EA02025

TEXAS INSTRUMENTS, INC.'S

9/10/03 ATTACHMENT TO ODI

BOX 4, PARTS A - N

PART J

DIEMASTERS MANUFACTURING, INC.

CERTIFICATE OF CONFORMANCE

DATE: 07-10-92

CUSTOMER: TEXAS INSTRUMENTS

PURCHASE ORDER NUMBER: 500015400

PART NUMBER: 27639-1 REV/ECO NUMBER: D

PART DESCRIPTION: WASHER

QUANTITY THIS SHIPMENT: 12,367

SHIPMENT DATE: 07-10-92

TRACEABLE LOT NUMBER: TI. 163

****

WE CERTIFY THAT ALL ITEMS SHIPPED ON THIS ORDER MEET THE REQUIREMENTS OF THE TI PURCHASE ORDER AND TI DRAWINGS/SPECIFICATIONS. RESULTS OF REQUIRED MECHANICAL, VISUAL, FUNCTIONAL, AND CHEMICAL TESTS ARE ON FILE IN OUR QUALITY CONTROL DEPARTMENT.

****

SIGNED: [signature]
QUALITY ASSURANCE REPRESENTATIVE

TITLE: Q/A INSPECTOR

DIEMASTERS MANUFACTURING, INC.

CERTIFICATE OF MATERIAL ANALYSIS

DATE: 07-10-92

CUSTOMER: TEXAS INSTRUMENTS

SUPPLIER PURCHASE ORDER: 033652

CUSTOMER PURCHASE ORDER: 5000154007

PART NUMBER: 27639-1 REV/ECO: D

PART DESCRIPTION: WASHER

QUANTITY THIS SHIPMENT: 12,367 SHIPMENT DATE: 07-10-92

TRACEABLE LOT NUMBER: TI- 163

HEAT NUMBER: 664332

TYPE OF MATERIAL: CRS 1050

• • • • • • • • • •

WE CERTIFY THAT THE MATERIAL USED TO PRODUCE THE PRODUCT IN THIS SHIPMENT CONFORMS TO THE TI PURCHASE ORDER AND TI DRAWING/SPECIFICATION REQUIREMENTS. RESULTS VERSUS SPECIFICATION ARE AS NOTED BELOW.

• • • • • • • • • •

ELEMENTAL CONSTITUENTS	SPECIFIED RANGE	ACTUAL RANGE
1. C	0.47 – 0.55	.51
2. Mn	0.60 – 0.90	.69
3. P MAX.	0.040	.013
4. S MAX.	0.050	.002
5.		

ROCKWELL HARDNESS: B/76 DPH:

TS. K.S.I.:

SIGNED: Phil Kruger
QUALITY ASSURANCE REPRESENTATIVE

TITLE: Q/A Inspector

DIEMASTERS MANUFACTURING, INC.

MATERIAL CERTIFICATION

DATE: 07-10-92

CUSTOMER: TEXAS INSTRUMENTS

SUPPLIER PURCHASE ORDER: 033652

CUSTOMER PURCHASE ORDER: 500015400

PART NUMBER: 27639-1 REV/ECO: D

PART DESCRIPTION: WASHER

QUANTITY THIS SHIPMENT: 12,367

SHIPMENT DATE: 07-10-92

TRACEABLE LOT NUMBER: TI. 163

HEAT NUMBER: 664332

TYPE OF MATERIAL: CRS 1C5C

* * * * * * * * * * *

WE CERTIFY THAT THE MATERIAL USED TO PRODUCE THE PRODUCT IN THIS SHIPMENT, NAMELY (SPECIFIC NAME/NUMBER OF MATERIAL), CONFORMS TO TI DRAWING AND TI PURCHASE ORDER REQUIREMENTS.

* * * * * * * * * * *

SIGNED: Phil Brown
QUALITY ASSURANCE REPRESENTATIVE

TITLE: Q/A Inspector

IBG MM= 00477424 FR=AHOP TO=SB01 SENT=07/14/92 04:47 PM
R#=032 ST=C DIV=0050 CC=00101 BY=AHOP AT=07/14/92 04:47 PM

MORANDUM:

PELKEY RMR

ly 14, 1992
-253

: STEVE OFFILER SB01

: DAVE CZARN ZARN
NEIL MACKINNON MAPA
JOHN DEWOLFE MAPA

: AL HOPKINS AHOP

BJECT: CORROSION INSIDE OF SWITCH CAVITY
- TSL # 111745

NCLUSIONS:
---

e corrosion on the parts that we examined indicated that a quid electrolyte, such as tap water, for instance, was present thin the cavity. Furthermore, the connector end must have been inted in the approximate up direction.

SULTS AND DISCUSSION:
---

e major component, by far, of the powdery brownish substance ample #1) is copper oxide. We also saw some silver particulate esent.

e deposit on the badly corroded spring arm (Sample #2) was also edominantly copper oxide. Surprisingly, we also saw a small ea that was substantially enriched in aluminum oxide.

e corrosion on the cup (Sample # 3) showed zinc oxide (the itish deposit), copper oxide (probably from the spring arm), on oxide (probably from the 1006 steel of the cup) and silver rom the contact).

you examine the plastic base you might find a "high water" rk of corrosion products. This might give you a better feel for e exact orientation of the switch.

→ THIS IS CONFIRMED TO BE ABSENT; ~ 1/4" UP SW. CAVITY - ALSO CONFIRMS "UP" ORIENTATION

didn't see any significant amount of added electrolytes (such salt).

e data will be sent by Grace Dias (X3044) through the internal l.

--MSG M#= 477424 FR=AHOP TO=[illegible] CRT=07/14/92 04:47 PM
ST=C DIV=0050 CC=00673 BY=AHOP AT=07/14/92 04:47 PM

MEMORANDUM

July 14, 1992
92-253

TO: STEVE OFFILER SB01

CC: DAVE CZARN ZARN
NEIL MACKINNON MAPA
JOHN DEWOLFE MAPA

FR: [redacted] AHOP

SUBJECT: CORROSION INSIDE OF SWITCH CAVITY
- TSL # 111745

CONCLUSIONS:

The corrosion on the parts that we examined indicated that a liquid electrolyte, such as tap water, for instance, was present within the cavity. Furthermore, the connector end must have been pointed in the approximate up direction.

RESULTS AND DISCUSSION:

The major component, by far, of the powdery brownish substance (Sample #1) is copper oxide. We also saw some silver particulate present.

The deposit on the badly corroded spring arm (Sample #2) was also predominantly copper oxide. Surprisingly, we also saw a small area that was substantially enriched in aluminum oxide.

The corrosion on the cup (Sample # 3) showed zinc oxide (the whitish deposit), copper oxide (probably from the spring arm), iron oxide (probably from the 1006 steel of the cup) and silver (from the contact).

If you examine the plastic base you might find a "high water" mark of corrosion products. This might give you a better feel for the exact orientation of the switch.

We didn't see any significant amount of added electrolytes (such as salt).

The data will be sent by Grace Dias (X3044) through the internal

4.5 IMPULSE

4.5.1 PROCEDURES:
Per the engineering specification.

4.5.2 EQUIPMENT:
- Thermotron environmental chamber, model S - 4.
- Twenty-four station manifold.
- Mating electrical connectors.
- Trygon Electronics Dual Power Supply, DL40-1A for the loads.
- Acopian power supply, 5E25D-D15E05 for Sensotec transducer.
- Customized designed and built pressure cycler.
- Enerpac hydraulic pump.
- TI 315 Programmable Logic Controller.
- Moog servo valve, 760-552-A.
- Moog controller, MA-X-50.
- Simpson signal generator.
- Sensotec transducer, TJE-744-02, .0-2,500 psig, calibrated semi-annually.
- Nicolet oscilloscope, 310, calibrated semi-annually.

4.5.3 REQUIREMENTS:
At the completion of this test all switches shall meet the Voltage Drop, Current Leakage, and Creep Time requirements outline in the engineering specification (See Appendix 5.1). Additionally, the post-impulse calibration requirements are not define; results of this test will be used to set this requirement.

4.5.4 RESULTS:
All switches met the requirements outlined in the engineering specification. Data is presented in Appendix 5.4.2.

HIGHLIGHTS

Stephen B. Offiler
Week Ending 92-07-17

VALIDATION ISSUES:

The writeup of 57PSL2-2 was completed. Only an Impulse test was performed: the rest of the report claims similarity to 57PSL11-3. This could have gotten akward, with the failures experienced in L11-3; however this was avoided by asserting that L11-3 was actually tested to the L2-2 spec. This is generally true since the new, as-yet unfinished L11-3 spec is based largely on the L2-2 spec. Areas where the two specs diverge were explained in the L2-2 report.

We have had the necessary conversations with engineers at Ford, and have obtained verbal agreement on the finalized Power Steering spec which will ultimately cover all Ford PS devices. They have added a leak check at 100% frequency, which is fine since this is presently done on the automatic testing equipment. We ironed out all issues with vibration parameters, and worked away from the time-consuming additional thermal soaks Ford had proposed for the Thermal Cycle test. For drift after Impulse, they do not want to place additional post-test parameters onto the print; rather, they've proposed a blanket allowance of 10% additional tolerance on the low end. We'd like to see a bilateral 10% based on Stan's observations of upward drift; but this will certainly require re-opening of the negotiations and additional time which I do not think we can afford.

The next priority after the spec details are cleaned up and typed up is to produce the validation writeup for 87PSL2-2. Creep actuation issues experienced in the original testing have disappeared with the Impulse retest. We still need to use this opportunity to analyze what happened to the original parts, which may help produce a more robust design.

We must submit validation testing to Australia for Capri 77PSL6-1 by the end of September. This is complicated by the need to obtain a colored EPDM O-ring (to avoid production-line confusion). We may need to validate with APT black EPDM O-rings, then go back and retest later with the colored production-intent parts.

LIGHT TRUCK ISSUES:

The 600 hour test has experienced four failures to date (301K, 342K, 379K, and 416K) which are classified as "normal" diaphragm life problems. One other failure occurred at 49K which was a misplaced gasket. Without further failures, the projected completion is noon on 920721. However, based on the failure rate it is likely that we'll lose a couple more before 600 hours/500K cycles. Interim results were reported verbally to John Pelkey earlier this week, and did not seem to cause undue concern.

TSL has completed analysis of the returned truck device (77PSL2-1). They found that the "crud" was copper oxide from the spring arm. Small amounts of silver, zinc oxide, iron oxide, and aluminum were also found. No evidence of other elements (such as silts) were found, leading to the conclusion that the device was destroyed by plain water. We also reported this verbally to Pelkey. A report is to follow next week.

MISCELLANEOUS:

The test of rubber diaphragms has been abandoned temporarily. The EP rubber material we used to stamp out the disc-shaped diaphragms has been shown to take significant compression set and shrinkage, rendering its effectiveness as a seal rather useless. This idea still has merit, however, and should be continued with a more robust rubber material. Unfortunately, the cycler running these parts has experienced a failure of its Moog servovalve. These are rebuildable, but this valve has seen many many millions of cycles and should probably be replaced at some point. Unanticipated cycler failures have significant impact on the group's overcrowded cycling schedule.

-MSG M#= 573680 FR=SB01 TO=PCME SENT=07/17/92 01:15 PM
R#=434 ST=C DIV=0050 CC=00101 BY=SB01 AT=07/17/92 01:15 PM

TO:	Ted Ballard	ETB	Paul Kotch	PRK1
	Tom Burke	MFPC	Steve Major	SMFH
	Rick Conlin	RAC1	Danny O'Driscoll	DOD
	Jeff DiDomenico	DIDO	Dale Sogge	FFUN
	Charlie Douglas	CMP1	Matt Sellers	PCME
	Nora Freda	WHLZ	Rusty Struble	RCS2
	Dick Gariepy	MFPC	Jim Watt	PCQA

CC: Tom Charbonneau (delivered separately)
Dave Czarn

FR: Steve Offiler SB01

SJ: BiWeekly Highlights

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Regards,
Steve O.

16-1-01-30

SAMPLE ORDER

ORDER NO: C091-73

REQUEST DATE: 07/17/91

CREDIT ACCOUNT: 5902

COST CENTER: 101

PRODUCT CODE: 060

CUSTOMER: FORD MOTOR COMPANY

CUSTOMER P.O. NO: U-62975

TI PART NO: 77PSL2-1

CUSTOMER PART NO: ~~[illegible]~~ FLVC-9F924-AB

QUANTITY: 30

PRICE: $12.00 EACH

DELIVERY PROMISED: 9 - 6/28/91 (ALREADY DELIVERED)
18 24 - 7/19/91 (QTY THIS BUILD)
3 - 7/17/91 (77PSL2-1 SHIPPED WED 7/17)

SPECIAL INSTRUCTIONS:

BILL TO:
FORD MOTOR COMPANY
P.O. BOX 1704
DEARBORN, MI 48121

SHIP TO:
FORD MOTOR COMPANY
20000 ROTUNDA DRIVE
RM 3001 - BLDG #5
DEARBORN, MI 48121
ATT'N: TIN ANDRESEN

XX PRODUCTION SAMPLES

ENGINEERING DEVELOPMENT SAMPLES

CC: ENGINEERING: STEVE OFFILER

PRODUCTION CONTROL: MARIE CROSSLAND

SALES ENGINEER: JOE SCHUCK

HOW TO MEASURE A TEXAS INSTRUMENTS, INC. PRESSURE SWITCH SOUND PULSE.
77PSL3-1 CRUISE CONTROL SWITCH

1) View the trace at full scale on the oscilloscope (no expansion).

2) You will see two lines.
A sloped line which is the pressure at the switch (solid line).
This line may be straight and smooth or it may have a ripple. The ripple is the sound pulse

A horizontal and vertical line, (dashed).
This line measures the voltage across the switch. When the switch opens the line jumps vertically from the bottom of the page to the top of the page.

3) With the trace still on the scope zoom into the ripple in the curve.

4) Move the curser to the visual peak prior to the first valley. For switches with no ripple estimate the point of major slope change to a nearly level line.

5) Reset the voltage to zero at that level.

6) Move the curser to the bottom of the first valley and read the voltage.
If the switch is quite use 6A instead.
6A) Move the curser to the next major slope change, usually at the end of a short flat section. This is a visual estimate and as such is subject to interpretation.

7) Multiply the voltage by 50psi/volt (ref transducer scale factor) to obtain the magnitude of the ripple in psi.

The same technique works on a plotted curve.

A) zoom into the ripple.

B) Plot the curve. Figure 1.

The scales for these lines are indicated in the boxes on the left. The right side of the box is drawn with the same line type as the actual curve (solid, dashed,etc)

V/D = Volts per division
Vy = voltage at tick mark next to Vy on left side of page

There are 2cm per division on the y axis

T/D = Time per division
TL = time at left edge of page

There are 2.5 cm per division on the x axis

C) Using a ruler measure the distance from peak to valley in centimeters.

D) Multiply that figure by the v/d value to obtain the height in volts.

E) Multiply by 50psi/volt to get the pressure reading.

TO: ... Ozarn Circ... needed.

FR: Dale Sogge

SJ: Ford Silent switch test results

Attached are copies of all the pertinant documents pertaining to the silent switch.

The first document is the results from Ford's Test on parts with a range of sound levels as tested by R.H. Walker. Ford says the only accepatble parts are #64, 01, 16, 74.

The second document describes the details for all of the parts sent to Ford.

#64 was used for the orginal repatability study so it has been tested several times and it has seen at least one months exposure to brake fluid without any increase in sound level. It uses a disc from the first lot of produ quite switches.

#01 was also used for the repeatability study. It also uses a disc from one of the first four lots of quite production.

#16 uses a disc that I had judged to be slightly noisy based on the disc differential, at the beginning of the project. Apparently it's ok.

#74 is high differential fallout from the production line. This device exceed the 45psi differential test limit onthe fianl tester. Actual value on the final tester was unknow. The differential in the lab was 61.5psi which is probbly 50-55psi on the line. The fact that this was quite allowed me to open the differential spec from 45 to 50psi which has increased our yields. We may want to open it to 55psi. One problem though is we don't know why the differential should ever be that high.

Also attached are the sound curves for these devices. The smoothness of these curves vs others corrleates well to Ford's testing. The only fallback in the test was that it might not have been a blind test at Ford.

The next attachment is the final specification sent to Ford. Ford will make this part of the engineering specification. I selected a sound level of -1.5psi based on the Ford test results. One difficulty with this level for the spec is that we probaly won't be 1.33CPK capable due to the device variation and the large R&R (25%). Fortunately we do not need to demonstrate CPK, we must only pass an audit on 12 pices every 6 months.

The final document is a description of how to interpert the sound curves. Ford requested this for their information.

Actions

1) We need to modify the envelope drawings for quite switches to call out the sound test as specified. We may have to wait until the ES spec is issued. - Charlie, Steve

2) Retest the returned switches and then forward to other groups. - Dale

Regards, Dale

drs92-39, 7-28-92

TO: B. J. Meeroff

cc: R. H. Walker

Subject: Evaluation of alternate source for 1993 SHO dump switch.

Eleven cruise control dump switches from Texas Instruments were tested on a 1993 SHO to see at which sound level and above could the switches be seen as a viable alternative to the parts currently in use.

Eleven switches with serial numbers listed below were tested. Each was prefilled with brake fluid and the right front brake was bled after installation. A light indicator wired to the switch was used to verify switch actuation. Pedal feel was subjectively evaluated with and without vaccuum in the booster. All evaluations were static.

Listed below are the various readings for pedal feel and sound level:

SERIAL NUMBER	FEEL	SOUND LEVEL(pair)
64	9	+1.5
01	9	+0.5
16	9	0.0
74	8	0.0
39	6	-2.5
25	5	-4.25
56	4	-6.6
53	5	-9.5
10	4	-26.2
59	3	-41.4
06	3	-81.0

...on: The ... ...

have an acceptable rating for all pedal fee. issues.

Sandra Postell

Sandra L. Postell
845-3305

-MSG M#= 222666 FR=VAGS TO=COPY SENT=07/28/92 07:08 AM
ST=C DIV=0050 CC=00134 BY=VAGS AT=07/28/92 07:08 AM

TO: ANDRE CHARPENTIER ACHR

CC: 77PS SMWT MFPC
CLAIRE BALTHAZAR PCME

FR: MATT [redacted] PCME

SJ: 77PS FUNCTION TESTER UPDATES

ANDRE,

THERE ARE A FEW UPDATES NEEDED ON THE DEFAULT SETTINGS FOR THE FOLLOWING DEVICES. ADDITIONALLY I WOULD LIKE TO SET UP ANOTHER DEFAULT FOR A NEW DEVICE - 77PSL6-1.

CHANGE # 1

77PSL3-1
77PSL5-2
77PSL3-2
77PSL4-1

ON EACH DEVICE LISTED ABOVE PLEASE CHANGE:

1.) MINIMUM ACTUATION FROM 110 PSIG TO 105 PSIG.

2.) MAXIMUM DIFFERENTIAL FROM 45 PSIG TO 50 PSIG.

NEW DEVICE

77PSL6-1

PLEASE ADD THE DEVICE LISTED ABOVE TO THE DEFAULT SELECTION SCREEN. SET-UP PARAMETERS ARE SAME AS THE UPDATED 77PSL3-1 SPECIFICATION.

REGARDS . . . MATT
X1245

77PS Pressure Tester

7/27/92 portfolio : 77PSL2-1 PC Snap
L4-1 Falcon Quiet
L2-3 LT Snap
L5-2 Taurus Quiet
L3-1 EN53 Quiet non ABS
L3-2 Lit/LBB Quiet
L3-3 F-SER/Bronco Quiet
87PSL2-2 Ford PWR STR Snap

-MSG M#= 349687 FR=SB01 TO=PCME SENT=07/31/92 12:50 PM
R#=522 ST=C DIV=0050 CC=00101 BY=SB01 AT=07/31/92 12:50 PM

TO:	Ted Ballard	ETB	Paul Kotch	PRK1
	Tom Burke	MFPC	Steve Major	SMFH
	Rick Conlin	RAC1	Danny O'Driscoll	DOD
	Jeff DiDomenico	DIDO	Dale Sogge	FFUN
	Charlie Douglas	CMF1	[redacted]	PCME
	Norm Freda	WHLZ	Rusty Struble	RCB2
	Dick Garimpy	MFPC	Jim Watt	PCQA
CC:	Tom Charboneau	(delivered separately)		
	Dave Czarn			
FR:	Steve Offiler	SB01		

SJ: BiWeekly Highlights

The new, consolidated engineering specification for all power steering pressure switches has been typed up in its final form, and faxed to Norm for presentation to Ford engineers today. A clean paper copy is being overnighted to him as well, to be duplicated on Ford E8 title block paper and signed off for release into the Ford system.

The 600-hour thermal ramp and Impulse test for Ford Light Truck has completed the full 600 hours. A total of seven devices failed in the normal diaphragm rupture mode, as well as the early failure at 49K for misplaced diaphragm. These results were verbally communicated to John Pelkey, who did not indicate any undue concern over the failures. He has not had an opportunity to discuss this issue with Neru Modi as yet. We are working on a test report to be submitted to Ford.

Completion of the 600-hour test has allowed us to begin the battery of Impulse and Thermal Cycle tests for 77PSL3-1 and L5-2. If all goes well, the L3-1 Impulse will be complete mid-day Monday 08/03, the L5-2 Impulse will complete mid-day Friday 08/07, and Thermal Cycles on both will commence. It will be necessary to work over the weekend of 08/08 and 08/09 to complete the TC test in time for final characterizations and writeup for 08/14. Samples of these parts were pre-characterized for noise, and will be post-characterized as well to determine if there are noise changes over life.

Jeff has received the refurbished servovalve back from Moog, and is working to get cycler "B" up and running again with PAG oil.

We received metric hexports for Falcon from the model shop (820 CNC lathe), but discovered a thread chamfer was neglected, so they were sent back to be reworked. We should have these back, and through plating, within a couple of weeks.

We continue to share information with Andy McKenna in Japan on diaphragm life in brake fluid applications. We are sending Andy samples of some materials (Teizel, and Kapton with enhanced properties) so he may begin testing immediately. We are working with J-B-L to produce samples of lathe-cut rubber diaphragms; an EX print is being generated. We'll share these with Andy as well.

Regards,
Steve O.

HIGHLIGHTS

Stephen B. Offiler
Week Ending 92-07-31

The new, consolidated engineering specification for all power steering pressure switches has been typed up in its final form, and faxed to Norm for presentation to Ford engineers today. A clean paper copy is being overnighted to him as well, to be duplicated on Ford ES title block paper and signed off for release into the Ford system.

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PRESSURE SWITCH DATA Form 21605 TEST NO. 250-12-5

DEVICE	DATE REQUESTED	REQUESTED BY	REQUESTED COMPL. DATE
FHS	7/31/92	Dale Soose	
PERFORMED BY	**DATE STARTED**	**DATE COMPLETED**	**APPROVED BY**
DAVID O TOOLE	8/3/92		

PROJECT TITLE:

CUSTOMER:

PURPOSE OF TEST:

To Test Noise Level at ant.
After Testing by FORD on 5HO Taurus
All readings on Disk #10 8/3/92

PROCEDURE:

		X50 =	PSI	
250-12-4	0 Volts	*		
250-12-36	-7.466 MV		-58.3	Recorded on 8/3/92 Disk #10
250-12-40	-1.42 MV		-71.0	
250-12-16	0 Volts		0	
250-12-15	-155 MV		-7.75	
39	-75 MV		-3.75	
53	-215 MV		-10.75	
64	-745 MV	*	-37.25	
69	-990 MV		-49.5	
79	-10 MV		-0.5	

JEFF

1) PLEASE RUN A R&R (REPEATABILITY & REPRODUCIBILITY) TEST ON A NOISY PASSENGER CAR SWITCHES FROM THE PRODUCTION LINE. A SECOND & THIRD PERSON WILL BE REQUIRED TO INSTALL THE SWITCH, RECORD IT & GET A RESULT FOR THE REPRODUCIBILITY PART. SEE STATISTICAL QUALITY CONTROL MANUAL FOR METHOD. 10 UNITS

PLOTS ARE NOT REQUIRED JUST THE PEAK TO PEAK VOLTAGE VALUE. SAVE ALL DATA ON DISC.

2) MEASURE THE PEAK TO PEAK VOLTAGE OF THE FOLLOWING SWITCH TYPES. MEASURE FIVE PIECES OF EACH TYPE & RECORD THE AVERAGE & SIGMA. (NOTE: FOR QUIET SWITCHES YOU MAY NOT BE ABLE TO DETECT A RIPPLE, JUST RECORD AS ZERO)

RECORD RESPONSE ON ALL TESTS BEFORE STARTING.

77PS L3-1			QUIET PASS CAR
77PS L			NOISY TRUCK
—			QUIET TRUCK - QUIET WITH LOT 'AA' DISC'S. ~~GOT FROM CHRIS~~ IN BOX
—		LOT	"N" SLIGHTLY NOISY PASS CAR
		LOT	"L" " " "
QUIET PASS CAR 6.5 grams		LOT	"F"
QUIET TRUCK 10.5 "		LOT	"T" SLIGHTLY NOISY TRUCK
		LOT	"U" QUIET TRUCK - NEW RAW STOCK
		LOT	"B" IF YOU CAN FIND IT - I THINK YOU HAVE IT. (QUIET TRUCK FROM 1990
		LOT	"D" YOU HAVE
		LOT	"E"

ALL WITH NO SNUBBERS

SAVE ALL PARTS SO I CAN RECRIMP &
PULLOUT VERSION CURVE & THEN RECRIMP &
MEASURE DISC CURVE

GM GAGE STUDY FOR REPEATABILITY AND REPRODUCIBILITY (LONG METHOD
~~Q% can go~~ mhy 12/182
NOISY SWITCH PULSE LEVEL

NUMBER OF OPERATORS	2	MIN SPEC	-1500
NUMBER OF PARTS	10	MAX SPEC	2000
NUMBER OF TRIALS	2	TOLERANCE	3500

DATA SUMMARY

OPERATOR	AVERAGE	RANGE
JEFF	814.9	494.8
HOWARD	1110.55	87.7
3	NA	NA
4	NA	NA
5	NA	NA
6	NA	NA
7	NA	NA
8	NA	NA
9	NA	NA
10	NA	NA
AVERAGE	962.725	291.25

MIN XBAR	814.9
MAX XBAR	1110.55
XBARDIFF	295.65

	MEASUREMENT UNIT ANALYSIS	%TOLERANCE
REPEATABILITY:	1329.731	37.99%
REPRODUCIBILITY:	1038.113	29.66%
RPT & REPR (R&R):	1686.969	48.20%

NOTE: ALL CALCULATIONS BASED ON 5.15 SIGMA (99%)

$C_{pk} = \frac{USL - \bar{X}}{3\sigma_{\bar{X}}}$

$USL = \bar{X} + 3\sigma_{\bar{X}} C_{pk}$

$= 962.75 + 3(161)(1.33$

$= 1605$

DATA FOR OPERATOR HOWARD

PART	TRIAL 1	2	3	4	5	AVG	RANGE
1	938	1085				1011.5	147
2	1130	994				1062	136
3	960	1000				980	40
4	1310	1350				1330	40
5	1280	1290				1285	10
6	960	1040				1000	80
7	825	1123				974	298
8	1220	1280				1250	60
9	1150	1140				1145	10
10	1040	1096				1068	56
11	$\bar{x} = 1091.3$	$\bar{x} = 1131.8$				NA	0
12						NA	0
13	$\sigma_{n-1} = 111.15$	$\bar{r}_{n-1} = 125.7$				NA	0
14						NA	0
15						NA	0
16						NA	0
17						NA	0
18						NA	0
19						NA	0
20						NA	0
21						NA	0
22						NA	0
23						NA	0
24						NA	0
25						NA	0

GRND AVG= 1110.55 AVG RNGE= 67.7
UCL FOR INDIVIDUAL RANGES 951.5137

ENTER STUDY TITLES IN CELLS A8,A9,A10, MIN/MAX SPEC IN B12, B13
NOISY SWITCH PULSE LEVEL

MIN SPEC
MAX SPEC
TOLERANCE 0

DATA FOR OPERATOR JEFF

PART	TRIAL 1	2	3	4	5	AVG	RANGE
1	671	1000				835.5	329
2	694	1091				892.5	397
3	657	1005				831	348
4	177	1321				749	1144
5	775	1102				938.5	327
6	176	1090				631.5	917
7	729	1117				920	394
8	707	1256				981.5	549
9	665	383				524	282
10	715	976				845.5	261
11						NA	0
12						NA	0
13						NA	0
14						NA	0
15						NA	0
16						NA	0
17						NA	0
18						NA	0
19						NA	0
20						NA	0
21						NA	0
22						NA	0
23						NA	0
24						NA	0
25						NA	0

GRND AVG: 814.9 AVG RNGE: 494.8
UCL FOR INDIVIDUAL RANGES 951.5137

GM GAGE STUDY FOR REPEATABILITY AND REPRODUCIBILITY (LONG METHOD
~~92-Jan-88~~ May 12, 1992
SOUND PULSE SILENT SWITCHES

NUMBER OF OPERATORS	2	MIN SPEC	-200
NUMBER OF PARTS	10	MAX SPEC	500
NUMBER OF TRIALS	2	TOLERANCE	700

DATA SUMMARY

OPERATOR	AVERAGE	RANGE
JEFF	38.95	16.5
HOWARD	44.9	27.8
3	NA	NA
4	NA	NA
5	NA	NA
6	NA	NA
7	NA	NA
8	NA	NA
9	NA	NA
10	NA	NA
AVERAGE	41.925	22.15

MIN XBAR	38.95
MAX XBAR	44.9
XBARDIFF	5.95

	MEASUREMENT UNIT ANALYSIS	%TOLERANCE
REPEATABILITY:	101.1281	14.45%
REPRODUCIBILITY:	0	0.00%
RPT & REPR (R&R):	101.1281	14.45%

NOTE: ALL CALCULATIONS BASED ON 5.15 SIGMA (99%)

ENTER STUDY TITLES IN CELLS A8,A9,A10, MIN/MAX SPEC IN B12. B13
SOUND PULSE SILENT SWITCHES

MIN SPEC
MAX SPEC
TOLERANCE 0

DATA FOR OPERATOR JEFF

PART	TRIAL 1	2	3	4	5	AVG	RANGE
1	37	52				44.5	15
2	-12	-7				-9.5	5
3	33	0				16.5	33
4	-22	-13				-17.5	9
5	39	10				24.5	29
6	205	223				214	18
7	-13	-4				-8.5	9
8	0	30				15	30
9	59	53				56	6
10	49	60				54.5	11
11	37.5	90.4				NA	0
12						NA	0
13	$\sigma_{n-1} = 65.5$	$\sigma_{n-1} = 69.7$				NA	0
14						NA	0
15						NA	0
16						NA	0
17						NA	0
18						NA	0
19						NA	0
20						NA	0
21						NA	0
22						NA	0
23						NA	0
24						NA	0
25						NA	0

