EA02-025

TEXAS INSTRUMENTS, INC.'S 9/10/03 ATTACHMENT

REQUEST NO. 7

BOX 8

PART A-U

PART F

-MSG M#= 50055 FA=MJS2 TO=COPY SENT=05/13/93 07:11 AM
ST=C DIV=0050 CC=00134 BY=MJS2 AT=05/13/93 07:11 AM

TO: ED KADISEVSKIS EKAD
GENE WEBER STEL
LOU ROCHA MAYR

CC: BILL SWEET WS4
DICK GARIEPY RWG3
TERRY RODRIGUEZ TER7
JIM GRAMMER JG01
DAVE PERIPOLI ELTL
BOB BASILIERE ELTL

FR: MATT SELLERS MJS2

SJ: 57PS TESTER UPGRADE SCHEDULE

WE PLAN TO RESERVE 5/20/93 AND 5/21/93, (THUR. & FRI.), AS DOWNTIME TO ALLOW COMPLETION OF YOUR INSTALLATION WORK FOR MWO # 6248.200. 5/22 AND 5/23 CAN BE USED AS NEEDED. THIS UPGRADE WILL ALLOW US TO TEST ALL 77PS AND 87PS PRODUCT ON THE 57PS TESTER. ADDITIONALLY, WE WILL WANT TO COMPLETE TABLE MODIFICATIONS THAT WILL ALLOW INTERFERENCE FREE UNLOAD OF DEVICES WITH THE LONGER 36917-1 HEXPORT. ie. 77PSL6-1, 57PSL11-2, 57PSL8-1, ETC. PLEASE SEE LOU ROCHA OR ME FOR DIMENSIONAL DETAILS RELATED TO THIS CHANGE.

REGARDS . . . MATT
X1245

MECHANIZATION WORK ORDER SHT. 1 OF 1

Form 30659

Date Entered By MECHANIZATION

Project No. 253-880-11

Product Code

CC

☐ Proposal ☐ Design ☒ Build Urgent

Requested By (Print)	Date	Mail Sta.	Tel. Ext.
Matt Sellers	11/6/92	12-37	1245
Assigned By	11/12/92		
Engineer	TRS		

RECOM. PRODUCT PRINT NOS. SUPPLIED LIST

	Drawing
1	
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PROJECT DESCRIPTION

TPS FTM programming per memo # 306748 dated 11/10/92,

Estimated 1 day work

Not to exceed 8 hours work

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

BUILD CLOSED DATE

WHITE – MECHANIZATION COPY YELLOW – ORIGINATOR'S COPY

TI-NHTSA 011749

[illegible] 14:[illegible] ACUSHNET RUBBER DIVISION [illegible] P.01

ACUSHNET COMPANY.
RUBBER DIVISION

744 Belleville Ave., P.O. Box [illegible], New Bedford, MA USA [illegible]
Tel. [illegible] / FAX [illegible]

cc: [illegible] 5/17

QUOTATION

May 17, 1993

Rufax 5/18/93

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 2

To [illegible]	From [illegible]
Co. [illegible]	Co. Acushnet Co
Dept.	Phone # 800-343-[illegible]
Fax # [illegible]-5762	Fax # 998-4100

[illegible]
[illegible] Avenue
[illegible], [illegible] [illegible]

Attn: [illegible]

Gentlemen: Re Your Part [illegible], [illegible]

Your Inquiry [illegible] Our Assigned No. [illegible]

We quote you on the above part, subject to immediate acceptance and to the clauses printed below and on the back of this sheet. [illegible]

1. Quotation on Tools Required
   A. [illegible] Molds of [illegible] cavities Cost [illegible] Each, Net.
   B. We estimate delivery of tooling [illegible] weeks after receipt of order.

   [illegible]
   [illegible] [illegible]
   [illegible] [illegible]

2. Quotation on Rubber Parts
   A. In lots of [illegible] [illegible] Each
      " " " [illegible] [illegible] Each
      " " " [illegible] [illegible] Each
   B. Terms on parts are Net, F.O.B. NEW BEDFORD, MASS.
   C. The proposed [illegible] [illegible] and has a [illegible] [illegible].
   D. The estimated production per 8-hour shift per mold is [illegible] pieces. We normally will run the mold equipment 2 shifts 5 days per week, and will try to run at least two shifts if schedules warrant doing so.
   E. Shipping weight per [illegible] pieces approximately [illegible] pounds.

1. [illegible]
2. [illegible]
3. The [illegible] price quotation is based upon current costs, subject to change [illegible] by major adjustments in material, labor and/or energy costs.
4. [illegible] will be subject for review after [illegible] days.

Yours very truly,
ACUSHNET COMPANY

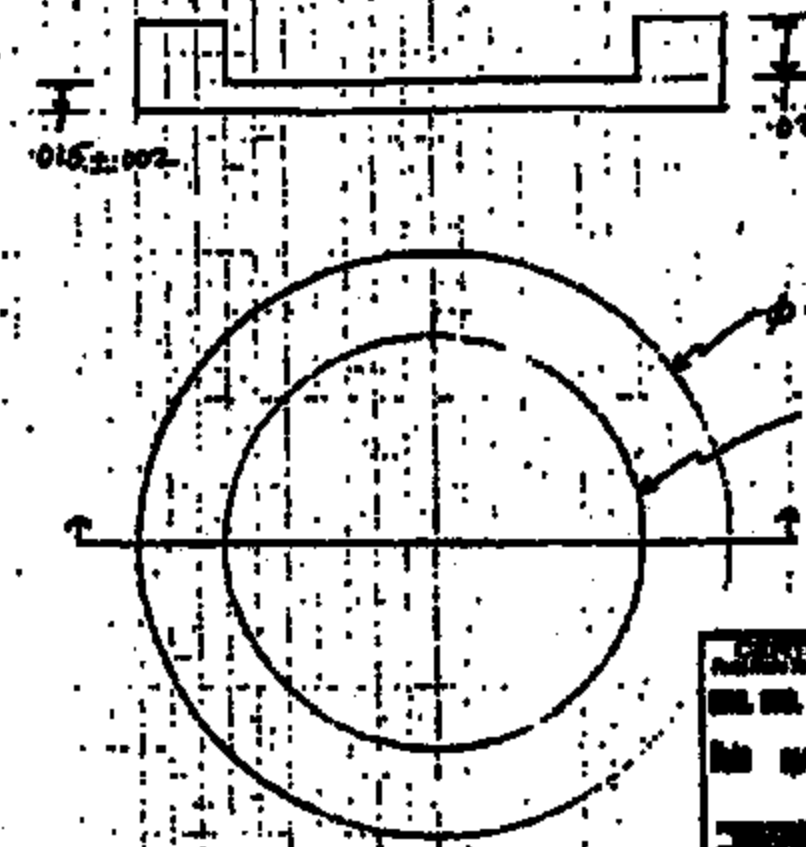
By [signature]
[illegible], Sales Service Representative

THESE QUOTATIONS AND ACCEPTANCE THEREOF ARE SUBJECT TO ALL THE TERMS AND CONDITIONS [illegible]

We appreciate the opportunity of

TI-NHTSA 011749

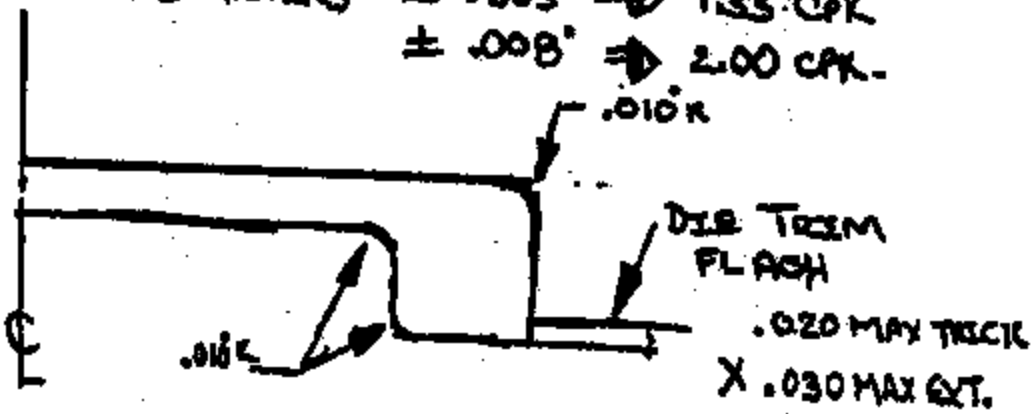
Rev 1	EX3423-68	Rubber Diaphragm	3/1/93	RE



Proof Pressure:	4000 psig
Burst Pressure:	7000 psig
Stroke:	.010" to .015" for diaphragm area (ϕ.474/.466)
Working Fluid:	DOT 3 Brake Fluid on High Pressure Side Air on Low Pressure Side
Cycle Life:	500K cycles, 0-1450 psig, 2 Hz, 135°C in brake fluid with minimum reliability of 90% at 90% confidence.
Material:	EPDM Reinforced Diaphragm, Durometer 70±5 Shore A
Fabric Reinforcement:	TBD

THICKNESS - ± .003" ⇒ 1.33 CPK
± .004 ⇒ 2.00 CPC

DIAMETERS ± .005" ⇒ 1.33 CPK
± .008" ⇒ 2.00 CPK.



TI - EX3423-68

EST # 8911

ACUSHNET CO.

J A Tavares
10 MAY 93

SPC001 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC0781
800201 RELEASE 2.86 DATE: 93/05/26
#SPEC# PARAMETER SPECIFICATIONS TIME: 12:49:57

process: 52SH2

description: SENSOR HEIGHT employee id: 64009

maximum records: 1500 file full: STOP CONTINUE pct full: 100

usl: 0.30200 x ucl: 0.28974 r ucl: 0.00600

lsl: 0.27400 x lcl: 0.27738 r lcl: 0.00000

un-natural pattern checks: CURRENT EXTENDED NONE

use calculated limits: YES NO halt pending process change: YES NO

min observations: 5 max observations: 5

input format: NORMAL p_CHART (BAD/GOOD BAD/TOTAL)

control: X_RANGE X_SIGMA

f12

SPC001 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC0781
S00201 Z RELEASE 2.66 DATE: 93/05/26
SPEC PARAMETER SPECIFICATIONS TIME: 12:51:32

process: 57PS-HZ

description: SENSOR HT. AMI employee id: 752025

maximum records: 1000 file full: STOP CONTINUE pct full: 100

usl: 0.30200 x ucl: 0.28674 r ucl: 0.00600

lsl: 0.27400 x lcl: 0.27738 r lcl: 0.00000

un-natural pattern checks: CURRENT EXTENDED NONE

use calculated limits: YES NO halt pending process change: YES NO

min observations: 3 max observations: 5

input format: NORMAL p_CHART (BAD/GOOD BAD/TOTAL)

control: X_RANGE X_SIGMA

f12

SPC001 STATISTICAL PROCESS CONTROL -- 9087 SYID: IPC0781
S00201 TA RELEASE 2.86 DATE: 93/05/26
SPEC PARAMETER SPECIFICATIONS TIME: 12:52:41

process: 77SENHTA

description: 77PS SENSOR HEIGHT employee id: 752025

maximum records: 1500 file full: STOP CONTINUE pct full: 62

usl: 0.30200 x ucl: 0.28874 r ucl: 0.00600

lsl: 0.24700 x lcl: 0.27738 r lcl: 0.00000

un-natural pattern checks: CURRENT EXTENDED NONE

use calculated limits: YES NO halt pending process change: YES NO

min observations: 5 max observations: 5

input format: NORMAL p_CHART (BAD/GOOD BAD/TOTAL)

control: X_RANGE X_SIGMA

F12

$\bar{\bar{X}} = 0.28306$

$\bar{R} = 0.00274$

$\sigma = 0.00189$

$3\sigma = 0.00568$

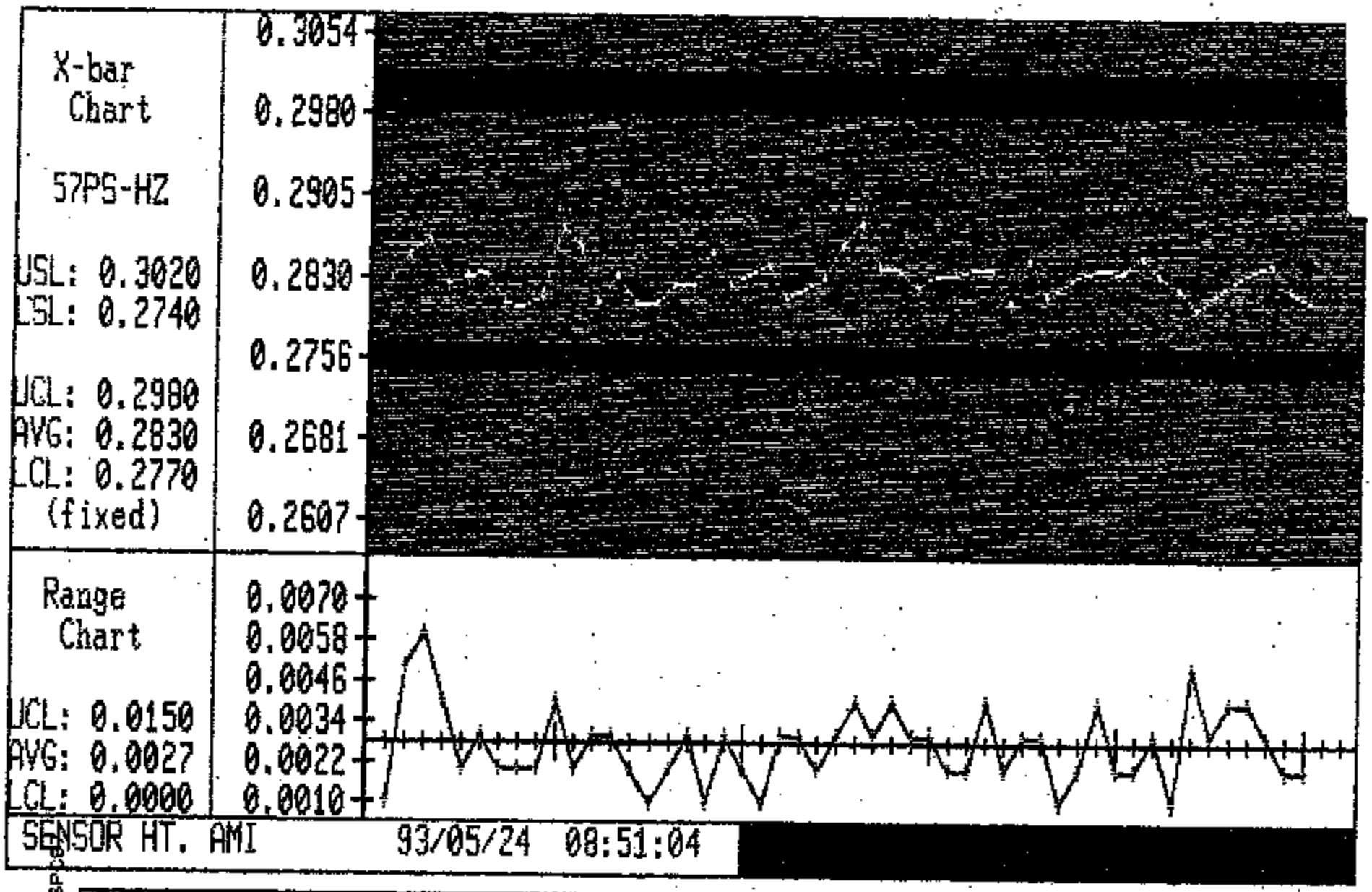
Title: 57PS-HZ SPC File Name: 57PS-HZ

0.2812			0.2860		
0.2820	0.0032	Range	0.2830	0.0048	Range
0.2844	0.2829	X Bar	0.2820	0.2833	X Bar
0.2840			0.2812		
0.2828	1		0.2842	6	
0.2816			0.2832		
0.2802	0.0048	Range	0.2822	0.0032	Range
0.2824	0.2825	X Bar	0.2854	0.2831	X Bar
0.2832			0.2824		
0.2850	2		0.2822	7	
0.2836			0.2804		
0.2838	0.0024	Range	0.2804	0.0054	Range
0.2836	0.2830	X Bar	0.2834	0.2821	X Bar
0.2826			0.2806		
0.2814	3		0.2858	8	
0.2848			0.2876		
0.2808	0.0040	Range	0.2810	0.0076	Range
0.2838	0.2833	X Bar	0.2810	0.2820	X Bar
0.2898			0.2800		
0.2832	4		0.2804	9	
0.2834			0.2834		
0.2824	0.0058	Range	0.2830	0.0040	Range
0.2840	0.2844	X Bar	0.2824	0.2841	X Bar
0.2849			0.2864		
0.2802	5		0.2852	10	

Total		Total	
Range Bar	0.0040	Range Bar	0.0050
X Dbl Bar	0.2832	X Dbl Bar	0.2829

Sigma		Sigma	
3 Sigma	0.0048	3 Sigma	0.0063
5 Sigma	0.0080	5 Sigma	0.0105

Control Limits		Control Limits	
UCL X bar	0.286	UCL X bar	0.286
LCL X bar	0.281	LCL X bar	0.280
UCL Range	0.009	UCL Range	0.011
LCL Range	0.000	LCL Range	0.000
USL	0.2904	USL	0.2924
LSL	0.2760	LSL	0.2734



TI-NHTSA 011756

E:\SPC87\SP

E:\SPC87\SP

f12

SPC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC0781
S00501 Z RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:32:23

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
93/05/24	08:51:04	725933	0.2812	0.0030	
93/05/24	05:23:12	749916	0.2820	0.0020	
93/05/21	18:55:31	750386	0.2844	0.0030	
93/05/21	17:50:32	750386	0.2840	0.0040	
93/05/21	16:46:37	750386	0.2828	0.0040	
93/05/21	03:17:21	749916	0.2816	0.0080	
93/05/21	01:57:51	749916	0.2802	0.0050	
93/05/21	01:05:19	749916	0.2824	0.0010	
93/05/20	19:04:35	750386	0.2832	0.0030	
93/05/20	18:06:08	750386	0.2850	0.0020	
93/05/20	17:00:28	750386	0.2836	0.0020	
93/05/20	11:35:17	724550	0.2838	0.0040	
93/05/20	10:39:55	725933	0.2836	0.0020	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

SPC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC0781
S00501 Z RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:33:40

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
93/05/20	03:32:17	749916	0.2826	0.0010	
93/05/20	01:27:22	749916	0.2814	0.0030	
93/05/19	13:03:56	724550	0.2848	0.0030	
00/05/19	00:59:05	749916	0.2808	0.0020	
00/05/19	23:44:44	750386	0.2838	0.0040	
00/05/19	22:52:06	750386	0.2838	0.0020	
00/05/19	21:16:14	750386	0.2832	0.0020	
00/05/19	17:29:05	750386	0.2834	0.0030	
00/05/19	13:55:52	724550	0.2824	0.0030	
00/05/19	11:41:29	724550	0.2840	0.0040	
00/05/19	10:50:21	724550	0.2840	0.0030	
00/05/19	09:36:05	724550	0.2882	0.0040	
00/05/19	08:39:40	724550	0.2860	0.0030	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

SPC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC0781
S00501 Z RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:34:08

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
00/05/18	05:05:36	749916	0.2830	0.0020	
00/05/18	04:05:47	749916	0.2820	0.0080	
00/05/18	00:54:19	749916	0.2812	0.0090	
00/05/17	23:52:44	750386	0.2842	0.0010	
00/05/17	16:14:30	750386	0.2832	0.0020	
00/05/17	14:17:16	725933	0.2822	0.0030	
00/05/17	07:59:48	725933	0.2854	0.0010	
00/05/17	05:01:02	749916	0.2824	0.0030	
00/05/17	04:06:30	749916	0.2822	0.0020	
00/05/17	02:17:34	749916	0.2804	0.0010	
00/05/17	01:26:48	749916	0.2804	0.0020	
00/05/15	16:58:22	750386	0.2834	0.0030	
00/05/15	14:51:39	750386	0.2806	0.0030	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

SPC005 STATISTICAL PROCESS CONTROL — S087 SYID: IPC0781
S00501 Z RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:34:36

