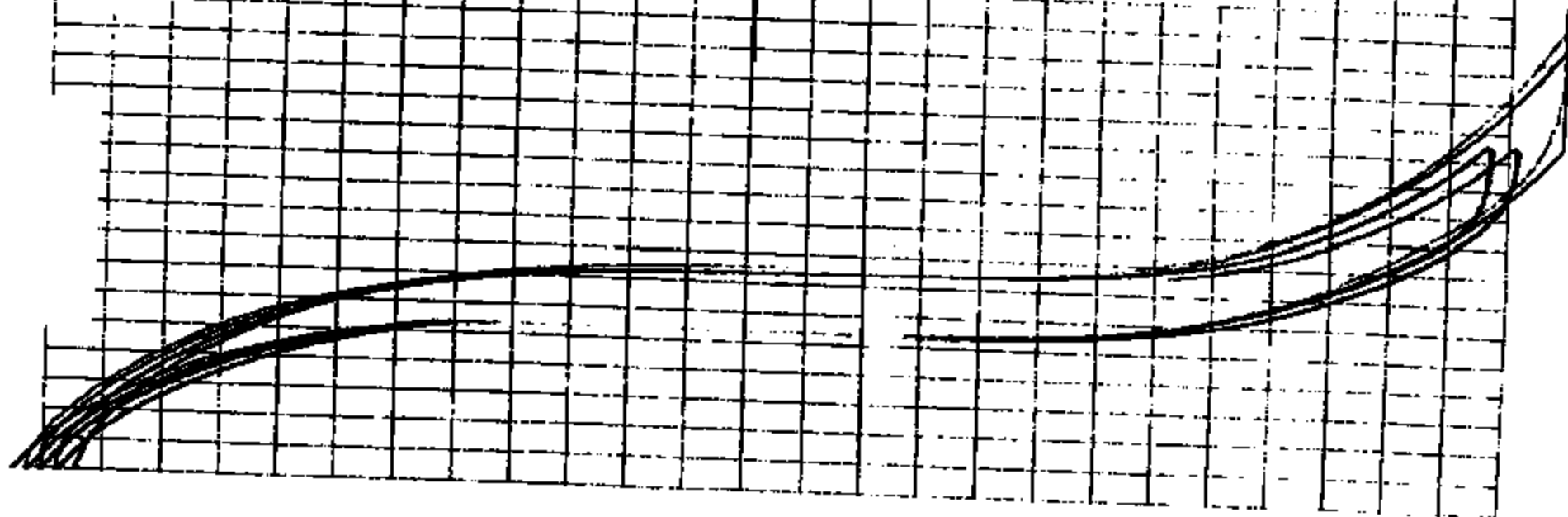
BLACK = 100
 RED = 2
 BLUE = 2
 GREEN = 400



TI-NHTSA 006714

F3 PASS CAR LUP, TWO OVERPRESSURE PEECYCLES TO 750psi

BLACK = 1ST CYCLE
RED = 2ND CYCLE
BLUE = 3RD CYCLE
GREEN = 4TH CYCLE



DATA 3/27/92

*** REMARKS ***

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[illegible]

TJ-NHTSA 004716