GRND AVG: 38.95 AVG RNGE: 16.5
UCL FOR INDIVIDUAL RANGES 72.36405

$UCL_{\bar{x}} = \bar{\bar{X}} + A_2 \bar{R}$

$41.825 + .308(22.15)$

$= 48.74$

$6\sigma_{\bar{x}} = \sqrt{n}\, 2 A_2 \bar{R}$

$= \sqrt{10}\, 2\,(.308)(22.15)$

$= 43.14$

$C_{pk} = \dfrac{(USL - \bar{\bar{X}})}{3\sigma_{\bar{x}}}$

$USL = \bar{\bar{X}} + 3\sigma_{\bar{x}} C_{pk}$

$= 41.9 + 3(69)(1.33)$

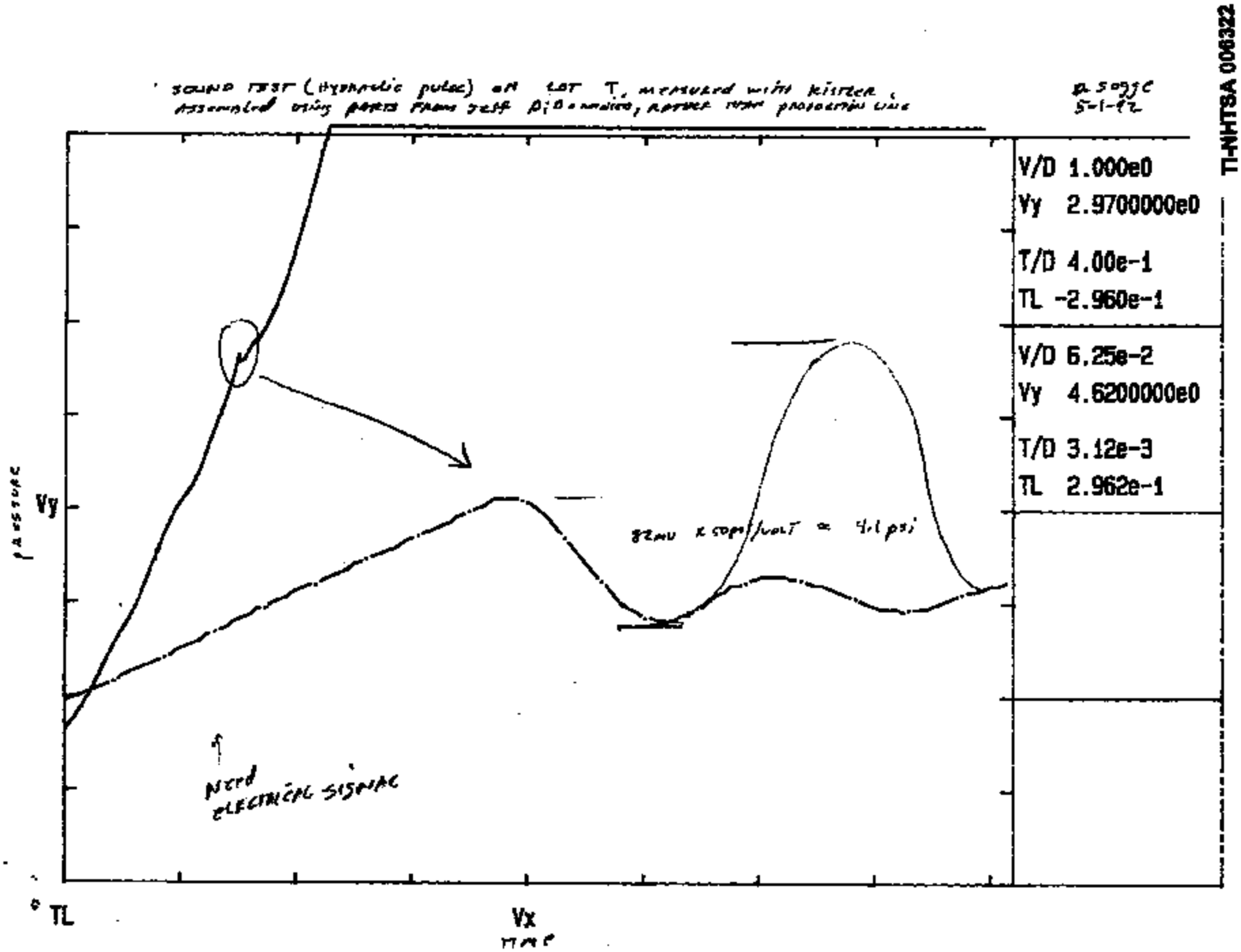
$= 317.21$

$LSL = -233.41$

DATA FOR OPERATOR HOWARD

PART	TRIAL 1	2	3	4	5	AVG	RANGE
1	40	68				54	28
2	40	26				33	14
3	20	53				36.5	33
4	23	-19				2	42
5	17	9				13	8
6	181	155				168	26
7	-8	22				7	30
8	0	33				16.5	33
9	70	19				44.5	51
10	81	68				74.5	13
11						NA	0
12						NA	0
13						NA	0
14						NA	0
15						NA	0
16						NA	0
17						NA	0
18						NA	0
19						NA	0
20						NA	0
21						NA	0
22						NA	0
23						NA	0
24						NA	0
25						NA	0

GRND AVG: 44.9 AVG RNGE: 27.8
UCL FOR INDIVIDUAL RANGES 72.36405


SLED TEST (HYDRAULIC PULSE) ON LOT T, MEASURED WITH KISTLER, ASSEMBLED USING PARTS FROM TEST BUILD #1 ON HYDRAULIC PROPULSION UNIT
D-5093C
5-1-82
V/D 1.000e0
Vy 2.9700000e0
T/D 4.00e-1
TL -2.960e-1
V/D 6.25e-2
Vy 4.6200000e0
T/D 3.12e-3
TL 2.962e-1
82MV X COPPS/VOLT = 41 psi
NEED ELECTRICAL SIGNAL
Vy
PLATFORM
TL
Vx
TIME
TI-NHTSA 006322

	JEFF				HOWARD				
	1 RUN 1	2 RUN 2	3 AVG	4 DELTA	5 RUN 1	6 RUN 2	7 AVG	8 REPEAT DELTA	9 REPRO DELTA
1	171	1000	836	+329	938	1085	1012	+147	+12
2	894	1091	893	+197	1130	994	1062	-136	-29
3	657	1005	831	+348	960	1000	980	+40	-25
4	177	1321	759	+1144	1310	1550	1330	+240	+9
5	775	1162	939	+387	1280	1290	1285	+10	+158
6	273	1090	632	+917	960	1040	1000	+80	-90
7	723	1119	826	+393	815	1163	974	+298 *	-143
8	767	1246	782	+599	1334	1280	1250	+60	-6
9	665	383 *	564	-282	1150	1140	1145	-10	N/A
10	715	976	846	+261	1040	1096	1068	+56	+92
11									
12		1054/254	← w/ "0" mlg.				1110/134	58.5/111	0.3/95
13		801/116						34.9/77	
14	THESE							↓	
15	TAKEN							15 ± 301.	
16	ON A			6R AVG				263	285
17	DIFF.			1108					
18	DAY							$\frac{263}{1108}$ = 23.7%	$\frac{285}{1108}$ =
19	N/G								25.8%
20									

REPEATABILITY — BASED ON HOWARD'S MEAS. W/ FLYER RUN AVG (#7) IS 23.7%

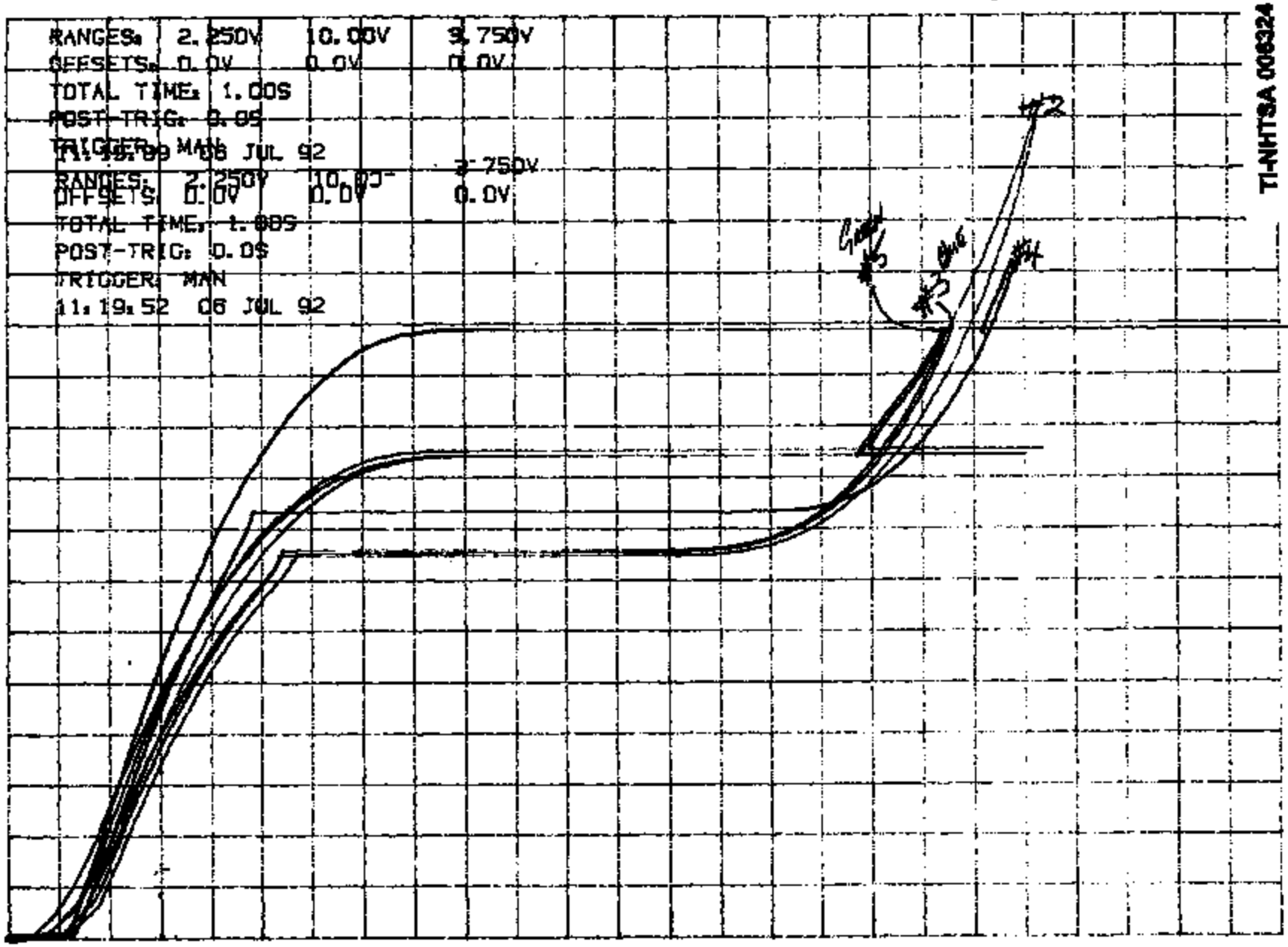
REPRODUCIBILITY — JEFF'S SINGLE SET VS. HOWIE'S AVG (3D #9 REMOVED) IS 25.8%

D 920515

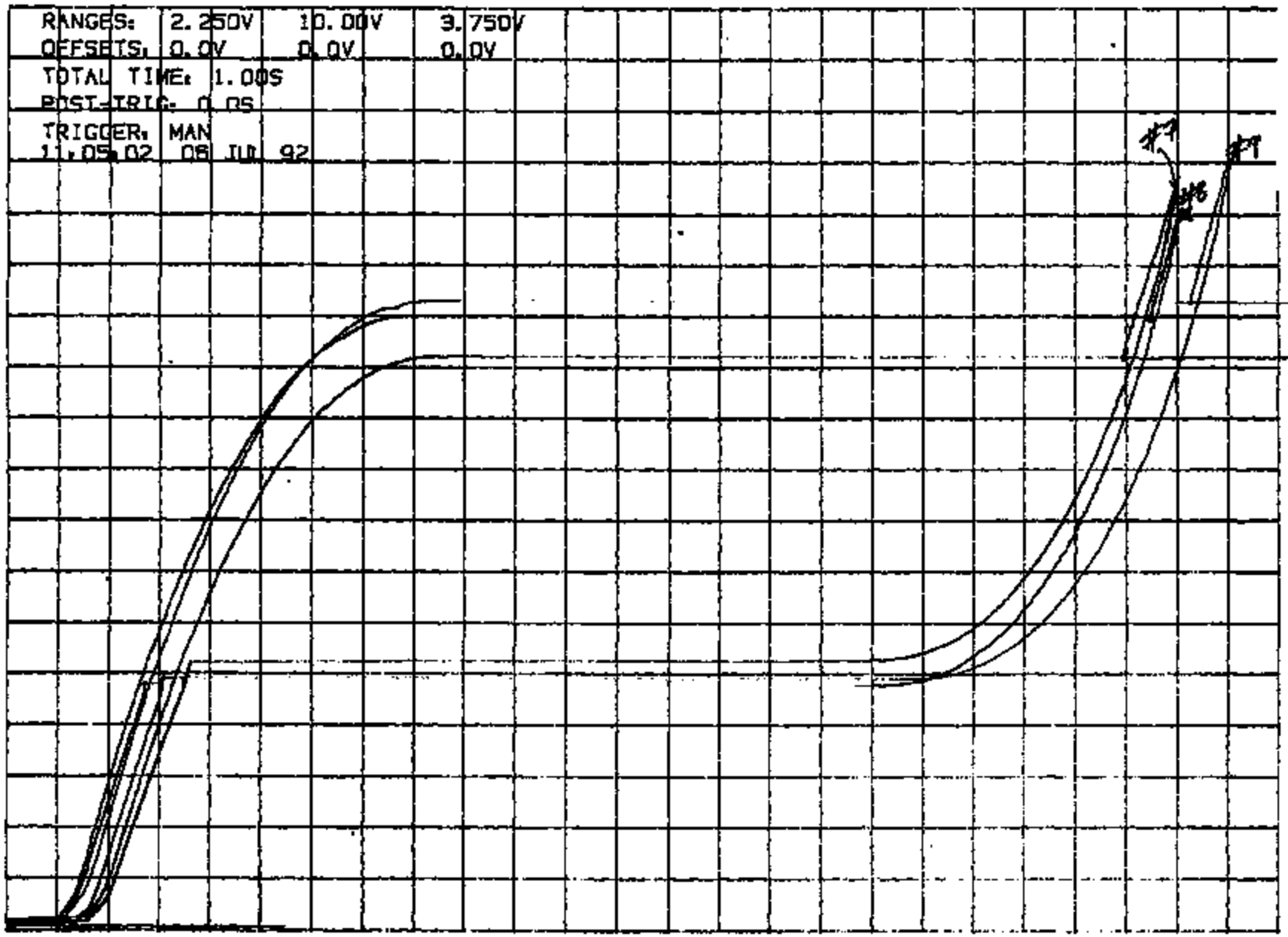
EFFICIENCY LINE = 22305

TI-NHTSA 006323

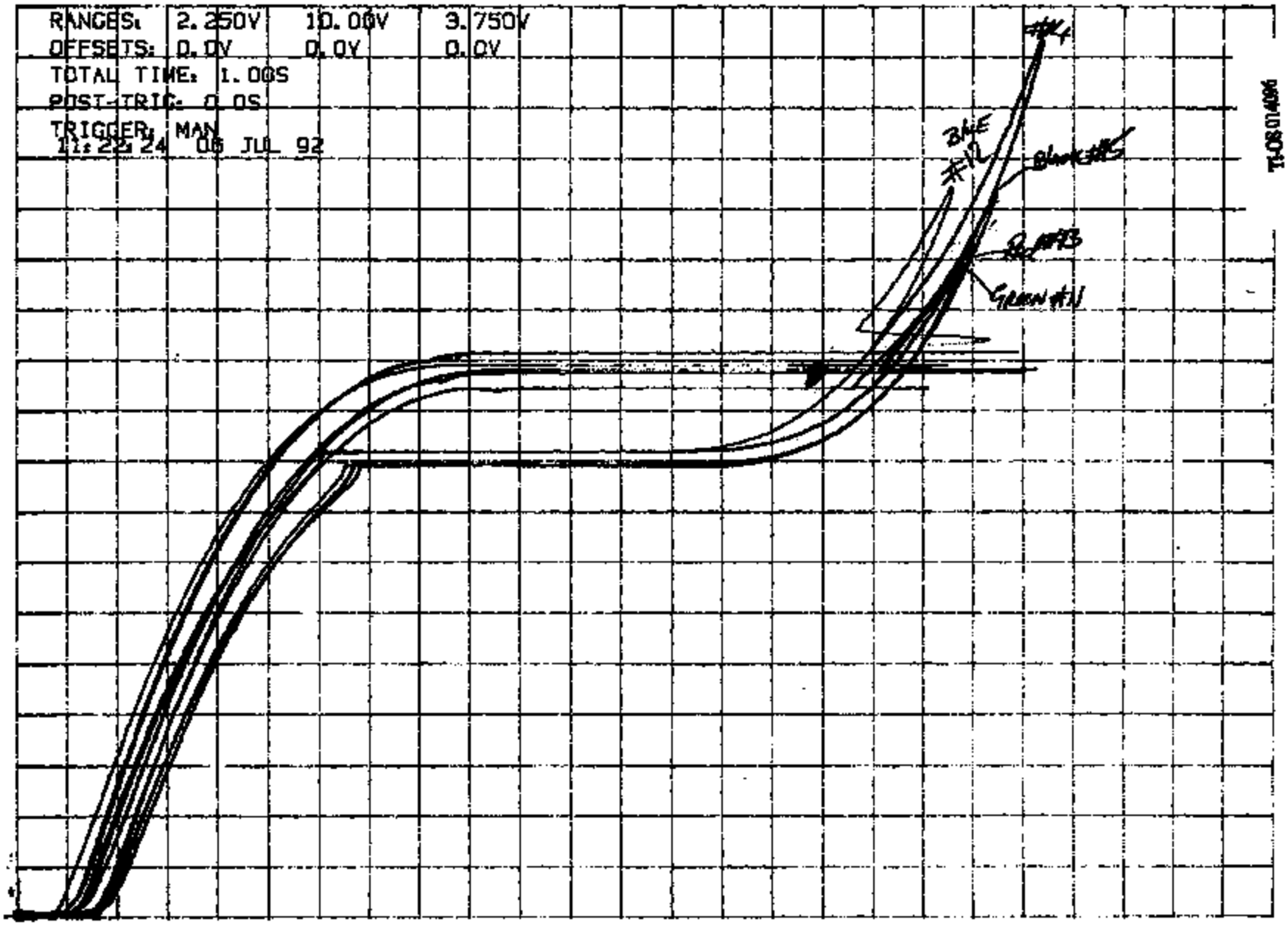
#1 Slipped. #1


RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
11:19:52 06 JUL 92
RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
11:19:52 06 JUL 92
#2
#3
#4
TI-NHTSA 006324

#640 Swipe.

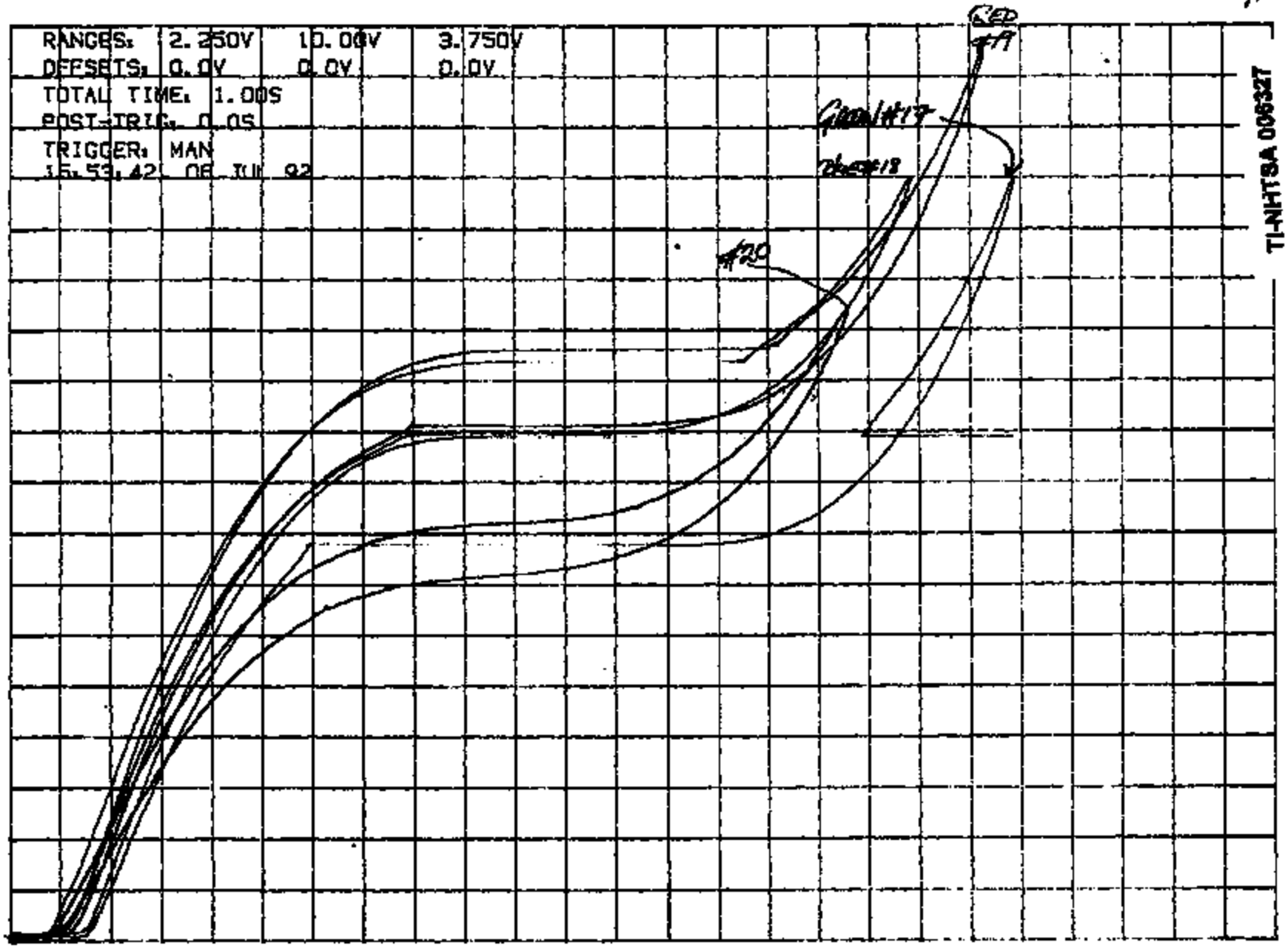


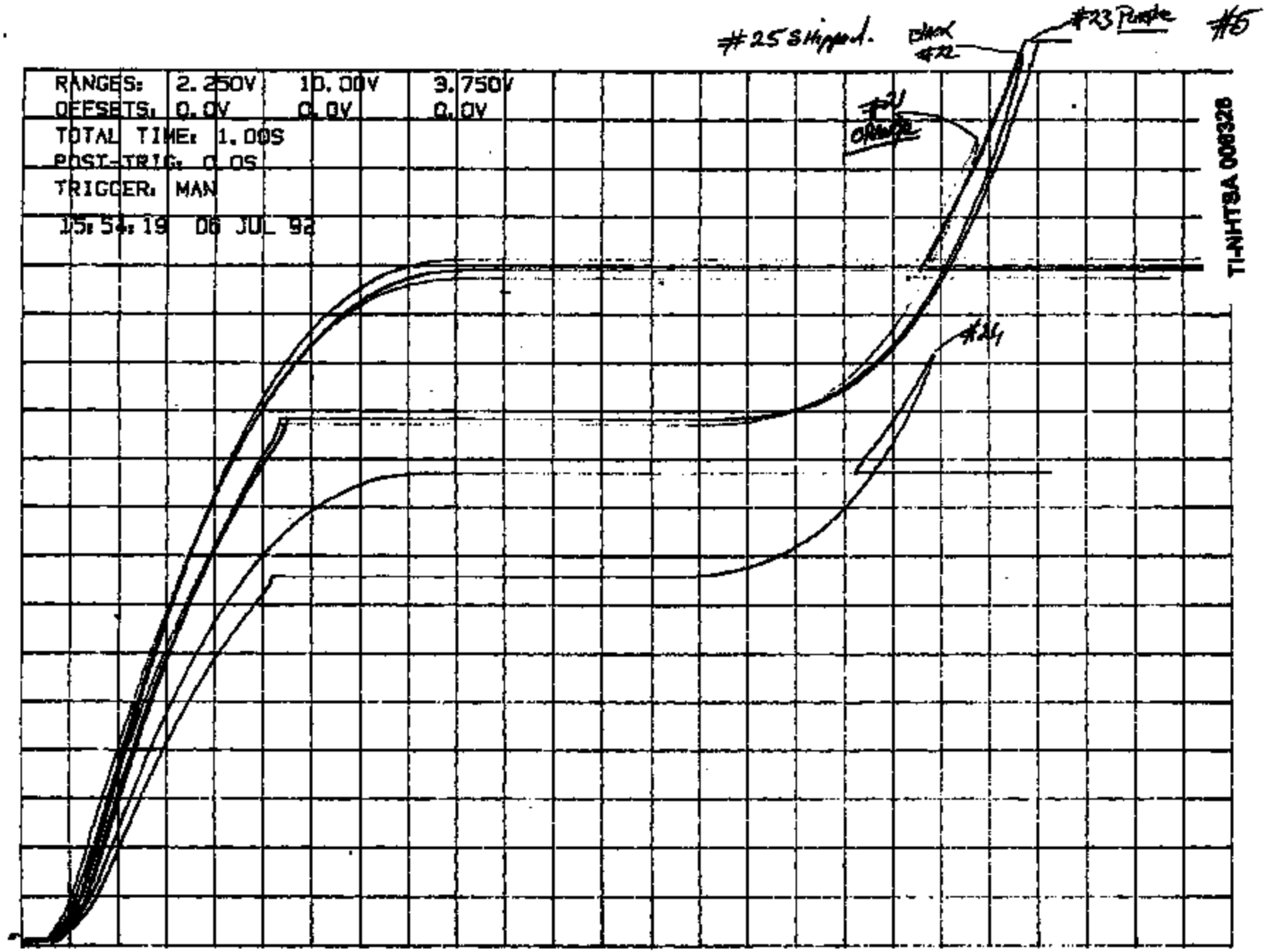
TI-NHTSA 006326



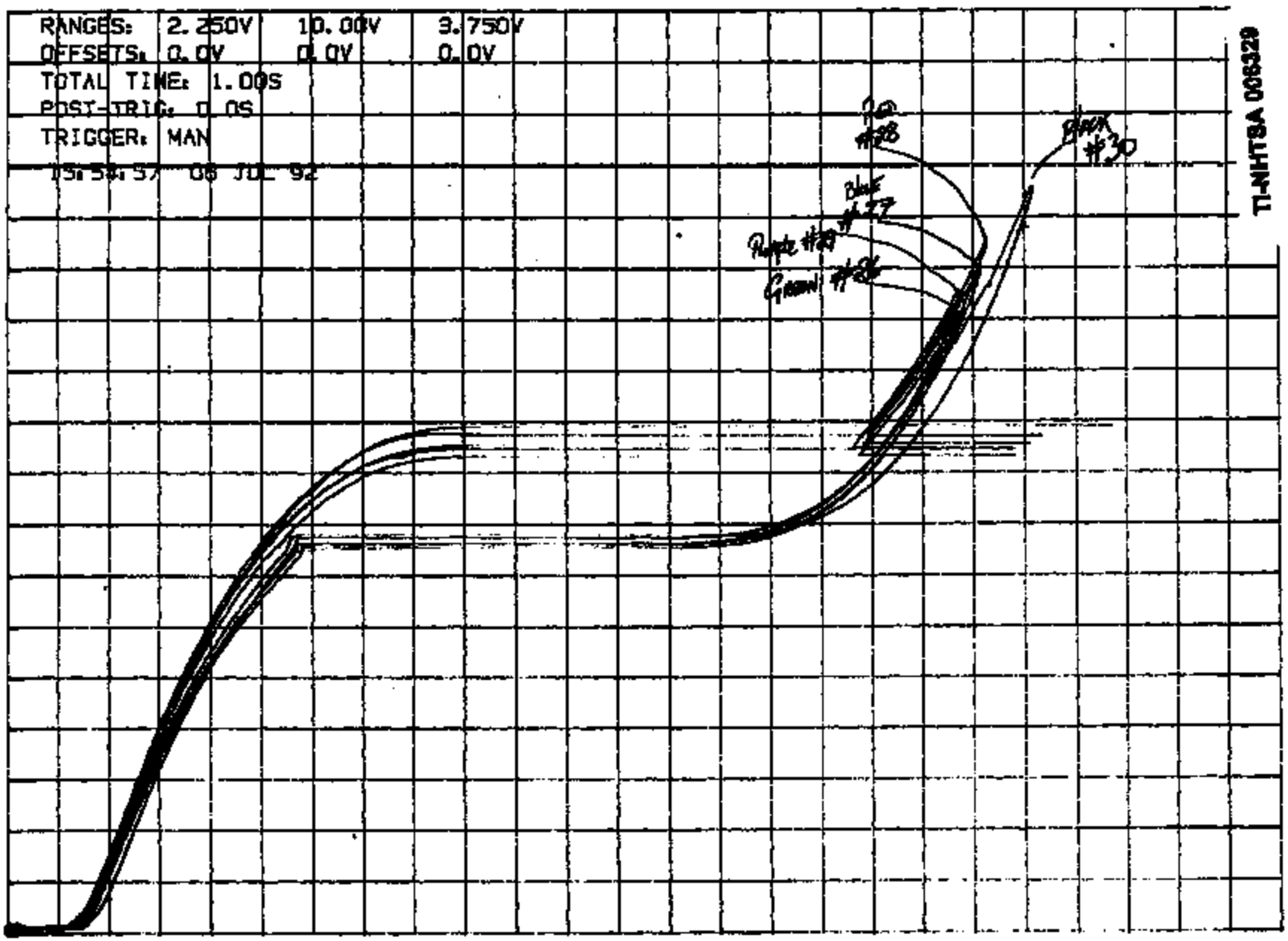
TI-NHTSA 006326

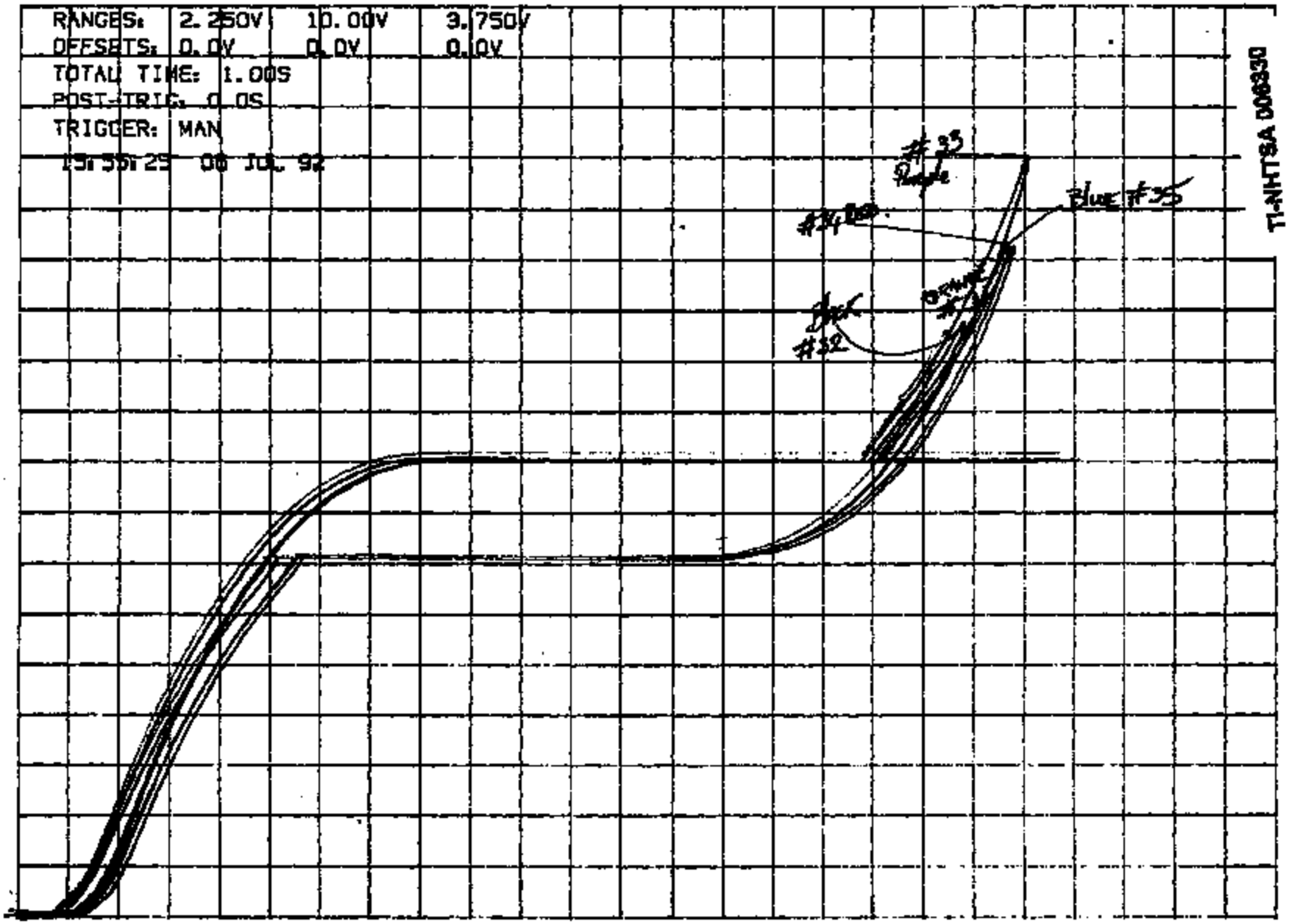
#16 Chipped. #4


RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
15:53:42 08 JUL 92
RED
#19
#17
#18
#20
TI-NHTSA 006327