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
00/05/14	09:20:01	724550	0.2858	0.0020	
00/05/14	08:01:32	724550	0.2876	0.0040	
00/05/14	05:07:55	749916	0.2810	0.0020	WRONG DATA P.WEE
00/05/14	03:49:34	749916	0.2810	0.0020	
00/05/14	02:31:15	749916	0.2800	0.0020	
00/05/14	01:00:07	749916	0.2804	0.0020	
00/05/13	23:51:29	750386	0.2834	0.0030	
00/05/13	22:32:07	750386	0.2830	0.0020	
00/05/13	16:16:16	750386	0.2824	0.0040	
00/05/13	15:08:55	57	0.2864	0.0060	
00/05/13	13:00:17	724550	0.2852	0.0050	
00/05/13	10:31:46	725933	0.2826	0.0010	
00/05/13	05:50:59	749916	0.2814	0.0010	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

TI-NHTSA 011758

$\bar{X} = 0.28430$

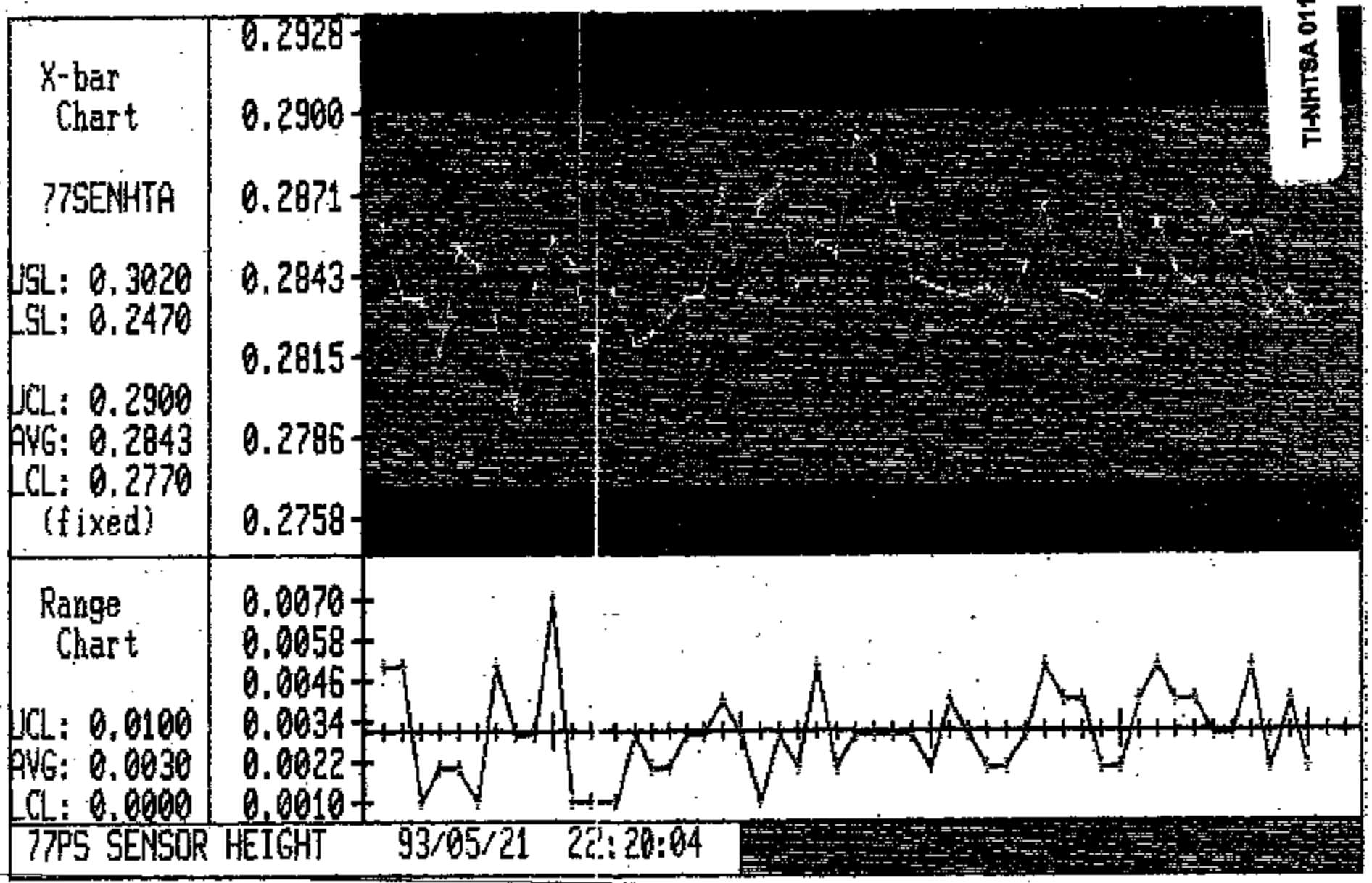
$\sigma = 0.00179$

$3\sigma = 0.00537$

$\bar{R} = 0.00302$

Title: _77SENHTA			SPC File Name: _77SENHTA		
0.2828			0.2850		
0.2836	0.0028	Range	0.2854	0.0036	Range
0.2828	0.2841	X Bar	0.2838	0.2857	X Bar
0.2856			0.2874		
0.2858	1		0.2868	6	
0.2866			0.2836		
0.2838	0.0028	Range	0.2872	0.0044	Range
0.2844	0.2850	X Bar	0.2834	0.2841	X Bar
0.2860			0.2834		
0.2842	2		0.2828	7	
0.2860			0.2822		
0.2832	0.0028	Range	0.2818	0.0030	Range
0.2836	0.2840	X Bar	0.2838	0.2828	X Bar
0.2836			0.2816		
0.2836	3		0.2846	8	
0.2844			0.2856		
0.2832	0.0012	Range	0.2838	0.0060	Range
0.2838	0.2837	X Bar	0.2796	0.2832	X Bar
0.2834			0.2826		
0.2836	4		0.2846	9	
0.2838			0.2852		
0.2842	0.0052	Range	0.2814	0.0046	Range
0.2866	0.2864	X Bar	0.2834	0.2841	X Bar
0.2882			0.2846		
0.2890	5		0.2860	10	

Total		Total	
Range Bar	0.0030	Range Bar	0.0043
X Dbl Bar	0.2846	X Dbl Bar	0.2840
Sigma		**Sigma**	
3 Sigma	0.0049	3 Sigma	0.0056
5 Sigma	0.0081	5 Sigma	0.0093
Control Limits		**Control Limits**	
UCL X bar	0.286	UCL X bar	0.286
LCL X bar	0.283	LCL X bar	0.281
UCL Range	0.006	UCL Range	0.009
LCL Range	0.000	LCL Range	0.000
USL	0.2919	USL	0.2923
LSL	0.2773	LSL	0.2756



(s)cale (o)perator [redacted] (e)very n (l)imits (z)ones (q)uit

← → f12 :

IATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
)0/05/14	22:40:45	750386	0.2854	0.0050	
)0/05/14	19:25:37	750386	0.2838	0.0020	
)0/05/14	11:12:29	724550	0.2874	0.0030	
)0/05/14	10:06:28	724550	0.2868	0.0010	
)0/05/13	21:05:49	750386	0.2836	0.0030	
)0/05/13	19:50:53	750586	0.2872	0.0040	
)0/05/13	18:34:39	750386	0.2834	0.0030	
)0/05/13	17:35:17	750386	0.2834	0.0030	
)0/05/12	21:25:21	750386	0.2828	0.0020	
)0/05/12	20:43:06	750386	0.2822	0.0020	
)0/05/12	04:17:19	749916	0.2818	0.0030	
)0/05/12	01:47:39	749916	0.2838	0.0010	
)0/05/12	00:49:17	749916	0.2816	0.0010	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

PC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC07814
00501 RELEASE 2.86 DATE: 93/05/24
DATA* EDIT DATA TIME: 13:42:55

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
00/05/10	18:08:36	750386	0.2846	0.0010	
00/05/10	17:06:47	750586	0.2856	0.0070	
00/05/10	15:57:17	750386	0.2838	0.0030	
00/05/08	00:52:16	749916	0.2796	0.0030	
93/05/07	23:10:42	750386	0.2826	0.0050	
93/05/07	22:03:31	750386	0.2846	0.0010	
93/05/07	20:15:55	750386	0.2852	0.0020	
93/05/07	18:48:01	750386	0.2814	0.0020	
93/05/07	00:44:54	749916	0.2834	0.0010	
93/05/06	23:22:16	750586	0.2834	0.0050	
93/05/06	22:30:33	750386	0.2860	0.0050	
93/05/06	21:35:51	750586	0.2846	0.0040	
93/05/05	17:44:36	750386	0.2818	0.0040	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

21

SPC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC0781
S00501 TA RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:38:40

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
93/05/21	22:20:04	750386	0.2828	0.0020	
93/05/21	21:35:38	750386	0.2836	0.0040	
93/05/21	20:30:52	750386	0.2828	0.0020	
93/05/21	15:47:07	750386	0.2856	0.0050	
93/05/21	14:37:07	724550	0.2856	0.0030	
93/05/21	12:55:38	724550	0.2866	0.0030	
93/05/21	12:04:18	724550	0.2838	0.0040	
93/05/20	22:46:44	750386	0.2844	0.0040	
93/05/20	21:52:05	750586	0.2860	0.0050	
93/05/20	20:53:27	750386	0.2842	0.0040	
93/05/20	10:39:34	725933	0.2860	0.0020	
93/05/19	23:13:32	750386	0.2832	0.0020	
93/05/19	22:17:50	750386	0.2836	0.0040	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

E:\SPC87>SPC*&

SPC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC07814
S00501 RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:41:42

DATE	TIME	EMPLOYEE ID	MEAN	RANGE	COMMENT
93/05/19	21:23:50	750386	0.2836	0.0040	
93/05/19	20:15:09	750586	0.2866	0.0050	
00/05/17	22:38:14	750386	0.2844	0.0030	
00/05/17	21:39:39	750386	0.2832	0.0020	
00/05/17	20:40:54	750386	0.2838	0.0020	
00/05/17	18:40:24	750386	0.2834	0.0030	
00/05/15	13:47:42	750386	0.2836	0.0040	
00/05/15	12:54:37	750386	0.2838	0.0020	
00/05/15	11:30:29	725933	0.2842	0.0030	
00/05/15	10:41:21	725933	0.2866	0.0030	
00/05/15	09:36:43	725933	0.2882	0.0030	
00/05/15	08:15:25	725933	0.2890	0.0030	
00/05/14	23:34:55	750386	0.2850	0.0020	

(e)dit (g)raph (t)op (b)ottom (q)uit

f5 f6 f12

SPC005 STATISTICAL PROCESS CONTROL -- 8087 SYID: IPC07814
S00501 RELEASE 2.86 DATE: 93/05/24
DATA EDIT DATA TIME: 13:42:22

JUNE 2, 1993 MWO #253060218

TO: MATT SELLERS

CC: BILL SWEET
TIM SPOONER
LOU ROCHA
JOHN KOURTESIS
BOB BARTOSH
STAN STELIGA
BOB VIENS

FROM: ANDRE CHARPENTIER
ED KADISEVSKIS

SUBJ: PROPOSAL TO MODIFY 57PS ROTARY PRESSURE TESTER (UPGRADE OF PREVIOUS PROPOSAL OF NOV. 19, 1992)

DESCRIPTION MECHANICAL
THE OBJECT IS TO CONVERT THIS INTO A "UNIVERSAL" TESTER TO ACCEPT 52, 57, 77, 78, 87, NISSAN, HONDA, AND FUTURE PS DEVICES WITH LARGER BASES, WITH MINIMUM SET-UP CHANGES.

THE FOLLOWING MODIFICATIONS WILL BE REQUIRED:
1. LONGER STROKE SEAL CYLINDERS, AND LONGER SEAL HOLDERS TO ACCOMMODATE A GREATER VARIETY OF HEXPORT LENGTHS.
2. NEW NEST INSERTS (12), (PERMANENT, NOT TO BE CHANGED FOR DIFFERENT PRODUCTS).
3. NEW HOLD-DOWNS (12), WITH INSERTS (12). THESE INSERTS MAY HAVE TO BE CHANGED FOR SOME FUTURE BASES.
4. MODIFIED TEST STATION FRAME MEMBERS.
5. ADDED PROBE CYLINDERS (4), WITH MOUNTS.
6. NEW "QUICK-CHANGE" PROBE INSULATORS WITH GUIDE SYSTEM.
7. NEW HIGHER "BREAD BOX" GUARD (SIMILAR TO THE ONE ON THE 77PS TESTER). THIS REQUIRES MODIFYING THE FRAME WEDMENT.

DESCRIPTION ELECTRICAL
THIS PROPOSAL COVERS THE CONVERSION OF THE 57PS, TM990 CONTROLLED ROTARY PRESSURE TESTER TO VAXELN BASED CONTROL SIMILAR TO THE 77PS PRESSURE TESTER. THE CONTROLLING COMPUTER WILL BE CHANGED AS WELL AS THE TOUCH SCREEN CRT AND THE PRINTER. MOST OF THE EXISTING 6MT I/O WIRING WILL BE LEFT INTACT AND THE 6MT RACKS INTERFACED TO THE NEW COMPUTER. THE PRODUCT CONTINUITY AND CREEP DETECTION CIRCUITS WILL BE CHANGED TO BE THE SAME AS THE 77PS TESTER. THIS TESTER WILL ONLY HAVE THE FEATURES THAT ARE PRESENTLY ON THE 77PS TESTER. ANY OTHER FEATURES WILL HAVE TO BE QUOTED.

ESTIMATED COST

MECHANICAL

ENGINEERING	50 HRS @ $57	$2.8K	
DESIGN	190 HRS @ $46	8.7	
PURCHASE PARTS			2.0
BUILD	750 HRS @ $39		29.2
DEBUG	20 HRS @ $57		1.1
		$11.5K	$32.3K

ESTIMATED COST FOR CONTROL CONVERSION FOR 57PS TESTER:

ELECTRICAL

DESIGN	200 HRS @ $57	$11.4K	
DRAFTING	25 HRS @ $46	1.2	
PURCHASE PARTS			20.0
BUILD	180 HRS @ $39		7.0
DEBUG	40 HRS @ $57		2.3
		$12.6K	$29.3K

TOTALS:	EXPENSE	$24.1K	CAPITAL	$61.6K
ADD 10% CONTINGENCY:		2.4		6.2
TOTALS:	EXPENSE	$26.5K	CAPITAL	$67.8K

THIS MODIFICATION WILL ENABLE THE MACHINE TO TEST ALL ABOVE-LISTED DEVICES WITHOUT MECHANICAL SET-UP CHANGES, EXCEPT THE 78PS.

78PS

THE 78PS DEVICE WILL REQUIRE A SEAL CHANGE, PLUS INSERT LINERS FOR BOTH THE NESTS AND THE HOLD-DOWNS. THESE LINERS WILL BE HELD IN BY MAGNETS. 78PS WILL BE UNLOADED BY THE OPERATOR.

ESTIMATED COST TO TEST 78PS:

DESIGN	20 HRS @ $46	$.9K	
MATERIAL			.6
BUILD	280 HRS @ $39		7.0
		$.9K	$7.6K

TOTALS:		$.9K		$7.6K
ADD 5% CONTINGENCY:				.4
TOTALS:	EXPENSE	$.9K	CAPITAL	$8.0K

VOLVO AND 80PS

THESE DEVICES WILL REQUIRE THEIR OWN INSERT LINERS FOR THE HOLD-DOWNS ONLY.

DESIGN	20 HRS @ $46	$.9K	
MATERIAL			.5
BUILD	140 HRS @ $39		5.5
		$.9K	$6.0K

TOTALS:		$.9K		$6.0K
ADD 5% CONTINGENCY:				.5
TOTALS:	EXPENSE	$.9K	CAPITAL	$6.5K

TEST PNEUMATICS UPGRADE

THE REASONS FOR DOING THIS ARE:

1. REDUCE DOWNTIME AND R/M COST BY REPLACING OLD SKIMMER VALVES WITH NEW ROTARY VALVES.
2. ADD LOW PRESSURE CAPABILITY BY ADDING A 100PSI TRANSDUCER AND SMC VOLTAGE CONTROLLED REGULATOR TO GET RELIABLE PRESSURE RAMPS.

ENGINEERING	10 HRS @ $57	$.6K	
DESIGN	15 HRS @ $46	.7	
PARTS			5.0
BUILD	60 HRS @ $39		2.3
		$1.3K	$7.3K
	TOTALS:	$1.3K	$7.3
	ADD 5% CONTINGENCY:		.4
	TOTALS: EXPENSE	$1.3K CAPITAL	$7.7K

GRAND TOTALS OF ALL ITEMS: EXPENSE $29.6K CAPITAL $90.0K

THIS IS NOT A FIXED COST PROPOSAL DUE TO THE UNKNOWNS INHERENT IN REBUILDING AN EXISTING MACHINE. FIVE TO SEVEN WEEKS DOWNTIME WILL BE REQUIRED. THAT INCLUDES INSTALLING ALL ABOVE OPTIONS.

APPROVALS:

6/2/93
JOHN KOURTESIS

6/2/93
JOHN GOMLEY

6/2/93
STAN STELIGA

F-5.4

MEMORANDUM

JUNE 9, 1993

TO: *ANDY NOGURIK*
MIKE DENATTIA
JIM MATT
NORM FREDA
STEVE MAJOR
GARY SNYDER
MARTHA SULLIVAN
DAN KOST

FM: *JIM WOOD*

SJ: ***FORD Q1 CUSTOMER SERVICE SURVEY REPORT***

Attached, for your records, is a copy of the Ford Q1 Report for the June 2-4 Q1 Survey.

Regards,

Jim Wood

Attachment

TI 0019120

TI-NHTSA 011758

Quality System Survey Report

Sheet 1 of 7

Division/Operations Group	System Survey Rating	Survey No.	Date
CCD/ELD	196	93-1	6/4/93

To

Producer name: Texas Instruments — Producer code: T095A

Plant: Precision Controls — Phone: (508) 699-3432

Address: 34 Forest Street

City and state: Attleboro, MA

Producer personnel contacted: Wood, McGuirk, Natt, DeMattia, Forsyth, Gariepy, Sweat, Chamburkar, Bartosh, Congdon, Strott, Charboneau, Sullivan, Beringhause, Czarn, Lesser, Freda, Kost

Description of products: Pressure Switches and Switches

Producer in conformance with Ford Q-101: Yes ☒ No ☐

Corrective action required: Yes ☐ No ☒

Purchasing assistance required: Yes ☐ No ☒

Producer acknowledgement signature: Paul Lustig

Survey representative signature(s):
Mike Hamm CCD
Joan Florian CCD
Sam Khoury ELD

Copies to:
Purchasing: John Bros, Larry Klemczak
Product Engineering: Fred Schroeder
Customer Plants:

For each question, provide complete descriptive comments. Then assign a rating using the System Survey Scoring Guidelines.	Rating
PLANNING FOR QUALITY	
1. Is the responsibility for quality planning on new products clearly defined? Does the definition of responsibility make sense for the processes involved? • Describe the responsible organization. • Indicate reporting relationships. • Indicate the key contact personnel/department for quality planning and quality concern resolution.	10
2. Are Control Plans, Process Failure Mode and Effects Analyses, and other documented methods used as a basis for establishing quality programs for new (and specifically-identified existing) products? • Does the producer perform feasibility analysis on potential new products? • Assess the adequacy of the producer's quality planning effort.	10
3. Does the producer have available and use a procedure for reviewing design and process changes prior to implementation? • Are FMEAs and Control Plans reviewed and updated as part of this procedure? • Is customer approval obtained prior to implementing change? • Is there a procedure for updating operator instructions and visual aids for process and product changes?	10
TOTAL PLANNING FOR QUALITY (Total points available = 30) =	30
STATISTICAL METHODS	
4. Is Statistical Process Control (SPC) utilized for significant and Critical ( ) product characteristics and process parameters? • How are the significant characteristics chosen? • Describe the SPC methods used? Are they appropriate to the processes being controlled? • Evaluate the producer's reaction to out-of-control conditions. Is the reaction as specified in the Control Plan? What is the role of the operators? Of the supervisors? Evaluate the producer's application of SPC, based on the evidence of the control charts, process logs, and other appropriate documentation.	10

T: 0019126

Quality Doc 2955

Ford Quality System Survey Report

Producer	Date

STATISTICAL METHODS (Continued)	Rating
5. Are preliminary statistical studies conducted on new product characteristics and process parameters?	10
6. Are control charts being used effectively to monitor the processes? Do the charts indicate that statistical control has been achieved and that process capability has been demonstrated? • In all cases where process capability has not yet been demonstrated, is there a plan to improve the process? Is appropriate interim action (i.e., 100% inspection) being taken to prevent shipment of nonconforming parts.	9
7. Does the producer have a definite program to bring about continual improvement in quality and productivity? • Describe the program. Indicate the statistical methods and other tools used to promote continual improvement. • Are there improvement priorities identified and project teams established?	10
8. Does the producer have an effective system for assuring the quality of incoming products and services (e.g., plating, heat treating). • Are suppliers encouraged to meet Q-101 requirements? • Are suppliers encouraged to use SPC? Is evidence of statistical control and capability required from producers? • Assess the adequacy of the incoming material quality system?	10
TOTAL STATISTICAL METHODS (Total points available = 50) =	49
GENERAL	
9. Are process/product auditing functions and responsibilities clearly defined? • Indicate which plant activities conduct process/product auditing (e.g., quality inspectors, production operators, laboratory technicians). Assess the adequacy of the producer's auditing program.	10
10. Are written procedures defining the significant quality-related functions available (i.e., a quality manual)? • Are these procedures appropriate to and adequate for the producer's operations? (e.g., is there an adequate procedure for reacting to ES test failures?) • Are the procedures implemented as written? • Is there a formal review system to verify implementation?	10
11. Are written process monitoring and control instructions available for incoming, in-process, laboratory, layout inspection and outgoing auditing? • Are all Critical and Significant characteristics included, specifically those affecting function, durability and appearance? • Are Control Items, their Critical Characteristics and related operations identified with the inverted delta symbol? • Are sample sizes and frequencies adequate? • Is appropriate statistical analysis specified?	10
12. Are appropriate gages, measuring facilities, laboratory equipment, and test equipment available to facilitate process control? • Is the selection of significant characteristics effectively incorporated in gage planning and design? • Are gages and test equipment and personnel appropriately located throughout the producer's operations? • Are adequate, well-lighted areas available for gaging, measuring, and testing the product? Evaluate the producer's gage planning and execution.	10

Quality System Survey Report

Producer	Date

GENERAL (Continued)	Rating
13. Does the producer have an effective gage and test equipment maintenance program? • Are new gages/test equipment inspected to design specifications, calibrated and approved before being used? • Do records indicate that gages and test equipment are periodically inspected and calibrated? • Does the producer use statistical methods to determine the stability and capability of gages, measuring, and test equipment? Assess the adequacy of the producer's gage and test equipment maintenance program.	10
14. What controls does the producer use to indicate the processing and inspection status of products throughout the producer's system? • Are effective controls in place to provide accurate part number identification throughout processing, storage, packaging and shipping? • Are controls adequate to prevent movement of rejected incoming materials into the production system? • Are nonconforming products separated from the stream of production? Are there effective controls to prevent their movement?	9
15. Does the producer have complete records supporting initial sample certifications?	10
16. Does the producer react appropriately to customer concerns? • Are in-plant and customer quality concerns effectively communicated to all members of the organization? • Are nonconforming parts returned by customers analyzed? Is the root cause of failure determined, verified, and corrective action taken? • Is a disciplined method of problem solving (the Eight Discipline Method) utilized?	10
TOTAL GENERAL (Total points available = 50) =	~~49~~ 79
IN-PROCESS AND OUTGOING	
17. Are inspections, measurements, and tests being performed according to the instructions? • Are there adequate records of inspections, measurements, and tests?	10
18. Are documented rework and/or scrap procedures and standards available? Are reworked or sorted products audited for conformance to all customer requirements? Assess the adequacy of rework and sorting operations.	9
19. Are the handling, storage and packing adequate to preserve product quality? • For production and service parts, does the producer meet applicable packaging specifications? • Are effective controls in place to assure correct service part identification?	10
20. Are plant cleanliness, housekeeping, environmental, and working conditions conducive to quality improvement? • Are there working conditions that could be detrimental to quality improvement? • What actions have been taken to mitigate these factors?	9
TOTAL INCOMING, IN-PROCESS and OUTGOING (Total points available = 40) =	38
TOTAL RATING POINTS FROM QUESTIONS 1-20 (Maximum = 200 points) =	196

TI-NHTSA 011771

SQA Survey Report

Supplier	Survey No.	Date
Texas Instruments	93-1	6/4/93

Item/ Ref. No.	Supplemental Remarks and Supplier Commitments
6	More refined use of SPC Data interpretation (i.e., training, trend analysis, better documentation of corrective actions, determination of root cause of out of control).
	Identify which charts are used for data collection and which are not. Feedback decisions to floor personnel. (Many S.P.C. discrepants were provided to the engineers and control limits modified by them, but floor personnel were not fully aware).

SQA Survey Report

Supplier	Survey No.	Date
Texas Instruments	93-1	6/4/93

Item No.	Checklist Ref. No.	Supplemental Remarks and Supplier Commitments
	14	Improper labeling of boxes found, out of place boxes found, wrong color code bins used for questionable status stock.
		- Institute across the board uniform color coded stock bins.
		- Awareness of possible mishandling of bad or questionable stock while production area is in a reorganizational/transition status.
		- More refined reject traceability (i.e., to operator level)
		- In interim suggest use of red bins in reject area (APT line) or paint cardboard red.

SQA Survey Report

Supplier	Survey No.	Date
Texas Instruments	93-1	6/4/93

Item	Item/Ref. No.	Supplemental Remarks and Supplier Commitments
18		More refined method of rework traceability for product failure for solder rework operation. (i.e., mark reworked parts)
		Better description of discrepant parts and how to rework and visual aids to describe these.

SQA Survey Report

Supplier		Survey No.	Date
	Texas Instruments	93-1	6/4/93

Item/Ref. No.	Supplemental Remarks and Supplier Commitments
20	Unfriendly work environment around; open container wash freon, some areas appear cluttered (i.e., Kan Ban cart location, general stock location, reject Kan Ban location).

Ford Motor Company
Climate Control Division
Supplier Quality Report Card

TEXAS INSTRUMENTS
34 FOREST ST
ATTLEBORO, MA 2703 A9H2E

Quality Expectation

Zero Defects

Quality Tools
Advanced Quality Planning
Quality Operating System
Management Involvement
Correlation to Customer Measurables
Shutdowns Parts per Million
Quality Driven Compensation

Number of Parts Sourced	SQE Engineer	Buyer	Q-1	System Survey Score	System Survey Date	1991 Rejections	1992 Rejections	1993 Rejections
5	Mike Hamm (313) 451-9020	Larry Khmenuk (313) 451-9050	Yes	196	930611			

For your 1993 Quality Performance, Ford Motor Company appreciates your persistence and your continued effort toward quality improvement.

1993 Quality Reject Summary **TEXAS INSTRUMENTS A9H2E**

Quality Rejection Origin	Quality Rejection Number	Part Number	Reject Date	Remarks

TI-NHTSA 011778

TO:	BILL SWEET	12-29
	[redacted]	12-29
CC:	JOHN GORMLEY	20-25
	JOHN KOURTESIS	20-25
	LOUIS ROCHA	12-30
	STAN STELIGA	20-01
FROM:	ANDRE CHARPENTIER	20-25

SUBJECT: PROPOSAL FOR CONVERTING THE 55PS/56PS TM990 CONTROLLED PRESSURE TESTER TO A VAXELN CONTROLLED TESTER

This proposal covers the conversion of the 55PS/56PS, TM990 controlled rotary pressure tester to VAXELN based control similar to the 77PS pressure tester. The controlling computer will be changed as well as the touch screen crt and the printer. Most of the existing 6MT i/o wiring will be left intact and the 6MT racks interfaced to the new computer. The product continuity and creep detection circuits will be changed to be the same as the 77PS tester. This tester will only have the features that are presently on the 77PS tester. Any other features will have to be quoted.

Estimated cost for control conversion for 55PS/56PS tester:

DESIGN	RATE	HRS	
ELEC DES TOTAL	$58	300	$17,400
DRAFTING	$47	40	$1,880
EXPENSE TOTAL			$19,280

DESIGN	RATE	HRS	
DEBUG	$58	120	$6,960
BUILD	$40	220	$8,800
PARTS			$31,460
CAPITAL TOTAL			$47,220
PROJECT TOTAL			$66.5K

APPROVALS:

JOHN GORMLEY 6/2/93

JOHN KOURTESIS 6/2/93

STAN STELIGA 6/8/93

MECHANIZATION WORK ORDER SHT. 1 OF 1 FORM 20222

Date Requested

- ☐ Proposal
- ☒ Design
- ☐ Build

Requested By (Print)	Date	Mail Sta.	Tel. Ext.
Matt Sellers	6-30-93	1239	1245
Approved By			
R. Sweet	7/1/93		
DEPARTMENT	5795		

Date Entered By MECHANIZATION

Project No. 2530600134

Product Code 060 CC 043

REQ'D. PRODUCT PRINT NOS. SUPPLIED LIST

1	
2	
3	
4	
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9	
10	
11	
12	
13	
14	

PROJECT DESCRIPTION

Design work only For 5795 Tester upgrades per Ed K. proposal 253060218 dated 6-2-93

MECH. TITLE

MECHANICAL	EST. HRS.	ELECTRICAL	EST. HRS.
PROJ. MGR.		PROJ. MGR.	
ENG.		ENG.	
DBA		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

BUILD CLOSED DATE

ADDITIONAL REMARKS, INFORMATION, SKETCH

T-NHTBA 01178

WHITE – MECHANIZATION COPY YELLOW – ORIGINATOR'S COPY

77PS BASE ASSEMBLY MACHINE LOT REPORT

LOT ID:6-15
DEVICE ID:77PSL2-1
LOT STARTED:14-JUN-1993 23:35:29.80
LOT FINISHED:15-JUN-1993 02:35:05.76
DURATION: 0 02:59:35.96

CALIBRATION SETUP PARAMETERS

INITIAL CAL -84.25 MILS
MODIFIED CAL-84.25 MILS CAL TOLERANCE: 0.20 MILS
CHK POINT:-88.25 MILS CHK TOLERANCE: 1.75 MILS
CHECK MEAS SORT LIMIT: DISABLED
CAL/CHK DIFFERENCE LIMIT: DISABLED

SPRINGBACK AI MODE DISABLED

CHECK FEEDBACK AI MODE DISABL
DEFAULT SPRINGBACK: 1.00 MILS FINAL SPRINGBACK: 0.00 MILS

TOTAL PIECES CYCLED	2637	
PIECES GOOD	2594	98.37 %
PIECES GOOD (STA DISABLED)	0	0.00 %
PIECES BAD	43	1.63 %
NO BASE	9	0.34 %
NO STA TERM	23	0.87 %
NO STAKE STA TERM	0	0.00 %
NO MOV TERM	2	0.08 %
NO STAKE MOV TERM	0	0.00 %
NO CONTACT	0	0.00 %
FAILED CALIBRATION	0	0.00 %
FAILED CAL CHECK	9	0.34 %
CAL/CHK DIFF FAILURE	0	0.00 %
FAILED UNLOAD	0	0.00 %
EMERGENCY STOP	0	0.00 %
SPRING ARM MISFEEDS	28	
CALIBRATION CYCLES	0	
EFFECTIVITY		48.14 %

INITIAL MEAS DATA	MEAN	SIGMA	COUNT
	-75.12	0.78	2603

CALIBRATED DATA	MEAN	SIGMA	CPK	COUNT

77PS BASE ASSEMBLY MACHINE DOWNTIME REPORT

LOT ID:6-15
DEVICE ID:77PSL2-1
START TIME:14-JUN-1993 23:35:29.80
FINISH TIME:15-JUN-1993 02:35:05.76
DURATION: 0 02:59:35.96

CODE	DOWNTIME REASON	OCCURENCES	AVG	TOTAL	% OF RUN	% OF DOWN
3	STATION 3 LOAD STA-TERM	16	2.51	40.12	22.3	63.1
41	CYCLE STOP	12	0.83	9.98	5.6	15.7
9	STATION 9 LOAD MOV-TERM	10	0.88	8.76	4.9	13.8
13	STATION 13	6	0.38	2.31	1.3	3.6
2	STATION 2 SENSE BASE	2	0.64	1.28	0.7	2.0
37	ZONE GUARD INTRUSION	1	0.77	0.77	0.4	1.2
31	MACHINE SETUP	1	0.34	0.34	0.2	0.5
TOTAL DOWNTIME OCCURENCES		48	1.32	63.56	35.4	100.0

- .34
63.22

FORD NEXT GENERATION SPEED CONTROL (77PS)
MANUFACTURING CONTROL PLAN
77PSL QUIET SWITCH

PROCESS STEP DESCRIPTION	PRODUCT CHARACTERISTICS	EVALUATION METHOD	CONTROL METHOD	FREQUENCY OF TEST	REACTION PLAN
BASE ASSEMBLY (AMI AUTOMATION)	TERMINAL HEIGHT	DIAL INDICATOR	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	TERMINAL PUSHOUT	FORCE GAGE/ DIAL INDICATOR	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	TERMINAL SEPARATION/ ALIGNMENT	PLUG GAGE	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	SPRING ANGLE (B)	COMPARATOR	X/R	5pc/4Hr.	SORT SINCE LAST CHECK
	SPRING CONTACT WIDTH	CALIPERS	X/R	5pc/Hr	SORT SINCE LAST CHECK
	SPRING TORQUE	FORCE GAGE	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	SPRING BUMP HGHT (B)	CALIPERS	X/R	5pc/4Hr.	SORT SINCE LAST CHECK
	RIVET HEIGHT	DIAL INDICATOR	X/R	5Pc/Hr.	SORT SINCE LAST CHECK
	CALIBRATION DEFORMATION	CUSTOM CONTINUITY SYSTEM	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	VISUAL QUALITY (C)	VISUAL	P	5pc/Hr.	SORT SINCE LAST CHECK
SENSOR ASSEMBLY	CRIMP DIAMETER	CALIPERS	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	CRIMP HEIGHT	CALIPERS	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	VISUAL QUALITY	VISUAL	P	5pc/Hr.	SORT SINCE LAST CHECK

FORD NEXT GENERATION SPEED CONTROL (77PS)
MANUFACTURING CONTROL PLAN
77PSL QUIET SWITCH

PROCESS STEP DESCRIPTION	PRODUCT CHARACTERISTICS	EVALUATION METHOD	CONTROL METHOD	FREQUENCY OF TEST	REACTION PLAN
FINAL ASSEMBLY (AMI AUTOMATION)	CRIMP DIAMETER (B)	GO/NO-GO GAGE	P	5pc/Hr.	SORT SINCE LAST CHECK
	CRIMP HEIGHT (B)	GO/NO-GO GAGE	P	5pc/Hr.	SORT SINCE LAST CHECK
	BASE TORQUE	TORQUE GAGE	X/R	5pc/Hr.	SORT SINCE LAST CHECK
	CODE CRIMP RING/ DIAMETER-LEGIBILITY	PLUG-VISUAL	P	5pc/Hr.	SORT SINCE LAST CHECK
	PIN HEIGHT (B)	DIAL INDICATOR	P	100%	SEPARATE FAILED LOT. PRODUCT TEAM REVIEW.
JUNCTION TESTER (CUSTOM)	ACTUATION/RELEASE POINTS (Ford Significant Char.)	MASTERS	X/R	EACH SHFT	ENGINEERING EVALUATIONS
	ACTUATION/RELEASE POINTS (C) (Ford Significant Char.)	RAMP THROUGH PRESSURE RANGE	P	100%	YIELD TRACKING/ SCRAP CONTROL
PRODUCT AUDITS (PRODUCTION)	HIGH PINNING (B)	CUSTOM HYPOT SYSTEM/P		20PC/LOT	SEPARATE FAILED LOT. PRODUCT TEAM REVIEW
	LOW PINNING (B)	OVEN/OHM METER	P	10pc/Lot	SEPARATE FAILED LOT. PRODUCT TEAM REVIEW.
QC AUDITS (C)	* OUTLINED IN DETAIL IN TEXAS INSTRUMENTS (QA5 208). FMC (THREADS / Ford Significant Char.)				
	* ELEVATED TEMP IMPULSE CYCLING AUDITS. FREQUENCY TBD. PER DELTA ES-F2VC-9F924-AA SEC III-E				

Revision C

13 July 1993 MJS/mjs 77OCONT.B.XLS 050-0134

-MSG M#= 74242 FR=MJS2 TO=COPY SENT=07/15/93 10:40 AM
ST=C DIV=0050 CC=00134 BY=MJS2 AT=07/15/93 10:40 AM

TO: JIM WATT JW02

CC: ELAINE ROSE GAMY CHARLIE DOUGLAS CMP1
BILL SWEET WS4 DAVE CZARN ZARN
DICK GARIEPY RNG3 AZIZ RAHMAN ZIZ

FR: MATT SELLERS MJS2

RE: 77PS/87PS IMPULSE TESTING

JIM,

PLEASE EVALUATE THE FOLLOWING PROPOSAL FOR REORGANIZING TH[redacted]LE SUBMISSION PLAN FOR ALL 77PS AND 87PS DEVICES. THE NEED IS [redacted] STREAMLINE THE PROCESS WHILE MAINTAINING ADHERENCE TO ES [redacted] GUIDELINES AND ENGINEERING CONCERNS OVER SPRING & DISC LIF[redacted]

IF THE PLAN OUTLINED BELOW DOES NOT SATISFY ES OR QAS REQUIREMENTS, PLEASE HIGHLIGHT THE AREAS OF CONFLICT AND RETURN. I AM CONFIDENT THAT THIS NEW PLAN WILL SATISFY ENGINEERING CONCERNS AND ACTUALLY WILL IMPROVE THE REAL TIME ASPECT OF REPORTING.

PROPOSED SAMPLE SUBMISSION PLAN

CONCERNED ES SPECIFICATIONS: - 9F924 (77PS) & 3N824 (87PS)

IP-2 FUNCTIONAL TEST

RECOMMEND SUBMISSION OF (4) DEVICES FROM EACH ASSIGNED SENSOR LOT, (2000 DEVICES). Q.C. TO PERFORM ALL REQUIRED FUNCTIONAL TEST AND REPORT RESULTS BACK TO PRODUCTION.

NOTE: THIS SUBMISSION FREQUENCY ACTUALLY SURPASSES 3N824 REQUIREMENT.

IP-2 DURABILITY TEST

RECOMMEND SUBMISSION OF (3) MINIMUM DEVICES EACH QUARTER FOR IMPULSE TESTING IN ACCORDANCE WITH ES SPECIFICATION GUIDELINES. DEVICE TYPES SUBMITTED NEEDS TO BE DETERMINED BY MRB.

ALSO RECOMMEND SUBMISSION OF (1) 77PS SENSOR LOT EACH WEEK FOR TRADITIONAL IN-PROCESS IMPULSE TESTING TO MONITOR CHRONIC LEVEL OF DISC CRACKING.

ENGINEERING DURABILITY TEST

(5) DEVICES MINIMUM PER OPERATING DAY, OR UPON ANY MAJOR TE[redacted]NALASSEMBLY MACHINE TOOL WORK - (AS DEFINED BY ENGINEERING). SAMPLE BUILD AS FOLLOWS:

- BASE ASSEMBLIES NEWLY MANUFACTURED ON THE SUBMISSION DAY.
- 87PS.2-2 SENSOR ASSEMBLIES (WORST CASE).
- OFFSET CALIBRATION PER ENGINEERING REQUIREMENTS.
- FUNCTIONALLY TESTED FOR PROPER OPERATION BY PRODUCTION.