#25 Shipped.
#23 Purple
#24
RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
15:54:19 06 JUL 92
TI-NHTSA 006326

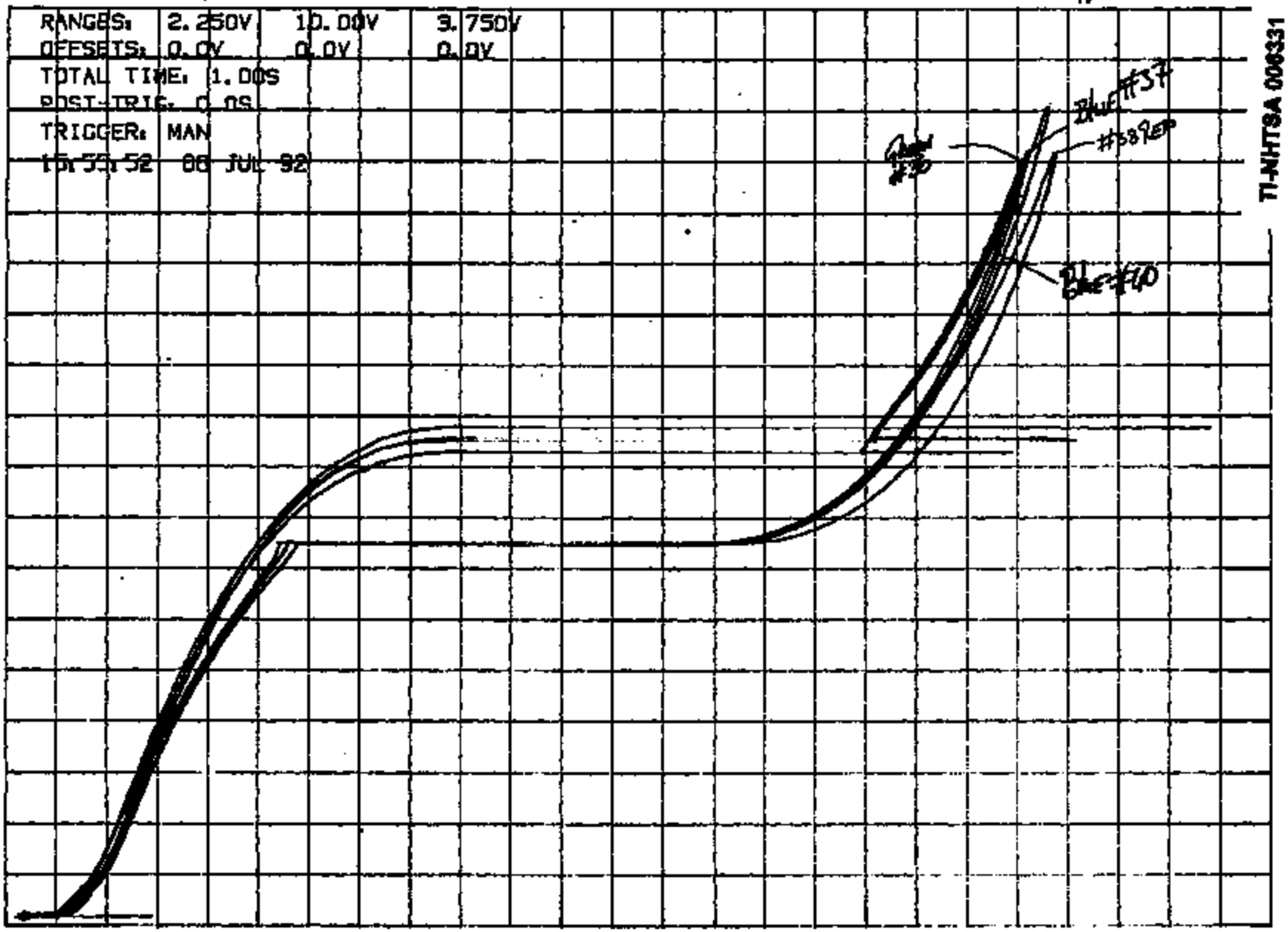
#4

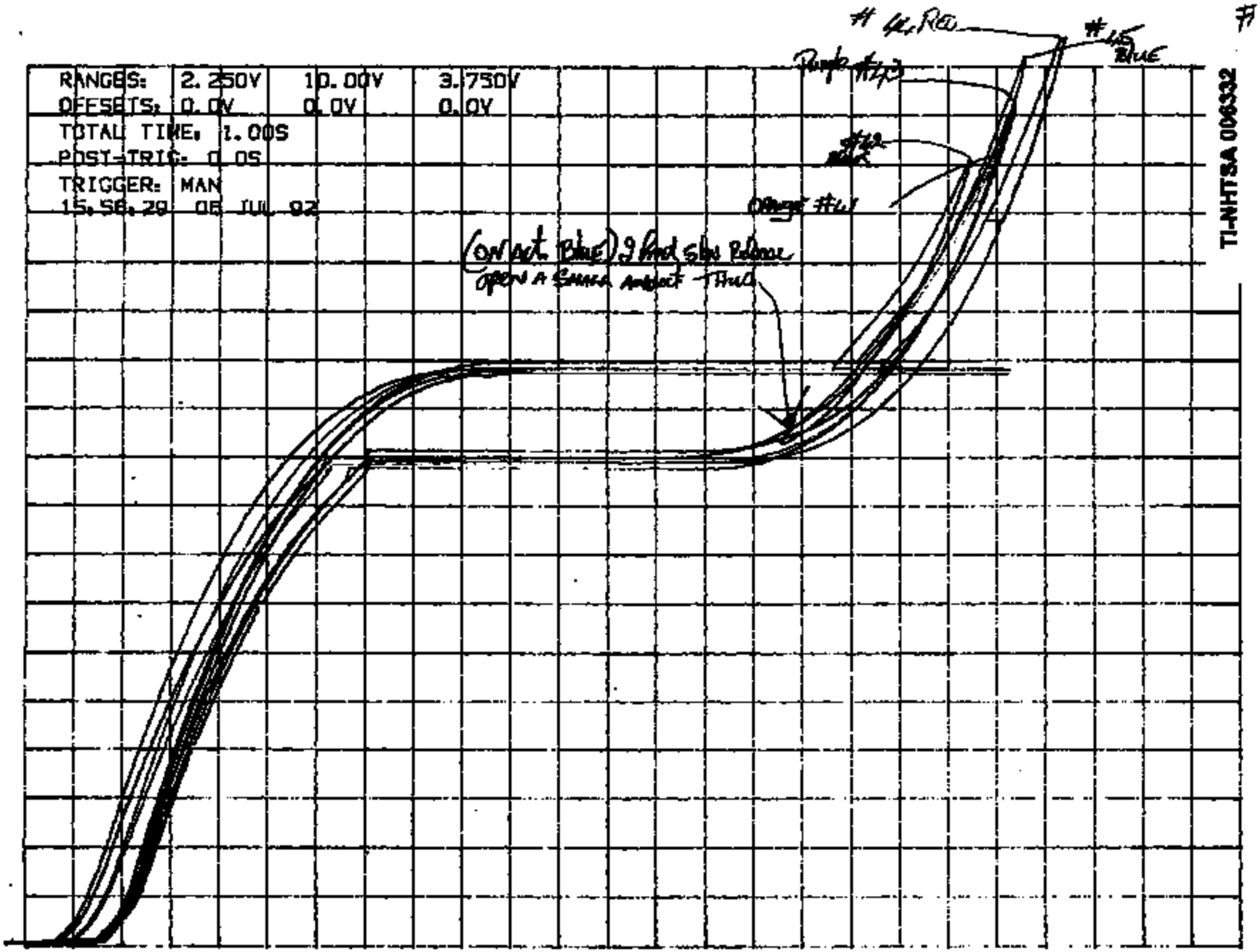

RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
15:54:37 06 JUL 92
Red #28
Black #27
Purple #29
Green #26
Black #30
TI-NHTSA 006329

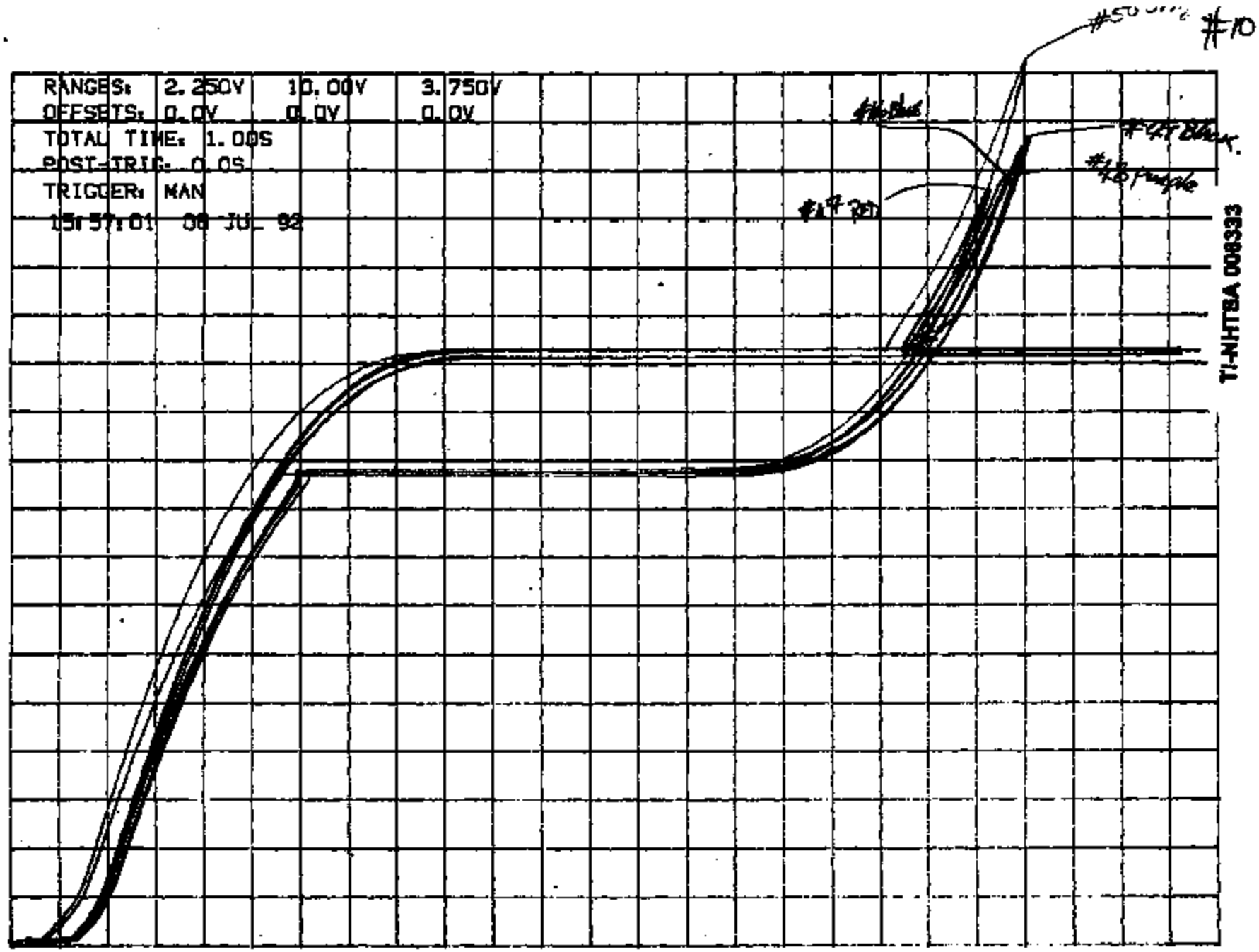

RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
13:56:25 08 JUL 92
TL-NHTSA 060350
Blue #35
#34
Black
#32

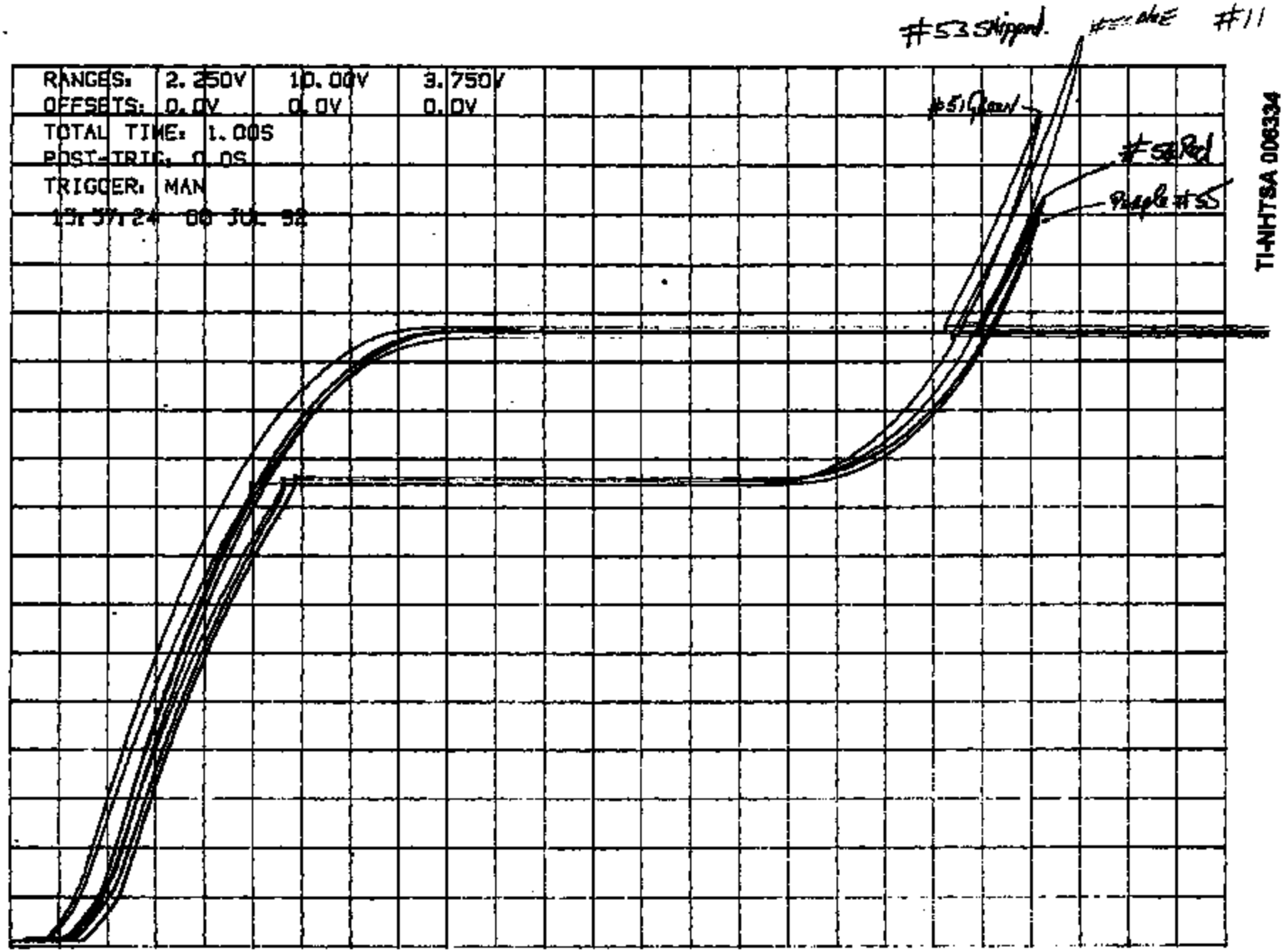
#8

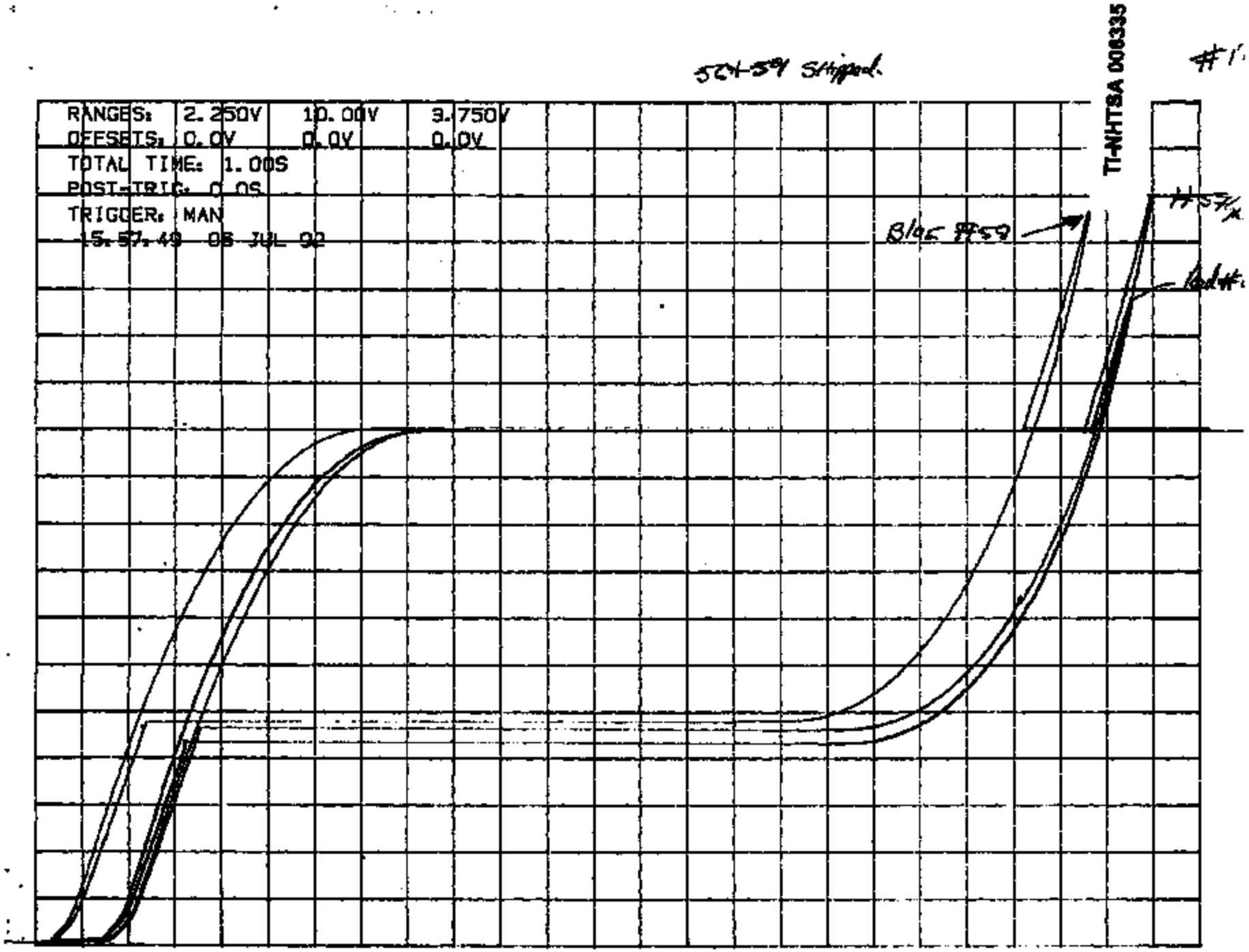
#39 shipped.


RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
15:55:52 06 JUL 92
Blue #37
Blue #40
TI-NHTSA 000331


RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
15:56:29 08 JUL 92
TI-NHTSA 006332

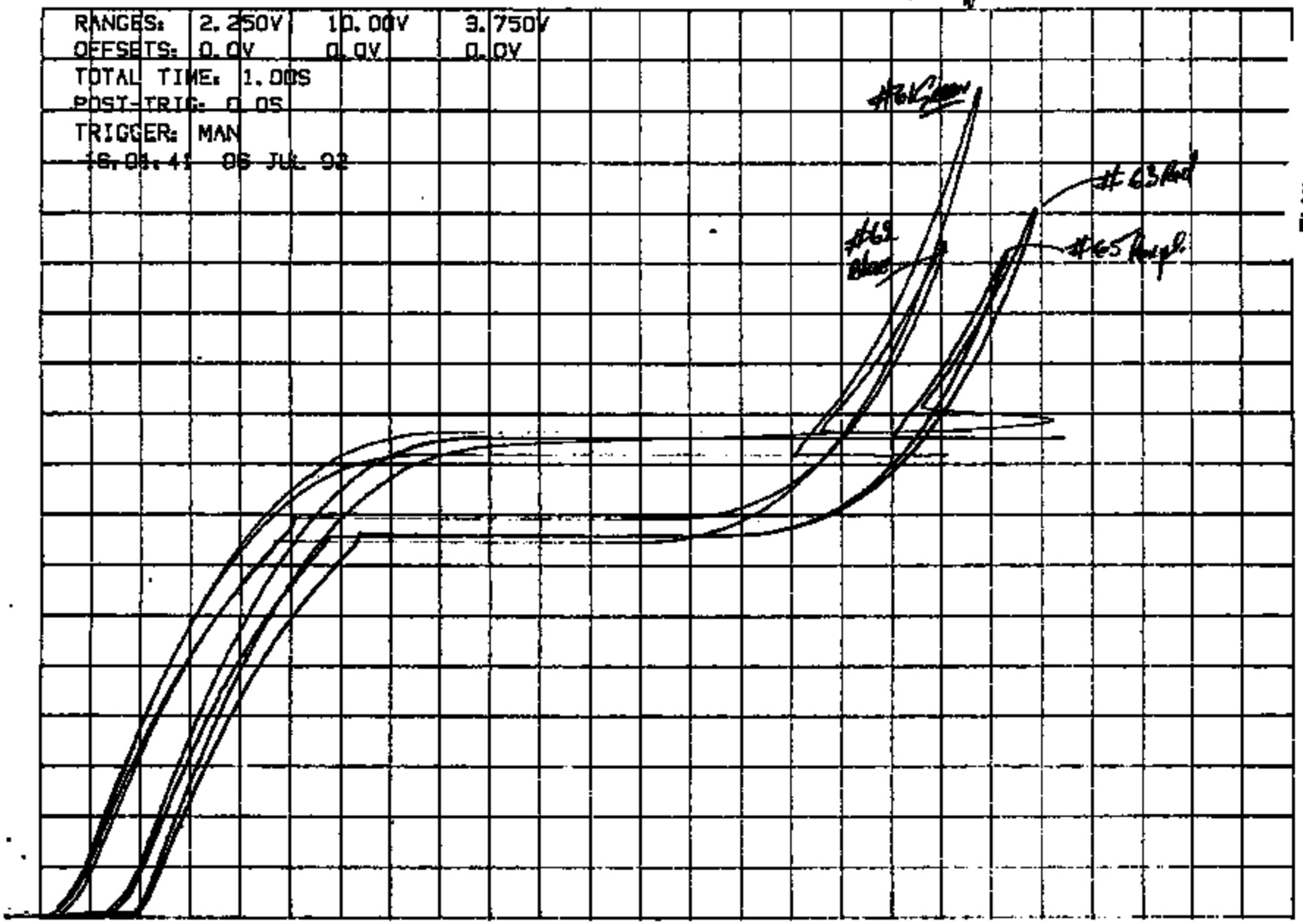

RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
15:57:01 06 JUL 92
#10
TEKTRONIX 008333


#53 Slipped.
#11
RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG: 0.0S
TRIGGER: MAN
#51 Green
#52 Red
Purple #55
TI-NHTSA 006334

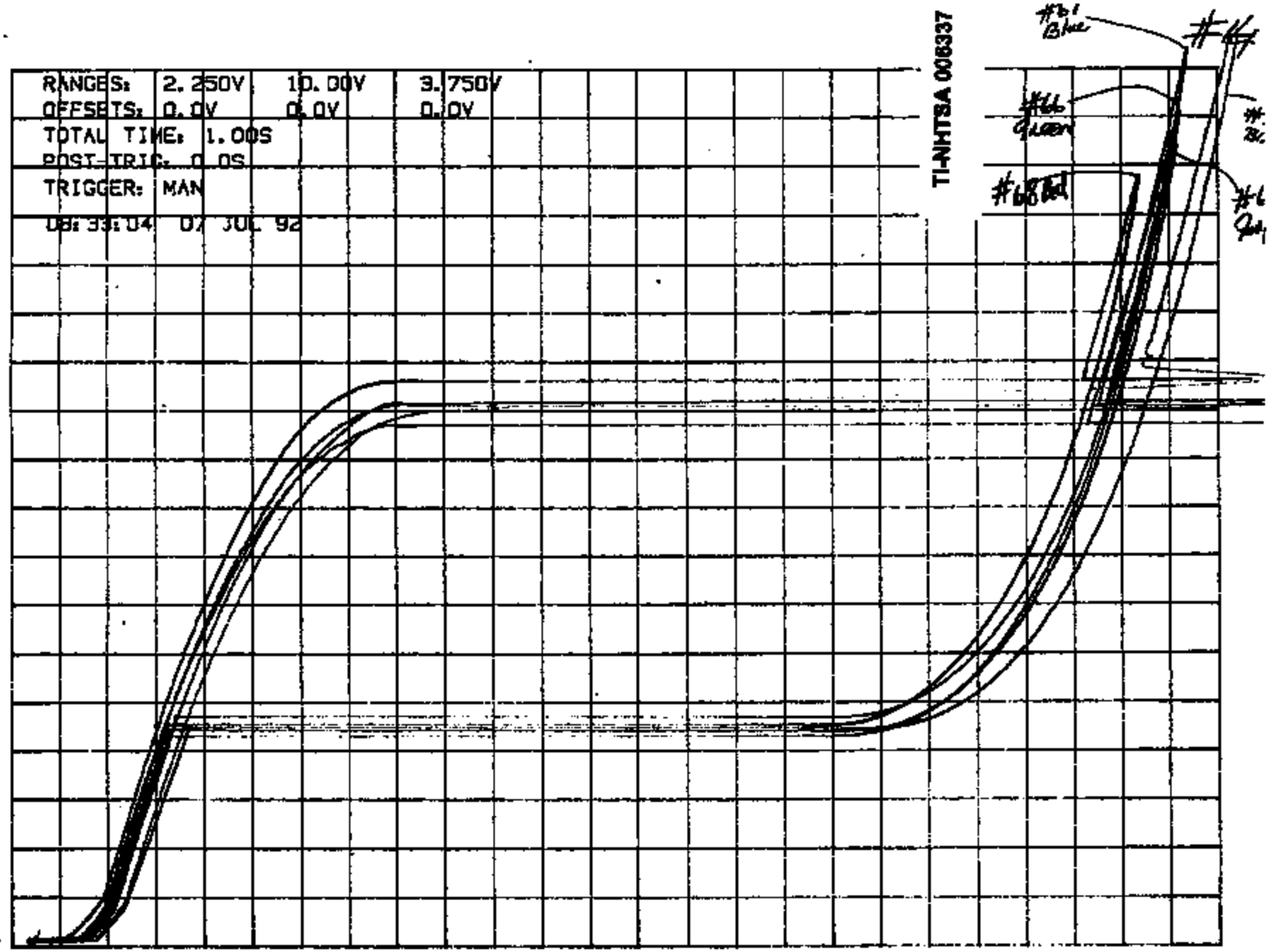

SC459 Shipped
#1
TI-NHTSA 006335
RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST-TRIG. 0.0S
TRIGGER: MAN
15:57:49 08 JUL 92
Blue #59
#57
Gold

#13

4 Shippl.

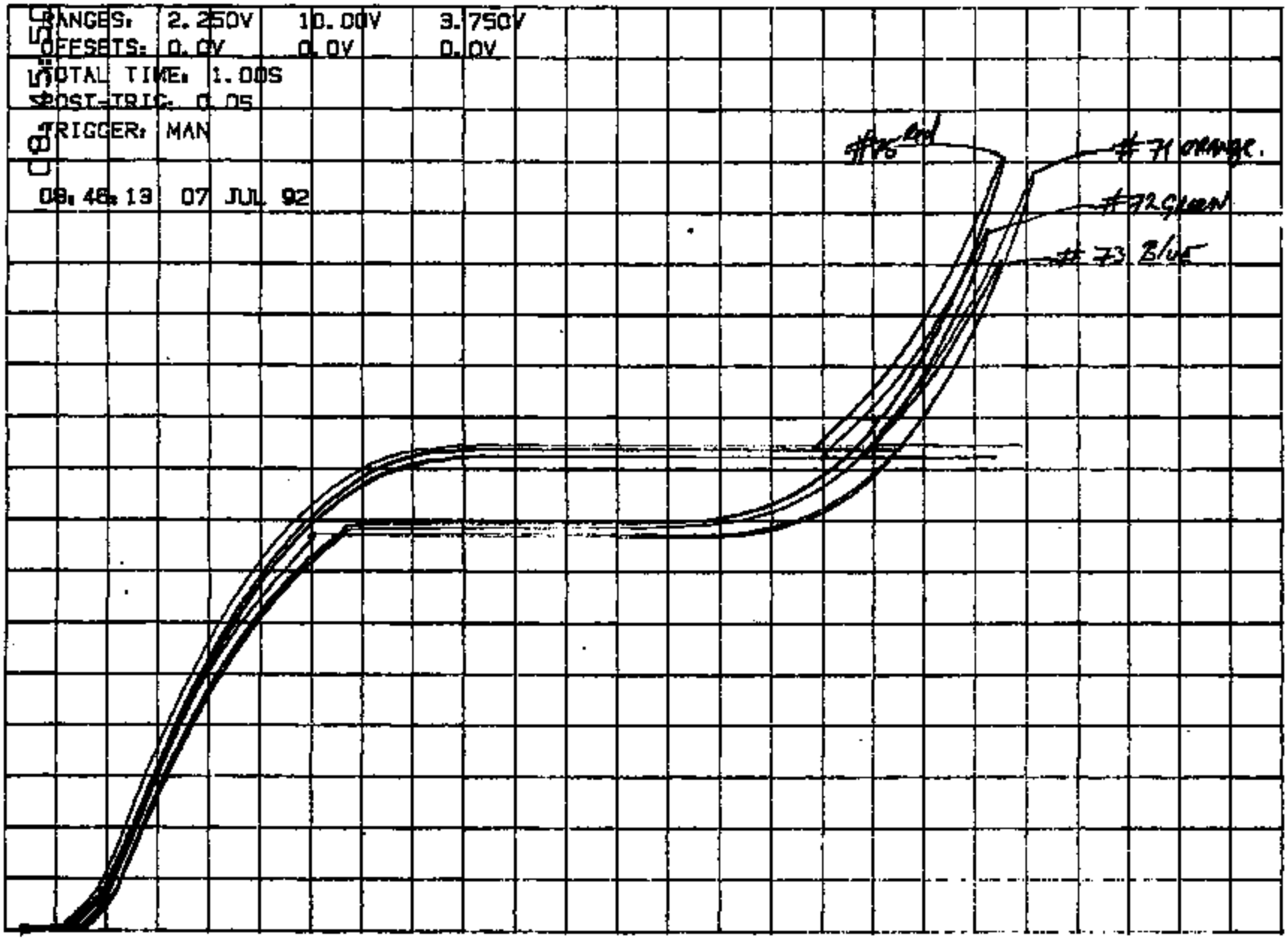


TI-NHTSA 000330


RANGES: 2.250V 10.00V 3.750V
OFFSETS: 0.0V 0.0V 0.0V
TOTAL TIME: 1.00S
POST TRIG. 0.0S
TRIGGER: MAN
08:33:04 07 JUL 92
TI-NHTSA 006337

#1 Th Stripped

#15



TI-NHTSA 006338

CREEP ACTUATION AFTER ~~CREEP~~ IMPACT TEST 251 JAD 920513

DEVICE #	TEST	BASE DIM.	CUP-PIN	PRE-LOAD	CONDITION	
223-15-01	IMPULSE	89	96	7	OK	
223-15-02	"	89	96	7	OK	
223-15-03	"	89	96	7	CREEP	
223-15-04	"	90	96	6	CREEP	
223-15-05	"	92	96	4	CREEP	
223-15-06	"	91	95	4	CREEP	
223-15-07	"	90	96	6	OK	
223-15-08	"	99	96	7	CREEP	PRELOAD $\bar{X}$
223-15-09	"	91	95	4	CREEP	5.33
223-15-10	"	90	96	6	CREEP	
223-15-11	"	91	96	5	CREEP	
223-15-12	"	91	96	5	CREEP	
223-15-13	"	90	96	6	OK	
223-15-14	"	90	96	6	CREEP	
223-15-15	"	90	96	6	CREEP	
223-15-16	"	91	96	5	CREEP	
223-15-17	"	93	96	3	CREEP	
223-15-18	"	91	96	5	CREEP	
223-15-19	V	92	96	4	CREEP	
223-15-37	TERM.	87	96	9	OK	
223-15-38	STRENGTH	86	96	10	OK	
223-15-39	"	87	96	9	OK	
223-15-40	"	87	96	9	OK	
223-15-41	"	90	96	6	OK	
223-15-42	"	88	96	8	OK	PRELOAD $\bar{X}$
223-15-43	"	87	96	9	OK	9.08
223-15-44	"	86	96	10	OK	
223-15-45	"	86	97	11	OK	
223-15-46	"	87	96	9	OK	
223-15-47	"	86	96	10	OK	
223-15-48	V	88	97	9	OK	
223-15-49	T-CYCLE	87	95	8	OK	
223-15-50	"	88	96	8	OK	
223-15-51	"	88	96	8	OK	PRELOAD $\bar{X}$
223-15-52	"	91	96	5	OK	7.33
223-15-53	"	89	96	7	OK	
223-15-54	V	88	96	8	OK	

-MSG M#= 02147611 FR=FFUN TO=SB01 SENT=07/31/92 01:47 PM
R#=083 ST=C DIV=0050 CC=00101 BY=FFUN AT=07/31/92 01:47 PM
dra92-43

TO: Dave Czarn
Matt Sellers
Steve Offiler

FR: Dale Sogge

SJ: Tolerance on 6.5mil preload target.