Customer Event | Summary | 77PS + 57PS.
7/20/93

	CY 1993		CY 1992		CY 1991	
	77PS	57PS	77PS	57PS	77PS	57PS
Misaligned Bracket	5	1	0	1	0	2
Thread	1	4	0	3	0	3
Wiring Component	1	2	0	1	0	0
Radial Turn Connector	1	1	0	0	0	0
Misaligned/Bent Terminal	0	1	1	0	0	0
Vacuum	0	0	1	0	0	0
Flake	0	0	1	0	0	0

Faxed to J. Pelkey 7/22/93
via Courier

CUSTOMER RETURNS SUMMARY						
87P6						
DATE RETURNED	DATE CODE	T.L P/N	RETURNED FROM	REASON FOR RETURN	COMMENTS	
930115	2308	L2-2	KELSEY HAYES	WRONG COMPONENTS	INCORRECT HEXPORT	
930115	2316 - 2329	L2-2	"	DAMAGED THREADS	UNRE-ROLLED THREADS	
930125	2329	L2-2	"	WRONG COMPONENTS	INCORRECT HEXPORT	
930125	2126 - 2306	L2-2	KELSEY HAYES	DAMAGED THREADS	UNRE-ROLLED THREADS	
930310	3047 - 3048	L2-2	KELSEY HAYES	DAMAGED THREADS	"	
930317	2213 - 3061	L2-2	"	INOP & BAD THREADS	INOP NOT DUPLICATED	
930331	2202	F8-5	PITTS INDUS.	LOW LEVEL AIR LEAK	MISPLACED GASKET	
930427	2265	L11-2	J PELKEY/TI ENGG	INGRESS BY CONNECTOR SEAL	SWITCH DIMENSIONS IN SPEC	
930521	3111	L2-2	ANCHOR SWAN	O-RING GLAND	DIMENSIONS IN SPEC. NTF.	
930531	1275	L5-2	J. PELKEY	INOP SPEED CONTROL	INOP NOT DUPLICATED	
90623	0272 - 1172	L2-2	DEALERS	LEAKS OIL	MISALIGNED GASKET	
920206	N/A	F8-6P	FORD U.K.	N/A		
920623	1058	L2-2	KIRBY AUST	NOISE	LOOSE CRIMP	
920702	N/A	L11-1	FORD U.K.	INOP	NTF	
920728	1089 - 1169	L2-2	KIRBY AUST	NOISE	LOOSE CRIMP	
921007	2210	L2-2	ANCHOR SWAN	DAMAGED HEXPORT	O-RING GLAND NOT FORMED	
921102	N/A	L2-2	PTB	THREADS TIGHT	DAMAGED THREADS	
921104	2280 - 2296	L2-2	KELSEY HAYES	BAD THREADS	UN RE-ROLLED THREADS	
910701	0237	L3-1/L2-2	DEALERS	LEAKS	MISALIGNED THREADS	
910920	1049	F8-5	PITTS INDUS.	PLATING	COSMETIC	
910920	1162	L2-2	UNITED TECH.	BAD THREADS		
910705	1198	L2-2	UNITED TECH.	BAD THREADS		
911010	179	L2-2	FORD USA	BAD THREADS		

TI-NHTSA 011795

A.R.M.S. 7/22/93

CUSTOMER RETURNS SUMMARY						
77P8						
DATE RETURNED	DATE CODE	T.I. P/N	RETURNED FROM	REASON FOR RETURN	COMMENTS	
920908	2008	L2-1	ITT TEVES	FLAKES	CARDBOARD DUST/DIRT	
920909	2052	L2-3	FORD	BENT TERMINAL		
920910	2028	L2-1	DANA	CALIBRATION	CALIBRATION CORRELATION	
921118	2242	L3-3	FORD	LEAK	NTF	
921124	2224 - 2261	L5-2	FORD	VACUUM SENSITIVITY	REDESIGNED SENSOR	
930129	2346	L2-1	PITTS	LEAKS	MISALIGNED GASKET	
930128	2352	L2-1	PITTS	WRONG HEXPORT		
930204	2353	L2-1	PITTS	LEAKER	MISALIGNED GASKET	
930211	3005	L2-1	PITTS	LEAKER	MISALIGNED GASKET	
930217	3011	L2-1	PITTS	LEAKER	MISALIGNED GASKET	
930312	9217	L2-9	TI ENGG	SHOP	LEAKED THRU CONNECTOR	
930316	3025	L2-1	PITTS	LEAKER	MISALIGNED GASKET	
930602	9104 - 9109	L2-1	PITTS	BAD THREADS		

MANUFACTURING PROCESS REVIEW FOR TIME PERIOD JUNE 92 TO JAN 93

ASSUMPTION: WARRANTY PROBLEMS OBSERVED IN THE FIELD ARE RELATED TO INGRESS INTO CONTACT ZONE

MAJOR COMPONENT CHANGES :

CHANGED PLASTIC BASE FROM BLACK GELANEX TO RED NORYL
- RED BASE SHIPMENTS STARTED MY 93
- PARALLEL SHIPMENTS EXISTED FOR THIS TIME FRAME

NORYL PROVIDES BETTER DIMENSIONAL STABILITY AND STRENGTH OVER EXTENDED TEMP. RANGE

CHANGED DISC FROM SNAP TO QUIET
- QUIET DISC SHIPMENTS STARTED JAN. 93
- QUIET SWITCHES' PINNING IS BIASED TO COMPENSATE FOR TEMP. SHIFT

POSSIBLE PROCESS/TOOLING MALFUNCTION WHICH COULD RESULT IN INGRESS INTO CONTACT ZONE

MISSING/MISPLACED ENV. SEAL
- UPGRADED SEAL HANDLING SYS

CRACKED PLASTIC BASE DURING CRIMPING
- ROOT CAUSE: EXCESSIVE CRIMP FORCE
- CRIMP FORCE MONITORED ON SPC VIA CRIMP HT AND TORQUE
- SPC DATA FOR THAT TIME FRAME UNDER EVALUATION; ETA 6/2

PLASTIC BASE DIMENSIONAL ANOMALIES
- SEAL SURFACE FINISH INSPECTED 100% AT FINAL PKG.
- DIMENSIONAL CHECKS AT EACH MOLDING RUN
- DIMENSIONAL ANALYSIS OF ISIR SUBMISSIONS AND RETURNED PARTS
- MOLDING SPC DATA FOR THAT TIME FRAME UNDER EVAL, ETA 6/2

TI-NHTSA 011797

A.R.M.S. 7/22/93

-MSG M#= 454513 FR=JW02 TO=MJB2 SENT=07/28/93 10:54 AM
R#=070 ST=C DIV=0050 CC=00149 BY=JW02 AT=07/28/93 10:54 AM

Memorandum

July 28, 1993

TO:	Bill Sweet	WB4	Dave Czarn	ZARN
	Aziz Rahman	ZII	Matt Sellers	MJB2
	Andy McGuirk	PCDA	Charlie Douglas	CMP1
	Elaine Rose	GAMY	Jim Grammar	JGO1
	Dick Gariepy	RWD3	Rick Conlin	RAC1

FROM: Jim Watt JW02

SUBJ: 77PS/87PS Impulse Testing

The proposed sample submission plan for the 77PS/87PS pressure switches will meet the requirements of specification 9F924(77PS) and 3N824 (87PS):

Test	9F924	3N824	Sub Plan
IP -2 Functional tests (Voltage drop, proof, burst)	4/lot	3/3 mos	4/sensor lot 77PS 4 week 87PS
IP-2 Durability tests (Impulse testing)	3/3 mos	3/3 mos	3/ quarter
Engineering Durability (Vacuum, temp cycle, humidity, vibration)	6/6 mos	6/6 mos	5 devices impulse per operating day

Regards,

Jim Watt MSG: JW02 Ext: 1719 M/S: 12-27

Equipment Effectiveness Summary
PC088 Base Assembly Machine

* Report Date: 8 August, 1993 10:00 am
* Data Period : "(8-8-93 to 9-8-93)" or "Last 10 lots"
* Exclusions : - Lots less than 1000 pcs.
  - Lots less than 1 hr. duration
  - Codes ___, ___, ___, ___, ___
* Devices Included: 77PSL2-1, 87PSL2-2, etc.
* Shifts included: All, 1st only, 2nd only, 3rd only, etc.

Downtime Summary Info.

Cause Description	Code	Ave. occ. per 1000 cycles	Ave. % of Total lot Duration
Pareto Sorted by % of Downtimes ↓	↓	↓	↓
Sub-Total	—	Σ of col.	Σ of col.

Yield Summary Info.

Cause Description	Average % of Total Cycled
Pareto Sorted by % of total Cycled ↓	↓
Sub Total	Σ of Col.

Terminal Assembly machine performance

Total Spring arm mis-feeds :	A
Total B.A.M. Cycles :	B
T.A.M. Yield loss % :	A/(A+B)

Throughput Performance

Total Pcs. Cycled :	A
Total Pcs. Good :	B
Total lot Durations :	C
Total Excluded lot Qty. :	D
Total Uptime % :	E

Data Period Yield % : B÷A
Average throughput (pcs./Hr.): B÷D
Equipment Effectiveness %: E*(B÷A)

Downtime/Yield Program

* Include some kind of default selection Screen to show:

- Selected Codes for OEE Calc.
- Selected Devices
- Time period
- Shift Selection
- Criteria for Assignment of lots to Shifts.
- When does daily data get Summarized into weekly and then discarded.

Questions

1. How will individual lot Summary reports be handled.
   - Where stored.
   - How long will the remain as individual reports.
   - When will weekly, monthly, Quarterly, annual reports be generated and how will they be stored.
   - IF reports are Crunched weekly how will part numbers, shift, etc. be kept Separate.

     Categorized.

2. Visual Graphs
   - Downtime pareto of time period
   - Yield loss pareto "
   - Trending
     - What's possible. Could we See Trending of Codes over time, etc. Trending of throughput perf.

3. 1st lots Started From 7:01am to 3:00pm
   " " " 3:01pm to 11:30pm

Example

Base Assembly Machine (BAM)

Reason Desc	Code	Number of occurrences per 1000 cycles	Average % of total lot downtime
Cycle Stop	41	5.6	17.7 %

5 reports Summary

Code	Total # occur	Total min down
41	109	286.09

Total pcs cycled/Good	
cycled	19316
Good	18,234
%	94.40

Excluded Codes

(1) Total downtime must be backed out of total run downtime prior to any % calculations

(2)

Total Downtime minutes After exclusion of select Codes

770.25 minutes
vs. 897.00

126.67 minutes excluded

Total Duration After exclusions of select Codes
1797 - 126.67
= 1670.33 duration minutes after exc.

TLNHTSA 011781

MATT SELLERS

C.BALTHAZAR

27256-1	SHELF/BUMP	BUMP HEIGHT	CONCENTRICITY
#1	0.0672	0.0156	0.1559
	0.0674	0.0154	0.1537
	0.0672	0.0160	0.1559
	0.0675	0.0157	0.1541
#2	0.0676	0.0159	0.1463
	0.0662	0.0156	0.1457
	0.0680	0.0159	0.1447
	0.0679	0.0157	0.1447
#47156	0.0669	0.0155	0.1531
	0.0680	0.0154	0.1545
	0.0673	0.0160	0.1549
	0.0671	0.0159	0.1566
#52112	0.0673	0.0155	0.1537
	0.0671	0.0153	0.1526
	0.0669	0.0161	0.1549
	0.0671	0.0150	0.1543
#51321	0.0676	0.0161	0.1563
	0.0674	0.0165	0.1565
	0.0679	0.0160	0.1563
	0.0676	0.0161	0.1563

26958-02	O.D.	BURR	CROWN HEIGHT	WEAR MARK
#1	0.7490	0.0012	0.0293	
		0.0008		
#2	0.7490	0.0006	0.0294	
		0.0006		
#47156	0.7493	"	0.0295	0.0627
#52112	0.7490	"	0.0300	0.0664
				0.0664
				0.0666
				0.0643
#51321	0.7486	"	0.0299	0.0662
				0.0662
				0.0649
				0.0670

DRAWINGS AVAILABLE UPON REQUEST

8/19/93

Forest City Tech Jack De Ruyter.

Make Sponge + Silicone Seals
(Sponge Seals also make out of silicone)
Silicone Seal process is: liquid silicone injection.

Sponge : 38 - 50% Comp
Silicone : 10 - 15% Comp (to reduce installation load).

Seal designed originally for injector connector.

Ron Frantz (Ford Release Engineer)

Rocking Motion has been seen to cause leak problems.

TEXAS INSTRUMENTS

ATTLEBORO, MASSACHUSETTS 02703

PAGE ____ OF ____

SAMPLE REPORT

REASON FOR REPORT		P.O.	PART NO.	REV.
NEW PART		Tool #46575		E
REPLACEMENT TOOL.				
CORRECTED TOOL.				
REPAIRED TOOL.				
REVIEW				
OTHER				

REPORT REQ BY	DATE	INSPECTED BY	DATE
Jim Watt	9/27	M. L. Godbout	9/2

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING TH ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIAT FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FO EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)					DISPOSITION		
		Black	Red	Brown	Gray			
1.	.766 - .780	.771	.780	.771	.777			
2.	.652 - .660	(650)	.653	(650)	.654	measured inside tabs		
3.	.459 - .467	.463	(457)	(457)	.460			
4.	.114 - .118	.115	.115	(118)	.115			
	2 plcs	.115	.116	(113)	.115			
5.	.016 - .024	.0233	.0197	.0206	.0217			
	4 plcs	.0200	.0246	.0196	.0209			
		.0222	.0190	.0214	.0179			
		.0224	.0205	.0204	.0202			
6.	.327 - .343	.3343	.3319	.3322	.3362			
	2 plcs	.3307	.3329	.3321	.3331			
7.	.085 - .095	.0874	.0858	.0872	.0876			
	2 plcs	.0871	.0854	.0857	.0852			
8	25° - 27°	24	24	25	24			
	2 plcs	25	25	25	25			
9	Flatness	.0043	.0012	.0034	.0038	Top of Base		
11	Parallelism	.004	.0022	.0011	.0014	To Locking Tabs		

REMARKS AND/OR INSTRUCTIONS:

DISPOSITION: TOOL APPROVED FOR PROD.		RESUBMISSION REQ'D	
MFG. ENG.:		QRA ENG.:	
		PURCH. AGENT:	

TI-NHTSA 011795

FORM NO: 30756

-MSG M#= 490213 FR=JW02 TO=MJS2 SENT=07/27/93 04:02 PM
R#=077 ST=C DIV=0050 CC=00149 BY=JW02 AT=07/27/93 04:02 PM

Memorandum

July 27, 1993

TO:	Bill Sweet	WS4	Dave Czarn	ZARN
	Aziz Rahman	ZIZ	Matt Sellers	MJS2
	Andy McGuirk	PCQA	Charlie Douglas	CMP1
	Elaine Rose	GAMY		

FROM: Jim Watt JW02

SUBJ: 77PSL2-3/77PSL3-2 (Base No. 46515 Assessment)

We characterized the p.n. 46515 base for the 77PS pressure switches and found the pertinent base dimensions for connector fit to be within specification. The black base is from the field return unit (77PSL2-3), while the red base if from the field return unit (77PSL3-2). The brown and grey bases were selected from production bases in the production area.
Two additional measurements (not on the component base drawing) were also completed:

Measurement	Black base (Field PBT)	Red Base (Field PBT)	Brown Base (Prod PBT)	Grey Base (Prod PBT)
Flatness (top of base)	.0043 "	.0012 "	.0034 "	.0038 "
Parallelism of top of base to locking tab feature	.004 "	.0027 "	.0011 "	.0014 "

Regards,

Jim Watt MSG: JW02 Ext: 1719 M/S: 12-27

TEXAS INSTRUMENTS

ATTLEBORO, MASSACHUSETTS 02703

SAMPLE REPORT

REASON FOR REPORT		VENDOR		P.O.	PART NO.	REV.
NEW PART		T I			27639-1	D
REPLACEMENT TOOL		REPORT REC BY	DATE	INSPECTED BY		DATE
CORRECTED TOOL		ELAINE ROSE		RITA SALOIS		8/12/9
REPAIRED TOOL						
REVIEW						
OTHER DIM ANALYSIS	X					

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)				DISPOSITION		
	DIM	A5132	A47156	A81804	INSP METHOD		
1	Ø.294 - .298	X .2942	X .2966	X .2965	T mic		
	SIDE A	Y .2961	Y .2961	Y .2963			
	SIDE B	X .3015	X .3002	X .3007			
		Y .2992	Y .3007	Y .3010			
	MAL PLUG	.295	.296	.296	Plug		
2	.005 R - .015 R						
3	.001 MAL BURR .002 MAX IF TUMBLED						
4	Ø 1.059 - 1.063	X 1.0603	X 1.0609	X 1.0615	T mic		
		Y 1.0607	Y 1.0605	Y 1.0603			
5	FLAT TO .006 T.I.R.	.002	.002	.001	18" Surf		
6	LONGITUDE .004 T.I.R	.001	.0009	.0018	Comp		
7+8	C 40-60 HARDNESS PER NOTE #5	about. Engineering decided to retain all samples and not have them sectioned since customer is pro Copy drawing dimensions.					
9							

REMARKS AND/OR INSTRUCTIONS:

DISPOSITION: TOOL APPROVED FOR PROD. | RESUBMISSION REQ'D

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

TI-NHTSA 011797

FORM NO. 30755

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

SAMPLE REPORT

REASON FOR REPORT		VENDOR		P.O.	PART NO.	REV.
NEW PART					27639-1	D
REPLACEMENT TOOL.		REPORT REQ. BY	DATE	INSPECTED BY		DATE
CORRECTED TOOL.		ELAINE ROSE				8/12
REPAIRED TOOL.						
REVIEW						
OTHER D.im ANALYSIS	X					

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)	3-16 202	4-23 216	7-9 228	7-16 229	DISPOSITION: INSP METHOD		
	Dim							
1	Ø.294-.288	X.2954	X.2952	X.2953	X.2954	T Mic		
	SIDE A	Y.2954	Y.2948	Y.2952	Y.2954			
	SIDE B	X.2955	X.2957	X.2955	X.2956			
		Y.2952	Y.2951	Y.2954	Y.2957	↓		
	MAX PLUG	.295	.295	.295	.295	Plug		
2	.005R-.015R					g		
3	.001 MAX BURR .005R MAX IF TUMBLED							
4	Ø1.059-1.063	X1.0615	X1.0609	X1.0608	X1.0614	TM		
		Y1.0609	Y1.0610	Y1.0609	Y1.0619	TM		
5	PLAT TO .004 T.I.R.	.001	.0001	.0005	.001	ENV.		
6	CONCENTRIC .004 T.I.R.	.0018	.0008	.0015	.0022	Comp		
7-8	C40-45 HARDNESS PER NOTE #5	see note on sheet #1						
9		see note on sheet #1						

REMARKS AND/OR INSTRUCTIONS:

DISPOSITION: TOOL APPROVED FOR PROD. | RESUBMISSION REQ'D

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

TI-NHTSA 011798

FORM NO. 29788

DRAWINGS AVAILABLE UPON REQUEST

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

PAGE 1 OF 2

SAMPLE REPORT

REASON FOR REPORT		VENDOR		P.O.	PART NO.	REV.
NEW PART		T. I			27406-1	F
REPLACEMENT TOOL		REPORT REQ. BY	DATE	INSPECTED BY		DATE
CORRECTED TOOL		ELAINE ROSE	8-10-93	RITA SALOIS		8-12-9
REPAIRED TOOL						
REVIEW						
OTHER: DIM ANALYSIS	X					

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)					DISPOSITION		
	DIM	189	194	200	202	MFG TOOLING		
1	.500 - .506	X .5028	X .5029	X .5027	X .5023	T-MIC		
		Y .5030	Y .5023	Y .5025	Y .5024			
2	.287 - .293	X .2914	X .2897	X .2905	X .2904	CMM		
		Y .2918	Y .2905	Y .2913	Y .2919			
3	.162 - .168	.1637	.1648	.1652	.1657	DIAL IND.		
4	.101 - .107	.1035	.1034	.1027	.1046			
5	.020 - .025	.0224	.0209	.0231	.0216			
6	.012 - .018	.0138	.0161	.0142	.0138			
7	.755 - .759	X .7567	X .7570	X .7572	X .7574	T-MIC		
		Y .7577	Y .7575	Y .7571	Y .7575			
8	.707 - .720	X .7159	X .7115	X .7159	X .7156	CMM		
9	.015 MAX	See Note below						
10	.010 - .035	See Note below						
11	CONCENTR. .008 T.I.R.	.0017	.0026	.001	.0018			
		.0016	.0030	.0021	.0016			

REMARKS AND/OR INSTRUCTIONS: SAMPLES TO BE RETAINED WITHOUT SECTIONING TO BE SHOWN TO CUSTOMER PER 8212 DESIGN ENGINEER

DISPOSITION: TOOL APPROVED FOR PROD. | RESUBMISSION REQ'D

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

FORM NO. 8155

TI-NHTSA 011800

TEXAS INSTRUMENTS
ATTLEBORO, MASSACHUSETTS 02703

SAMPLE REPORT

REASON FOR REPORT	
NEW PART	
REPLACEMENT TOOL	
CORRECTED TOOL	
REPAIRED TOOL	
REVIEW	
OTHER Dim ANALYSIS	X

VENDOR	P.O.	PART NO.	REV.
TI		27406-1	F

REPORT REQ. BY	DATE	INSPECTED BY	DATE
ELAINE ROSE	8-10-92	RITA SALAIS	8-12-92

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

	(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)					DISPOSITION		
	Dim	AS1814	AS1321	Section AS2112	Section AS7156	INSP NEEDED		
1	.500 - .506	X .5044	X .5120	X	X .5048	T-mic		
		Y .5021	Y .5122	Y	Y NA			
2	.287 - .293	X .2910	X .2900	X	X .2909	OPT Comp		
		Y .2918	Y .2907	Y	Y NA			
3	.162 - .168	.1662	.1646	.1622	.1643	Dim NA		
4	.101 - .107	.1037	.1033	.1019	.1034			
5	.020 - .025	.0216	.0226	.0214	.0216			
6	.012 - .018	.0145	.0143	.0126	.0144			
7	.755 - .759	X .7564	X .7571	X	X .7580	T-mic		
		Y .7564	Y .7560	Y	Y NA			
8	.707 - .720	X .7107 Y .7182	X .7152 Y .7156		X .7111	OPT Comp		
9	.015 - MAX	See Sheet #1 page #1		.015 R MAX		T-mic		
10	.010 R - .035 R	See Sheet #1 page #1		.031 R MAX				
11	CONCENTRIC .005	.0017	.0012			OPT Comp		
	T.I.R.	.0014	.0013					

REMARKS AND/OR INSTRUCTIONS:

DISPOSITION: TOOL APPROVED FOR PROD.		RESUBMISSION REQ'D	
MFG. ENG.:		QRA ENG.:	
		PURCH. AGENT:	

TI-NHTSA 011801

FORM NO. 30795

DRAWINGS AVAILABLE UPON REQUEST

TEXAS INSTRUMENTS

ATTLEBORO MASSACHUSETTS 02703

PAGE 1 OF 1

SAMPLE REPORT

REASON FOR REPORT		VENDOR		DWG.	PART NO.	REV.
NEW PART				77PS	Connector's	
REPLACEMENT TOOL.		REPORT REC. BY	DATE	INSPECTED BY		DATE
CORRECTED TOOL.		Aziz	7-29-93	Elaine		7-29-93
REPAIRED TOOL.						
REVIEW						
OTHER						

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERICS MEASURED. IN CASES WHERE ACTUAL VALUES DEVIATE FROM THE SPECIFIED DIMENSIONS, THE DISPOSITION MUST INDICATE THE REQUIRED ACTION FOR EACH NON-CONFORMANCE IN THE APPROPRIATE COLUMN.

(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)						DISPOSITION		
Part		Bump Width		DIP NOM. L	DIP NOM. R	RADIUS		
27406	L202	.2822				L .446 R	Scrap — Wrong	
		.2859				R .914 R		
		.6072		.0050	.0146			
27389	L262	.2918						
		.2863						
		.3291		.0039	.0076			
A47156		.2825					"V" CUT	
		.2868		.0063	.0046			
		—						
A52112	A	.2906						
		.2875						
		.3304		.0077	.0087			
	B	.2847						
		.2801						
		.3207		.0050	.0048			
Cver. Read	A	.2816				L .0602		
		.2843				R .240		
		.2968		.0065	.0044			
	B	.2893				L .2440		
		.2916				R .2820		
		.3706		.0173	.0119			

REMARKS AND OR INSTRUCTIONS:

* DIMENSIONS ARE IN INCHES

DISPOSITION: TOOL APPROVED FOR PROD. | RESUBMISSION REQ'D

T. J. ENG.: | ORA ENG.:

PLANT AGENT:

TI-NHTSA 011603

		0.309	0.301	0.299	0.297	0.295	0.293	0.291	0.289	0.285
L199		.071	.070	.071	.070	.069	.068	.066		
L200		.071	.070	.072	.072	.071	.070	.068		
L201		.070	.071	.071	.071	.070	.070	.068		
L202		.070	.070	.071	.071	.069	.068	.065		
L268		.071	.071	.071	.070	.069	.068	.066		
L269		.071	.071	.071	.071	.070	.068	.066		
L260		.071	.070	.070	.069	.068	.067	.065		
L261		.070	.070	.070	.070	.069	.069	.065		
L262		.073	.072	.072	.069	.069	.069	.066		
A81804		.072	.071	.070	.069	.067	.067			
A82112		.069	.068	.067	.067	.066	.067	.064		
A47156		.070	.069	.069	.068	.067	.068			
A81921		.072	.072	.069	.068	.068	.068	.063		
A82578		.071	.069	.068	.067	.066	.066	.063		
		0.309	0.301	0.299	0.297	0.295	0.293	0.291	0.289	0.285
L199		.000	-.001	.000	-.001	-.002	-.003	-.005		
L200		.000	.000	.001	.001	.000	-.001	-.005		
L201		.000	.001	.001	.001	.001	.000	-.004		
L202		.000	.000	.001	.000	-.001	-.002	-.005		
L268		.000	.000	.000	-.001	-.002	-.003	-.005		
L269		.000	.000	.000	.000	-.002	-.003	-.005		
L260		.000	-.001	-.001	-.002	-.003	-.004	-.006		
L261		.000	.000	.000	.000	-.001	-.002	-.005		
L262		.000	-.001	-.001	-.003	-.004	-.004	-.007		
A81804		.000	.000	-.001	-.003	-.004	-.004	-.015		
A82112		.000	-.001	-.002	-.002	-.002	-.002	-.005		
A47156		.000	-.001	-.001	-.002	-.003	-.004	-.020		
A81921		.000	.000	-.003	-.004	-.005	-.005	-.009		
A82578		.000	-.002	-.003	-.003	-.004	-.006	-.007		
		0.309	0.301	0.299	0.297	0.295	0.293	0.291	0.289	0.285
L199		.000	.001	.000	.001	.002	.003	.005		
L200		.000	.000	.001	.001	.000	.001	.005		
L201		.000	.001	.001	.001	.001	.000	.004		
L202		.000	.000	.001	.000	.001	.002	.005		
L268		.000	.000	.000	.001	.002	.003	.005		
L269		.000	.000	.000	.000	.002	.003	.005		
L260		.000	.001	.001	.002	.003	.004	.006		
L261		.000	.000	.000	.000	.001	.002	.005		
L262		.000	.001	.001	.003	.004	.004	.007		

A81604		.000	.000	.001	.003	.004	.004	.015		
A62112		.000	.001	.002	.002	.002	.002	.005		
A7156		.000	.001	.001	.002	.003	.004	.020		
A81321		.000	.000	.003	.004	.005	.005	.008		
A62578		.000	.002	.003	.003	.004	.005	.007		

	.285	.287	.289	.291	.293	.295	.297	.299	.301	.303
27389 L252			← M.I.	.0657	.0681	.0700	.707	71.1	71.1	71.1
27389 L252			← W.E.	66.1	68.1	69.9	70.4	71.1	71.0	71.
27389 L252			← N/A	.0655	.0686	.0688	.0694	.0715	.0718	.072
Ref. AB1504			← N/A	.0671	.0671	.0685	.0704	.0712	.0715	
Ref. AB1504 (sectioned)			N/A	.0626	.0644	.0671	.0677	.0668	.0670	.0683	.069
AB1504 (pin removed)			← N/A	.0657	.0666	.0682	.0698	.0693	.069	
[redacted] AS331			← N/A	.0633	.0664	.0664	.0679	.0691	.0715	.071
27389 L252			← N/A	.0646	.0678	.0684	.0691	.0700	.0701	.070
A7389 L252			← N/A	.0650	.0685	.0692	.0697	.0699	.0697	.070
27406 [illegible]			← N/A	.0657	.0680	.0688	.0697	.0705	.0702	.0704
[illegible]			← N/A	.0658	.0697	.0710	.0715	.0716	.0703	.0706
[illegible]			← N/A	.0664	.0695	.0704	.0712	.0707	.0709	.069
[illegible]			← N/A	.0652	.0683	.0694	.0705	.0706	.0700	.0701
AB1504			←	M.I.	66.1	67.4	68.4	69.5	70.4	70.

Mixed old Invisia
Lot used pins

FSERDIM.XLS

SWITCH #	TOP OF CONVERTER BUTTON	BOTTOM OF CONVERTER BUTTON	TOP OF WASHER 18 DEG CHFR	BOTTOM OF WASHER SHARP EDGE	WASHER I.D. OFFSET WITH .296 PIN
A47156	.291	.297	.296	.299	.006
A51321	.290	.301	.296	.299	.006
A52578	.290	.300	.296	.299	.006
A61804	.290	.297	.296	.299	.006
PROD 1	.288	.295	.296	.300	.006
PROD 2	.290	.298	.296	.300	.006
PROD 3	.289	.298	.296	.300	.006
PROD 4	.288	.293	.296	.300	.006

TI-NHTSA 011607

Diemasters
NUFACTURING, INC.

FAX COVER SHEET

Date: 8/11/93 Number of Pages: _____ (Including cover sheet

TO:
Mr./Ms. Matt Sullivan

Company: _____
FAX # _____

FROM:
Mr./Ms. Mike Arent

Company: DIEMASTERS MFG., INC.
FAX # _____

COPY TO:

_____
_____
_____
_____
_____

SPECIAL INSTRUCTIONS:

- ☐ Confidential
- ☐ Urgent
- ☐ Please reply
- ☐ Responding to your fax
- ☐ For your information

MESSAGE:

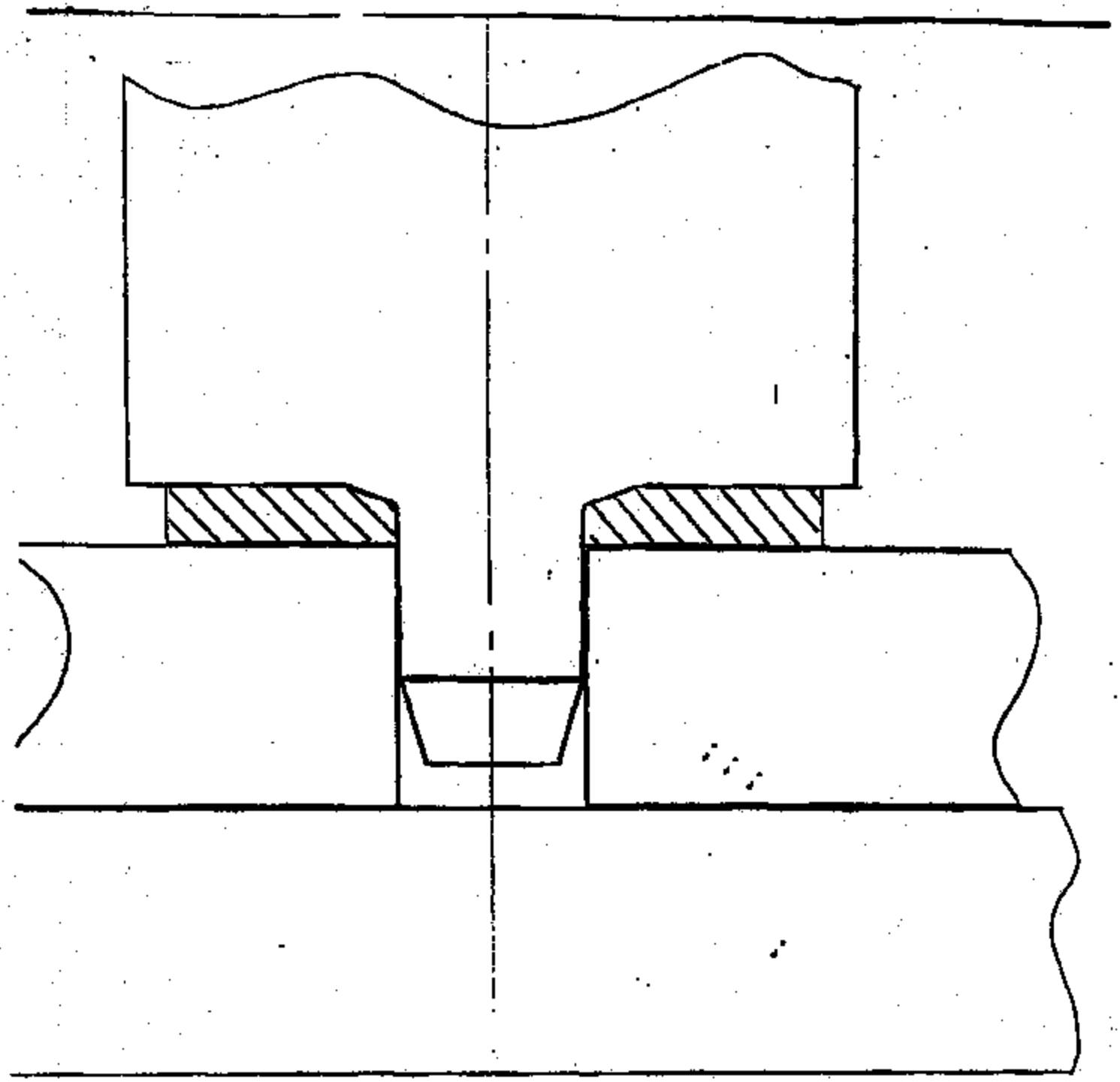
Matt, here is the information requested. Any questions please call.

TKS
Mike Arent

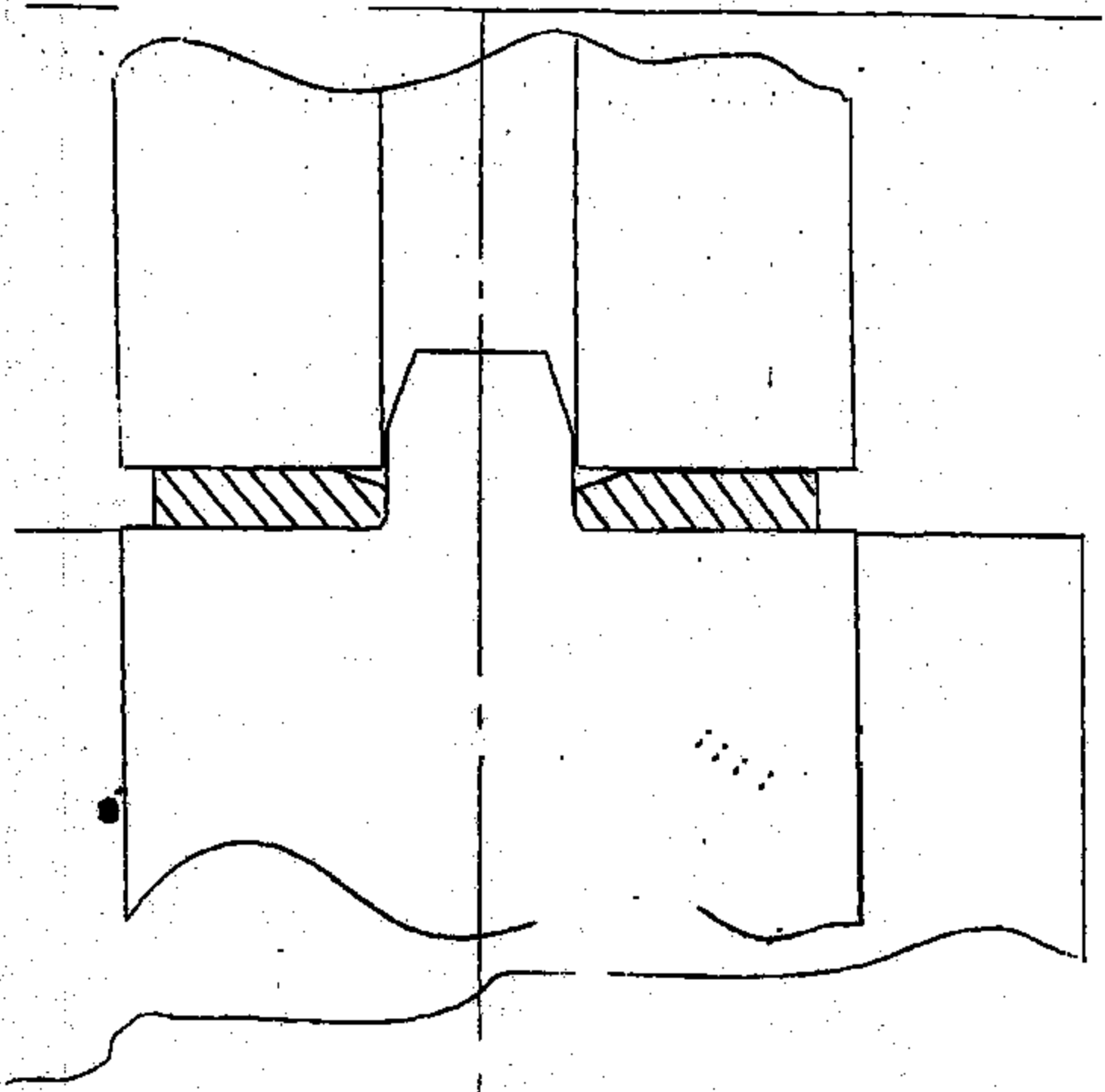
If not received correctly, please call: (708) 834-7400

TI-NHTSA 011808

767 Industrial Drive • Elmhurst, Illinois 60126 • (708) 834-7400 • FAX (708) 834-6029



PRIORITY 2.0



PRIORITY 4.0

TO: DAVE CZARN

CC: MATT SELLERS
PAUL KOTCH
CHARLIE DOUGLAS
ANDY MCGUIRK

FR: AZIZ RAHMAN

RE: DIEMASTERS TRIP REPORT

DT: 11/5/93

MONDAY, 11/1/93 - DIEMASTERS
1 PM - 5 PM

T.I. AZIZ RAHMAN

DIEMASTERS MIKE ARRENT, PROJECT ENGINEER
GLENN MARCANTONI, TOOLING SUPERVISOR
JIM BAUMBICH, DIRECTOR OF OPERATIONS

THE OBJECTIVE OF THE VISIT WAS TO CONDUCT A FINAL DESIGN/MFG REVIEW OF THE PROPOSED CHANGES TO WASHER 27439-1. THE DESIGN CHANGE INVOLVES COINING A CHAMFER ON THE BACK SIDE OF THE WASHER TO PROVIDE A RELIEF FOR THE RADIUS AT THE BASE OF THE CONVERTER. THIS CHANGE PROPOSAL IS THE RESULT OF THE 8-D ON 7/PELS-3 P-SERIES FIELD RETURNS.

DIEMASTERS IS A $12M STAMPING HOUSE INVOLVED IN STAMPED PRODUCTS FOR THE AUTOMOTIVE AND CONSUMER INDUSTRY. TYPICAL PRODUCTS MANUFACTURED HERE INCLUDE LEAD-FRAMES, HOUSINGS, SMALL ASSEMBLIES, CASINGS etc. THEY HAVE 90 EMPLOYEES AND ARE LOCATED IN ELMHURST, IL. THE PRESSES ON SITE RANGE FROM 40 TONS TO 120 TONS. THE T.I HYDRAULIC WASHER IS RUN ON A 60-TON PRESS. DIEMASTERS FABRICATE MOST OF THEIR DIES IN-HOUSE IN AN ADEQUATELY EQUIPPED TOOL SHOP.

DURING 9/93 DIEMASTERS HAD FABRICATED A SINGLE STATION PROTOTYPE TOOL TO EVALUATE MANUFACTURING FEASIBILITY OF THE DESIGN CHANGES. THEY ARE CONFIDENT THAT THIS CAN BE DUPLICATED IN PRODUCTION. THE INITIAL THOUGHT WAS TO COIN THE CHAMFER IN THE IDLE STATION AND RE-PERFORATE THE FINAL I.D. TO REMOVE THE ROLL-OVER TIPS. GLENN VOICED HIS CONCERNS THAT THIS WOULD ALMOST BE A SHAVING PROCESS RESULTING IN SMALL CHIPS DISPERSING ALL OVER THE PUNCHES. HIS PROPOSAL INVOLVED USING IDLE STATIONS IN THE DIES TO INCORPORATE A PILOTED CHAMFER COINING PUNCH FOR THE REVERSE CHAMFER. THE RADIUS ON THE TOP CHAMFER WOULD BE COINED IN THE NEXT STATION WITH A PILOTED PUNCH. THE PILOTED PUNCHES WOULD PREVENT MATERIAL ROLL-OVER INTO THE I.D. DIEMASTERS NEEDS TO GET BACK TO T.I. WITH A FINAL PROPOSAL.