Question: When rework is sent back through the line how close must the bases be to the target preload of 6.5mils. The line currently assumes it must be with in
+/-0.1mils.

Answer: Rework can take place if the target for the run is within -0.0 to +0.5 mils. Ie 6.5 to 7.0.

All production can also be built to this spec.

Justification: At 6.5 mils the conservatively assumed high temp shift of -4 produces actuations as low as 85psi at 150C. At low temps the assumed shift produces actuation at 175psi. This indicates that there is some room to move th e
target towards 7.0 mils which would produce 190psi actuation which is just belo w
the spec of 200psi.

At high temps we are well below the spec of 90psi. If we assume a more realisti c
number of 3 mils for high temp shift than we get 90psi at 150C, just meeting the spec. this indicates that we cannot target anything below 6.5mils.

These calculations work so long as the sensor assemaly switches in the 130-140psi range. If the disc drops it down to 120psi we would fall below the 90psi spec again. Then the preload target should shift upwards to match the changing disc. Tying the target and the act and rel specs to the disc at this point is not recommended because of the complexity it adds. It may need to be consider in the future so that production is not always running in and asking for a spec modification because of a change in the lots.

Note: We recently have a lot running low. For this lot we reduced the lower [illegible] act. from 110 to 105psi, without making any change in the target preload. These parts maybe a problem at high temps.

Regards,
Dale

PS 92/78

QUIET SWITCH STUDIES
ALTERNATIVE CONFIGURATIONS

PURPOSE

There is a need for a quiet cruise control pressure switch to prevent noises from being transmitted into the passenger compartment. A silent switch was developed by using a low differential disc. This quiet switch is assigned part number 77psl3-1. During the development of this switch a number of alternative configurations were investigated in the hope of finding a simpler solution to control sound. This report describes the results of tests on the alternative configurations.

CONFIGURATIONS

Seven configurations were tested. Six with a noisy wide differential disc (standard production disc).

A) A sheet of 0.003" thick silicone rubber was placed between the convertor and the cup (figure 1). The theory was that the convertor maybe hitting the cup when the disc snaps and the impact generates a noise.

B) A sheet of 0.003" thick silicone rubber was placed between the disc and the convertor (figure 1). The theory was to see if the sound generated by the disc could be blocked from transmitting to the convertor.

C) A sheet of 0.0003" thick silicone rubber was placed between the convertor and the washer (figure 1). The theory was that when the convertor impacts the washer on switch release that it generates a sound.

D) A metal labyrinth was installed inside the hexport, just below the diaphragm. The theory was that by proper acoustical tuning the passage could be made to absorb the sound wave as it tried to travel down the passage. The labyrinth consisted of two brass pieces with horizontal slots cut in them. The pieces were stacked so as to create a "Z" channel (figure 2).

E) A rubber labyrinth with four holes was installed inside the hexport, just below the diaphragm (figure 3). This was an advancement on the theory behind #4, in that the rubber would provide more absorption. The rubber piece also tired to take advantage of the sloped walls of the hexport to reflect the sound wave. The rubber piece design was selected to have a manufacturable shape.

F) Same as 5 except for 2 holes.

TEST LOT NO.	TEST	DEVICE
TESTED BY Dale Snyder		
APPROVED BY	SPENCER PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DOC.
DATE 8/3/76		PAGE 1 of 13

PR 1206

G) A hex shaped metal insert to create a snubber (figure 4). The theory is that the hydraulic fluid cannot fill the void left by the instantaneous disc snap as quickly, thus slowing down the hydraulic turbulence that creates sound. This was tested with a quiet disc to see if it could be made more quiet.

EVALUATION METHOD

Each piece was tested by ramping air from 0-400psi at a fixed rate till the switch actuated. There was a microphone located in the tubing just below the switch to listen for the sound. The microphone was attached to a B&K spectrum analyzer. for some of the tests there was also an accelerometer attached to the top of the cup to measure the acceleration generated by the snap. The spectrum analyzer was used to measure the intensity of the sound and to look for resonances.

Later a test was devised to measure the sound in a hydraulic system using a high frequency pressure transducer. Some of the pieces were evaluated with this method. In all cases the sound level was compared to a know noisy switch to evaluate the effect of the change. On the hydraulic system the sound level is defined by the magnitude of the negative pressure pulse generated when the fluid tries to rush in and fill the void left by the disc snap. A noisy switch is typically -40psi. A quiet switch is 0.0psi.

RESULTS

The intensity plots for a standard noisy switch are shown in figure 5. The top scale shows the magnitude of the acceleration. The bottom scale shows the magnitude of the sound. The setup was not calibrated so the scales are for relative comparison only. Form the plot it is clear that sound is generated in the 700 to 2k frequency range.

Figure 6 shows the same plot for a quiet switch using a low differential disc. The magnitude of the acceleration and sound has decreased by 2/3rd's. This is called a moderately quiet switch. During later testing with the hydraulic system it was determined that even this sound level was to loud. An even lower differential disc was developed. The lower differential disc was not measured with air because the sound could not be detected.

Case A) The rubber between the convertor and the cup did not show a noticeable decrease in the sound level. No plot is available because the plotter malfunctioned.

TEST LOT NO.	TEST	DEVICE
TESTED BY		
APPROVED BY	SPENCER PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DOC.
DATE		PAGE 2 of 13

PR 5289

Case B) The rubber between the disc and convertor did reduce the sound level as seen in figure 7. The level is approximately the same as the moderate quiet switch. Figure 8 shows the same switch plotted as intensity vs time. This shows that a sound pulse is still being generated.

Case C) The rubber between the convertor and the washer is shown in figures 9 & 10. Again the sound is reduced, in this case slightly more than even the previous case.

Case D) The metal labyrinth did not reduce the level (figure 10). A slight increase in the sound level was noted.

Case E) The rubber 4 hole plug was tested hydraulically because no sound could be detected with air. It had a -38.8psi pulse, just as noisy as the standard noisy part. This piece was also tested by FORD on a SHO taurus and deemed to be noisy.

Case F) The 2 hole rubber part had a pulse of -27.6psi. Quieter than the 4 hole but still noisy.

Case G) The metal hex snubber insert a no sound, pulse level was 0.0psi. This part was tested by FORD on a SHO taurus, and deemed quiet. Note this had a quiet disc.

DISCUSSION

During the development of the quiet switch it was determined that any noisy detected on an air system is to much. This means that cases A-D will not work.

Case E & F were rejected because the vehicle test showed they were noisy.

Case G was not expected to be noisy because it had a quiet disc. If the quiet disc without a snubber is at zero sound then it cannot be reduced by additional snubbing. This piece shows that a snubber really offers no benefit.

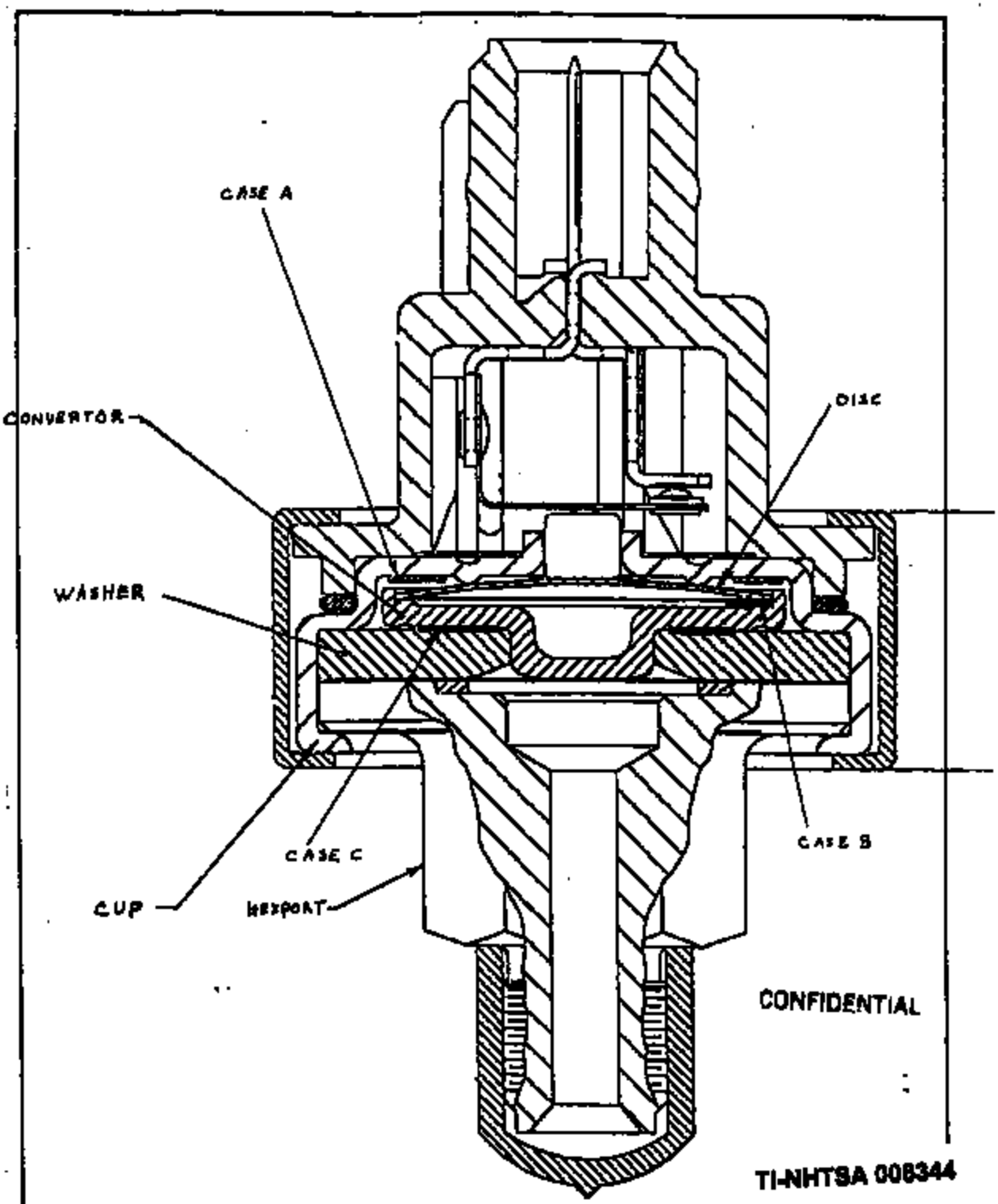
Based on these results the decision was made to convert to a quiet disc without any other changes. It was chosen because it was the only solution that FORD brake engineers felt was quiet enough and had a low enough feet.

CONCLUSION

A wide selection of creative solutions to control switch sound were tested. the only solution that was quiet was a low differential disc. This solution was implemented at the start of production in June of 1992.

TEST LOT NO.	TEST	DEVICE
TESTED BY		
APPROVED BY	SPENCER PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DOC.
DATE		PAGE 3 of 13

PR 1286

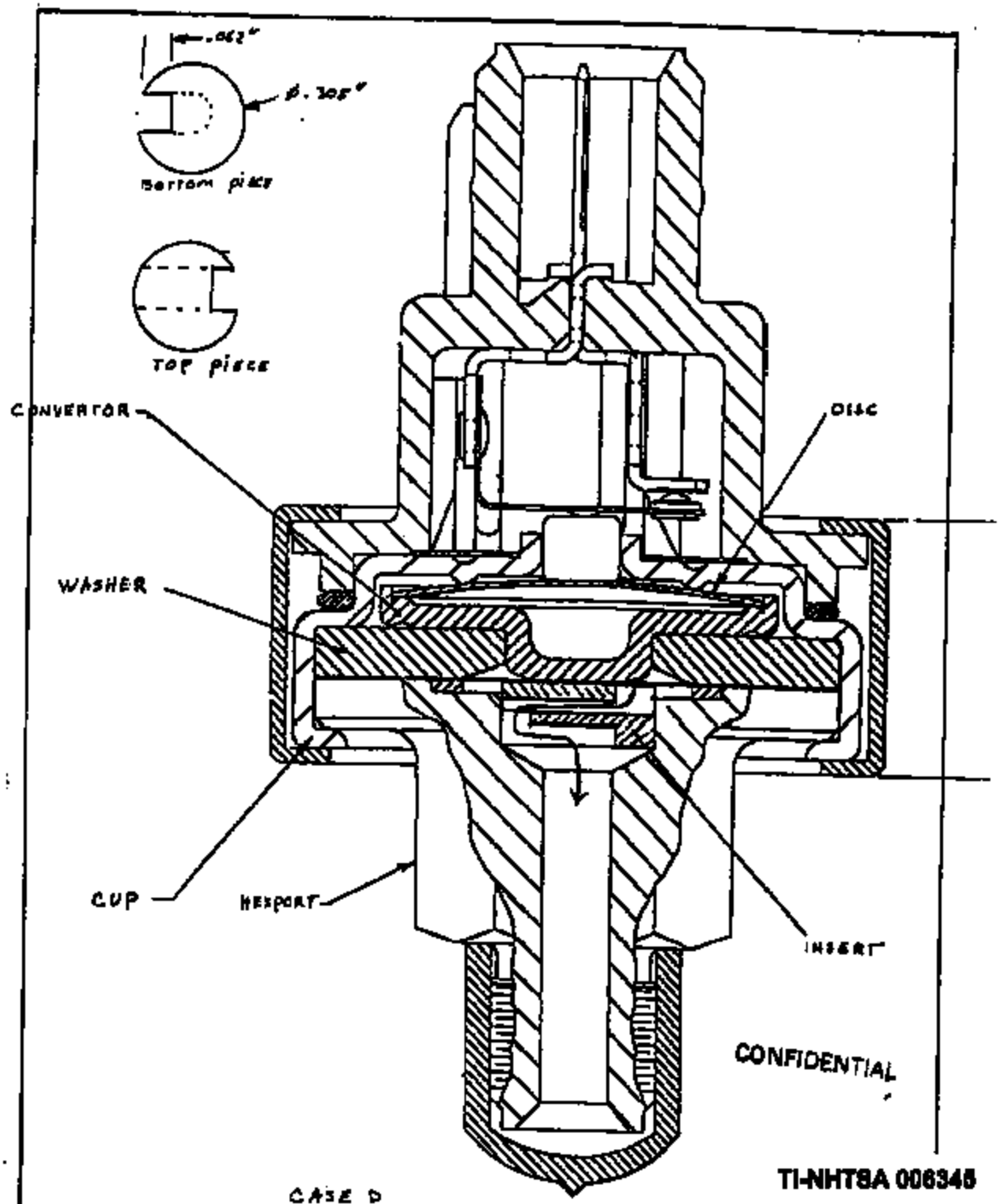


CONFIDENTIAL

TI-NHTSA 008344

TEST LOT NO.	TEST FIGURE 1	DEVICE
TESTED BY		
APPROVED BY	SPENCER PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DOC.
DATE		PAGE 4 of 13

FR 1205



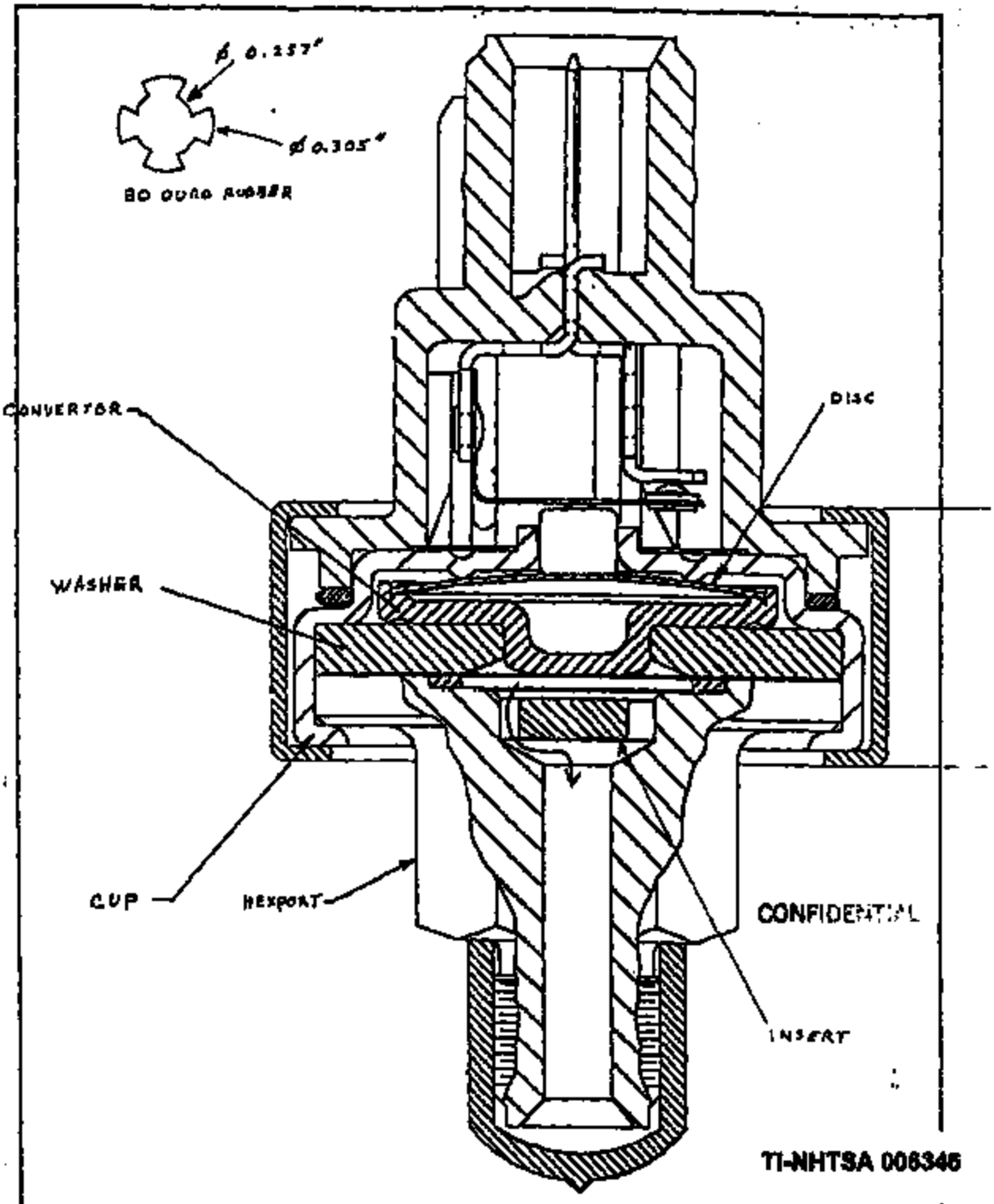
CONFIDENTIAL

TI-NHTSA 006345

CASE D

TEST LOT NO.	TEST	DEVICE
TESTED BY		
APPROVED BY	SPENCER PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DWG.
DATE		PAGE 7 of 13

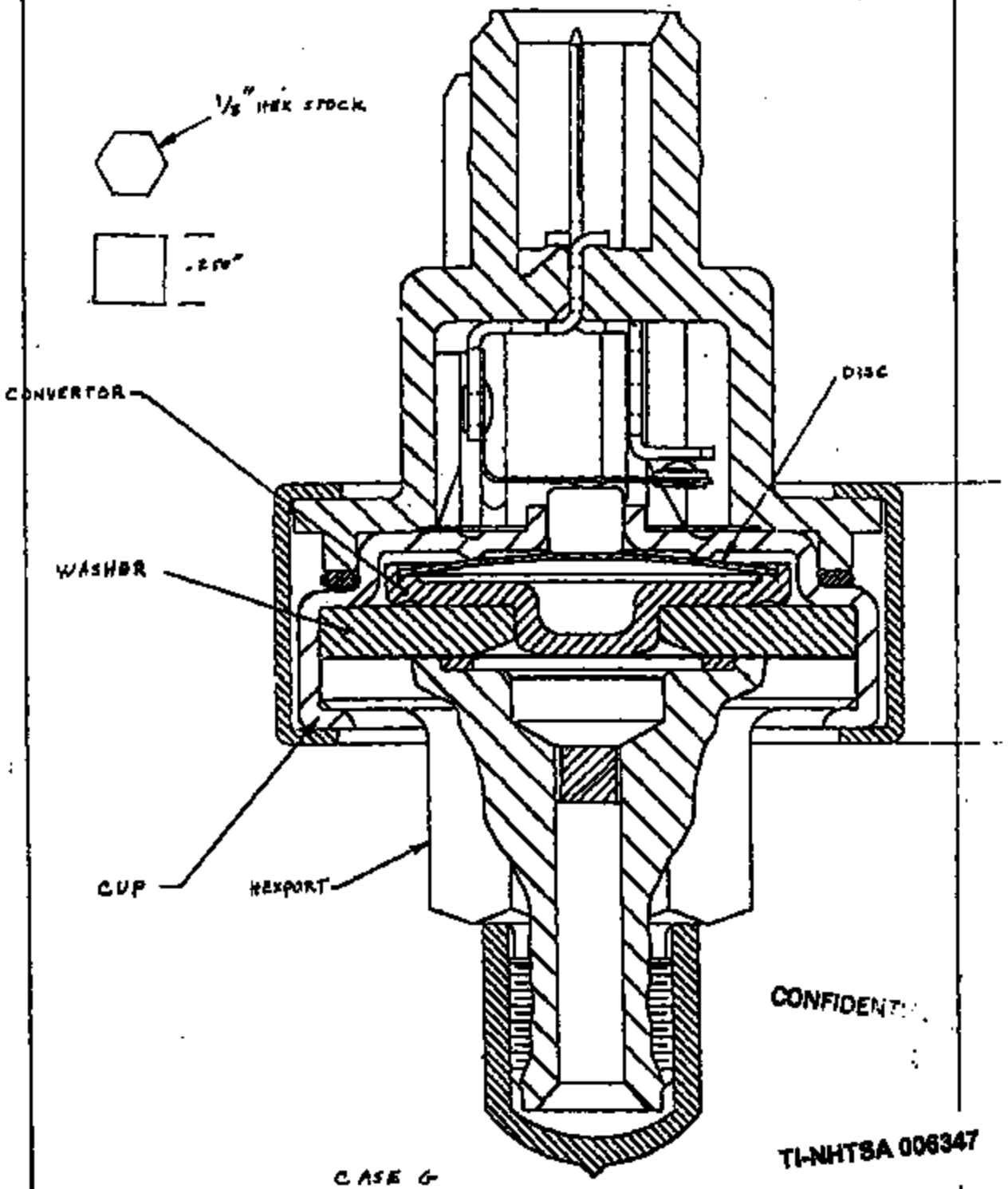
PR 5206



TI-NHTSA 006346

TEST LOT NO.	TEST CASE E FIGURE 3	DEVICE
TESTED BY		
APPROVED BY	SENSOR PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DOC.
DATE		PAGE 60 of 15

PR 5858



CONFIDENTIAL

TI-NHTSA 006347

TEST LOT NO.	TEST FIXTURE 4	DEVICE
TESTED BY		
APPROVED BY	SPRINGER PRODUCTS - METALS & CONTROLS DIVISION TEXAS INSTRUMENTS INCORPORATED ATTLEBORO, MASSACHUSETTS	DOC.
DATE		PAGE 10 of 13

PR 3286

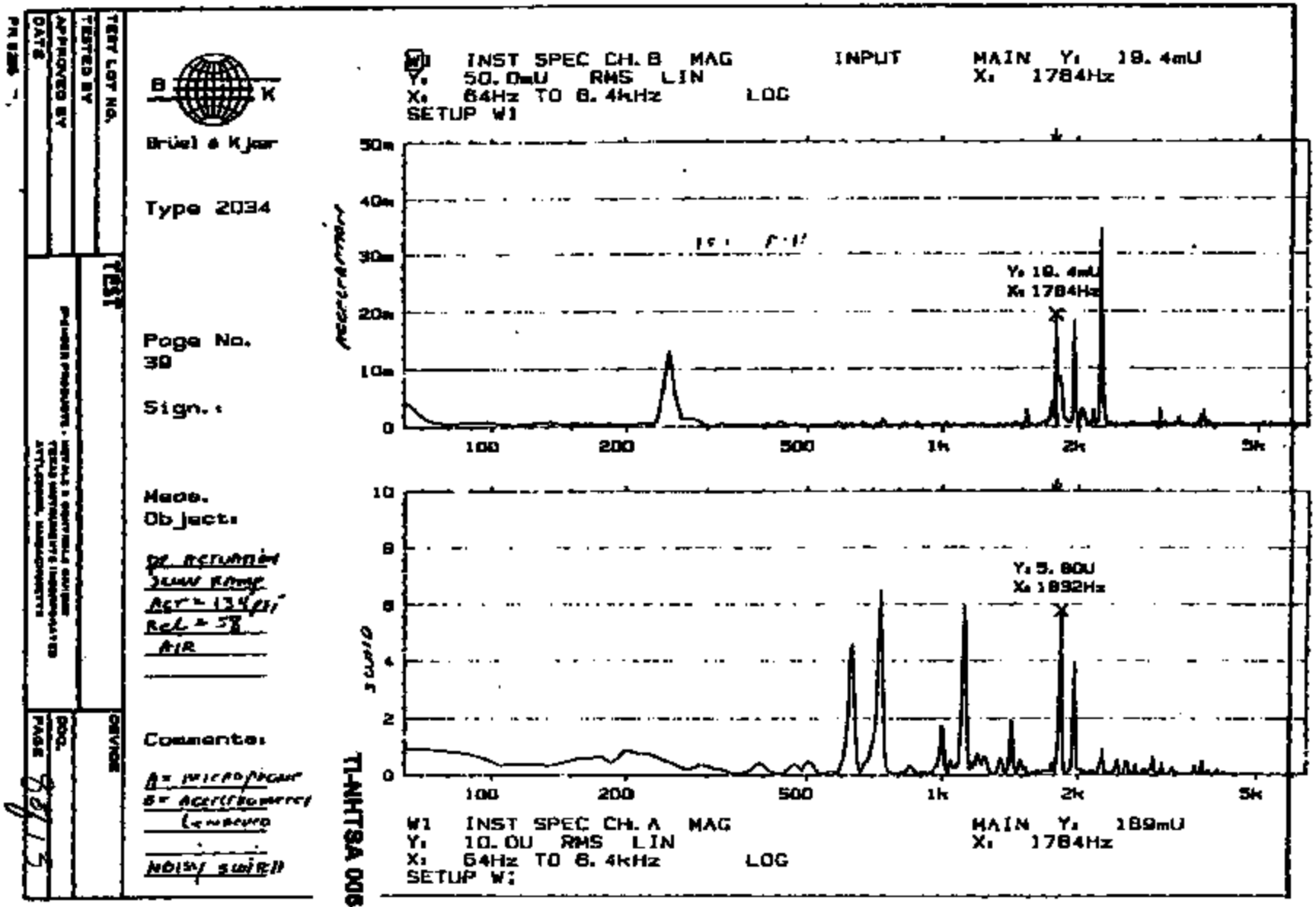
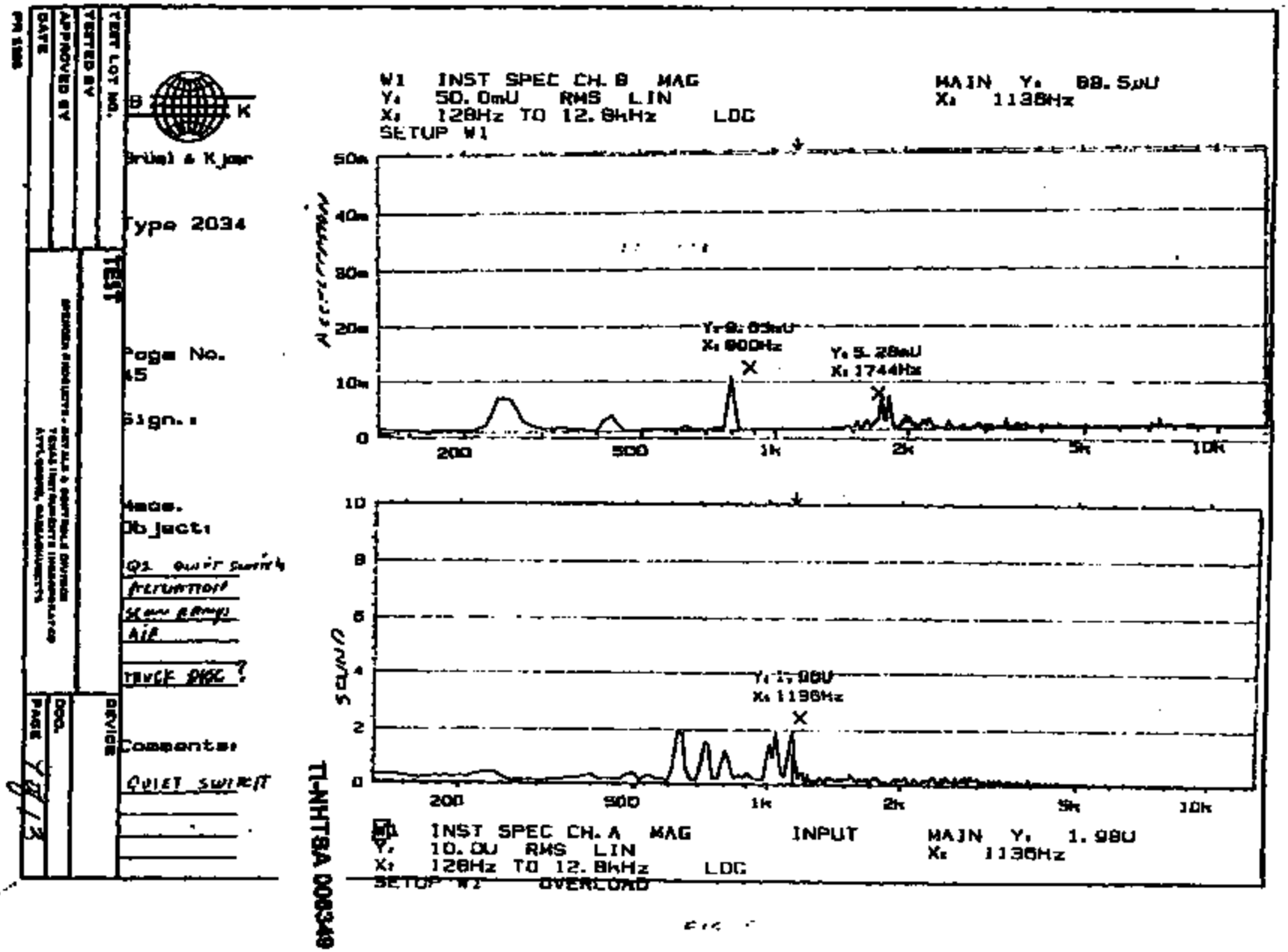
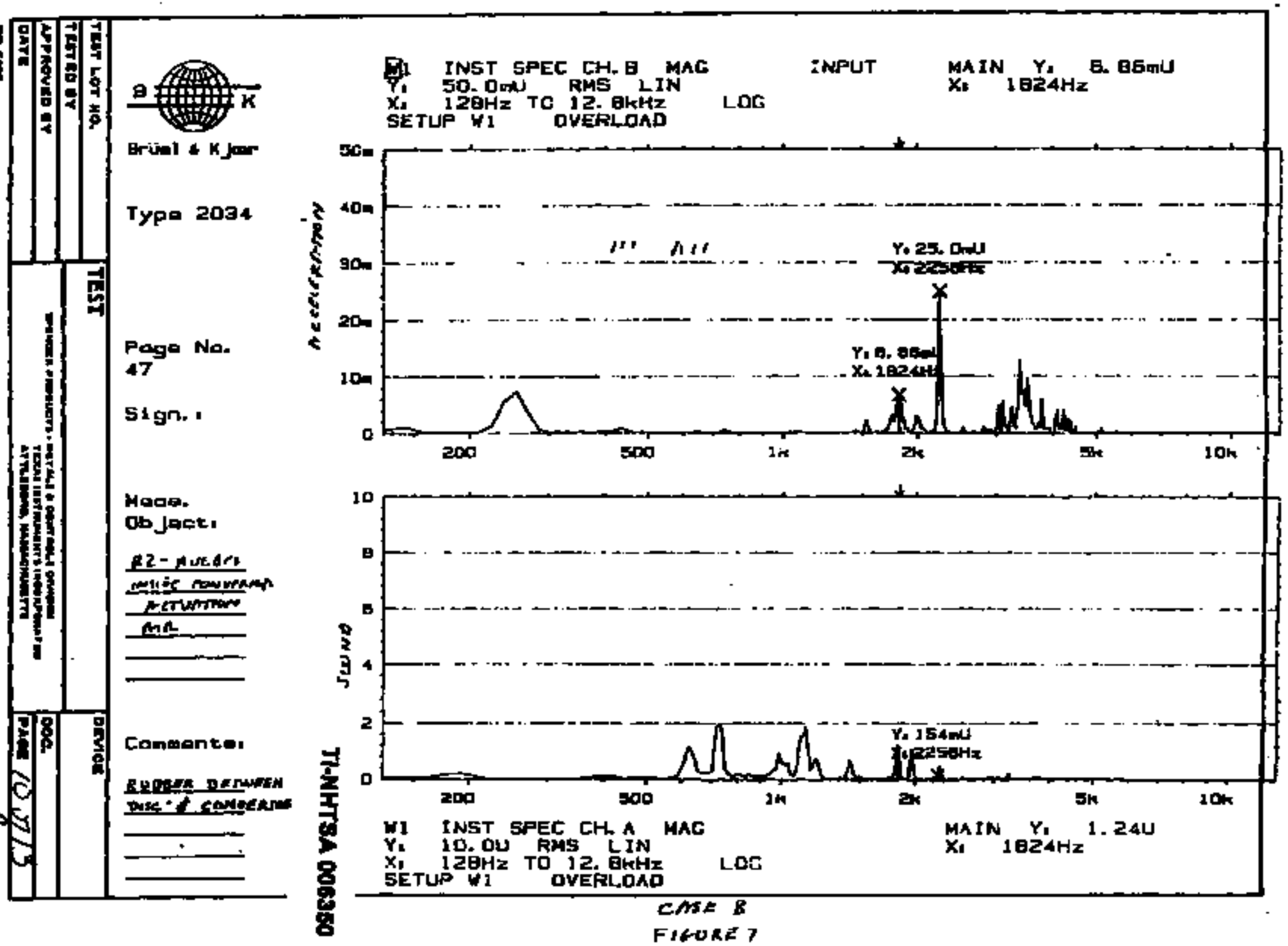
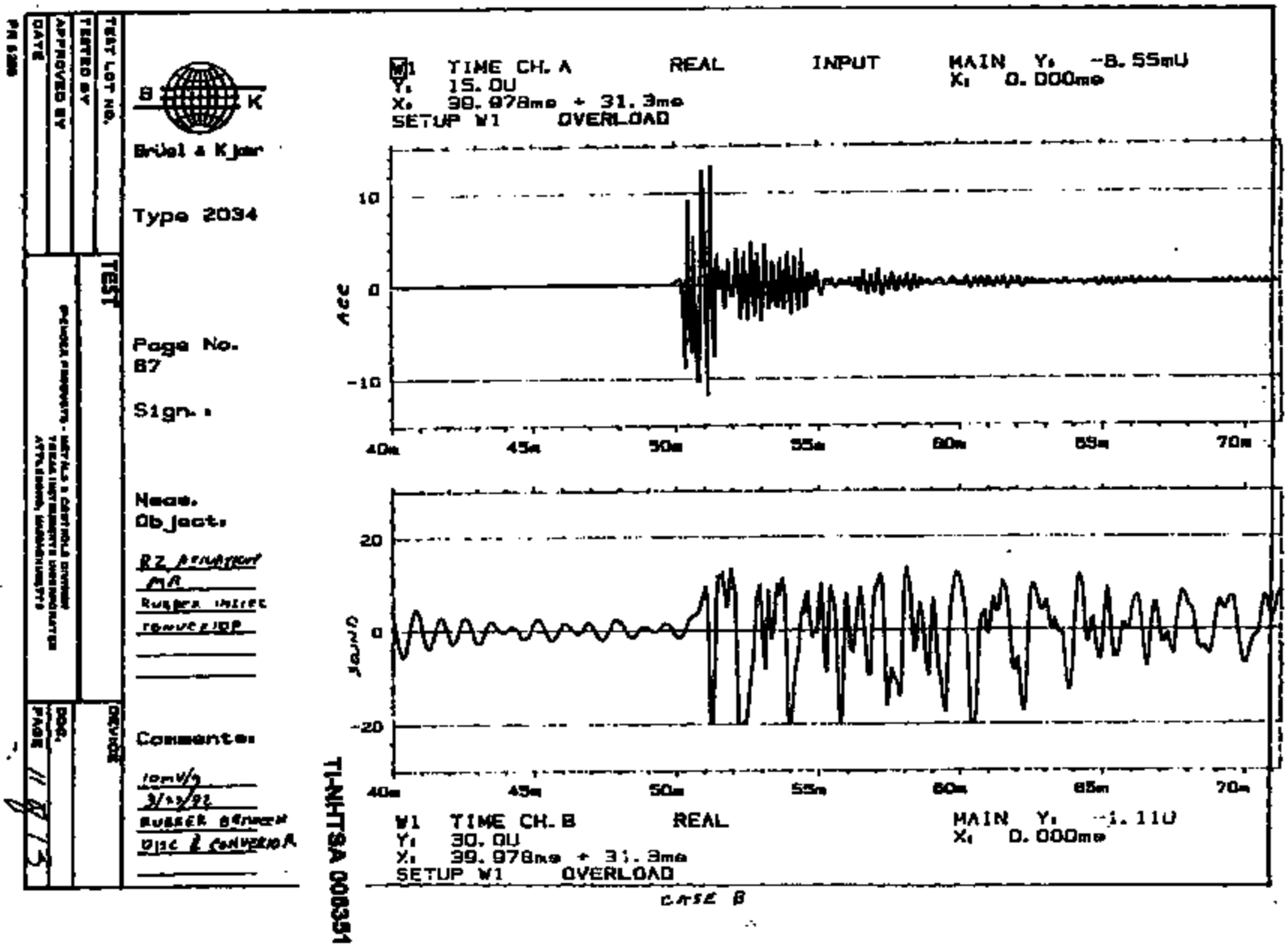
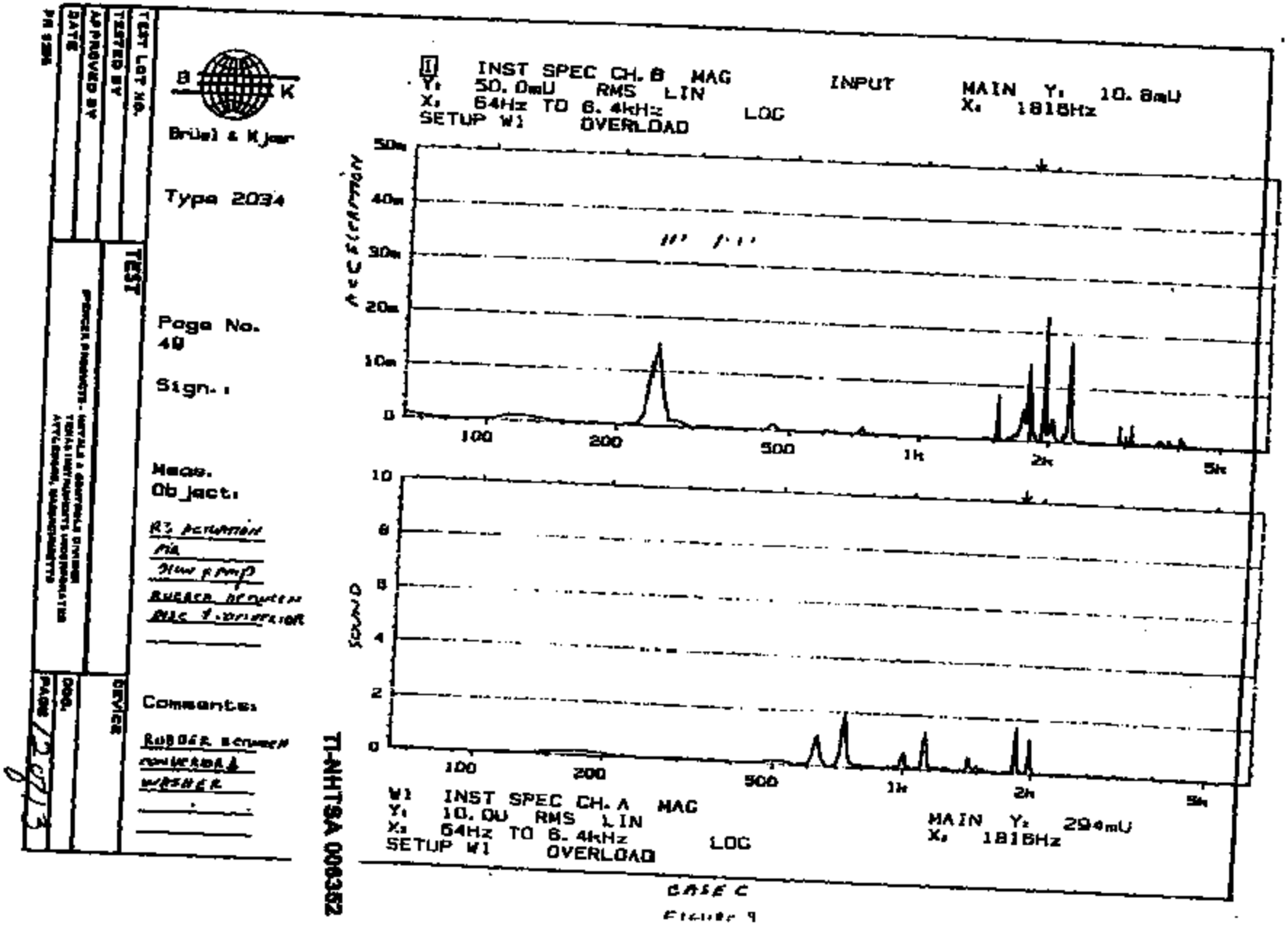

W1 INST SPEC CH. B MAG
Y: 50.0mU RMS LIN
X: 64Hz TO 6.4kHz LOG
SETUP W1
INPUT
MAIN Y: 19.4mU
X: 1784Hz
Y: 19.4mU
X: 1784Hz
W1 INST SPEC CH. A MAG
Y: 10.0U RMS LIN
X: 64Hz TO 6.4kHz LOG
SETUP W1
MAIN Y: 189mU
X: 1784Hz
Y: 5.80U
X: 1892Hz
Brüel & Kjær
Type 2034
Page No.
39
Sign.:
Meas.
Objects:
Comments:
B= accelerometer
noisy switch
TL-NHTSA 0089648

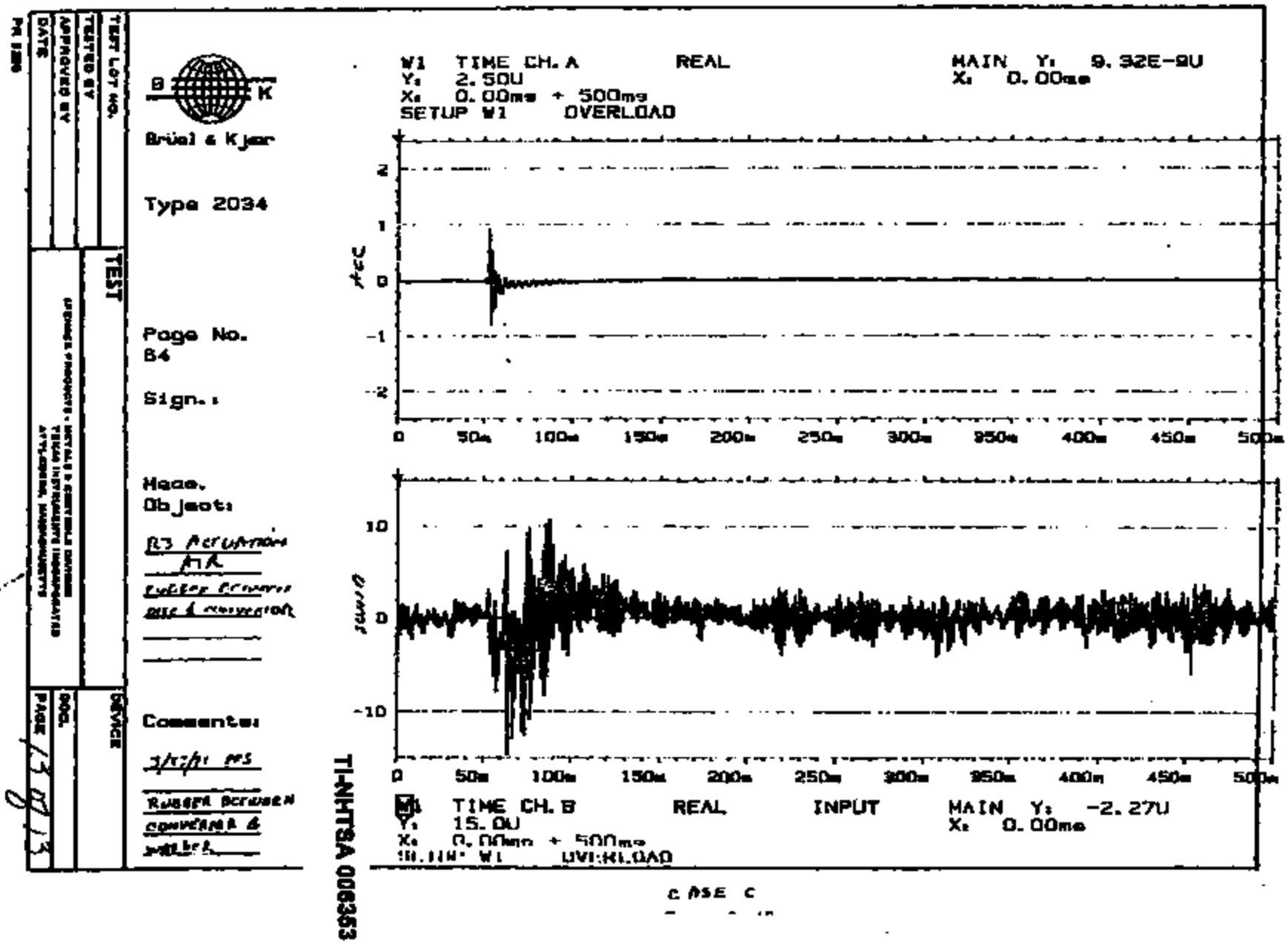
FIG 5


W1 INST SPEC CH. B MAG
Y: 50.0mU RMS LIN
X: 128Hz TO 12.8kHz LOG
SETUP W1
MAIN Y: 88.5µU
X: 1138Hz
Y=9.05mU
X: 900Hz
Y: 5.28mU
X: 1744Hz
50m
40m
30m
20m
10m
0
200
500
1k
2k
5k
10k
10
8
6
4
2
0
Y: 1.98U
X: 1136Hz
W2 INST SPEC CH. A MAG
Y: 10.0U RMS LIN
X: 128Hz TO 12.8kHz LOG
SETUP W2
INPUT OVERLOAD
MAIN Y: 1.98U
X: 1136Hz
Brüel & Kjær
Type 2034
Page No.
45
Sign.:
Meas.
Object:
Q1 quiet switch
Attenuator
Skew ramp
Air
TRUCK DISC ?
Comments:
QUIET SWITCH
TEST
DEVICE
TEST LOT NO.
TESTED BY
APPROVED BY
DATE
PAGE
DOC.
TI-NHTSA 006349


W1 INST SPEC CH. B MAG INPUT MAIN Y: 6.86mU
Y: 50.0mU RMS LIN X: 1824Hz
X: 128Hz TO 12.8kHz LOG
SETUP W1 OVERLOAD
Y: 25.0mU
X: 2256Hz
Y: 6.86mU
X: 1824Hz
ACCELERATION
50m
40m
30m
20m
10m
0
200
500
1k
2k
5k
10k
10
8
6
4
2
0
Y: 1.54U
X: 2256Hz
W1 INST SPEC CH. A MAG
Y: 10.0U RMS LIN
X: 128Hz TO 12.8kHz LOG
SETUP W1 OVERLOAD
MAIN Y: 1.24U
X: 1824Hz
Brüel & Kjær
Type 2034
Page No. 47
Sign.:
Meas. Object:
Comments:
RUBBER BETWEEN DISC & CONCRETE
TEST
DEVICE
DOC.
PAGE 10 of 13
DATE
APPROVED BY
TESTED BY
TEST LOT NO.
TI-NHTSA 006350
CASE 8
FIGURE 7


TEST LOT NO.
TESTED BY
APPROVED BY
DATE
TEST
DRAWING
DOC. PAGE
Brüel & Kjær
Type 2034
Page No.
87
Sign.:
Meas. Object:
RZ Actuator
MR
Rubber inlet
removed
Comments:
10m/s
3/12/91
RUBBER BETWEEN
DISC & CONNECTOR
W1 TIME CH. A REAL INPUT MAIN Y: -8.55mU
Y: 15.0U
X: 39.978ms + 31.3ms
X: 0.000ms
SETUP W1 OVERLOAD
Acc
10
0
-10
40m
45m
50m
55m
60m
65m
70m
W1 TIME CH. B REAL MAIN Y: -1.11U
Y: 30.0U
X: 39.978ms + 31.3ms
X: 0.000ms
SETUP W1 OVERLOAD
Force
20
0
-20
40m
45m
50m
55m
60m
65m
70m
CASE B
TI-NHTSA 008351


INST SPEC CH. B MAG
Y: 50.0mU RMS LIN
X: 64Hz TO 6.4kHz LOG
SETUP W1 OVERLOAD
INPUT
MAIN Y: 10.8mU
X: 1818Hz
ACCELERATION
50m
40m
30m
20m
10m
0
100
200
500
1k
2k
5k
SOUND
10
8
6
4
2
0
100
200
500
1k
2k
5k
W1 INST SPEC CH. A MAG
Y: 10.0U RMS LIN
X: 64Hz TO 6.4kHz LOG
SETUP W1 OVERLOAD
MAIN Y: 294mU
X: 1818Hz
CASE C
Figure 9
Brüel & Kjær
Type 2034
TEST LOT NO.
TESTED BY
APPROVED BY
DATE
TEST
SERVICE
DOC. PAGE
Page No. 49
Sign.:
Meas. Object:
Comments:
TI-NHTSA 000352



TI-NHTSA 0068363

CASE C

QUIET SWITCH FINAL ASSEMBLY
PRE-LOAD TARGET = .0065 TO .007
VALID FINAL ASSEMBLY MATRIX'S

SENSOR LOT X-BAR x .001"		SENSOR	BASE CHECK SELECTION TABLE BY PIN SIZE BASE CHECK TOLERANCE IS +/-.001"						
FROM	TO	LOT CODE	140	141	142	143	144	145	146
42.5	43	A	90.5	91.5	92.5	93.5	94.5	95.5	96.5
43.5	44	C D	89.5	90.5	91.5	92.5	93.5	94.5	95.5
44.5	45	E F	88.5	89.5	90.5	91.5	92.5	93.5	94.5
45.5	46	G H	87.5	88.5	89.5	90.5	91.5	92.5	93.5
46.5	47	I J	86.5	87.5	88.5	89.5	90.5	91.5	92.5
47.5	48	K L	85.5	86.5	87.5	88.5	89.5	90.5	91.5
48.5	49	M N	84.5	85.5	86.5	87.5	88.5	89.5	90.5
49.5	50	O	83.5	84.5	85.5	86.5	87.5	88.5	89.5
PRE-LOAD "-.001"	PRE-LOAD "-.0065"		STANDARD LOW GAGE		STANDARD HIGH GAGE				

MJS QUIET PRE-LOAD.XLS

REVISION:A
9/3/92

TI-NHTSA 008354

Ford

PROCESS POTENTIAL AND QUALITY INDEXES SUMMARY DATA SHEET

PART #: F2AC-9F924-AA
SUPPLIER: TEXAS Instruments
CODE: T0258
ADDRESS: 34 Forest St.
Attleboro MA.
VEHICLE BUILD: EP VP FB OTHER

SUPPLIER CONTACT: Jim Watt
CONTACT PHONE: (508) 699-1719
PART DESCRIPTION: Next Generation Speed Control Deactivation Safety Switch
SQA CODE:
VEHICLE PROGRAM: Pass Car

CHARACTERISTIC TYPE

∇ = FORD CRITICAL CHARACTERISTICS

S.C. = FORD OR SUPPLIER SIGNIFICANT CHARACTERISTICS

NUMBER OF CRITICAL AND SIGNIFICANT CHARACTERISTICS:

1:	Actuation Pressure	TYPE:	SC	Cp =	* *	Cpk = * *
2:	Release Pressure	TYPE:	SC	Cp =	* *	Cpk = * *
3:	3/8-24UNF-2A THD.	TYPE:	SC	Cp =	A *	Cpk = A *
4:		TYPE:		Cp =		Cpk =
5:		TYPE:		Cp =		Cpk =
6:		TYPE:		Cp =		Cpk =
7:		TYPE:		Cp =		Cpk =
8:		TYPE:		Cp =		Cpk =
9:		TYPE:		Cp =		Cpk =
10:		TYPE:		Cp =		Cpk =
11:		TYPE:		Cp =		Cpk =
12:		TYPE:		Cp =		Cpk =
13:		TYPE:		Cp =		Cpk =
14:		TYPE:		Cp =		Cpk =
15:		TYPE:		Cp =		Cpk =

PIST = 1833/1833 x 100 = 100 %

$PIPC_{Cp}$ = _____ x 100 = _____ % $PIPC_{Cpk}$ = _____ x 100 _____ %

COMMENTS:

* * Calibration check is done 100%. Parts tested 300; defective 0, percent of defect 0.

A * Threads are checked on a Go/NoGo Gage

PREPARED BY:
Elaine Rose DATE: 8-4-92

DRAWINGS AVAILABLE UPON REQUEST

TEST

Crimp HT

1 538	6 536
2	7
3	8 540
4 538	9 539
5 537	10 541

120° STILL CON.

150° STILL CON.

TORQUE 2

1 9	6 11
2 12	7 13
3 10	8 11
4 7 needed adj to Take out slack	9 13
5	10 15

needed adj to Take out slack

CRIMP HT 2

1 538	6 536
2 537	7 537
3 537	8 540
4 538	9 538
5 537	10 540

Ark devices can be turned without

TPS PRESSURE TESTER LOT REPORT

PART NUMBER: 7PSLZ-3
LOT ID: 106
LOT START: 9-MAR-1992 14:17:24.50
LOT FINISH: 9-MAR-1992 14:28:36.03

SETUP DATA:
BASIC LOT LEN: 0.00
MISC MEAN ALT: 0.0 MEAN REL: 0.0
LIMIT (MIN TO MAX):
ACTUATION: [illegible] PSI
RELEASE: 100.0 TO 140.0 PSI
DIFFERENTIAL: 0.0 TO 300.0 PSI
MAX MILLIVOLTS: 200.0 PSI
ACT CREEP TIME: 25.0 PSI
REL CREEP TIME: 150.0 PSI
MAX CREEP TEST
PRECYCLE PRESS: 800.0 PSI
PRECYCLE COUNT: 2

NOT ENOUGH PARTS FOR REPORT ON FIXTURE 0

10 Devices

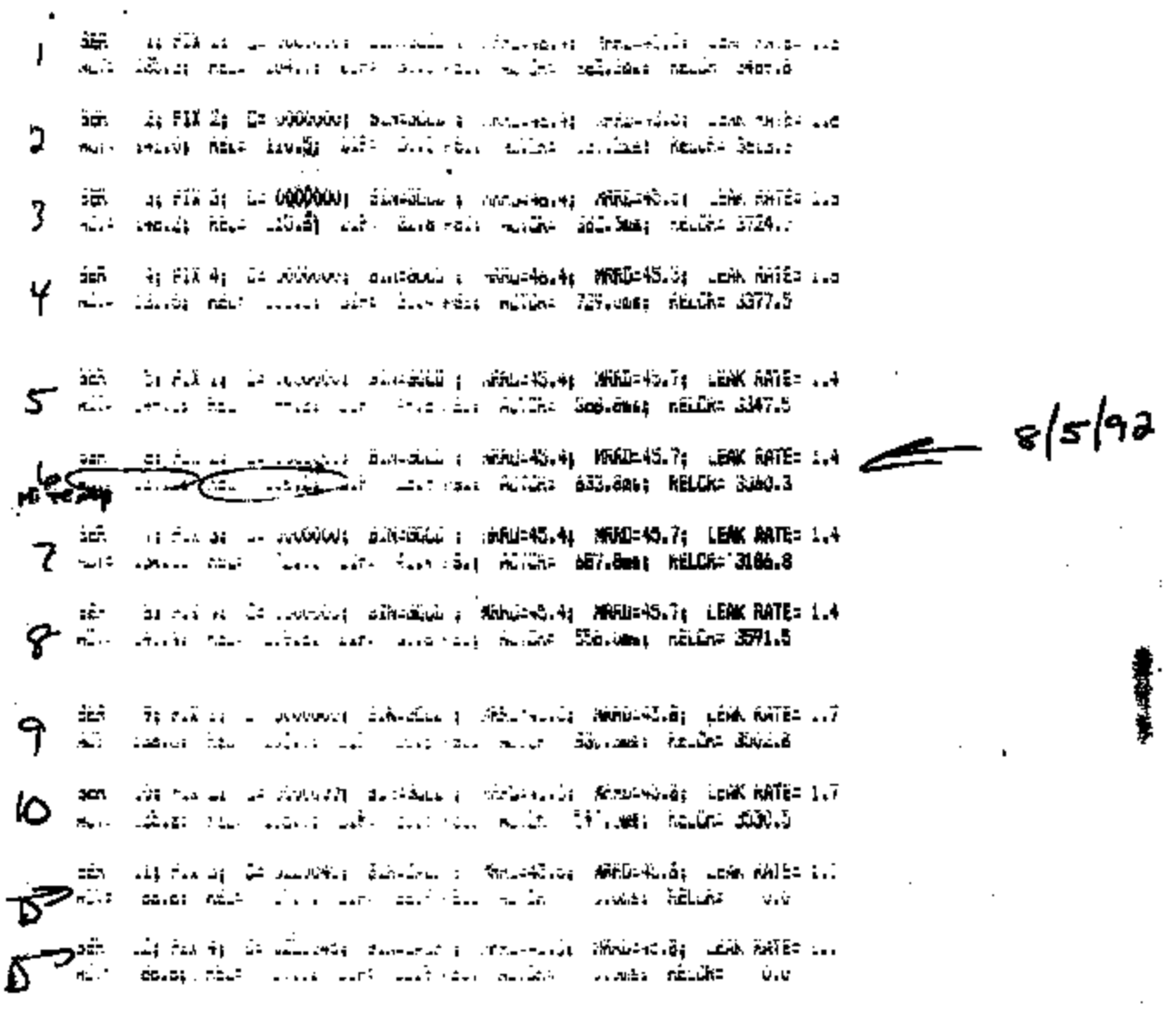
- Terminated
- Torque TEST → 10
  And
  Crimp Height

→ Hi temp TEST

→ 120°C 1/2 hour Cont.