THE ABOVE CHANGES TO THE TOOL WOULD BE REVERSIBLE. THE DIES ARE "CLASS C" DIES, AS IN "CHEAPEST IN CLASS", MEANING THERE IS NOT MUCH SOPHISTICATION IN HOW THEY ARE PUT TOGETHER. (CLASS "A" DIES WOULD BE FULLY BUSHED AND DOWELED, WITH TIGHT CLEARANCES , THICKER BASE BLOCKS ETC.) THE ONLY LONG TERM PROCESS CONCERN MIKE HAD WAS REGARDING TOOL WEAR AND INCREASED CYCLE TIME, BOTH OF WHICH PROBABLY TRANSLATE TO INCREASED PIECE PRICE.

THERE ARE THREE DIES WHICH PRODUCE THIS PART. IT SEEMED LIKE ONLY ONE OF THE DIES HAD SUFFICIENT IDLE STATIONS TO INCORPORATE THE ADDITIONAL COINING PUNCH. DIEMASTERS WILL HAVE TO ADDRESS HOW THEY WILL MEET VOLUMES IF ONLY ONE DIE IS RE-TOOLED.

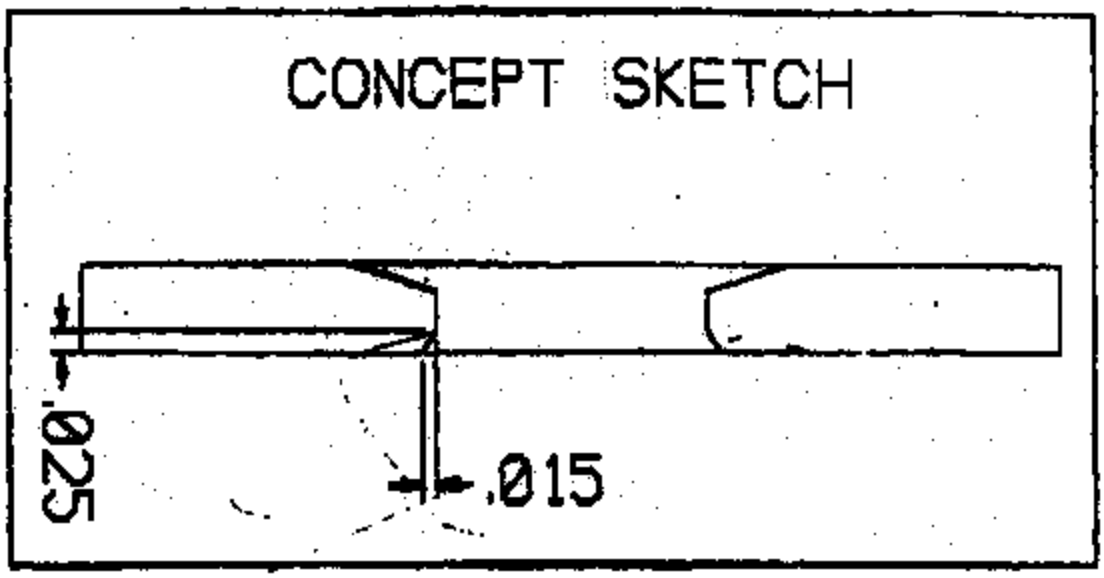
WE ALSO DISCUSSED MODI'S SUGGESTIONS OF INCORPORATING AN I.D. GAGING SCHEME IN THE DIE ITSELF. THIS WOULD ENSURE THAT THE I.D., WAS LARGER THAN THE MMC OF THE CONVERTER ON EACH WASHER. THOUGH MIKE WAS RECEPTIVE TO THE IDEA, HE WAS HESITANT TO INCORPORATE A GAGE PIN IN THE DIE. HE AGREED TO GO RESEARCH NON-PROBING TECHNIQUES TO ACHIEVE THE SAME.

THE FOLLOWING ACTION ITEMS WERE GENERATED FOR FOLLOW-UP:

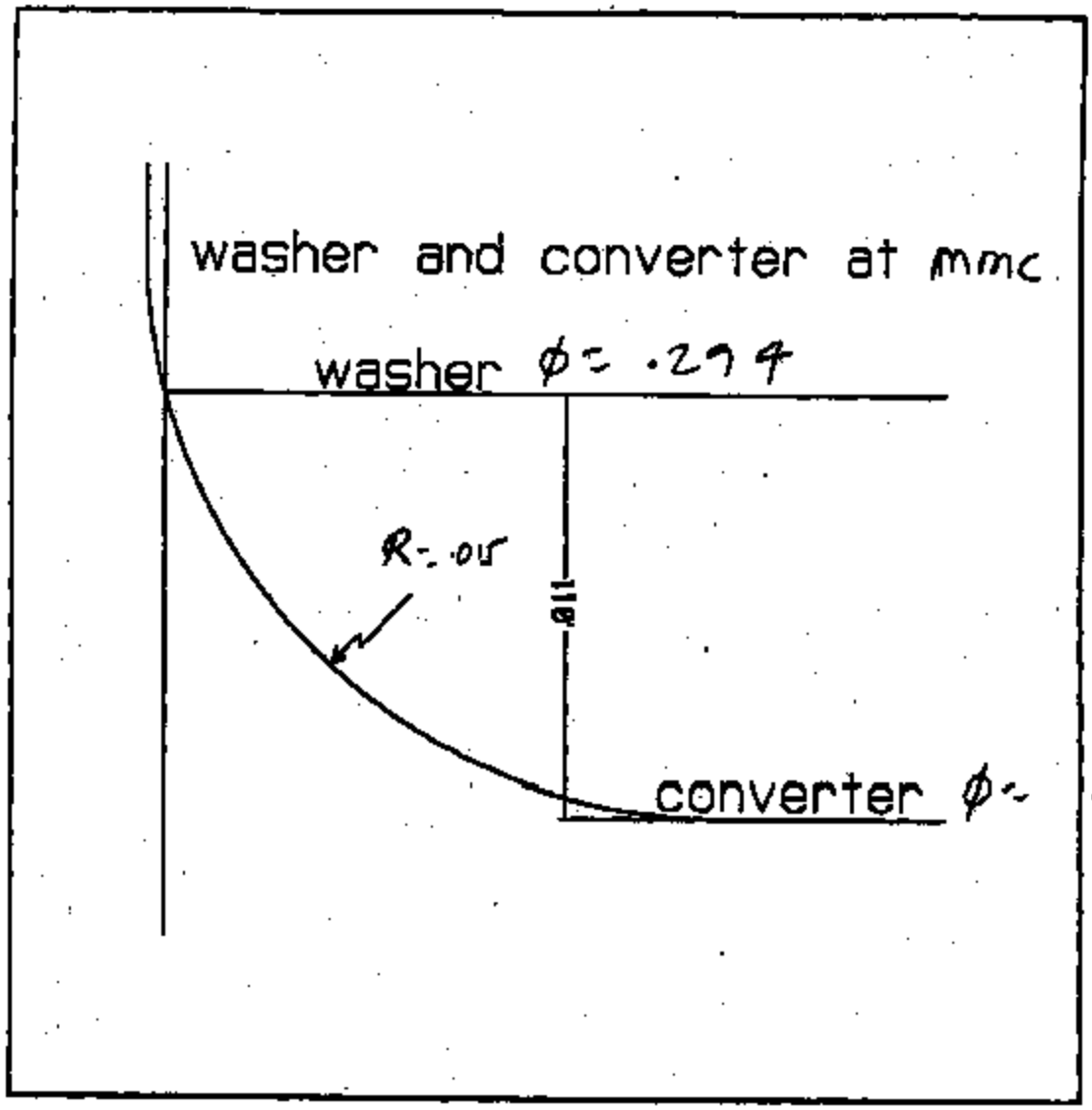
FORWARD FINAL PRINT AND RFQ TO DIEMASTERS	RAHMAN/KOTCH	11/5 ✓
REVIEW DESIGN CHANGE STRATEGY AND QUOTE	ARRENT	11/12
PROPOSE IN-DIE I.D. GAGING SCHEME	ARRENT	12/1
KEY DIMS CAP STUDY ON PARTS FROM 3 DIES	ARRENT	11/19
OBTAIN DESIGN CHANGE APPROVAL FROM FORD	RAHMAN/DOUGLAS	11/19
RELEASE DESIGN CHANGE	SELLERS	12/1

REGARDS
AZIZ.

DRAWINGS AVAILABLE UPON REQUEST



6-1-93
Attachment #2


washer and converter at mmc
washer ϕ= .294
R=.015
.118
converter ϕ= .293

MATT SELLERS

C.BALTHAZAR

27288-1	SHELF/BUMP	BUMP HEIGHT	CONCENTRICITY
#1	0.0872	0.0156	0.1559
	0.0874	0.0154	0.1537
	0.0872	0.0160	0.1553
	0.0875	0.0157	0.1541
#2	0.0878	0.0169	0.1483
	0.0882	0.0169	0.1467
	0.0880	0.0169	0.1447
	0.0879	0.0157	0.1447
#47156	0.0869	0.0158	0.1531
	0.0880	0.0154	0.1545
	0.0873	0.0160	0.1549
	0.0871	0.0159	0.1565
#52112	0.0873	0.0155	0.1537
	0.0871	0.0153	0.1528
	0.0869	0.0161	0.1549
	0.0871	0.0150	0.1543
#51321	0.0876	0.0161	0.1563
	0.0874	0.0165	0.1585
	0.0879	0.0160	0.1569
	0.0878	0.0161	0.1533

39668-83	O.D.	BURR	CROWN HEIGHT	WEAR MARK
#1	0.7490	0.0012	0.0293	
		0.0008		
#2	0.7490	0.0008	0.0294	
		0.0008		
#47156	0.7490	"	0.0298	0.0827
#52112	0.7490	"	0.0300	0.0854
				0.0864
				0.0886
				0.0843
#51321	0.7485	"	0.0299	0.0862
				0.0862
				0.0849
				0.0870

Final Assembly Machine
LVDT station correlation excercise
100 piece sample comparison with f.s.m. actuals
77PSL3-S quiet switch

A2.2.
Your Copy
MATT

Lot # 786			
8/2/99			
47.3	47.0	47.3	46.8
47.0	46.7	47.0	46.9
47.0	46.7	47.0	47.0
46.9	47.4	47.3	47.2
47.2	47.0	47.1	46.8
46.9	47.4	47.2	47.0
47.0	47.1	47.2	47.2
47.1	47.2	46.8	47.2
47.2	46.8	47.1	47.0
47.0	47.3	47.2	46.7
47.2	47.1	47.0	46.7
47.0	47.0	47.1	47.2
47.0	47.1	46.9	47.0
47.0	47.3	46.8	47.1
47.1	46.9	47.0	47.1
47.8	47.0	47.1	47.1
47.1	46.7	46.7	46.7
47.1	47.1	47.2	47.4
47.0	47.0	47.1	46.7
47.1	46.9	46.9	47.2
47.1	47.1	47.3	47.1
47.1	47.2	47.2	47.1
47.0	47.2	47.0	47.1
47.1	46.9	47.3	47.1
46.9	46.9	46.9	47.0

X-BAR	47.0
SIGMA	0.18
HI PIN	146.0
LO PIN	144.0
MANUAL X-BAR W/HI PIN	99.0
MANUAL X-BAR W/LO PIN	97.0
LVDT X-BAR W/HI PIN.	98.4
LVDT SIGMA W/HI PIN	0.47
LVDT X-BAR DELTA	-0.6

LVDTCORR.XLS

F 5[illegible]

Containment

① Review LVDT correlation MS/KA
② Fall out Analysis - MS/KA
- sensor ht - KA
- p.d curve - KA
③ Audit Check - MS/KA/AR
- sensor ht - KA
- p.d curve - KA
- housing cycling JD
- sensor ht - KA
- p.d curve KA
- review results MS/AR

Disposition

✓① Visually Inspect Production Samples AR
✓② Visually Inspect DV Test Samples AR
③ Dimensional Analysis MS/ER
a Functional Type Analysis
- Returns
- Production
~~④~~ FAI/out of Rework verification
- Returns
- Production
④ Rebuild known orientation actuators + check for leakage AR/JD
⑤ Build off c.i. master/comp + build AR/JD
⑥ Cycle stuck closed valves in housing position AR/JD
⑦ Update DFMEA AR

7/29

A/C vs non-A/C

- [illegible]

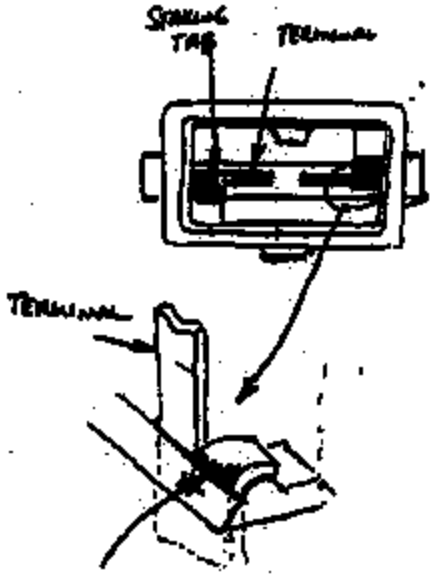
+ Connector [illegible]
in November

+ OPEN: Speed control wiring [illegible]

→ [illegible]

[illegible]

→ hot [illegible]



BLUE-GREEN RESIDUE ALONG EDGE OF TERMINAL AND SEALING TAB VISIBLE IN THE CONNECTOR CAVITY

THIS STICKY SWITCH HAS THE BLUE-GREEN RESIDUE ALONG THE TERMINAL AND IN ONE CORNER OF THE CONNECTOR CAVITY, SHOWING THAT THE LIQUID PUDDLED IN ONE AREA

ANOTHER SWITCH HAS THE RESIDUE COVERING ABOUT 1/2 OF THE CONNECTOR CAVITY, CLEARLY FROM LIQUID THAT FORMED A PUDDLE AFTER INGRESS THROUGH THE CONNECTOR

-MSG M#= 507944 F[redacted] SENT=08/19/93 09:45 AM
ST=C DIV=0050 CC=00134 BY=MJS2 AT=08/19/93 09:45 AM

TO:	TERRY RODRIGUEZ	TER7
	CLAUDE RICHARDSON	CER
	JIM GRAMMER	JG01
	PAUL FERREIRA	PJF4
	77PS SMWT	MFPC
CC:	DICK GARIEPY	RWG3
FR:	MATT SELLERS	MJS2

RE: Q.C. SAMPLE SUBMISSIONS

THE REVISED Q.C. SAMPLE SUBMISSION PLAN FOR 77PS AND 87PS LOTS HAS BEEN PLACED INTO TYPING TO BE ADDED TO THE 77PS PILOT MAKER PROCESS SPECIFICATION. FOR YOUR CONVENIENCE I HAVE PROVIDED THE LINE WITH A HAND WRITTEN COPY OF THE REVISION FOR IMMEDIATE IMPLEMENTATION. PLEASE ENSURE THAT ALL OPERATORS ARE TRAINED ON THIS NEW PROCEDURE AND UNDERSTAND IT. PLEASE CALL IF THERE ARE ANY QUESTIONS REGARDING THE NEW PLAN.

THANKS & REGARDS. . .MATT
MSO MJS2
EXT.1245

PRESSURE SWITCH DATA Form 21605 TEST NO. 414-03-06

DEVICE	DATE REQUESTED	REQUESTED BY	REQUESTED COMPL. DATE
77PSL3-1		Aziz Rahman	
PERFORMED BY	**DATE STARTED**	**DATE COMPLETED**	**APPROVED BY**
Jeffrey P. Domaico	9/13/93		

SUBJECT TITLE: Cruise Control PS

CUSTOMER:

PURPOSE OF TEST: Evaluation of no-radius washers

PROCEDURE: Build sensors with no-radius washers. Run old curves. Run 500K on production impulse cycler

Devices built but test never performed

Device #:									
414-03-01									
-02									
-03									
-04									
-05									
-06									

-MSG MN= 187988 FR=MAYR [illegible]=MJB2 SENT=09/17/93 03:48 PM
R#=038 ST=C DIV=0050 CC=00869 BY=MAYR AT=09/17/93 03:48 PM

TO: BILL SWEET WG4
MATT SELLERS MJB2

FR: LOU ROCHA

SU: CONVERTING 52PS PRESSURE TESTER TO RUN 57,87,77 PS DEVICES

WE TOOK A LOOK AT THE TESTER AND MADE THE FOLLOWING OBSERVATIONS:

1. 57PS DEVICES WILL NOT FIT IN NESTS DUE TO THE OVERALL THICKNESS AT THE NECK. THE THICKNESS INCLUDES THE VERTICAL TAB WHICH IS THE PROBLEM.

2. THE 87PS DEVICE WILL FIT IF A SMALL RADIUS CUT IN THE NESTS TO CLEAR THE CORNERS. THE PRESSURE RANGES ALSO SEEM TO BE COMPATIBLE WITH THE 52 PS DEVICES, AND THE UNLOADER SHOULD BE NO PROBLEM.
THE 87'S ARE PROGRAMMED DIFFERENTLY ON THE 77 TESTER THAN WHAT THE 52 TESTER WILL ALLOW, SO YOU WOULD HAVE TO CHANGE YOUR PROCESS SPECS.
IE: LA, HA, LR, HR, MIN DIFF ON 77PS TESTER
LA, HA, LR, MIN DIFF ON 52PS TESTER.

3. THE 77PS DEVICE WILL ALSO FIT IF THE NESTS ARE MODIFIED FOR ABOVE, HOWEVER THE LOW RELEASE VALUES ARE PRETTY LOW, 20PSI, THIS MAY RESULT IN A LONG CYCLE TIME, SINCE THE RAMP RATES ARE SET FOR THE HIGHER 52PS RANGES. THE LIMITS HERE ARE PROGRAMMED DIFFERENTLY AS WELL. O.K - Lower volume on 77PS
IE: LA, HA, LR, HR, MAX DIFF ON THE 77PS TESTER.
LA, HA, LR, MIN DIFF ON THE 52PS TESTER.

4. PRINTED LOT REPORTS WILL NEED TO HAVE 52PS PART NUMBERS SINCE MECHANIZATION CANNOT CHANGE PROGRAMS. O.K.

5. I DID CHAMFER THE CORNERS ON SOME 77PS AND 87PS DEVICES AND RAN THEM THROUGH, WITH 52PS LIMITS. THEY DID SEAL AND CONTACT, BUT OF COURSE DID NOT PASS THE TEST.

IN SUMMARY, IT APPEARS A MINOR CHANGE TO THE 52PS TESTER WOULD GIVE US 87PS CAPABILITY. WE NEED TO DIG A LITTLE FURTHER TO SAY THE SAME FOR 77PS CAPABILITY.

LET ME KNOW WHAT YOU WANT TO DO.

LOU X9690, RADIO #140

Actions
* Release by MWD mods req'd to Allow testing of 87/57PS product.
* ASAP conduct Correlation Study between testers.

TI-NHTSA 011822

MECHANIZATION WORK ORDER SHT. 1 OF 1

FORM 20220

Date Entered By MECHANIZATION

Project No. Expense 25206021E Capital 6042.2

Date Requested
- ☐ Proposal
- ☐ Design
- ☐ Build

Requested By (name)	Date	Mail Sta.	Tel. Ext.
Matt Sellers		B27	1295
Approved By			
B. Lewis			
Department	PREC 57PS		

Product Code

CC

RECD. PRODUCT PRINT NOS. SUPPLIED LIST

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PROJECT DESCRIPTION

* Design + Build of required modifications to the 57PS function tester to allow full testing capability for the 87PS device:

Ref. Proposal dated 1/19/93 Mwo 25206021E

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			
BUILD CLOSED	DATE		

ADDITIONAL REMARKS, INFORMATION, SKETCH

Ed K.
Please forward a detailed time line ASAP outlining when downtime will be required.