→ 150°C 1/2 hour Cont

→ Torque TEST
  crimp height.



From Lot #112 77P5L3-L 8/1/92

Lot 112 had 1 Hi temp failure

(1) 10 devices each box (2) perform Torque test.

(2) Same 10 devices From each box dis-Assemble And measure Calculated Spring pre-load.

	Torque	Pin	Base	Sensor	Preload
1	16	142	88	.474	.0066
2	17	142	89	.473	.0067
3	18	142	88	.470	.0070
4	15	142	89	.471	.0069
5	16	143	89	.469	.0071
6	13	143	89	.472	.0068
7	12	142	89	.467	.0073
8	16	142	89	.470	.0070
9	14	142	89	.470	.0070
10	13	149	89	.470	.0070
11	13	143	88	.470	.0070
12	15	143	88	.465	.0075
13	16	142	89	.469	.0071
14	15	143	89	.473	.0067
15	15	142	89	.467	.0073
16	15	142	89	.464	.0076
17	14	142	89	.469	.0071
18	12	142	89	.467	.0073

TI-1418-D

TEXAS INSTRUMENTS

ISIR SUBMISSION

TO DANA CORPORATION
FOR PART NUMBER F2AC-9F924-AA
NEXT GENERATION
SPEED CONTROL DEACTIVATION SAFETY SWITCH

AUGUST 4, 1992

TEXAS INSTRUMENTS INCORPORATED • 34 FOREST STREET • ATTLEBORO, MA 02703
508-699-5999 • TELEX 94888 • CABLE TEXINS

TEXAS INSTRUMENTS

Dana Corporation
Weatherhead Division
109 Increment Street
St. Thomas, Ontario
Canada M5P3G8

August 20, 1992

Attn: Mr. Jerry Garber
Quality Manager

Subj: Part Number F2AC-9F924-AA (Pressure Switch)
TI Part Number 77PSL3-1

Dear Jerry,

Enclosed, please find the ISIR for the F2AC-9F924-AA pressure switch. An identical ISIR package has also been forwarded to the Dana Angola, Indiana facility.

Please let me know if you have any questions or if I may be of any further assistance.

Regards,

Jim Watt
CRA Engineer
Precision Controls Department
Control Products Division

cc: Dave Czarn, MS 12-29; Steve Offiler, MS 12-29
Rick Conlin, MS 12-33; Gary Snyder, MS 12-33
Andy McGuire, MS [illegible]
Grant Simmons, Dana Purchasing Dept., Ontario, Canada
Norm Freda, TI Farmington Hills, Michigan

encl: ISIR submission F2AC-9F924-AA

TEXAS INSTRUMENTS

Dana Corporation
Weatherhead Division
203 Weatherhead Street
Angola, Indiana 46703

August 20, 1992

Attn: Mr. Lynn Johnson
Quality Manager

Subj: Part Number F2AC-9F924-AA (Pressure Switch)
TI Part Number 77PSL3-1

Dear Lynn,

Enclosed, please find a copy of the ISIR for the F2AC-9F924-AA pressure switch. The original ISIR package has been forwarded to Dana Ontario, Canada facility.

Please let me know if you have any questions or if I may be of any further assistance.

Regards,

Jim Watt
QRA Engineer
Precision Controls Department
Control Products Division

cc: Dave Czarn, MS 12-29; Steve Offiler, MS 12-29
Rick Conlin, MS 12-33; Gary Snyder, MS 12-33
Andy McGuirk, MS 12-27
Mike Rogers, Dana Purchasing Dept., Angola, Indiana
Norm Freda, TI Farmington Hills, Michigan

encl: ISIR submission F2AC-9F924-AA

REPORT OF ISR TESTING
FORD PASSENGER CAR
ELECTRONIC SPEED CONTROL
DEACTIVATION PRESSURE SWITCH
PS/92/82

TEXAS INSTRUMENTS INCORPORATED
CONTROL PRODUCTS DIVISION
PRECISION CONTROLS DEPARTMENT
34 FOREST STREET
ATTLEBORO, MA 02703

TEST LOT NO.	TEST	DEVICE
TESTED BY		
APPROVED BY	TEXAS INSTRUMENTS — MATERIALS & CONTROLS GROUP, ATTLEBORO, MA 02703	DOC.
DATE 92-08-13		PAGE 1

FORM 5290

TABLE OF CONTENTS

1.0 GENERAL

1.1 Customer: Ford Motor Company P.I.A. from Dana-Weatherhead

1.2 Part Numbers:

1.2.1 Ford P/N: F2AC-9F924-AA

1.2.2 Dana P/N: 120-55046

1.2.3 TI P/N: 7798L3-1

1.3 Engineering Specification: (inv delta) ES-F2VC-9F924-AA

1.4 Date of Completion: 920811

1.5 Quantity of Units Tested: 72

1.6 Disposition of Tested Units: All devices are presently retained under quarantine, completely separate from any production devices, to be destroyed per the ES at a later date after full ISR approval is obtained.

1.7 TI test series number: 245-15-129

1.8 TI Pressure Switch test report number: PS/92/82

TEST LOT NO.	TEST	DEVICE
TESTED BY		
APPROVED BY	TEXAS INSTRUMENTS MATERIALS & CONTROLS GROUP ATTLEBORO, MA 02703	DOC.
DATE 92-08-17		PAGE

FORM 8294

2.0 OBJECTIVE

This testing was performed to demonstrate the ability of 77PSL3-1 to conform to customer specifications given in (inv delta) ES-F2VC-9F924-AA, in fulfillment of the requirements of the Initial Sample Report. Units tested were built using fully qualified production components and production assembly equipment.

3.0 TEST PROCEDURES AND RESULTS

All switches were tested per Ford Engineering Specification (inv. delta) ES-F2VC-9F924-AA. A copy of this ES is included in Appendix 4.1. Procedural details are therefore omitted from the presentation of results in most cases. In those instances where the ES procedure methodology requires elaboration, a complete explanation of the procedure is presented. For all tests, raw data is included in Appendix 4.2.

3.1 CALIBRATION

3.1.1 Devices tested: 245-15-01 thru 72

3.1.2 Procedure: Calibration is checked at room temperature using ambient air as the pressure medium. Calibration settings, as specified on the part drawing, are actuation (electrical contacts opening) at 90 - 160 psig, and release (contacts reclosing) at 20 psig minimum. For the purpose of stabilization, actuation values are recorded on the sixth cycle, after subjecting the switch to two (2) pressure cycles to 800 psig minimum and back to zero, followed by three (3) cycles to approx. 10% above actuation pressure and back to approx. 10% below release pressure. The change in continuity is measured while conducting 750 +/- 50 milliamps at 13.0 +/- 1.0 volts DC.

3.1.3 Equipment: Custom TI designed and built pressure check station, using Heise Model CM96365 pressure gage calibrated on a regular quarterly schedule. Continuity change measured on custom TI designed and built equipment meeting the above electrical parameters.

3.1.4 Initial Results: Prior to proof testing, the average actuation was found to be 126 psi with a sigma of 6.2; after proof the average actuation was 131 psi with a sigma of 4.9. The average shift is 4%. Prior to proof testing, the average release was found to be 113 psi with a sigma of 6.5; after proof the average release was 119 psi with a sigma of 5.7. The average shift is 5%.

3.1.5 Final Results: Prior to proof testing, the average actuation was found to be 130 psi with a sigma of 5.4; after proof the average actuation was 129 psi with a sigma of 5.3. The average shift is -0.8%. Prior to proof testing, the average release was found to be 108 psi with a sigma of 7.7; after proof the average release was 108 psi with a sigma of 6.6. The average shift is 0.

3.2 VOLTAGE DROP

3.2.1 Devices tested: 245-15-01 thru 72

3.2.2 Procedure: Voltage drop is checked simultaneously with Calibration (see 3.1.2). The measurement is taken at room temperature using ambient air as the pressure medium. For the purpose of stabilization, data is recorded on the sixth cycle, after subjecting the switch to two (2) pressure cycles to 800 psig minimum and back to zero, followed by three (3) cycles to approx. 10% above actuation pressure and back to approx. 10% below release pressure. The voltage drop is measured while conducting 750 +/- 50 milliamps at 13.0 +/- 1.0 volts DC.

3.2.3 Equipment: Fluke Model 8020B Digital Multimeter, calibrated quarterly, used in conjunction with the continuity equipment in 3.1.3.

3.2.4 Initial results: Values for all devices fell below the specification of 200 millivolts maximum by close to two orders of magnitude; no specific statistics calculated for this reason.

3.2.5 Final results: With the exception of parts undergoing Impulse testing (devices 245-15-01 thru 12 and -37 thru 48), all final results were comparable with initial results. The Impulse parts experience an increase in the voltage drop reading due to the specified 25,000 cycles run at full electrical load, which causes a certain amount of normal erosion of the contact surfaces. All 24 Impulse devices still fell significantly below 200 mV maximum, and statistics show a Cpk of 2.53.

3.3 CURRENT LEAKAGE

3.3.1 Devices tested: 245-15-01 thru 72

3.3.2 Procedure: Per the ES section III. C. This test is conducted as a pass/fail.

3.3.3 Equipment: Associated Research HyPot test unit used as power source for 500 VAC, 60 Hz test circuit. Fluke Model 8020B Digital Multimeter, calibrated quarterly, used to measure voltage drop across a series resistance of one megohm (+/- 5%).

3.3.4 Initial results: All devices passed.

3.3.5 Final results: All devices passed.

3.4 PROOF

3.4.1 Devices tested: 245-15-01 thru 72

3.4.2 Procedure: Per the ES section III. D. This test is conducted as a pass/fail. The test pressure specified on the part drawing is 3000 psi.

3.4.3 Equipment: Enerpak model P-392 hydraulic hand pump using Enerpak hydraulic fluid as the pressure medium. Hydraulic fluid is removed from the devices using a combination of vacuum and residue-free solvent Sprayon(TM) Hi-Tech 02002 TF Electrical Contact Cleaner. US Gauge #33714 reading to 5000 psig with 100 psi increments, resolvable to 50 psi., calibrated quarterly. Custom TI designed and built safety enclosure.

3.4.4 Initial Results: All devices passed.

3.4.5 Final Results: All devices passed.

3.5 IMPULSE

3.5.1 Devices tested: 245-15-01 thru 12 and -37 thru 48

3.5.2 Procedure: Per the ES section III. E.

3.5.3 Equipment: Thermotron model S-4 Mini-Max environmental chamber capable of -55 C to +200 C, humidity uncontrolled. Custom TI designed and built cycler, utilizing Enerpak integrated hydraulic pressure source, TI315 Programmable Logic Controller, Moog servovalve and controller, Simpson signal generator, and opposing-piston fluid isolators, to produce a hydraulic-fluid flow-type primary with a brake-fluid dead-end-type secondary terminated with a 24-station manifold equipped with internal heaters. Capability to 5 Hz at 0-1450 psig cycle. Custom TI designed and built 24 station Switch

Monitor Circuit which automatically stops the cycler in the event of abnormal switch action, defined as continuity change which does not track the signal from the signal ganerator. Thermocouple readouts calibrated quarterly. 12-station inductive load bank, per the schematic found in the ES (figure 4) used in the last 25K cycles.

3.5.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.6 BURST

3.6.1 Devices tested: 245-15-67 thru 72.

3.6.2 Procedure: Per the ES section III. F. After holding 7000 psi for 30 seconds as specified, the devices were inadvertently pressurized to approx. 7600 psi.

3.6.3. Equipment: Same as 3.4.3, with the addition of Enerpak gauge reading to 10,000 psig with 100 psi increments, resolvable to 50 psi., calibrated quarterly.

3.6.4. Results: All six devices passed 30 seconds at 7000 psig without evidence of fluid leakage or seepage from the switch or threads.

At 7600 psi, one device (-70) displayed evidence of fluid seepage.

TEST LOT NO.	TEST	DEVICE
TESTED BY		
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DATE 91-04-17		PAGE

FORM 9266

3.7 HUMIDITY

3.7.1 Devices tested: 245-15-25 thru -30.

3.7.2 Procedure: Per the ES section III. G. Please note that performing a full characterization per the ES consists of measurement of actuation, release, voltage drop, current leakage, and proof. This battery of tests when performed on six (6) devices takes approximately 2 hours to complete. Therefore "Within 15 minutes..." called out in the ES (section III. G. 2. a.) is an acceptance requirement that is physically impossible to meet. Every effort is made to complete final characterization within the two hour period stated above.

3.7.3 Equipment: Humidity chamber RK model 5S.

3.7.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.8 SALT SPRAY

3.8.1 Devices tested: 245-15-31 thru -36.

3.8.2 Procedure: Per the ES section III. H.

3.8.3 Equipment: Harshaw salt spray chamber.

3.8.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.9 VIBRATION

3.9.1 Devices tested: 156-15-61 thru 66.

3.9.2 Procedure: Per the ES section III. I.

TEST LOT NO.	TEST	DEVICE
TESTED BY		
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DATE 88-08-17		PAGE 9

FORM 8268

3.9.3 Equipment: Vibration table, Ling, model A395 with Hewlett-Packard model 5427 controls. Air tank with 350 psig minimum pressurized Nitrogen used to actuate devices with at least 1.1 times maximum actuation specification on part drawing; 160 psig * 1.1 = 176 psi minimum.

3.9.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.10 TERMINAL STRENGTH

3.10.1 Devices tested: 245-15-13 thru -24.

3.10.2 Procedure: Per the ES section III. J.

3.10.3 Equipment: Custom TI designed and built fixtures for gaging terminal movement after force application and for application of impact via a pendulum. This equipment is regularly used on the 57PS/77PS assembly lines in testing to TI Quality Assurance Specifications.

3.10.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.11 VACUUM

3.11.1 Devices tested: 245-15- 55 thru 60.

3.11.2 Procedure: Per the ES section III. K.

3.11.3 Equipment: Kinney vacuum pump. Sensotec pressure transducer range 0-25 psia calibrated quarterly, with Fluke model 8020B Digital Multimeter readout, calibrated quarterly.

3.11.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.12 TEMPERATURE CYCLE

3.12.1 Devices tested: 245-15-49 thru 54

3.12.2 Procedure: Per the ES section III. L.

3.12.3 Equipment: Same as 3.5.3.

3.12.4 Results: All devices passed the acceptance requirements of the ES (sections A, B, C, D).

3.13 FLUID RESISTANCE

3.13.1 Devices tested: 245-15-01 thru -36.

3.13.2 Procedure: Per the ES section III. M.

3.13.3 Equipment: Fluids as called out in ES table in III. M. 1. c. plus appropriate beakers and storage apparatus; vented hood.

3.13.4 Results: The 36 devices were divided into groups as follows for subsequent testing. Results of these tests are reported in the section indicated.

3.13.4.1 Impulse (3.5), -01 thru -12

3.13.4.2 Terminal Strength (3.10), -13 thru -24.

3.13.4.3 Humidity (3.7), -25 thru -30.

3.13.4.4 Salt Spray (3.8), -31 thru -36.

3.14 NOISE

In certain vehicle applications, the brake pressure switch action has been shown to be transmitted to the passenger compartment as audible noise and corresponding tactile feel in the brake pedal. A "silent" device has been developed by Texas Instruments in order to address this concern. At the same time, a means of quantifying the noise/feel was explored. The hypothesis was that a sudden motion of pressure-sensing components within the switch caused a pressure wave to propagate from the switch. Characterization of this effect using high-speed pressure transducers showed that "noisy" devices produce a large negative pressure spike at the point of switch activation, and supported the hypothesis. The "silent" devices produce little or no spike. See Appendix 4.3 for a pressure trace of a typical silent device.

Ultimately (inv delta) E8-F2VC-9F924-AA will be updated to include a section on noise testing, to be applicable only to devices designated as silent. For this validation, in lieu of an officially finalized noise specification, a total of 12 devices (6 from this test and 6 similar devices) were initially characterized for noise, then run through Impulse or Thermal Cycle testing, then recharacterized for noise at the end.

3.14.1 Devices tested:

77PSL3-1 Impulse:	245-15-37, 38, 39
77PSL3-1 Thermal Cycle:	245-15-49, 50, 51
77PSL5-2 Impulse:	245-15-81, 82, 83
77PSL5-2 Thermal Cycle	245-15-105, 106, 107

3.14.2 Procedure: The device under test is installed on the test manifold. Air is evacuated via a vacuum pump. The manifold is filled with the test fluid. Pressure to 300 psi is applied and the signal from the high-speed transducer is captured on a digital oscilloscope.

3.14.3 Equipment: Custom TI designed and built equipment, utilizing a single-port test manifold within a protective enclosure. The manifold is evacuated by a Piab H-125 pneumatic vacuum pump. DOT 3 Brake Fluid is introduced via a fluid reservoir. Pressure is applied via pressurized air which is introduced to an air-over-oil chamber which connects to the test manifold. The dynamic pressure signal during switch actuation is measured with a Kistler High-Frequency Dynamic Pressure Transducer model 606A (SN C46154) with a Kistler 5004 Charge Amplifier whose output connects to channel A of a dual-channel Nicolet 4094A Digital Oscilloscope. The electrical switching action of the device under test is recorded simultaneously on channel B using a 5-volt source and a 1K ohm load resistor.

3.14.4 Initial results: All twelve test devices produced zero pressure spike.

3.15.5 Final results: All twelve test devices produced zero pressure spike.

Appendix 4.1
Ford Engineering Specification
(inv delta) ES-F2VC-9F924-AA

TEST LOT NO.	TEST	DEVICE
TESTED BY		
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DATE 92-08-17		PAGE 14

FORM 6288

Engineering Specification

PART NAME	PART NUMBER
SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE	▽ E6-F270-97924-AA

LET																			
FR																			
LET																			
FR																			

DATE	LET	FR	REMARKS	DR	CK
			ADDED DATA TO COMPLETE SPEC. & RETYPED		
8/11/80			NC006100793792002		

REFERENCE

PREPARED/APPROVED BY
W.E. Peace 9-29-80

CHECKED BY | DETAILED BY

CONCURRENCE/APPROVAL SIGNATURES

DESIGN ENGINEERING SUPERVISOR
K. Wilson Speight

DESIGN ENGINEERING UNIT

MANUFACTURING ENGRG.

QUALITY CONTROL
K. T. Thompson 9/30

ENGRG. QUALITY ASSISTANCE
C.R. Ramsey

ELECTRIFICATION DIVISION
[illegible]

▽ CONTROL ITEM — THE ▽ SYMBOL ALSO IDENTIFIES PRODUCT SAFETY, EMISSION RELATED CRITICAL CHARACTERISTICS AND ADDITIONAL CRITICAL CHARACTERISTICS DESIGNATED BY FORDS PRODUCT SAFETY/ENVIRONMENTAL/GOVERNMENT REGULATIONS PROJECT ENGINEER

SWITCH ASSEMBLY - SPEED CONTROL DEACTIVATE

I. General

This specification covers the test requirements for the speed control deactivate switch -9F924- used in the electronic speed control system. Design changes on the switch assembly or its components shall not be made without compliance to Section V of this specification and written approval from the releasing Production Engineering Office.

This engineering specification is a supplement to the released drawing on the above part, and all requirements herein must be met in addition to all other requirements of the part drawing. Minimum measures necessary for demonstrating compliance to these requirements are given in each section.

The engineering tests, sample sizes, and test frequencies contained within this engineering specification reflect the minimum requirements established to provide a regular evaluation of conformance to design intent. The engineering test program is intended as a supplement to normal material inspections, dimensional checking and in-process controls, and should in no way adversely influence other inspection operations.

Q1 suppliers may implement different test sample sizes and frequencies providing these changes have been included in an alternate Control Plan approved by the design responsible Product Engineering Office and concurred in by SQA.

II. PRODUCTION VALIDATION AND IN-PROCESS TESTS

- Production Validation (PV) Tests must be completed satisfactorily with parts from production tooling (and processes where possible) before ISIR approval and authorization for shipment of production parts can be effected. Parts must be revalidated completely, or per Section V whenever any change is made which could possibly affect part function or performance;

- In-Process Test Phase 1 (IP-1) - IP-1 tests are used to demonstrate process capability and must be completed using initial production parts from production tooling and processes prior to first production shipment approval. IP-1 tests are to continue in effect until process capability is demonstrated.

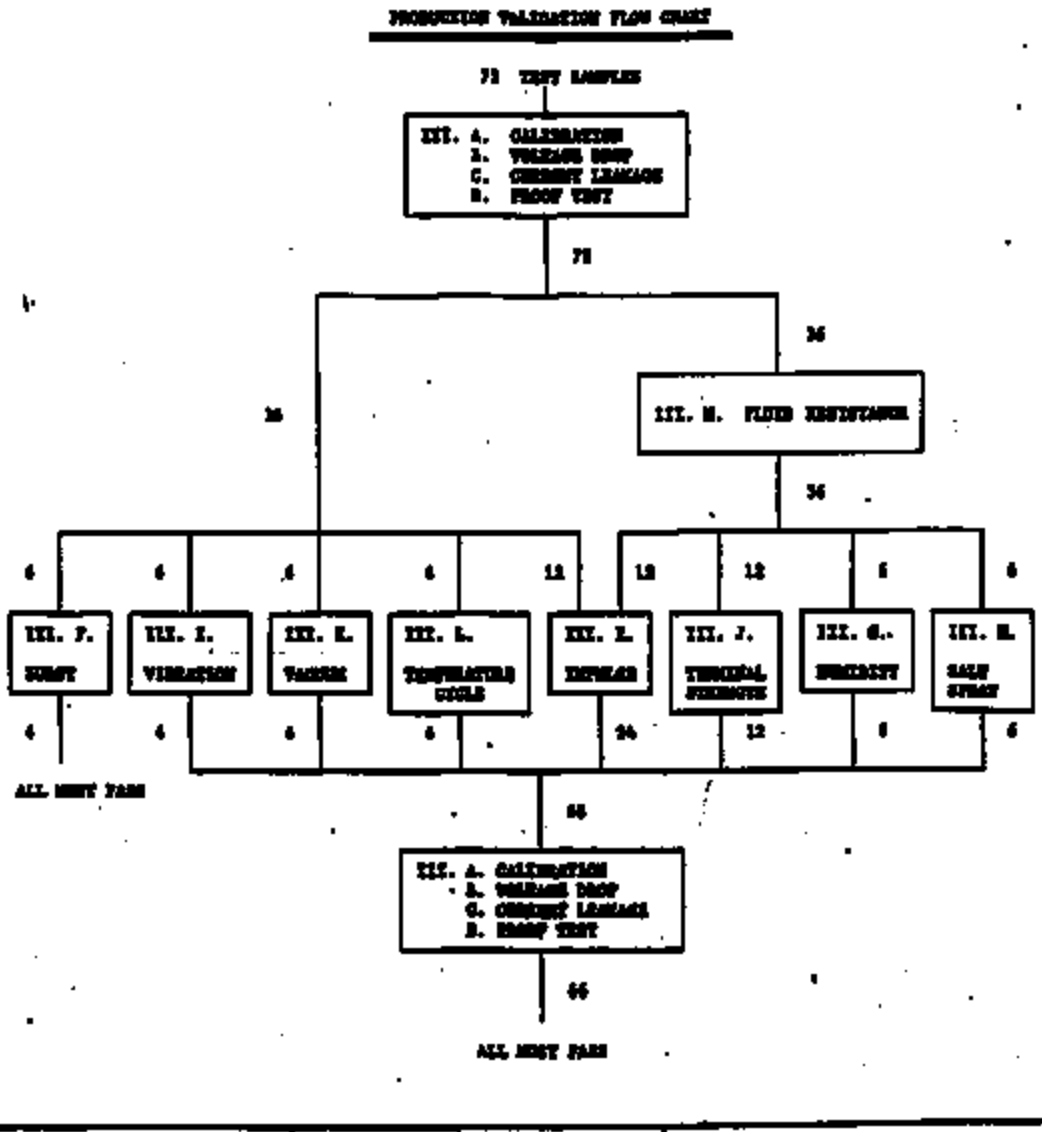
- In-Process Tests Phase 2 (IP-2) - IP-2 test program may be implemented only after process capability has been established. Tests must be completed with production parts on a continuing basis. Samples for these tests must be selected on a random basis to represent the entire production population as much as possible. In the event that any of the requirements in these tests is not met, the reaction plan specified in Ford Q101 Sect. 3.5, "Engineering Specification (ES) Test Performance Requirements" shall be invoked.

SECTION III. TABLE OF TESTS

Item	Test Name Functional Tests	PRODUCTION VALIDATION Minimum Sample Size	PRODUCTION VALIDATION Statistical Test Acceptance Criteria	IN-PROCESS IT-1 Minimum Sample Size	IN-PROCESS IT-1 Statistical Test Acceptance Criteria	IN-PROCESS IT-2 Minimum Sample Size	IN-PROCESS IT-2 Statistical Test Acceptance Criteria
III.							
A	Calibration	72	P90-.96	100%	All Must Pass	100%	All Must Pass
B	Voltage Drop	72	P90-.96	12/Mo.	P90-.84	4/Lot	* * *
C	Current Leakage	72	P90-.96	3/Mo.	P90-.56	4/Lot	* * *
D	Proof Test	72	P90-.96	12/Mo.	P90-.84	4/Lot	* * *
F	Burst	6	P90-.72	3/Mo.	P90-.56	4/Lot	* * *
I	Vibration	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
J	Terminal Strength	12	P90-.84	6/Mo.	P90-.72	4/Lot	All Must Pass
K	Vacuum	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
L	Temperature Cycle	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
M	Fluid Resistance	36	P90-.94	36/12Mo	P90-.94	36/12Mo.	P90-.94
	Durability Tests						
III.							
E	Impulse	24	P90-.90	12/Mo.	P90-.84	3/1 Mo.	P90-.56
G	Humidity	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72
H	Salt Spray	6	P90-.72	3/Mo.	P90-.56	6/6 Mo.	P90-.72

Engineering Specification

TI-NHTSA 006383



III. TEST PROCEDURES AND REQUIREMENTS

▽ A. Calibration

1. Test Requirements

a. Switch calibration is to be checked at room temperature (18°C-35°C) using ambient air or equivalent.

b. Calibration settings shall be specified on the part drawing with the settings checked after 2 or more pressure cycles with ambient air, or equivalent. Pressure cycle range is to be determined by the manufacturer to insure switch calibration stability. The cut-in and differential set points are to be measured while conducting 750 ± 50 milliamperes while 13.0 ± 1.0 volts D.C. is applied. The cut-in point is to be checked with increasing pressure.

c. The cut-out point is to be checked with decreasing pressure, and the differential set point is to be calculated using the cut-in pressure minus the cut-out pressure.

2. Acceptance Requirements

a. Nonconformance is defined as any switch point which falls outside the tolerance band specified on the part drawing.

B. Voltage Drop

1. Test Requirements

a. Voltage drop is to be measured after 2 or more cycles with ambient air or equivalent, from 0 to 10,000 ± 172 KPa (1450 ± 25 PSI) while conducting 750 ± 50 milliamps and 13.0 ± 1.0 volts D.C. is applied to the switch. Under these conditions with the switch closed the voltage drop is to be measured. Millivolt connection interfaces at terminals to be less than 10 millivolts.

2. Acceptance Requirements

a. Nonconformance is defined as a voltage drop in excess of 200 millivolts.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

C. Current Leakage

1. Test Requirements

a. Current leakage is to be checked with 500 volts, 60 Hz alternating current.

b. Current leakage is to be checked:

(1) Between the switch leads with the contacts open.
(2) Between the lead and the switch housing with contacts closed.
(3) Between either lead and switch housing with the contacts open.

2. Acceptance Requirements

a. Nonconformance is defined as any leakage current in excess of one hundred (100) microamperes.

D. Proof Test

1. Test Requirements

a. Subject sample switches to Section A to establish their initial switching pressures.

b. Proof test is to be conducted using brake fluid or equivalent as the pressure medium. Test pressure shall be as specified on the part drawing. Test pressure shall be isolated from pressure source and held for not less than 30 seconds.

c. Recheck the switches to Section A.

2. Acceptance Requirements

a. No evidence of fluid leakage, seepage, or drop in test pressure greater than 430 KPa.(62 PSI) is permitted.

b. A change in cut-in and cut-out pressures greater than ± 34 from the initial value is not permitted.

c. The test samples must be destroyed after testing.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

E. Impulse

1. Test Requirements

a. Test the switch for a total of 500,000 cycles. Cycle pressure between (low) 0-276 KPa (0-40 psi) and (high) 10,000 ± 345 KPa (1450 ± 50 psi).

1) 0 - 475,00 cycles: 13 ± 1 volts, trace current to monitor function.

2) 475,001 - 500,000 cycles: 13 ± 1 volts D.C., 750 ± 50 ms., per figure 4.

b. Brake fluid temperature to be 135 ± 14°C and ambient temperature to be 107°C min.

c. Cycle rate is to be 110-130 cycles per minute.

d. Switch must open and close each cycle.

2. Acceptance Requirements

a. After impulse test check to sections A, B, C, & D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, & D.

c. Samples used for this test must be destroyed after all testing is completed.

F. Burst

1. Test Requirements

a. Burst strength is to be checked using brake fluid or equivalent as the pressure medium.

b. Pressurize the switch to 48.3 MPa (7000 PSI) minimum and hold for 30 seconds minimum.

2. Acceptance Requirements

a. Nonconformance is defined as any evidence of fluid leakage or seepage from the switch or threads. Samples used for this test must be destroyed after testing is completed.

III. Test Requirements and Procedures (cont'd)

G. Humidity

1. Test Requirements

a. Mount the switch in the test port in a humidity chamber. Currently released mating electrical connector must be installed before start of test.

b. Subject the switch to ten (10) continuous humidity cycles as follows:

(1) Raise temperature to 65 +10/-2 °C over 2.5 hours; at 90-98% relative humidity.

(2) Hold 3 hours at 65 +10/-2 °C at 90-98% relative humidity.

(3) Lower temperature to 25 +10/-2 °C over 2.5 hours; at 80-98% relative humidity.

2. Acceptance Requirements

a. Within 15 minutes after completion of the tenth humidity cycle check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D.

H. Salt Spray

1. Test Requirements

a. Mount the switch in the test port in a salt spray chamber. The currently released mating electrical connector and wiring must be installed prior to start of test.

b. Expose the switch assembly to 72 hours of salt spray per ASTM B-117.

2. Acceptance Requirements

a. After exposure, check the switch to sections A, B, C, D, using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

I. Vibration

1. Test Requirements

a. Mount the switch in the test port and attach the currently released mating electrical connector before start of test.

b. Switches are to be vibrated in all 3 planes with electrical continuity being monitored during the entire test. See Figure 1 for switch orientation in the 3 planes. Vibration tests are to be conducted at room temperature using brake fluid, ambient air, or equivalent as the pressure medium.

c. Internal pressure shall be maintained at 0 KPa G, when the switch is in the closed position and 1.1 times max actuation pressure shown on print when the switch is in the open position.

d. Vibrate the switch at 1.5 mm displacement (peak-to-peak) while varying the frequency uniformly from 5 to 50 to 5 Hz over a 5 minute period.

e. Vibrate the switch in alternate one-hour periods in the open and closed positions for a total of 8 hours in each plane. (Total test time is 24 hours).

2. Acceptance Requirement

a. After the entire vibration sequence check the switches to sections A, B, C, or D using the procedure established in each section.

b. Nonconformance is defined as any evidence of leakage or any change in electrical continuity/discontinuity during the vibration cycles, or any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

III. Test Requirements and Conditions (cont'd)

J. Terminal Strength

1. Test Requirements

a. Mount the switch in the test port.

(1) Apply a 89 ± 9 N axial force to each terminal.

(2) With a pendulum apply a 45 ± 5 N impact force to the switch housing at the connector end, perpendicular to the centerline axis of the switch. See Figure 1 for force application point and direction.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedures established in each section.

b. Nonconformance is defined as any terminal or housing fracture, or any switch not meeting the criteria in sections A, B, C, or D.

K. Vacuum

1. Test Requirements

a. Mount the switch in the test port. Vacuum tests are to be conducted at room temperature using ambient air as the pressure medium.

b. Subject the switch to 5 cycles of vacuum from atmospheric pressure (760 mm Hg) to an absolute pressure of 3-4 mm Hg. Maintain the vacuum for a minimum of 60 seconds.

2. Acceptance Requirements

a. Check the switch to sections A, B, C, and D using the procedure established in each section.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, and D.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

L. Temperature Cycle

1. Test Requirements

a. Mount switches in test ports; test to be run using currently released brake fluid.

b. Repeat the following procedure 25 times.

(1) Lower the switch and fluid temperature to at least -40°C.

(2) Cycle the switches ten times at 10 seconds/cycles. One cycle consists of a pressure variation from 0 - 276 KPa.G (0-40 psi) to 10,000 ± 345 KPa.G (1450 ± 50 PSI). Note: Switch must open and close each cycle.

(3) Raise switch and fluid temperature to 38°C minimum.

(4) Repeat Step 2.

c. At completion of Step b, check switches per sections A, B, C, and D.

2. Acceptance Requirements

A. Nonconformance is defined as any evidence of switch fluid leakage, seepage, or not meeting the criteria of sections A, B, C, and D.

M. Fluid Resistance

1. Test Requirements

a. Mount the switch in the test port and orient as installed in the vehicle.

b. Install the currently released mating electrical connector (with wire leads) to the switch.

c. Sequentially, immerse the switch into each of the specified fluids, at a temperature of 23 ± 2 °C, for 5 ± 1 second. Remove the switch and drain and store the switch for the specified time at room temperature, prior to immersing into the next fluid.

III. TEST PROCEDURES AND REQUIREMENTS (cont'd)

Fluid	Drain Time	Storage Time
Reference Fuel C ASTM D471	60 ± 5 min.	none
10W40 Engine Oil	24 ± 1 hour	14 days
Ethylene Glycol/ Water 50/50 by Volume	24 ± 1 hour	24 ± 1 hour
Brake Fluid DOT 3	24 ± 1 hour	48 ± 1 hour
Automatic Transmission/ Power Steering Fluid (same) ESP-M2C138-CJ	24 ± 1 hour	14 days
Isopropyl Alcohol/ Water 50/50 by Volume	24 ± 1 hour	none
Reference Fuel C, ASTM D471 with Methyl Alcohol 85/15 by Volume	24 ± 1 hour	none

d. For the Flow Chart, subject the prescribed number of immersed switches to the post immersion tests specified below:

III. E. Impulse
III. G. Humidity
III. H. Salt Spray
III. J. Terminal Strength

Acceptance Requirements

a. Switches must fully meet the requirements of the specified post immersion test.

b. Nonconformance is defined as any switch not meeting the criteria in sections A, B, C, or D. Samples used for this test must be destroyed after all testing is completed.

IV. STATISTICAL ANALYSIS METHODS

A. For PV, IP-1 and IP-2 tests, all samples tested must pass. Having all the required sample size pass will provide data to support the conclusion that the switch has a minimum reliability R, at a given confidence of C. The notation Fo-R is interpreted as minimum reliability equal to R, at a confidence C; thus F90-.80 means a minimum reliability of 80% at 90% confidence.

B. All samples must pass in the statistical test acceptance criteria stated for tests with 100% frequency; or samples from lots, which could have a variable size.

V. REVALIDATION REQUIREMENTS

A. No change in design, material, process or component supplier shall be made without prior approval from the releasing Product Engineering Office. As part of approving a change, the releasing Product Engineering Office will establish the portion of the Product Validation tests required to be run to revalidate the switch. The following table is to be used as a guide in determining the type of tests required for revalidation requirements.

RUNNING CHANGE REVALIDATION

Component	Process or Material Change or New Supplier
1. Terminals, Contacts, or Connector	III, B, C, E, G, H,I, J, L, M.
2. Case or Housing	All Tests
3. Disc or Diaphragm	III, A,D,E,F,I,K,L.
4. Fitting or Fluid Connection	III, D, E, F, H, I, M.

5. Annual revalidation is not required on carryover switches.

VI. LOT DEFINITION

A lot is defined as no more than eight (8) hours of production up to 4,000 pieces. If shifts extend beyond eight (8) hours, or more than 4,000 pieces are produced in a shift, the product must be separated into at least two lots.

VII. RECORD RETENTION

A. Recording and record retention shall conform with Ford Q-101.

B. Production Validation test results and analysis are to be forwarded to the releasing Product Engineering Office before approval for shipment of production parts can be granted.

C. In-Process test results shall be available at the supplier's manufacturing facility for the releasing Product Engineering Office and Ford SQA or its representatives to review on request.

VIII. INSTRUCTIONS AND NOTES

A. All switches are to be identified with the Ford part number, supplier identification, and a date code indicating final assembly.

All test equipment and test procedures for testing to this specification must be approved by the releasing Product Engineering Office and no change in equipment or procedure may be made without their written concurrence.

Test port configuration is shown in Figure 1.

O-rings, if used in the design, shall be free from cuts, nicks, abrasions or any other damage which would result in a fluid leak.

All switches must have a shipping cap installed over the port threads to prevent contamination. All shipping caps must be approved by the releasing Product Engineering Office prior to production incorporation.

All switches that do not pass the calibration test are to either be readjusted and rechecked, or scrapped. (Salvage of component parts permitted with 100% reinspection).

If product nonconformance occurs for test Sections III. B, C, D, E, F, and J, production shall be stopped and the problems corrected. All production lots shall be sorted 100% prior to shipment. Suspected nonconformance of any shipped parts shall be reported immediately to the releasing Product Engineering Office.

If nonconformance of the statistical acceptance criteria occurs for test Sections III. G, H, I, K, L and M, a cause to recall the subject weeks production and to stop production may result.

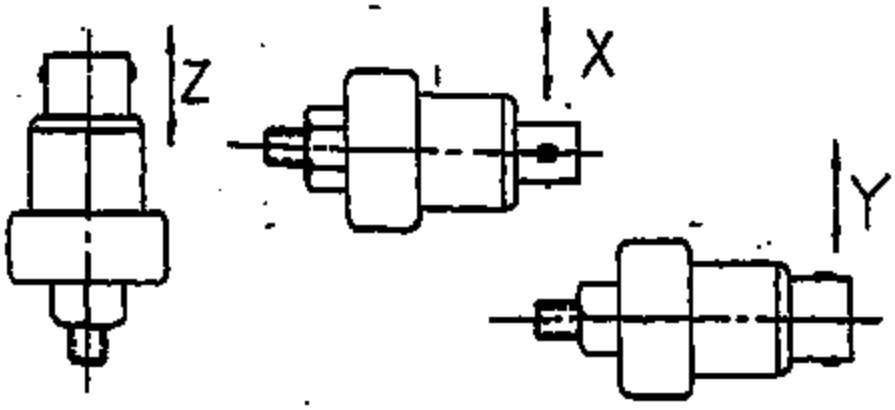
IX. CORRELATION OF REFERENCE DOCUMENTS

ASTM B-117, Salt Spray Testing

Ford Q-101, Quality System Standard - 1990 Edition

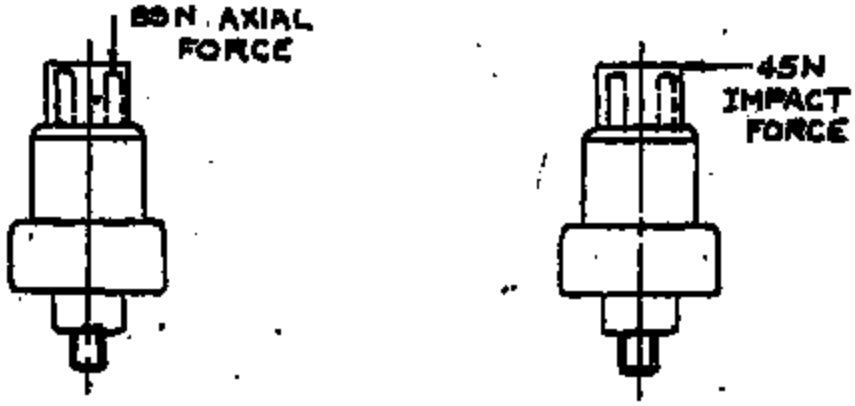
XS-F2VB-14A464-AA, Specification - SLV Assy - Wire Connector

XS-F2VF-9C735-AA, Specification - Servo Assembly Speed Control



VIBRATION TEST - SWITCH ORIENTATION

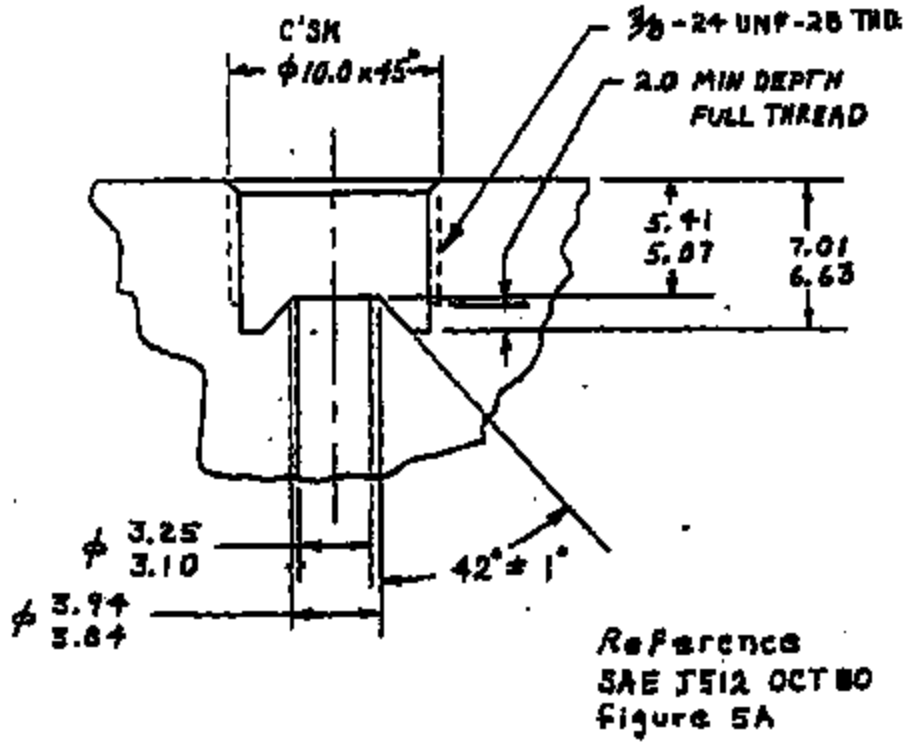
FIGURE 1.



TERMINAL STRENGTH - LOAD ORIENTATION

FIGURE 2.

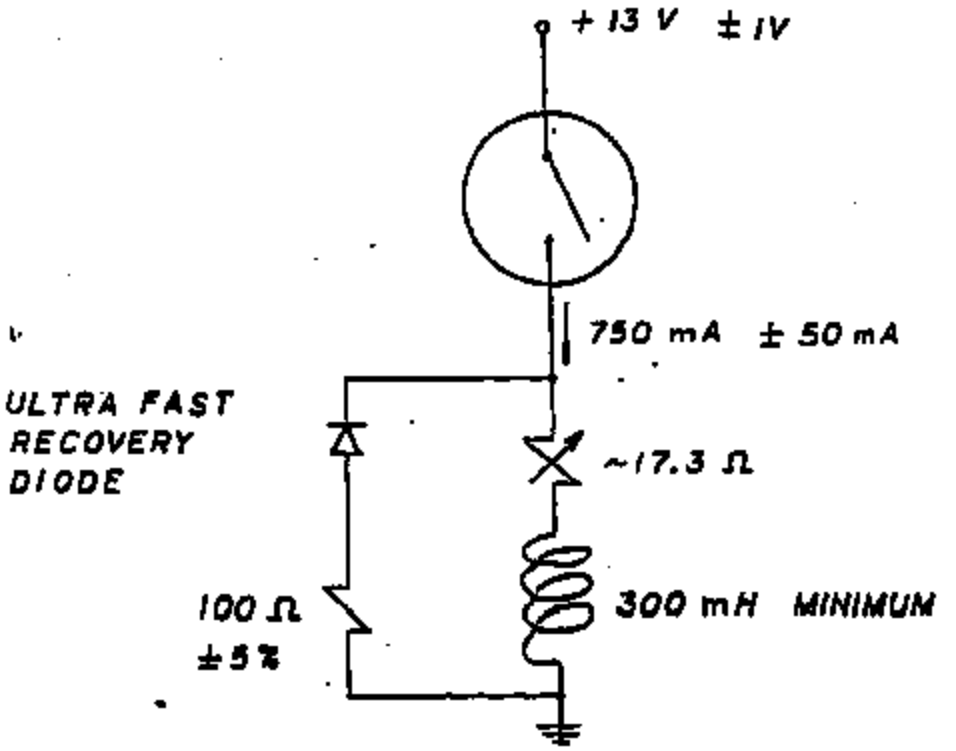
Engineering Specification



TEST FIXTURE PORT CONFIGURATION

FIGURE 3

FRAME 17 OF 18	REVISED		▽ [illegible] NUMBER



DEACTIVATE SWITCH
TEST SET UP

FIGURE 4

Appendix. 4.2
Data

TEST LOT NO.	TEST	DEVICE :
TESTED BY		
APPROVED BY	TEXAS INSTRUMENTS MATERIALS & CONTROLS GROUP ATTLEBORO, MA 02703	DOC.
DATE 92-08-17		PAGE 33

FORM 5298

PRESSURE SWITCH DATA Form 21605 TEST NO. 245-15-129

DEVICE	DATE REQUESTED	REQUESTED BY	REQUESTED COMPL. DATE
77PSL 3-1, 77PSL 3-2	920413	Steve Offiler	
PERFORMED BY	**DATE STARTED**	**DATE COMPLETED**	**APPROVED BY**
Jeffie DiBonaventura	920413		

PROJECT TITLE: Speed Control

CUSTOMER:

PURPOSE OF TEST: Production Validation

PROCEDURE: ▽ ES-F1VC-9F924-AA ; Full ESR

Natural Noryl Bezos

ultra-low diff disc.

Act 90-160

Rel 20 min

77PSL 3-1

INITIAL Characterizations

Device #	Act	Rel	Mc Burg	Excessive Leak	Burst Proof	Act	Rel	Test	Complete	Test	Complete
245-15-01	114	107	4.1	✓	✓	148	142	Hold Rel	✓	Impulse	✓
-02	117	109	3.1	✓	✓	120	113		✓		✓
-03	118	111	3.8	✓	✓	120	113		✓		✓
-04	121	115	5.7	✓	✓	121	117		✓		✓
-05	119	117	1.1	✓	✓	126	115		✓		✓
-06	120	103	4.7	✓	✓	123	113		✓		✓
-07	115	111	4.5	✓	✓	121	113		✓		✓
-08	123	107	4.8	✓	✓	119	113		✓		✓
-09	120	102	4.5	✓	✓	122	113		✓		✓
-10	121	115	3.8	✓	✓	124	116		✓		✓
-11	120	114	4.9	✓	✓	125	118		✓		✓
-12	126	117	4.2	✓	✓	129	124		✓	Tens Strength	✓
-13	126	116	3.8	✓	✓	123	114		✓		✓
-14	107	92	4.8	✓	✓	117	109		✓		✓
-15	129	114	3.4	✓	✓	128	120		✓		✓
-16	119	111	4.1	✓	✓	121	111		✓		✓
-17	125	108	3.9	✓	✓	121	101		✓		✓
-18	126	116	5.7	✓	✓	122	114		✓		✓
-19	128	116	5.3	✓	✓	122	112		✓		✓
-20	122	111	3.1	✓	✓	127	109		✓		✓
-21	134	121	3.9	✓	✓	141	128		✓		✓
-22	121	105	3.8	✓	✓	128	115		✓		✓
-23	124	117	2.7	✓	✓	133	120		✓		✓
-24	119	98	3.6	✓	✓	123	107		✓		✓
-25	124	110	3.1	✓	✓	132	118		✓	Burst Pty	✓
-26	119	103	3	✓	✓	125	107		✓		✓
-27	123	117	3	✓	✓	137	125		✓		✓
-28	131	120	3.2	✓	✓	130	119		✓		✓

Device #	Act	Rel	Dry Dust	Current leak	Temp rel Report	Act	Rel	Test	Complete	Test	Complete
24E-1C-29	129	114	3.3	✓	✓	120	110	Fluid Lvl	✓	Humidity	✓
- 24	114	106	3.8	✓	✓	126	116		✓	↓	✓
- 11	129	114	2.9	✓	✓	121	112		✓	Salt Spray	✓
- 12	123	115	2.4	✓	✓	133	126		✓	↓	✓
- 13	116	104	8.8	✓	✓	115	106		✓		✓
- 14	132	119	2.3	✓	✓	138	122		✓		✓
- 15	118	109	2.9	✓	✓	125	115		✓		✓
- 16	122	114	2.9	✓	✓	123	113	↓	✓	↓	✓
- 17	131	119	3.1	✓	✓	136	118	Impulse	✓	Water	✓
- 18	132	118	2.6	✓	✓	136	125		✓	↓	✓
- 19	134	126	2.6	✓	✓	135	126		✓		
- 20	124	112	2.7	✓	✓	129	120		✓		
- 21	125	113	2.8	✓	✓	127	117		✓		
- 22	116	106	2.7	✓	✓	130	117		✓		
- 23	117	106	2.7	✓	✓	127	117		✓		
- 24	120	101	2.7	✓	✓	131	105		✓		
- 25	134	126	3.7	✓	✓	144	131		✓		
- 26	124	114	3.4	✓	✓	130	120		✓		
- 27	127	117	3.7	✓	✓	133	118		✓		
- 28	116	107	3.7	✓	✓	127	120	↓	✓		
- 29	124	112	3.7	✓	✓	130	115	T-Cycle	✓	Water	✓
- 30	132	121	3.7	✓	✓	135	124		✓	↓	✓
- 31	112	101	3.0	✓	✓	120	104		✓		
- 32	127	121	3.4	✓	✓	130	118		✓		
- 33	127	121	3.0	✓		129	119		✓		
- 34	121	112	3.8	✓	✓	135	119		✓		
- 35	128	115	3.0	✓	✓	137	119	Vacuum	✓		
- 36	116	110	3.9	✓	✓	126	112		✓		
- 37	127	118	3.7	✓		130	119		✓		
- 38	122	111	3.3	✓	✓	130	116		✓		
- 39	123	113	3.1	✓	✓	125	109		✓		
- 40	131	117	3.4	✓		133	121	↓	✓		
- 41	127	119	3.6	✓		134	120	Vibration	✓		
- 42	127	117	3.7	✓		131	114		✓		
- 43	129	113	3.6	✓	✓	132	115		✓		
- 44	128	117	3.5	✓	✓	136	125		✓		
- 45	121	112	3.3	✓	✓	136	118		✓		
- 46	119	107	3.9	✓	✓	127	115	↓	✓		
- 47	132	123	3.9	✓	✓	134	122	Burst	Pass		
- 48	126	114	3.9	✓	✓	134	122		Pass		
- 49	123	113	3.7	✓	✓	120	109		Pass		
- 50	119	109	3.4	✓	✓	129	120		Burst 7000		
- 51	121	110	3.7	✓	✓	133	120		Pass		
- 52	125	114	3.8	✓	✓	136	126	↓	Pass		
- 53	125	120	3.5	✓	✓	139	131	Hot Soak			
- 54	124	113	3.4	✓	✓	138	120				
- 55	119	112	3.4	✓	✓	136	117				
- 56	109	103	3.4	✓	✓	121	114				
- 57	120	109	3.1	✓	✓	126	112				
- 58	111	101	3.4	✓	✓	125	113				
- 59	117	105	3.5	✓	✓	129	117				
- 60	131	119	3.7	✓	✓	136	121	↓			

PRESSURE SWITCH DATA Form 21605 **TEST NO.** _____

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

PROJECT TITLE:

CUSTOMER:

PURPOSE OF TEST:

PROCEDURE:

77F563-1

Final Clearance Variables

Device #										
1-F.V. #1	131	104	28.6	✓	✓	128-100				
#2	128	97	29.4	✓	✓	122-105				
#3	130	102	28.6	✓	✓	129-108				
#4	128	101	27.0	✓	-	127-104				
#5	135	109	25.2	✓	✓	132-110				
#6	107	95	12.1	✓	✓	117-99				
#7	130	103	26.6	✓	✓	128-105				
#8	124	99	25.2	✓	✓	122-103				
#9	124	96	29.3	✓	✓	123-105				
#10	122	101	20.8	✓	✓	120-101				
#11	107	87	20.9	✓	✓	106-105				
#12	125	104	16.8	✓	✓	124-105				
#13	128	109	6.3	✓	✓	128-118				
#14	124	92	2.2	✓	-	119-98				
#15	125	109	2.8	✓	✓	126-115				
#16	136	111	2.1	-	✓	136-120				
#17	134	107	2.6	✓	✓	132-116				
#18	131	99	2.2	-	-	132-105				
#19	133	99	2.7	-	✓	130-115				
#20	132	97	3.3	-	✓	130-111				
#21	142	110	4.7	✓	✓	140-122				
#22	132	104	5.1	✓	✓	132-112				
#23	133	104	3.0	✓	✓	125-112				
#24	135	103	2.5	✓	✓	132-114				
#25	121	105	2.1	✓	✓	120 114				
#26	124	112	5.0	✓	✓	125 109				
#27	138	112	3.1	✓	✓	137 114				
#28	133	112	3.4	✓	✓	133 101				

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
[illegible]	131 101	2.7	✓	✓	131 111				
[illegible]	128 99	3.9	✓	✓	[illegible] 110				
[illegible]	124 114	2.9	✓	✓	130 113				
[illegible]	131 103	3.3	✓	✓	[illegible] 106				
[illegible]	115 99	6.6	✓	✓	130 97				
[illegible]	131 115	3.9		✓	137 118				
[illegible]	137 106	3.9	✓	✓	120 95				
[illegible]	132 101	3.1	✓	✓	138 [illegible]				
[illegible]	125-112	9.6	✓	✓	123-105				
[illegible]	130-114	6.8	✓	✓	107-106				
[illegible]	126-112	8.7	✓	✓	106-107				
[illegible]	131-113	8.0	✓	✓	127-110				
[illegible]	125-111	7.2	✓	✓	123-106				
[illegible]	126-112	5.6	✓	✓	126-107				
[illegible]	127-113	5.7	✓	✓	124-108				
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[illegible]	126-112	4.5	✓	✓	122-105				
[illegible]	127-99	3	✓	✓	116 99				
[illegible]	129-100	5.6	✓	✓	117 100				
[illegible]	126-108	2.6	✓	✓	127 98				
[illegible]	130-105	1.7	✓	✓	130 101				
[illegible]	130-102	2.9	✓	✓	128 102				
[illegible]	125-104	1.1	✓	✓	125 77				
[illegible]	138-117	1.3	✓	✓	136-110				
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[illegible]	137-115	2.6	✓	✓	135-110				
[illegible]	128-109	2.6	✓	✓	139-113				
[illegible]	127-107	2.8	✓	✓	130-114				
[illegible]	127-105	3.1	✓	✓	128-110				

Appendix 4.3
Noise Pressure Trace

TEST LOT NO.	TEST	DEVICE
TESTED BY		
APPROVED BY	TEXAS INSTRUMENTS — MATERIALS & CONTROLS GROUP, ATTLEBORO, MA 02703	DOC.
DATE 92-06-17		PAGE 16

FORM 5298

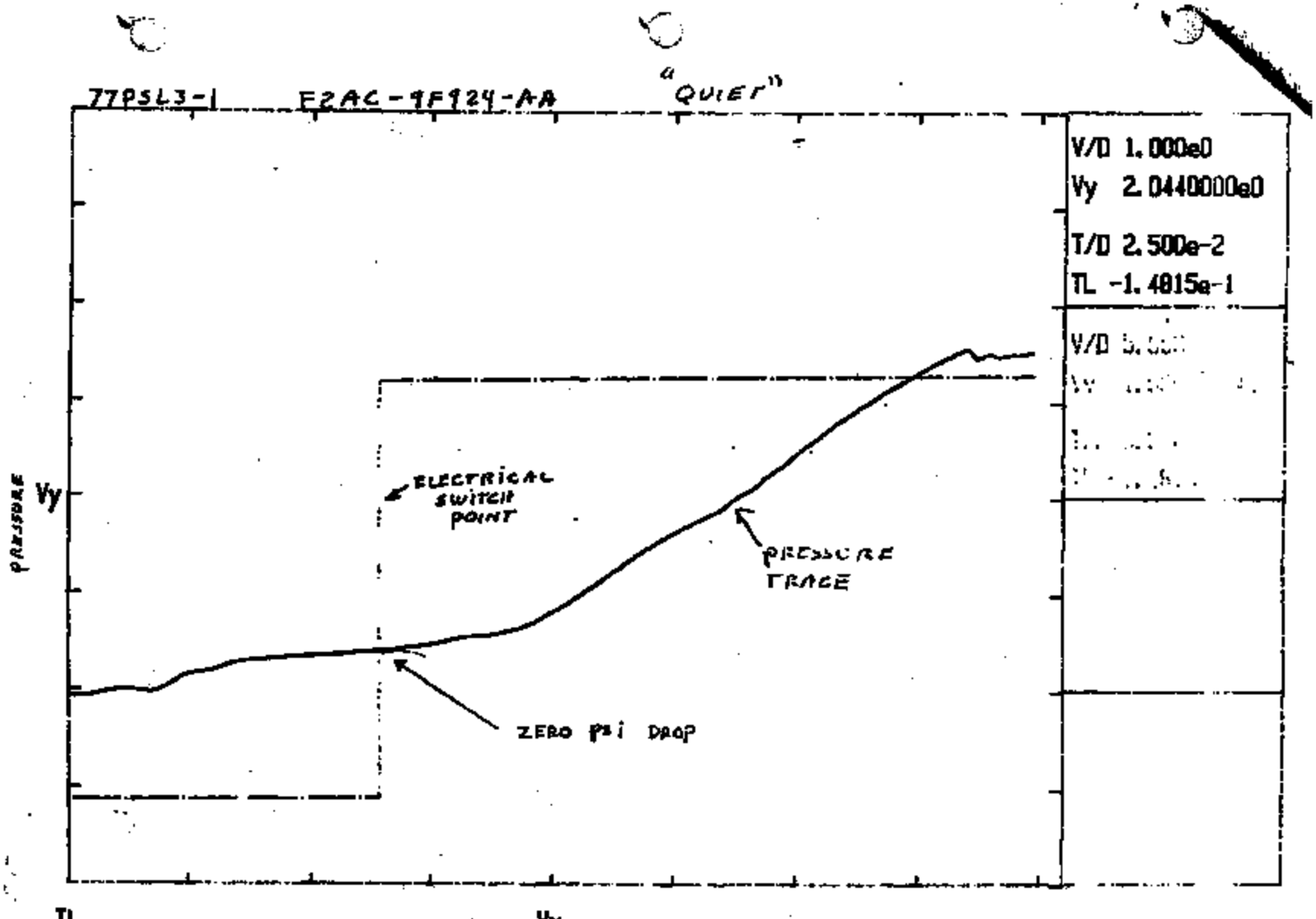

FIGURE 3

TEXAS INSTRUMENTS
INCORPORATED
MATERIALS AND CONTROLS GROUP
☐ ATTLEBORO, MA 02703 ☐ VERSAILLES, KY 40383
☐ CENTRAL LAKE, MI 49622

Shipping Order

DATE: 8/17/92 S.O. # 271328

REF. # _____ DATE SHIPPED: / /

SHIPPED VIA: OVERNIGHT

SHIP TO:
DANA CORPORATION
WEATHERHEAD DIVISION
203 WEATHERHEAD STREET
ANGOLA, INDIANA 46703

CHARGE TO:

USE (CHECK ONE)

☐ SCRAP SALES
☐ SALE OF ASSETS
☐ OUTSIDE PROCESSING
☒ TRANSFERS BETWEEN TI LOCATIONS
☐ [illegible]
☐ OTHER, EXPLAIN: [illegible] TERMS: DATA
DIV/AGCY. #: [illegible] COD

QUANTITY	DESCRIPTION/PART NUMBER	UNIT PRICE	TOTAL
6	77PSL3-1 SAMPLES	n/c	
.1	ISIR PKG.	n/c	

GROSS WEIGHT	NO. OF CONTAINERS	ORIGINATOR'S NAME (TYPED)	ORIGINATOR'S SIGNATURE
		ELAINE ROSE ep 12-27	

TEXAS INSTRUMENTS
INCORPORATED
MATERIALS AND CONTROLS GROUP
☐ ATTLEBORO, MA 02703 ☐ VERSAILLES, KY 40383
☐ CENTRAL LAKE, MI 49622

Shipping Order

DATE: 8 / 19 / 92 S.O. # 271329

REF. # _____ DATE SHIPPED / /

SHIPPED VIA: OVERNIGHT

SHIP TO:
DANA CORPORATION
WEATHERHEAD DIVISION
109 INCREMENT STREET
ST.THOMAS,ONTARIO
CANADA N5P3G8

CHARGE TO:

USE (CHECK ONE)

- ☐ SCRAP SALES
- ☐ SALE OF ASSETS
- ☐ OUTSIDE PROCESSING
- ☐ TRANSFERS BETWEEN TI LOCATIONS
- ☐ EXPENSE MATERIAL
- ☒ OTHER, EXPLAIN: CUSTOMER DATA

DIV/ACCT. # _____ OC: _____

QUANTITY	DESCRIPTION/PART #/PO	UNIT PRICE	TOTAL
6	77PSL3-2 SAMPLES @3.97 ea.	n/c	
1	ISIR PKG.	n/c	

GROSS WEIGHT	NO. OF CONTAINERS	ORIGINATOR'S NAME (TYPED)	ORIGINATOR'S SIGNATURE
		ELAINE ROSE ER 12-27	

6 pcs — Canada
Indiana

Customer Information

Checklist Of Required Actions

Part Number: 77RC3-1 Customer Requested Date: 8/14/92

Action 10 = DANA Corp Ontario, Canada

		Available/Completed	Status
1.	Manufacturing feasibility	✓	
2.	Design FMEA	✓	
	Process Fmea		
3.	Process Flow Diagram	✓	
4.	Designated characteristics(kpc) (Significant characteristics)	—	
5.	Control Plan	✓	
6.	Gage R & R Studies	✓	
7.	Process Capability Studies (Cpk)	—	
8.	ES testing	✓	
9.	Material Analysis (Date)	✓	
10.	PIPC (Process potential Cp and process capability Cpk on a minimum of 300 switches once the process is stable for significant characteristics.)	✓	
11.	PIST (Includes dimensional requirements on the print and also all engineering specification (ES) test results.	✓	
12.	Available product to accomplish testing/measurement	✓	
13.	Comments/negotiations:	Need duplicate ISIR copy to Dana Corp - Angola, Ind.	