Matt

77L6-1
57L87
57L11-2

TI-NHTSA 011823

WHITE – MECHANIZATION COPY YELLOW – ORIGINATOR'S COPY

-MSG M#= 256021 FR=MJS2 TO=COPY SENT=09/21/93 08:46 AM
ST=C DIV=0050 CC=00134 BY=MJS2 AT=09/21/93 08:46 AM

TO: LOU ROCHA MAYR
BILL MILLARD PCME

CC: BILL SWEET W84
DENNIS NATALE DJN1
77PS SMWT MFPC

FR: MATT SELLERS MJS2

RE: 52PS PRESSURE TESTER MODS

PLEASE US THIS MEMO AS AUTHORIZATION TO COMPLETE DESIGN AND BUILD OF 52PS TESTER NEST MODIFICATIONS TO ENABLE TESTING OF THE 77PS AND 87PS BASED PRODUCTS. WE WILL NEED TO EVALUATE PROBLEMS ASSOCIATED WITH THE LOW RELEASE PRESSURES ON THE 77PS PRODUCT AFTER WE DEVELOP THE CAPABILITY OF AT LEAST TESTING THEM.

REF: LOU ROCHA MEMO # 107988 DATED 9-17-93.

THANKS & REGARDS, MATT
EXT. 1245
MSG. MJS2

-MSG M#= 59559 FR=MAYR [redacted] 0/04/93 08:51 AM
R#=071 ST=C DIV=0050 CC=00869 BY=MAYR AT=10/04/93 08:51 AM

TO: BILL SWEET
MATT SELLERS

CC: BOB BABILIERE
DAVE PERIPOLI
BILL MILLARD

FR: LOU ROCHA

SU: 52PS PRESSURE TESTER MODIFICATION

Claire:
Let's discuss
I have a pilot to
run through 52PS
Tester for Correlation

The
MATT
PS 733

AS YOU REQUESTED A COUPLE OF WEEKS AGO, THE 52PS PRESSURE TESTER NESTS HAVE BEEN MODIFIED TO ACCEPT 77PS AND 97PS DEVICES BY CUTTING A RADIUS INTO THE NESTS. THIS CHANGE HOWEVER, WILL NOT ACCOMODATE 57PS DEVICES.

ALSO, WE HAVE PROTOTYPED AND TESTED THE TABLE SEAL IDEA WITH SOME SUCCESS. THAT IS, A POLYURETHANE SEAL THAT SITS IN A STEEL INSERT AND INSTALLS IN THE DIAL TABLE HOLES AT EACH FIXTURE. THE ADVANTAGES WE SEE ARE LONGER LIFE SINCE EACH SEAL ONLY SEES ONE THIRD THE SERVICE AND THE ABILITY OF THE OPERATORS TO CHANGE SEALS. WE PLAN ON DESIGNING A UNIVERSAL SEAL SO THAT ALL TESTERS USE THE SAME ONE AND THEN ADDING THIS FEATURE TO THE 77PS TESTER. I WILL ALSO SEE THAT ED K. INCORPORATES THIS ON THE 52PS TESTER UPGRADE.

REGARDS

LOU

Final Version

RISK ANALYSIS REPORT

INTRODUCTION/BACKGROUND:

* In early June 1992 Ford Australia asked TI if the speed control deactivate pressure switch could withstand a vacuum of 0.2 millibar. The explanation was that this level of vacuum is needed during factory fill to avoid spongy pedal feel. TI's initial response was that the ES calls for 4 - 8 mBar, and we had never characterized the device at harder vacuum levels.

* In mid-June, 0.2 mBar was revised to 0.4 mBar by Brent Franks.

* In late June, TI completed some initial testing down to 1.3 mBar, which was the vacuum capability limit of equipment available at the time. Inspection of these test devices revealed that the diaphragm (forming the fluid containment cavity) was being displaced by the vacuum. This was cause for concern since the wrinkled condition observed had been previously associated with shortened diaphragm life. A failed diaphragm results in a brake fluid leak.

* In early July, it was learned that Ford-Australia was doing work to confirm the vacuum requirement, taking actual vacuum readings with a calibrated gauge. A fax from John Peck dated 4 Aug 92 confirmed that actual measured readings ranged from 0.4 to 1.0 mBar across the vehicle population. This fax also contained milestone dates of 1 Nov 92 MRD for PPB, and 14 Apr 93 MRD for PCB which John indicates is the latest possible OTS submission.

* TI immediately began to put together a plan to scope the issue, including characterization testing of the present design, as well as simultaneously prototyping possible modifications, plus comprehension and scheduling of sample and validation requirements.

STATUS:

At this point, the present design has been characterized for diaphragm life after exposure to 0.4 mBar, with a control lot (no vacuum), plus four prototype designs. While all devices in all test lots actually passed the 500K cycle requirement, results indicate statistically that the high vacuum level has a detrimental effect on the life of the present design. It was confirmed that the wrinkled condition theorized to cause reduced life was again present, as also seen in the initial testing in late June.

Two of the four prototype lots produced excellent results, exceeding the life of the standard diaphragm configuration by a significant amount. These are the full-round Kapton and the rubber diaphragm. The full-round Kapton prototype lot differs from the standard design only in that it is round in shape, whereas the standard design is the inscribed square of the full-round circle. The full-round design gives much greater clamping area, hence greater resistance to vacuum exposure. The rubber diaphragm basically replaces the standard lathe-cut internal gasket with a solid rubber disc, having the same thickness and O.D. as the gasket (hence fitting in the same gland). It uses the standard 3 pieces of square Kapton.

ALTERNATIVES:

Option 1: Use the standard design, unmodified, and the high-vacuum assembly plant fill procedure.

Benefits:

* The standard design is fully production tooled, ISR'ed, and in full-scale production for various applications

* No cost or schedule impact related to diaphragm redesign

Risks:

* It has been shown in a controlled experiment that the Ford-Australia vacuum level has a negative impact on diaphragm life. Weibull analysis of the data indicates high vacuum exposure also results in decreased statistical certainty about diaphragm life; i.e. diaphragm life becomes less predictable, and demonstration of a given life expectancy during an ISR test may not correlate well with field experience.

Option 2: Use the standard design, unmodified, and reduce the vacuum level of the assembly plant fill procedure.

Benefits:

* The standard design is fully production tooled, ISR'ed, and in full-scale production for various applications

* No cost or schedule impact related to diaphragm redesign

* No issues with diaphragm life are expected to arise, which is backed up by field experience.

Risks:

* The spongy pedal issue will result, according to information from Ford. Therefore, this is not considered a real option.

Option 3: Use the rubber diaphragm design approach

Benefits:

* In one experiment, this design has shown a dramatic improvement in diaphragm life under high vacuum. Test aborted at 2.7KK cycles with no failures in this lot.

* This design could be built on existing automated production equipment, with certain modifications.

Option 3: Use the rubber diaphragm design approach (continued)

Risks:

* The performance over the full range of expected conditions must be further quantified

* The impact of any variability of material properties over time must be quantified

* The impact of production process variability must be quantified

* Bench-testing only; no on-vehicle experience exists.

Option 4: Use the full-round Kapton design approach

Benefits:

* In one experiment, this design has shown a significant improvement in diaphragm life under high vacuum, but not as good as the rubber diaphragm.

* This design represents essentially no departure from the standard design in terms of pressure- and fluid-exposed materials and geometries.

Risks:

* The performance over the full range of expected conditions must be further quantified

* The impact of production process variability must be quantified

* Bench-testing only; no on-vehicle experience exists.

* To automate this design would require major tooling modifications to existing equipment, which is unfeasible due to the fact that other applications also use this equipment.

77PS Data Collection. 10/14/93

* Real time "Monitor" or "Flags" to watch for poor effectivity #'s

* Daily download of data for use in program (artificial limitation)
vs.
real time availability in program.

* Data Storage area.

* SQL Cost $15k → Development Space Systems - mach.

-MSG M#= 18086 FR=MAYR TO=MJS2 SENT=10/21/93 07:08 AM
R#=155 ST=C DIV=0050 CC=00869 BY=MAYR AT=10/21/93 07:08 AM

TO: MATT SELLERS MJS2

CC: BILL SWEET W84
BILL MILLARD MAYR

FR: LOU ROCHA MAYR

SU: CONVERTING 52PS TESTER TO TEST 57/77/87 DEVICES

A. THE FOLLOWING CHANGES ARE REQUIRED TO BE ABLE TO TEST 57/77/87 DEVICES. ITEMS 1 THRU 4 ARE NEEDED BECAUSE THE EXISTING 52 PROBE ASSEMBLIES DO NOT REACH THE LOWER 77/87 DEVICES. ITEM 5 IS TO ACCEPT THE LARGER ALUMINUM CRIMP RING FOR THOSE DEVICES THAT USE THOSE RINGS.

1. MODIFY PROBE MOUNTING PLATE TO ALLOW PROBES TO REACH 77/87 DEVICES. (140438-12)
2. MAKE 8 NEW GUIDE POSTS. (140439-20)
3. ALTER PROBE TIPS TO ELIMINATE INTERFERENCE WITH 77/87 BASES. (140438-12)
4. ALTER CONTACT BLOCK HOLDER TO ACCOMODATE LONGER SPRINGS. (140438-19)
5. MAKE 12 NEW NEST INSERTS TO ALLOW FOR LARGER DIAMETER ALUMINUM CRIMP RINGS. (140437-14)

B. THE FOLLOWING CHANGES ARE OPTIONAL, BUT RECOMMENDED TO MAINTAIN ORIENTATION. I AM CONCERNED THAT THE OPERATOR MAY HAVE DIFFICULTY IN KEEPING THE TIGHT ORIENTATION NEEDED FOR THE PROBES TO HIT THE 77/87 DEVICES. I AM MAKING A SOFT PROTOTYPE FOR YOUR EVALUATION.

1. MAKE 12 NEW NEST ORIENT BLOCKS WITH FEATURES TO ORIENT 52,57,77,87 DEVICES. (140437-13)

C. THE FOLLOWING CHANGE MAKES EACH PROBE AREA INDIVIDUALLY SERVICEABLE RATHER THAN THE CURRENT SITUATION WHERE ALL FOUR PROBE ASSEMBLIES NEED TO COME APART TO WORK ON ONE.

1. CUT PROBE CYLINDER MOUNT PLATE INTO FOUR SECTIONS. (140438-18)

ESTIMATED COSTS (PARTS & LABOR):
PART A..... $3700
PART B..... $3600
PART C..... $ 300

REGARDS

LOU, 3680, PAGE 148

TO: TED BREDIKIN
TED BALLARD

CC: MATT SELLERS
77PS SMWT

FR: AZIZ RAHMAN

RE: 77PS DISCS

DT: 11/22/93

PER OUR DISCUSSION LAST FRIDAY, PLEASE FIND AN UPDATED SPECIFICATION TABLE FOR 77PS DISCS. THE ACTUATION AND RELEASE MEANS WILL BE SPECIFIED VIA THE KANBAN PULL. YOU MAY ENTER AN ECN PER THIS TABLE.

IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT MATT OR MYSELF.

REGARDS

AZIZ.

RETURNED DEVICE ANALYSIS REPORT

CUSTOMER P/N:	F2VC - 9F924 - AB	T.I. P/N:	7795L2-1
VEHICLE:	MY 95 TOWN CAR	DATE CODE:	2281
FIELD HISTORY:	DEVELOPMENT VEHICLE	RETURNED:	12/13/93
MILEAGE:	N/A	TEST CONDITIONS:	N/A

REASON FOR RETURN: INOPERATIVE SWITCH

SWITCH ANALYSIS

THE SWITCH WAS CONFIRMED TO BE OPEN CIRCUIT IN UN-PRESSURIZED STATE ON RECEIPT. THE SWITCH SHOULD BE NORMALLY CLOSED IN THE UN-PRESSURIZED STATE.

THE SWITCH CRIMP RING SHOWED SIGNS OF HANDLING DAMAGE BUT THERE WAS NO FUNCTIONAL IMPACT TO THE CRIMP RING. THOROUGH VISUAL OBSERVATION INDICATED FLUID INGRESS BY THE MATING CONNECTOR END OF THE SWITCH, AS EVIDENCED BY BRASS CORROSION PRODUCTS ON THE TERMINALS AND IN THE PLASTIC CAVITY. THE SWITCH PLASTIC BASE CONNECTOR LATCH WAS IN NORMAL CONDITION. SEE ATTACHED PHOTOGRAPHS. AN X-RAY OF THE SWITCH INDICATED THAT THE SPRING CONTACT ARM WAS COMPLETELY CORRODED. THE SWITCH WAS DISASSEMBLED FOR INTERNAL EVALUATION.

INTERNAL INSPECTION OF THE PLASTIC BASE INDICATED MASSIVE CORROSION OF THE CONTACT ARM. THERE WAS EVIDENCE OF FLUID INGRESS BY THE TERMINALS FROM THE CONNECTOR CAVITY. THE ENVIRONMENTAL SEAL WAS IN A NORMAL STATE AND THERE WAS NO INDICATION OF LEAKAGE BY THE SEAL.

ROOT CAUSE

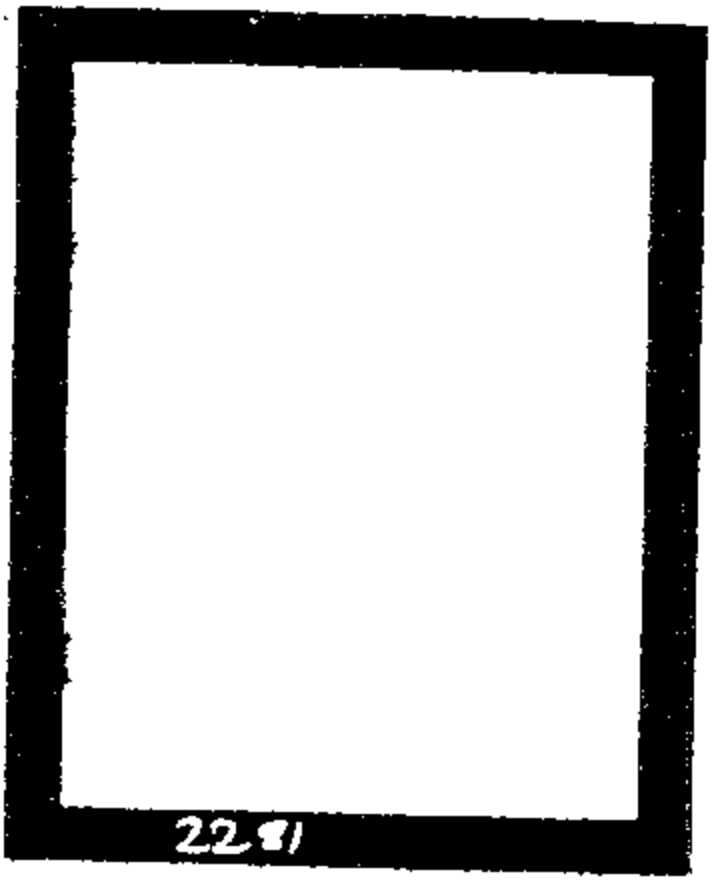
THE SWITCH WAS INOPERATIVE DUE TO LACK OF ELECTRICAL CONTINUITY BETWEEN TERMINALS. THE LACK OF CONTINUITY WAS DUE TO MASSIVE CORROSION OF THE CONTACT ARM CAUSED BY FLUID INGRESS BY THE MATING CONNECTOR. THE CONDITION OF THE SWITCH WAS IDENTICAL TO THAT OBSERVED ON BODYCLINE WARRANTY RETURNS IN SUMMER/FALL '93. AFTER EXTENSIVE TESTING AND THOROUGH ANALYSIS, THE ROOT CAUSE FOR THOSE SWITCHES WAS CONCLUDED TO BE FLUID INGRESS THROUGH THE CONNECTOR BECAUSE OF A COMBINATION OF A "ROCKED" CONNECTOR AND VERTICAL ORIENTATION OF THE SWITCH IN THE APPLICATION. THE 8-D FOR THAT FAILURE MODE WAS COMPLETED AND CLOSED IN CONCURRENCE WITH FORD LIGHT TRUCK ENGINEERING AND IS ATTACHED FOR REFERENCE (REPORT # FS/CAR/93-3).

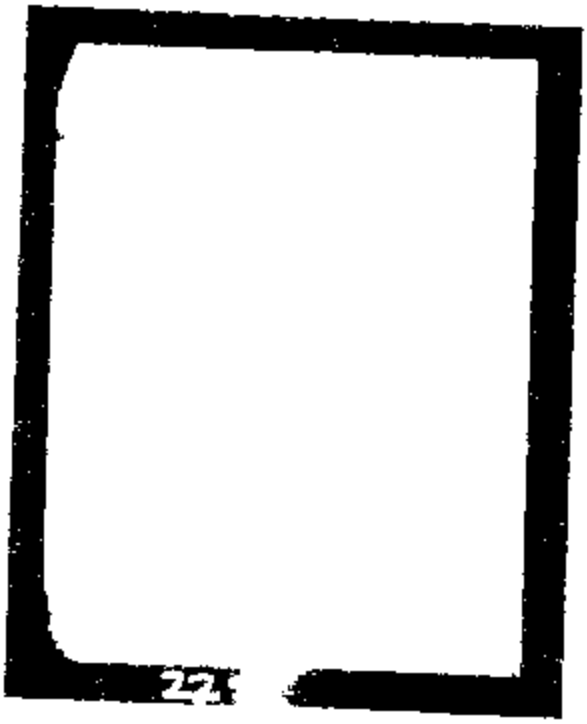
CONCLUSION

THE SWITCH WAS INOPERATIVE DUE TO MASSIVE CORROSION OF THE CONTACT ARM CAUSED BY FLUID INGRESS INTO THE SWITCH THROUGH THE MATING CONNECTOR.

TI-NHTSA 011832

TEST LOT NO. 12-21-93-01	TEST RETURNED DEVICE ANALYSIS	DEVICE 7795L2-1
TESTED BY DIDOMENICO	TEXAS INSTRUMENTS — MATERIALS & CONTROLS GROUP ATTLEBORO, MA 02703	DOC. FS/CAR/93-37
APPROVED BY BARMAN		PAGE NO. 1
DATE 12/30/93		NO. OF PAGES 1


22.91


27

JAN.' 94

ELCO INDUSTRIES, INC.
CAPABILITY ANALYSIS

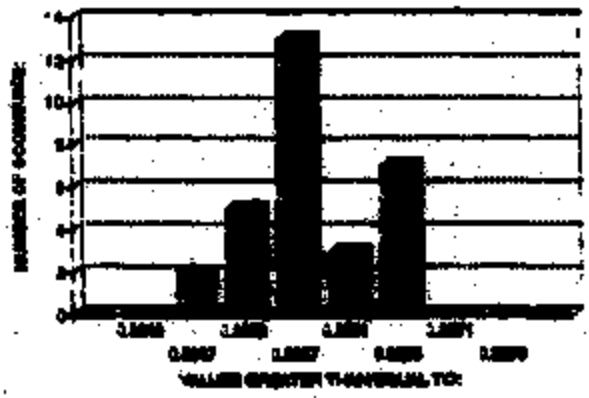
CUST: Texas Instruments — ELCO P/N: 304-087-007E70
P/N: 3880041 — DATE: 12-16-93
CHAR: Countersink Diameter — SPECS: UPPER: 0.330
LOWER: 0.320 — TOL: 0.010

RAW DATA

CELL1	CELL2	CELL3	CELL4	CELL5	CELL6	CELL7	CELL8	CELL9	CELL10
0.3280	0.3287	0.3284	0.3280	0.3287	0.3291				
0.3291	0.3286	0.3271	0.3287	0.3285	0.3284				
0.3287	0.3280	0.3287	0.3283	0.3280	0.3280				
0.3285	0.3280	0.3284	0.3288	0.3285	0.3271				
0.3285	0.3287	0.3280	0.3287	0.3271	0.3284				

SIGMA: 0.00264 — SKEWNESS: 0.006
Cp: 2.62 — KURTOSIS: -0.896
CpK: 2.08 — AVERAGE: 0.3280
Cr: 38.176

HISTOGRAM



77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
881	L2-1	6:00 PM	7:40 AM	8-25-93 8-26-93
886 / 887	L3-3	6:00 PM	7:20 AM	8-26-93
888	L3-3	11:15 AM		8-30-93
884 - 890	X3-3	3:30 PM	4:35 AM	9-3-93 9-7-93
891 + 892	L2-2	1:10 AM	5:45 PM	9-3-93
893 + 894	L3-3	6:00 PM	7:15 AM	9-3-94 9-2-93
882 1585	L3-4	7:30 AM		9-3-94
896 - 903	X3-3	10:00 PM	Lunch Stopped 10:30 AM	9-03-93 9-07-93
904 - 905	L3-3	10:35 AM	11:45 PM	9-7-93
909	L2-1	11:50 PM	12:30 PM	9-8-93 9-7-93
914 - 920	L3-3	8:55 PM	10:20 AM	9-8-93

77PS
IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
490	L2-1	9:45 A.M.	11:50 PM	12-28-93
491	L9-9	10:40 AM	12:55 AM	12-30-93 12-29-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
342/343	L9-3	2:40 PM	1:345 AM	12-2-93 12-1-93
344/345	L3-3	3:50 AM.	approx 5:00 PM	12-2-93
346/347	L3-3 But they have THM BASES	5:30 PM	approx 7:00 AM	12-2-93 12-3-93
348/349	L3-3	7:20 AM	8:25 PM	12-3-93
353/354	L3-3	8:30 PM	10:AM	12-4-93 12-3-93
355/356	L9-3	10:10 AM	approx 11:15 PM	12-4-93
378/379	L9-3	7:20 PM	8:30 AM	12-15-93 12-14-93
374/379	L9-3	8:40 AM	9:40 PM	12-16-93
405	L2-1	12:45 AM	approx 1:20 PM	12-27-93
412/414	L3-3	9:12 PM	10:30 AM	12-28-93 12-22-93
418/419	L9-3	10:40 AM	10:45 PM	12-29-93

#7PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
90+95	L3-3	7:20 AM	approx 8:30 PM	10-11-93
105/106	L3-3	9:30 PM	7:30 AM	10-12-93 10/11/93
162/163	L3-3	10:10 PM	11:26 AM	10-20-93 10-19-93
115	L3-3	2:00 PM	3:30 AM	10-21-93 10-20-93
172	L3-3	5:30	7:00 AM approx	10-21-93 10-22-93
177	L3-3	12:00 PM	1:45 AM approx	10-23-93 10-22-93
179-161	L3-3	2:15 AM	Stopped at 3:26 when I left camp Sat 10-23-93	10-23-93
180A/186	L3-3	10:00 PM	11:45 AM	10-25-93 10-24-93
188	L3-3	11:30 AM	12:40 AM	10-26-93 10-25-93
209	L3-2	9:00 AM	10:10 PM	10-26-93
208/209	L3-3	9:00 AM	approx 10:30 PM	10-26-93

TI-NHTSA 011838

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
922/923	L3-3	10:30 AM	approx 12:30 AM	9-10-93 9-8-93
936	L3-3	10:00 PM	approx. 11:00 AM	9-16-93 9-13-93
951/952	L3-3	10:30 PM	approx 12:00 AM	9-14-93 9-15-93
969/970	L3-3	12:25 AM	approx 1:00	9-16-93 9-8-93
975/977	L3-3	6:15 AM	approx 7:30 PM	9-21-93 9-21-93
978	L3-3	9:00 AM	10:00 PM	9-22-93 9-22-93
992/993	L3-3	10:30 PM	12:00 PM	9-23-93 9-22-93
994/995	L3-3	12:10 PM	approx 1:00 AM	9-23-93
9 & 10	L3-3	11:00 PM	12:00 PM	9-27-93 9-26-93
15	L3-3	2:50 AM	approx 3:30 PM	9-28-93
95	L3-3	11:30 AM	approx 12:45 AM	10-1-93 9-30-93

TI-NHTSA 011839

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
777/778	L3-3	12:30 PM AM	1:25 AM	7-27-93 7/26/93
779/780	L3-3	1:45	3:00 PM	7-27-93 7-27-93
784/789	L2-1/L3-3	3:00 PM	approx 4:30 AM	7-28-93 7-27-93
790/	L3-3	4:45 AM	approx 5:50 PM	7-28-93
798/799	L3-3	10:00 AM	11:05 PM	7-29-93 7-29-93
801/802	X3-3	11:25 PM	12:25 AM	
806	L3-3	4:45 PM	4:10 AM	7-30-93 8-2-93
811	L3-3	3:45 PM	4:30 AM	8-03-93 8-4-93
812/813	L3-3	12:30 PM	1:45 AM	8-04-93 8-5-93
814	L3-1	1:55 AM	3:00 PM	8-5-93
819/816	L3-1/L3-3	3:45 PM	4:10 AM	8-05-93 8-6-93

TI-NHTSA 011840

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
644/645	L2-1	4:00 Pm	5:00 AM	6-13-93 6-14-93
646/647	L2-1	5:10 AM	approx 6:10 pm	6-15-93
648/651	L3-3	6:45 Pm	7:45 AM	6-14-93 6-15-93
652	L9-9	8:15 AM	9:45 Pm	6-16-93
661	L3-3	9:50 Pm	12:00 PM	6-17-93 6/16/93
665	L3-3	10:20 pm		6-12-93
673	L9-9	10:00 AM	approx 11:15 pm	6-29-93
678	L2-1	7:00 Pm	8:00 AM	6-24-93 6-23-93
685/686	L9-9	10:00 AM	11:05 pm	6-28-93
688/694	L3 3	11:35 pm	12:45 PM	6-29-93 6-28-93
696/695	L9-9	1:10 PM	2:25 AM	6-30 93 6-29-93

97PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
481-483	L3-3	5:15 PM	10:00 AM approx.	4-7-93 4-6-93
484	L9-3	11:15 AM	12:40 PM	4-7-93 4-8-93
485/491	L9-3	10:45 AM	12:30 AM	4-9-93 4-8-93
489/491	L3.3 / L8-4	11:15 PM	10:15 PM Redone	4-13-93 4-12-93
485	L3.3	10'15 PM	12:00 AM	4-13-93
492-493	L3.3	3:15 PM	4:35 AM	4-15-93 4-14-93
502/503	X3-3	4:45 AM	6:15 PM	4-15-93
504	L2.1	6:30 PM	8:00 PM	4-15-93
510/511	X3-3	11:20 PM	11:10 PM	4-16-93 4-19-93
518/519	L8-3	2:00 PM	3:20 AM	4-20-93 4-21-93
516 R/520	L3-3	3:25 AM		4-21-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
456/457	L3-3	6:45 PM	8:00 PM	3-19-93 3-20-93
454/455	L2-1	8:45 AM	10 PM approx.	3-20-93
408/409	L2-1	2:30 PM	3:55 AM →	3-23-93 3-22-93
410/411	L3-3	1:30 PM	3:00 AM →	3-24-93 3-23-93
462/463	L3 3-	3:30 PM	4:50 AM →	3-24-93 3-25-93
465/466	L2-1	3:30 PM	5:10 AM	3-29-93 3-30-93
464/467	L5-2 / L2-1	11:30 AM	approx 12:15 AM	3-30-93 3-31-93
468/469	L3-3	10:15 AM	approx. 11:00 PM	3-31-93 3-31-93
472/473	L2-1	8:45 AM	approx. 10:00 PM	4-1-93 4-1-93
474/475	L3 3	4:00 PM	5:30 AM	4-01-93 4-3-93
479/480	L3 3	5:30 PM		4-01-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT #	DEVICE	START	STOP	DATE
	L3-3	9:45 PM	11:50 PM	7/14/93
743/744	L3-3	9:15 AM		7-16-93
742/740	L3-3 / L3-2	10:05 PM	11:15 AM	7-18-93
748	L3-3	11:30 AM	12:37 AM	7-20-93
751/752	L2-1	12:40 AM	1:45 PM	7-20-93
753/757	L2-1	1:50 PM	3:10 AM	7-21-93
759/760	L3-3	3:20 AM	[redacted] 7:00 PM	7-21-93
761/762	L3-3	7:35 PM	8:30 AM approx	7-22-93
763/764	L3-3	8:45 AM 10:20 PM	10:10 PM	7-22-93
773/774	L3-3		11:25 AM	7-23-93
775/776	L3-3	11:30 AM	1:10 PM	7-25-93
767/765	L2-1	11:15 PM	12:20 PM	7-25-93
				7-26-93

TNHTSA 011944

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
817/818	X3-3	4:18 AM	~~6:00~~ PM	8-6-93
821/822	X3-3	10:20 PM	approx 11:30 AM	8-6-93 → 8/7/93
832 826/~~827~~	L3-1 X3-3	1:30 PM	11:50 PM	8-7-93 8-9-93
829/~~827~~	L3-3	12:00 AM	1:45 PM	8-9-93
830	L9-9	2:00 PM	3:15 AM	8-10-93 8-9-93
839/840	X2-1	3:42 AM	4:30 PM	8-11-93
841/842	X2-1	4:45 PM	approx. 7:00 AM	8-10-93
831/843	L9-1/L9-1	7:40 AM	approx 8:50	8-11-93
844/845	L2-1	9:05 PM	10:45	8-12-93 8-11-93
846	L2-1	10:35 AM	11:50 PM	8-12-93
857	L9-1	2:30 PM	approx 3:45 AM	8-17-93 8-16-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
41/42	L3-9	9:20 AM	approx 11:00 PM	10-1-93
46	L3-3	3:10 PM	4:15 PM	10-4-93
49/54	L3 3	11:30 PM	5:30 AM	10-5-93 10-04-93
56	L3-3	5:33 AM		10-5-93
55	L3 3	8:30 PM	9:45 AM	10-6-93 10-07-93
65/66	L3-9	10:00 AM	1:05 PM	10-6-93
67/69	L3-3	11:12 PM	12:30 PM	10-7-93 10-6-93
68/70	L9-9	12:55 PM	2:00 AM	10-8-93 10-7-93
78/79	L8-9	10:50 AM	approx 12:00 PM	10-9-93 10-8-93
91+92	L3-3	4:45 AM	approx 6:00 PM	10-9-93 10-9-93
88+89	L3-3	Ran 1660FS cycles Restarted 10:00 PM	approx. 9:00 AM	10-10-93

TI-NHTSA 011848

77PS
IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
607-608	L2-1	7:05 PM	8:15 AM.	6-2-93 6-1-93
613-614	L3-3	10:05 PM	11:30 AM	6-3-93 6-2-93
615-616	L2-1	11:40 AM	approx 12:30 AM	6-3-93
617	X3-3	1:30 AM	2:30 PM	6-3-93 6-4-93
619/620	L2-3	1:30 PM	2:30 AM	6-4-93 6-7-93
621/622	L2-1	1:10 PM	approx 2:10 AM	6-8-93
624/625	L3-3	7:35 PM		6-9-93
632/633	L3-3	3:30 PM	4:40 AM	6/11/93 6-10-93
637	L2-1	3:30 PM	approx 4:40 AM	6-12-93 6-11-93
639	L2-1	7:45 AM	2:15 AM	6/14/93 6-12-93
643/642	L3-3	2:25 AM		6/14/93

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77PS
IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
555/556	L3-2	9:30 AM	10:30 PM	5-5-93 5-5-93
558/557	L3-1/L3-3	12:15 AM	1:45 PM	5-6-93
559/560	L3-3	2:00 PM	3:15 AM	5-10-93 5-11-93
563/564	L3-3	6:05 PM	7:15	5-11-93 5-12-93
539B/540B	L3-3	7:45 PM	9:00 PM	5-12-93
569	L2-1	9:50 PM	11:30 PM	5-12-93 5-13-93
567/568	L4-1	1:00 PM	2:00 AM	5-13-93 5-14-93
571	X3-3	2:10 AM	3:15 PM	5-14-93
565/566	L5-2	3:30 PM	4:40 AM	5-14-93 5-15-93
572	L2-1	4:45 AM	5:15 PM	5-15-93 5-16-93
574/525	L3-3	6:00 PM	7:15 AM	5-17-93 5-12-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
363/364	L3-3	3:45 PM	8:15 AM	1-19-93 1-20-93
369/370	L5-2	12:25 PM	4:30 PM	1-20-93
372	L3-3	12:30 PM.	1:45 AM.	1-21-93
373/374	L2-1	2:00 PM	3:32 AM	1-25-93 1-26-93
375/376	X2-1	9:36 PM.	approx 5:00 PM	1-26-93
376	L8-3	8:00 PM	9:30 AM Run 25,000 cycles	1-27-93 1-28-93
380/381	L5-2	5:00 PM		1-29-93
382/383	L8-2	10:00 PM	11:15 PM.	2-1-93 2-2-93
384	L2-1	11:30 PM	approx 12:45 AM	2-2-93 2-3-93
385/386	L3-3	1:45 AM	2:45 PM.	2-3-93
387/388	L3-3	2:00 PM	8:15 AM	2-3-93 2-4-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
332A/333A	QUIET EVENING L3-3	4:00 PM	5:15 AM	1/05/93 1-6-93
342-A/343	L3-3	2:00 PM	approx 3:20 AM	1-7-93 1-8-93
344/345	L3-3	4:00 PM	APPROX 5:00AM	1-8-93
347/348	L3-3 / L2-1	7:10 AM	8:10 AM	1-09-93 1-11-93
349/350	L2-1	2:20 AM		1-11-93
346B/351	L3-3 / L3-3	11:00 PM	12:15 AM	1-13-93 1-12-93
346A/345	L2-1 / L3-3	5:30 P m	8:00 PM	1-14-93 1-16-93
353/354	L3-1	8:45 PM		1-16-94
357/358	L3 3	10:30 PM		1-17-93
359/361	L2-1 / L3-3	11:30 PM	12:30 AM	1-18-93
360 A	L2-1	12:55 AM	2:00 P.M.	1-19-93 1-19-93

THMHTBA 011850

TPS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
435	L2-1	12:00 PM	approx 1:00 AM	3-7-93 Friday 3-8-93
437/438	L3-3	1:35 AM	3:00 PM	3-9-93 3-9-93
436	L5-2	12:00 PM	approx 1:00 AM	3-10-93
440/441	L9-3	10:00 AM	approx 11:30 am	3-11-93
439/442	L3-3 / L2-1	11:40 pm	1:00 PM	3-11-93 3-12-93
443/444	L2-2	1:30 PM	2:30 AM	3-13-93 3-13-93
445	L6-1	3:00 AM	approx 4:00 am	3-13-93 3-15-93
446/447	L3-3	6:40 PM	8:15 AM	3-15-93 3-16-93
448/449	L9-9	11:10 AM	approx 2:00 AM	3-16-93 3-17-93
450/451	L9-9	10:46 AM	1:30 AM	3-18-93
452/453	L2-1	1:35 AM	2:45 PM	3-19-93

TI-NHTSA 011861

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
389/390	L3-3	8:30 PM	approx. 10:00 PM	2-4-93 2-4-93
391	L5-2	10:15 PM	11:35 PM	2-4-93 2-5-93
392/393	L3-3	11:30 PM	12:45 AM	2-9-93 2-10-93
394/395	L3-3	12:50 AM	2:30 PM	2-10-93 2-10-93
396/397	L3-3	9:00 PM	approx. 11:00 PM	2-11-93
398	L3-3-3	3:15 PM	4:00 AM	2-15-93 2-16-93
400	L3-3	01:15 PM	2:45 AM	2-16-93
401A-402	L3-3	12:00 PM	approx. 1:00 AM	2-16-93 2-17-93
405/406	L3-1	2:30 AM	4:00 PM	2-18-93
406/407	L3-3	4:15 PM	5:40 AM	2-18-93 2-19-93
409	L3-3	5:45 AM		2-19-93

TI-NHTSA 011852

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
408/410	L3-3	2:00 Pm	9:30 AM	2-19-93 2-20-93
413	19-9	2:15 PM	4:30 AM	2-23-93 2-24-93
414	L3-3	10:30 PM	12:00 PM	2-25-93 2-26-93
420/421	19-1	1:00 PM	2:30 PM	2-26-93
415/416	L3-3	7:30 PM	1:50 AM	2-27-93
417/418	L3-3	8:00 AM	3:15 PM	3-1-93
422/423	L2-1	6:45 PM	8:15 AM	3-01-93 3-2-93
424/430	L5-2/L3-3	3:30 PM Am	4:45 AM	3-02-93 3-4-93
431	L3-3	4:50		3-4-93
433	L3-3	7:00 PM	8:15 AM	3-5-93 3-4-93
434	18-3	10:45 AM		3-5-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
521	L3-3	5:00 PM	6:00 AM	4/21/93
522	L2-1	5:00 PM		4/21/93
523/527	L2-1/L3-3	6:30 AM	7:30 PM	4/22-93
524/525	L1-1/L3-3	2:15 PM	9:30 AM	4-23-93
539/534	L3-3	7:15 PM	8:30 AM	4-24-93 4-26-93
535/537	L2-1/L3-3	8:45 AM		2-27-93
538/540	L3-3/L2-1	11:00 PM	2:30 PM	2-28-93 2-27-93
539/541	L2-1	2:40 PM	4:00 AM	4-28-93
543	L3-3	4:05 AM		4-29-93
548	L3-3	11:25 PM	12:12	4-30-93
546	L5-2	6:45 PM	7:45 AM	5-03-93 5-4-93
551	L3-3	6:15 PM	7:30 AM	5-04-93

TI-NHTSA 011954

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
576	L3-3	2:45 PM.	3:25 AM	5-18-93 5-19-93
579	L3-3	7:15 PM	8:15 AM	5-20-93 5-19-93
580 581	L3-3	1:45 PM	2:45 AM	5-20-93 5-21-93
584-585	L3-3	2:50 AM	5:30 PM	5-21-93 5-21-93
586-587	L3-3	5:45 PM	approx 6:50 AM	5-22-93 5/24/93
588/590	L3-3	6:15 PM	7:45 PM	5-25-93 5/24/93
592/591	L3-3	8:00 AM	approx 7:00 PM	5-25-93
593/594	L2-1	10:10 PM	approx 11:00 PM	5-26-93 5-25-93
600	L3-3	6:30 PM	7:45 AM	5-26-93 5-26-93
601/602	L3-3	5:30 PM	approx 6:45 AM	5-27-93 5/27/93
605/606	L2-1	5:00 PM	approx 9:00 AM	5/28/93

TI-NHTSA 011855

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
699 / 698	L2-1 & L3-3	9:30 AM	3:30 PM	6-30-93
701 / 703	L2-1 / L3-3	3:45 PM	5:00 AM	7-1-93 6-30-93
704/705	L3-3	5:05 AM	6:30 PM	7-1-93
706	L3-3	6:45 PM	8:00 AM	7-1-93 7-1-93
707A / 708A	L3-3	10:10 PM	11:30 AM	7-6-93 7-6-93
712	L3-3	9:00 PM	approx 3:30 AM	7-6-93 7-7-93
711A	L3-3	3:25 AM.	5:00 PM approx	7-7-93
715	L2-1	11:45 AM	1:00 AM	7-8-93 7-9-93
722-723	L2-1	9:15 PM	4:20 AM	7-13-93 7-12-93
721	L2-1	4:25 AM	approx 6:00 PM	7-13-93
727/729	L3-3	8:00 PM	8:45 AM	7-14-93 7-13-93

77PS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
210/211	L3-3	10:45 PM	11:55 AM	10-28-93
225	L3-1	9:30 PM	11:00 AM	11-2-93 11-01-93
234/235	L3-3	9:45 PM	11:15 AM approx	11-02-93
236/238	L3-3	11:30 AM	approx 2:40 AM	11-4-93 11-3-93
237/239	L3-3	1:00 AM	2:15 PM	11-4-93 11-4-93
248/249	L3-3	2:30 PM	3:30 Am.	11-4-93 11-5-93
250/251	L3 3	3:35 AM.	4:30 PM approx.	11-5-93
253/254	L3-3	6:00 PM	7:00 AM approx	11-05-93
265	L3-1	9:00 A.M.	10:15 PM	11-10-93
~~268~~	~~L2-3~~	~~9:10 PM~~		~~11-10-93~~
271 & 272	L3-3	11:30 PM		11-11-93

TPS

IMPULSE TEST LOG SHEET

DISC LOT	DEVICE	START	STOP	DATE
274	L3-3	4:45 PM	5:40 AM	11-13-93 11-12-93
283	L2-1	12:10 PM	approx 6:30 AM	11-17-93 11-16-93
290/291	L3-3	2:15 PM	approx 3:30 AM	11-15-93 11-17-93
292/293	L3-3	3:45 AM	4:50 PM	11-18-93
294/295	L3-3	5:30 PM	6:30 AM	11-19-93 11-18-93
296/303	L3-3	6:35 AM	approx 11:00 PM	11-19-93
304	X3-3	2:30 PM	9:45 AM	11-20-93 11-19-93
305/311	L3-3	1:40 PM	approx 8:45 AM	11-24-93 11-23-93
333/334	L3-3	6:45 PM	8:00 AM	11-30-93 11/29/93
339	L3-3	8:15 AM	9:30 PM	11-30-93
340 & 341	X3-3	12:15 AM	approx 1:30 PM	12-1-93 12-1-93

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