(Rev 0, 06/25/92, J. Watt)

Ford

PROCESS POTENTIAL AND QUALITY INDEXES SUMMARY DATA SHEET

PART #: F2AC-9F924-AA
SUPPLIER: TEXAS Instruments
CODE: 70858
ADDRESS: 34 Forest St. Attleboro MA.
VEHICLE BUILD: EP VP FB OTHER

SUPPLIER CONTACT: Jim Watt
CONTACT PHONE: (508) 699-1719
PART DESCRIPTION: Next Generation Speed Control Deactivation Switch
SDA CODE:
VEHICLE PROGRAM: Pass Car

CHARACTERISTIC TYPE

∇ = FORD CRITICAL CHARACTERISTICS

S.C. = FORD OR SUPPLIER SIGNIFICANT CHARACTERISTICS

NUMBER OF CRITICAL AND SIGNIFICANT CHARACTERISTICS:

1:	Actuation Pressure	TYPE:	SC	Cp =	**	Cpk = **
2:	Release Pressure	TYPE:	SC	Cp =	**	Cpk = **
3:	3/8-24UNF-2A THD.	TYPE:	SC	Cp =	A*	Cpk = A*
4:		TYPE:		Cp =		Cpk =
5:		TYPE:		Cp =		Cpk =
6:		TYPE:		Cp =		Cpk =
7:		TYPE:		Cp =		Cpk =
8:		TYPE:		Cp =		Cpk =
9:		TYPE:		Cp =		Cpk =
10:		TYPE:		Cp =		Cpk =
11:		TYPE:		Cp =		Cpk =
12:		TYPE:		Cp =		Cpk =
13:		TYPE:		Cp =		Cpk =
14:		TYPE:		Cp =		Cpk =
15:		TYPE:		Cp =		Cpk =

PIST = 183/183 x 100 = 100 %

$PIPC_{Cp}$ = ____ x 100 = ____ % $PIPC_{Cpk}$ = ____ x 100 ____ %

COMMENTS:

** Calibration check is done 100%, Parts tested 200; defective 0, percent of defect 0.

A* Threads are checked on a Go/No Go Gage

PREPARED BY: Elaine Rose DATE: 8-4-92

TEXAS INSTRUMENTS, INC. ISIR SUBMISSION
TO DANA CORPORATION
FOR PART NUMBER F2AC-9F924-AA (77PSL3-1)

TEXAS INSTRUMENTS

SAMPLE REPORT

REASON FOR REPORT		VENDOR	P.O.	PART NO.	REV.
NEW PART				7705L3-1	A
REPLACEMENT TOOL		REPORT REQ BY / DATE	INSPECTED BY		DATE
CORRECTED TOOL		Elaine Rose 4/14/92	Sandy Gilbert		4/20/92
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		
	Dimension	1	2	3	4	5	6	Method of Inspection	
1	1.85 - 2.06	1.933	1.933	1.942	1.956	1.900	1.927	1mic	
2	Ø 19.05 max	18.687 / 18.766	18.692 / 18.211	18.583 / 18.724	18.795 / 18.693	18.793 / 18.672	18.865 / 18.845	"	
3	.25 - .75	0.593	0.561	0.552	0.522	0.558	0.575	"	
		0.748	0.804	0.752	0.805	0.684	0.767	"	REMEASURED
4	2.79 - 3.10 2 pks	2.90	2.90	2.91	2.92	2.91	2.91	Cal	
		2.91	2.92	2.93	2.94	2.92	2.94	"	
5	19.45 - 19.81	19.65	19.70	19.71	19.73	19.75	19.73	"	
6	11.40 - 11.90	11.794	11.797	11.791	11.790	11.789	11.783	1mic	
7	16.56 - 16.76	16.623	16.652	16.636	16.654	16.626	16.626	"	
8	2.84 - 3.05	2.936	2.948	2.927	2.924	2.910	2.919	"	
	Ø 0.1 Ⓜ A	0.035	0.017	0.018	0.006	0.043	0.030	"	
9	1.24 - 1.45	1.241	1.242	1.249	1.260	1.270	1.258	"	
10	11.60 - 11.92	11.864	11.719	11.725	11.681	11.682	11.736	"	
11	1.24 - 1.55	1.384	1.397	1.393	1.397	1.425	1.382	"	
12	57.15 MAX	55.64	55.65	55.69	55.75	55.75	55.71	Cal	
13	12.59 - 13.11	12.824	12.862	12.914	12.933	12.850	12.906	2 WD	
14	11.65 - 12.17	12.023	12.025	12.146	12.126	12.068	0.81	"	
		11.963	11.923	12.056	12.081	12.011	12.053	"	
15	6.60 - 6.81	6.702	6.696	6.690	6.690	6.708	6.710	1mic	
16	MD Flash OK Burrs on this Surface	OK	OK	OK	OK	OK	OK	Visual	
17	2.79 - 3.41	3.053	3.164	3.162	3.205	3.187	3.225	Comp	
18	0.68 - 1.30	1.137	1.066	1.253	1.165	1.071	1.117	"	
19	Stamp Date code & Fabs P/N.	OK	OK	OK	OK	OK	OK	Visual	

REMARKS AND/OR INSTRUCTIONS:

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

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

FORM NO. 20788

TEXAS INSTRUMENTS

PAGE 1 OF 3

SAMPLE REPORT

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

VENDOR | P.O. | PART NO. 7705L3-1 | KEY A

REPORT REQ. BY Elaine Rose | DATE 4/14/92 | INSPECTED BY Sandy Gilbert | DATE 4/20/92

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERISTICS 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) Dimension	1	2	3	4	DISPOSITION 5	6	Type of correction
1	1.85-2.06	1.933	1.933	1.942	1.956	1.900	1.927	1 mic
2	⌀ 19.05 max	19.697 / 19.736	19.692 / 19.811	19.653 / 19.729	19.757 / 19.691	19.134	19.816	"
3	.25-.276	0.593	0.561	0.552	0.522	0.558	0.546	"
		0.748	0.804	0.762	0.805	0.684	0.787	" Remove
4	2.79-3.10 2 pks	2.90	2.90	2.91	2.92	2.91	2.91	Gol
		2.91	2.92	2.93	2.94	2.92	2.94	"
5	19.45-19.81	19.65	19.70	19.71	19.73	19.75	19.73	"
6	11.40-11.90	11.794	11.797	11.791	11.790	11.784	11.788	4 mic
7	16.56-16.76)	16.623	16.652	16.636	16.654	16.626	16.628	"
8	2.84-3.05	2.936	2.948	2.924	2.924	2.910	2.919	"
	⌀ 0.1 Ⓜ A	0.035	0.017	0.018	0.006	0.045	0.030	"
9	1.24-1.45	1.241	1.242	1.249	1.260	1.270	1.258	"
10	11.60-11.92	11.864	11.719	11.725	11.681	11.682	11.726	"
11	1.24-1.55	1.384	1.397	1.393	1.397	1.425	1.382	"
12	55.15 max	55.64	55.85	55.81	55.75	55.75	55.78	Gol
13	12.59-13.11	12.804	12.862	12.914	12.933	12.950	12.940	2 WO
14	11.65-12.17	12.023	12.025	12.146	12.126	12.068	12.087	"
		11.963	11.923	12.056	12.081	12.011	12.045	"
15	6.00-6.81	6.708	6.636	6.690	6.690	6.708	6.702	7 mic
16	Min Flash or	OK	OK	OK	OK	OK	OK	Visual
	Parts on this							
	Surface.							
17	2.79-3.41	3.053	3.164	3.162	3.205	3.187	3.225	20 mic
18	0.68-1.30	1.127	1.016	1.163	1.165	1.071	1.117	"
19	Stamp date code	OK	OK	OK	OK	OK	OK	Visual
	& Fab PN.							

REMARKS AND/OR INSTRUCTIONS:

DISPOSITION: TOOL APPROVED FOR PROD (E.R.) | OS RESUBMISSION REQ'D

MFG. ENG.: | QRA ENG.:

PURCH. AGENT:

FORM NO. 30765

TEXAS INSTRUMENTS

ATTLEBORO, MASSACHUSETTS 02703

SAMPLE REPORT

REASON FOR REPORT		VENDOR		P.O.	PART NO.	REV.
NEW PART					77PS23-1	A
REPLACEMENT TOOL.		REPORT REQ. BY	DATE	INSPECTED BY	DATE	
CORRECTED TOOL.		Elaine Rose	4/14/92	Sandy Gilbert	4/20/92	
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			
	Dimension	1	2	3	4	5	6			
39	cont	24°21'	23°36'	23°42'	22°47'	24°28'	23°46'			
40	Housing to be	OK	OK	OK	OK	OK	OK			
	natural in color									
41	[71.5°] 2 pks	71°49'	71°25'	22°21'	71°46'	71°43'	71°44'			
		72°37'	22°21'	72°14'	22°30'	22°5'	72°36'			

REMARKS AND/OR INSTRUCTIONS:

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

FORM NO. 20784

TEXAS INSTRUMENTS

PAGE 3 OF 3

SAMPLE REPORT

REASON FOR REPORT	VENDOR	P.O.	PART NO.	REV.
NEW PART			77PSL3-1	A
REPLACEMENT TOOL.				
CORRECTED TOOL.				
REPAIRED TOOL.				
REVIEW				
OTHER Dim analysis X				

REPORT REQ. BY	DATE	INSPECTED BY	DATE
Elaine A Rose	4/14/92	Sandy Gilbert	4/20/92

THE DIMENSIONS INDICATED BELOW REPRESENT TEXAS INSTRUMENTS' FINDINGS REGARDING THE ACTUAL VALUES FOR ALL CHARACTERISTICS MEASURED. WHERE MEASURED VALUES VARY 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
	Dimension	1	2	3	4	5	6	REASON OF REJECTION
39	Cont	24°21'	23°36'	23°42'	23°47'	24°28'	23°36'	Comp
40	Housing to be	OK	OK	OK	OK	OK	OK	Comp
	Natural in color.							
41	(71.5°) 2 pks	71°49'	71°25'	72°21'	71°45'	71°43'	71°44'	Comp
		72°37'	72°21'	72°14'	72°30'	72°5'	72°36'	"

REMARKS AND/OR INSTRUCTIONS:

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

FORM NO. 2978B

TEXAS INSTRUMENTS

PAGE 2 OF 3

SAMPLE REPORT

F3AC-9F924-AA

REASON FOR REPORT		VENDOR		P.O.	PART NO.	REV.
NEW PART					77PS23-1	A
REPLACEMENT TOOL		REPORT REQ. BY	DATE	INSPECTED BY		DATE
CORRECTED TOOL		Elaine Rose	4/14/92	Sandy Gilbert		4/20/92
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		
	Dimension	1	2	3	4	5	6	METHOD OF DISPOSITION
20	3/8-24 UNF 2A	OK	OK	OK	OK	OK	OK	[illegible]
	.3667 - .3739 Reamer	.3715	.3725	.3710	.3715	.3705	.3710	Cal
21	1.10 - 1.40	1.224			section			Tmic
22	2.5°	[illegible]			section			surface meter
23	.16 Dimensional							
24	41° - 43°	42°10'			section			Tmic
25	40° - 50° chamfer	44°24'	44°7'	41°57'	46°6'	46°53'	46°5'	comp
26	Ø 7.82 - 8.03	7.940	8.001	7.932	7.919	7.950	7.910	"
27	1.52 - 2.04	1.836	1.897	1.783	1.821	1.823	1.783	"
28	9.39 - 9.66	9.433	9.442	9.462	9.504	9.507	9.448	2 HD
29	8.12 min	8.913	9.104	8.945	8.900	8.950	8.884	"
30	14.23 max	13.64	13.58	13.50	13.53	13.50	13.56	cal
31	Ø 32.51 max	31.40	31.63	31.61	31.58	31.66	31.45	"
32	Ø 5.58 - 5.85 6	5.703	5.647	5.692	5.677	5.642	5.598	Tmic
33	Ø 7.23 - 7.37 6	7.341	7.323	7.297	7.302	7.311	7.303	"
34	Ø 3.30 - 3.60 6	3.439	3.466	3.482	3.462	3.479	3.484	"
35	Ø 14.02 - 14.53 Hex	14.11	14.14	14.24	14.13	14.14	14.14	cal
36	0.58 - 0.68 2 pcs	0.626	0.670	0.623	0.625	0.624	0.629	Tmic
		0.664	0.665	0.653	0.670	0.664	0.665	"
37	2.59 - 2.80 2 pcs	2.691	2.682	2.721	2.703	2.674	2.668	"
		2.625	2.621	2.677	2.625	2.630	2.638	"
	⌖ Ø.25 Ⓜ A B	0.013	0.019	0.041	0.004	0.023	0.014	"
		0.049	0.072	0.062	0.112	0.143	0.113	"
38	8.30 - 8.72 2 pcs	8.321	8.318	8.488	8.376	8.346	8.348	comp
		8.430	8.475	8.445	8.524	8.369	8.398	"
39	25°±4° 2 pcs	23°52'	24°24'	24°1'	24°54'	23°36'	25°4'	"

REMARKS AND/OR INSTRUCTIONS:

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

FORM NO. 20788

TEXAS INSTRUMENTS

SAMPLE REPORT

F2AC-9F924-HA

REASON FOR REPORT	VENDOR	P.O.	PART NO.	REV.
NEW PART			77PS23-1	A
REPLACEMENT TOOL	REPORT REQ. BY	DATE	INSPECTED BY	DATE
CORRECTED TOOL	Elaine Rose	4/14/92	Sandy Gilbert	4/20/92
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.

F2AC-1F1

(CIRCLE ALL OUT OF TOLERANCE DIMENSIONS)

	Dimension	1	2	3	4	5	6	DISPOSITION
20	3/8-24 unF 2A	OK	OK	OK	OK	OK	OK	
	.3667 - .3739 Both Dimensions	.3715	.3725	.3710	.3715	.3705	.3710	
21	1.10 - 1.40	1.224			section			
22	.86	.975	.95		section			
23	↗ 0.76 D Datum by others							
24	41° - 43°	42° 10'			section			
25	40° - 50° chamfer	44° 24'	44° 7'	41° 57'	46° 6'	43° 53'	46° 4'	
26	Ø 7.82 - 8.03	7.940	8.001	7.932	7.919	7.950	7.910	
27	1.52 - 2.04	1.836	1.897	1.783	1.821	1.823	1.783	
28	9.39 - 9.66	9.433	9.442	9.463	9.504	9.507	9.494	
29	8.12 min	8.913	9.104	8.945	8.900	8.960	8.881	
30	14.23 max	13.64	13.54	13.50	13.53	13.50	13.56	
31	Ø 32.51 max	31.40	31.63	31.61	31.58	31.66	31.45	
32	Ø 5.58 - 5.85 4 plcs	5.782	5.767	5.815	5.841	5.819	5.816	
33	Ø 7.23 - 7.37 4 plcs	7.291	7.268	7.319	7.285	7.340	7.312	
34	Ø 3.30 - 3.60 4 plcs	3.494	3.467	3.455	3.493	3.473	3.496	
35	Ø 14.02 - 14.53 Hex	14.01	14.34	14.48	14.53	14.46	14.46	
36	0.68 - 0.68 2 plcs	0.626	0.620	0.623	0.625	0.624	0.620	
		0.664	0.665	0.653	0.670	0.664	0.662	
37	2.59 - 2.80 2 plcs	2.691	2.683	2.721	2.703	2.694	2.680	
		2.685	2.631	2.677	2.625	2.630	2.632	
	⌖ .025 Ⓜ A B	0.023	0.019	0.041	0.004	0.033	0.004	
		0.049	0.072	0.062	0.112	0.143	0.102	
38	8.30 - 8.72 2 plcs	8.321	8.318	8.288	8.276	8.346	8.312	
		8.430	8.475	8.493	8.534	8.369	8.369	
39	25° ± 4° 2 plcs	23° 52'	24° 24'	24° 1'	24° 54'	23° 36'	25° 4'	

REMARKS AND OR INSTRUCTIONS:

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

FORM NO. 20788

DRAWINGS AVAILABLE UPON REQUEST

TEXAS INSTRUMENTS INCORPORATED
CONTROL PRODUCTS DIVISION
ATTLEBORO, MASSACHUSETTS 02703

QUALITY ASSURANCE WORK ORDER

* INDICATE TYPE OF SERVICE REQUESTED: ✓ FIRST ARTICLE INSPECTION
__ PARTIAL "FAI"
__ TOOLPROOF
__ DIMENSIONAL ANALYSIS
__ MACHINE CAPABILITY
__ PROCESS CAPABILITY

NOTICE: TWO COPIES OF THE DRAWING MUST BE INCLUDED WITH YOUR REQUEST.

IMPORTANT: SUPPLIER F.A.I. INCLUDED WITH THIS REQUEST: YES/NO * _____

* INDICATE ONE OF THE FOLLOWING REASONS: ✓ NEW PART / NEW TOOL / MOLD
(✓ F2AC-9F924-AA) __ CORRECTED TOOL / MOLD
__ OTHER _____

* PART NUMBER: 77PSL3-1 DRAWING REVISION: A

NUMBER OF CAVITIES / STATIONS 12 TOOL ID: _____

TYPE OF MATERIAL: Noryl PART DESCRIPTION: Pressure Switch

SUPPLIER: _____ SAMPLE / MOLD DATE: _____

* DATE SUBMITTED: 4-14-92 DATE REQUIRED: 4/24/92

REQUESTED BY: Elaine Rose M/S: 12-27

COST CENTER: 149 PRODUCT CODE: 88 EXT: 1907

PRIORTY (INDICATE ONE): ✓ URGENT * __ AS DATED

** "URGENT" PRIORTY REQUIRES MANAGERS APPROVAL

APPROVED BY (IF REQUIRED): M DeMatteo

ENGINEERING SPECIAL INSTRUCTIONS

NOTES

1.) A "FIRST ARTICLE INSPECTION", "PARTIAL F.A.I.", OR A "TOOLPROOF", ALL REQUIRE A "DISPOSITION" FROM THE MATERIALS REVIEW BOARD, INCLUDING ALL APPROPRIATE SIGNATURES. ALSO, THE DISPOSITIONED COPY MUST BE RETURNED TO RECEIVING INSPECTION CC:146 FOR PROPER RECORDS.

2.) RECORDS: A) COPIES OF ALL "FIRST ARTICLE INSPECTIONS" (INCLUDING PARTIALS) WILL BE RETAINED BY RECEIVING INSPECTION FOR SEVEN YEARS.
B) RECORDS OF ALL OTHER ANALYSIS WILL NOT BE RETAINED BY RECEIVING INSPECTION.

3.) "DIMENSIONAL ANALYSIS": ANY REQUEST FOR A DIMENSIONAL ANALYSIS THAT INCLUDES ALL DIMENSIONS, OR ALL "CRITICAL" & "MAJOR" DIMENSIONS, WILL BE CONSIDERED A "FIRST ARTICLE INSPECTION" OR A "TOOLPROOF", AND WILL REQUIRE DISPOSITION BY THE MATERIALS REVIEW BOARD. THE APPROVED COPY MUST BE RETURNED TO RECEIVING INSPECTION CC:146.

QUALITY ASSURANCE

DATE REC.: _____

EST. HRS.: _____

COMPLETED: _____

BY: _____

RECEIVING INSPECTION

77PSL3-1 Act. 90-160 psi 6-29-92

Data obtained Apr. 16 '92 pg. 1 of 2

1	128.2		125.9		130.4	*	172.0	127.6	141.4	
2	139.4		127.2		132.6		139.8		140.5	
3	129.7		123.3		138.8		129.4		130.8	
4	134.0		131.2		125.9		131.6		138.7	
5	140.5		122.5		140.4		132.5		133.4	
6	134.7		123.5		133.8		136.1		131.9	
7	130.7		138.9		132.4		130.4		134.6	
8	123.3		132.0		139.1		134.1		129.9	
9	139.4		120.8		127.6		125.0		128.4	
10	134.9		122.5		137.5		130.4		126.5	
11	132.4		128.1		137.3		133.9		125.9	
12	129.8		125.3		129.0		131.0		126.0	
13	133.6		132.1		125.3		127.2		129.8	
14	129.1		125.8		133.8		133.3		133.3	
15	134.7		134.9		130.4		127.2		126.9	
16	137.3		129.3		124.3		129.2		127.8	
17	131.0		140.6		132.4		136.7		132.4	
18	134.8		135.5		129.1		126.3		126.0	
19	136.8		131.3		119.8		128.3		139.9	
20	133.3		138.8		132.4		124.5		125.5	
21	134.0		134.0		135.3		127.0		126.7	
22	128.8		127.4		120.6		123.6		127.5	
23	131.6		130.4		128.2		134.0		126.6	
24	141.3		122.0	*	(127.2)	143.6	142.2		132.8	
25	130.7		123.7		128.5		135.9		132.5	
26	133.6		125.9		125.4		139.5		128.7	
27	131.7		127.0		125.4		132.8		133.6	
28	127.5		126.0		131.8		128.0		126.6	
29	129.1		128.3		134.4		131.7		126.9	
30	128.3		132.6		131.3		130.3		128.8	
31	131.9		127.3		128.6		131.7		128.8	
32	132.6		121.7		128.2		128.5		128.8	
33	134.5		129.2		132.2		128.1		128.2	
34	130.5		121.6		128.7		131.7		128.5	
35	128.3		131.6		128.1		129.3		128.8	
36	126.7		119.8		127.3		125.3		128.7	
37	125.6		124.4		128.1		128.9		128.6	
38	131.7		119.2		128.7		130.6		132.4	
39	128.6		122.0		130.6		129.8		128.4	
40	133.5		132.9		128.9		131.8		128.8	
41	134.9		124.1		127.6		132.9		128.8	
42	128.4		126.1		118.7		132.4		128.0	
43	126.9		132.5		129.4		136.0		126.5	
44	131.9		129.3		131.9		123.3		128.0	
45	129.9		128.2		128.3		130.6		128.8	
46	126.3		125.6		126.6		122.1		128.4	
47	128.0		132.4		124.5		138.4		128.4	
48	134.0		130.9		128.0		129.8		128.3	
49	131.8		128.6		132.2		133.1		126.4	
50	133.2		124.6		131.0		138.7		127.6	

77PSL3-1 Oct. 6-21-92

Data obtained Apr. 16 '92 pg. 242

1	137.7									
2	128.2									
3	131.7									
4	134.4									
5	137.1									
6	120.5									
7	130.3									
8	133.4									
9	124.2									
10	133.9									
11	133.7									
12	130.6									
13	128.1									
14	128.9									
15	130.9									
16	133.3									
17	127.2									
18	130.8									
19	129.5									
20	130.3									
21	142.8									
22	126.1									
23	127.1									
24	130.7									
25	134.7									
26	127.6									
27	127.2									
28	123.1									
29	129.9									
30	125.8									
31	130.5									
32	123.6									
33	131.3									
34	134.8									
35	131.5									
36	137.6									
37	125.6									
38	138.7									
39	132.1									
40	136.6									
41	138.4									
42	137.5									
43	139.9									
44	105.2									
45	134.0									
46	122.9									
47	131.0									
48	123.8									
49	123.8									
50	126.9									

6-21-92

77PSL3-1 Rel. 20-120 psi

Data obtained Apr. 16 '92

pg. 1 of 2

1	100.0		97.1		95.9	*	140.7	89.5	111.0
2	104.0		95.2		96.2		97.1		111.0
3	98.1		92.4		103.8		95.8		100.3
4	95.6		93.5		91.4		99.9		104.0
5	111.6		95.6		113.1		99.9		98.3
6	102.0		98.4		100.6		102.3		102.2
7	98.1		103.9		94.4		96.6		102.2
8	96.2		107.9		105.9		97.8		100.9
9	105.3		97.1		100.8		91.8		97.6
10	96.2		98.1		104.7		96.6		95.1
11	99.1		96.5		100.8		96.4		96.3
12	99.8		101.8		97.0		97.6		94.2
13	100.0		104.8		96.2		98.3		97.4
14	98.6		102.3		102.1		95.7		97.4
15	106.4		104.6		98.8		102.3		104.6
16	105.3		96.9		96.6		98.3		95.7
17	95.9		104.6		104.7		98.2		102.5
18	106.1		104.6		99.9		96.7		96.7
19	107.7		93.6		98.7		98.1		108.2
20	98.2		94.5		98.2		96.9		96.3
21	101.7		102.1		107.8		94.4		103.5
22	98.4		95.4		95.8		96.7		94.6
23	93.6		100.1	*	96.0	112.8	100.3		94.6
24	106.5		94.1		92.6		112.3		101.1
25	96.3		99.4		96.1		105.2		98.0
26	98.1		99.4		98.6		100.3	97.6	96.3
27	97.0		91.8		94.1		101.0	97.2	105.4
28	97.0		91.8		94.1		98.4	95.1	[illegible]
29	98.6		100.7		107.6		97.2		[illegible]
30	100.9		107.5		100.3		93.3		[illegible]
31	[illegible].0		93.3		97.1		97.7		[illegible]
32	[illegible].8		[illegible]		94.6		[illegible].4		97.1
33	[illegible].7		[illegible]		106.1		101.5		93.4
34	[illegible].5		[illegible]		96.9		101.1		95.0
35	99.5		[illegible]		99.5		90.4		95.0
36	[illegible].6		[illegible].0		96.3		104.0		[illegible]
37	[illegible].5		99.4		[illegible]		97.6		[illegible]
38	[illegible].1		[illegible]		97.1		[illegible]		[illegible]
39	105.9		[illegible]		[illegible]		[illegible]		[illegible]
40	101.9		[illegible]		[illegible]		[illegible]		[illegible]
41	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
42	103.4		[illegible]		[illegible]		100.0		[illegible]
43	93.4		[illegible]		[illegible]		[illegible]		[illegible]
44	100.9		[illegible]		[illegible]		[illegible]		[illegible]
45	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
46	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
47	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
48	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
49	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]
50	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]

77PSL3-1 Rel. 6-21-92

Data obtained Apr. 16-92 pg. 242

1	102.4									
2	92.3									
3	100.8									
4	99.5									
5	100.8									
6	97.6									
7	95.2									
8	100.1									
9	98.8									
10	101.2									
11	101.4									
12	102.8									
13	92.7									
14	101.4									
15	95.9									
16	101.0									
17	92.5									
18	95.9									
19	98.7									
20	98.5									
21	107.8									
22	94.9									
23	91.1									
24	97.2									
25	104.8									
26	97.2									
27	93.6									
28	89.0									
29	96.1									
30	88.9									
31	100.6									
32	94.2									
33	92.8									
34	100.6									
35	97.6									
36	103.6									
37	[illegible]									
38	[illegible]									
39	98.5									
40	101.0									
41	96.6									
42	108.6									
43	96.5									
44	93.0									
45	104.4									
46	87.3									
47	90.1									
48	90.6									
49	97.5									
50	91.8									

17-APR-1992 09:43:52.33 OPER DOOR DID NOT CLOSE 1

17-APR-1992 09:44:12.33 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 09:44:29.55 TOOL CYCLE TIMEOUT 1

7PPB PRESSURE TESTER LOT REPORT

RATING:77PGL2-1
LOT ID:MASTERS
LOT STARTED:17-APR-1992 09:43:29.56
LOT FINISHED:17-APR-1992 10:11:04.07

SETUP DATA:
DISC LOT ID: 0.00
DISC MEAN ACT: 23.4 MEAN REL: 12.7
LIMIT (MC)
ACTUATION: 90.0 TO 160.0 PSI
RELEASE: 20.0 TO 120.0 PSI
DIFFERENTIAL: 0.0 TO 160.0 PSI
MAX MILLIVOLT: 500.0 PSI
ACT CREEP TIME: 25.0 PSI
REL CREEP TIME: 130.0 PSI
PRECYCLE PRESS: 800.0 PSI
PRECYCLE COUNT: 2

NOT ENOUGH PARTS FOR REPORT ON FIXTURE 0

```
SER    1; FIX 1;  C= 0000000;  BIN=GOOD ;  MRRU=43.7;  MRRD=47.4;  LEAK RATE= 2.0
ACT=  129.2;  REL=  100.0;  DIF=  29.2 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER    2; FIX 2;  C= 0000000;  BIN=GOOD ;  MRRU=43.7;  MRRD=47.4;  LEAK RATE= 2.0
ACT=  139.4;  REL=  104.0;  DIF=  35.5 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER    3; FIX 3;  C= 0000000;  BIN=GOOD ;  MRRU=43.7;  MRRD=47.4;  LEAK RATE= 2.0
ACT=  129.7;  REL=   88.1;  DIF=  41.7 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER    4; FIX 4;  C= 0000000;  BIN=GOOD ;  MRRU=43.7;  MRRD=47.4;  LEAK RATE= 2.0
ACT=  134.0;  REL=   98.6;  DIF=  35.4 PSI;  ACTCR=  200.0ms;  RELCR=  200.0


17-APR-1992 10:11:26.79  DPER DOOR DID NOT CLOSE          1


17-APR-1992 10:11:46.79  DPER DOOR STILL DID NOT CLOSE          1


SER    5; FIX 1;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.2;  LEAK RATE= 2.0
ACT=  140.5;  REL=  111.6;  DIF=  28.9 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER    6; FIX 2;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.2;  LEAK RATE= 2.0
ACT=  134.7;  REL=  102.0;  DIF=  32.7 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER    7; FIX 3;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.2;  LEAK RATE= 2.0
ACT=  130.7;  REL=   98.1;  DIF=  32.6 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER    8; FIX 4;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.2;  LEAK RATE= 2.0
ACT=  123.3;  REL=   84.2;  DIF=  39.1 PSI;  ACTCR=  200.0ms;  RELCR=  200.0


17-APR-1992 10:12:34.38  DPER DOOR DID NOT CLOSE          1


17-APR-1992 10:12:54.38  DPER DOOR STILL DID NOT CLOSE          1


SER    9; FIX 1;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.1;  LEAK RATE= 2.0
ACT=  139.4;  REL=  105.3;  DIF=  34.1 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER   10; FIX 2;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.1;  LEAK RATE= 2.0
ACT=  124.9;  REL=   90.2;  DIF=  34.7 PSI;  ACTCR=  200.0ms;  RELCR=  200.0

SER   11; FIX 3;  C= 0000000;  BIN=GOOD ;  MRRU=44.1;  MRRD=48.1;  LEAK RATE= 2.0
ACT=  132.4;  REL=   97.1;  DIF=  35.3 PSI;  ACTCR=  200.0ms;  RELCR=  200.0
```

17-APR-1992 10:22:26.46 OPER DOOR DID NOT CLOSE 1

SER 13; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.3; LEAK RATE= 1.9
ACT= 133.6; REL= 100.0; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 14; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.3; LEAK RATE= 1.9
ACT= 129.1; REL= 92.6; DIF= 36.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 15; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.3; LEAK RATE= 1.9
ACT= 134.7; REL= 106.4; DIF= 28.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 16; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.3; LEAK RATE= 1.9
ACT= 137.3; REL= 105.3; DIF= 32.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:23:09.05 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:23:29.05 OPER DOOR STILL DID NOT CLOSE 1

SER 17; FIX 1; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=48.1; LEAK RATE= 1.7
ACT= 131.0; REL= 95.9; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 18; FIX 2; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=48.1; LEAK RATE= 1.7
ACT= 136.8; REL= 106.1; DIF= 30.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 19; FIX 3; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=48.1; LEAK RATE= 1.7
ACT= 136.8; REL= 107.7; DIF= 29.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

20 SER 20; FIX 4; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=48.1; LEAK RATE= 1.7
ACT= 133.3; REL= 98.2; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 21; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.9
ACT= 139.0; REL= 108.9; DIF= 30.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 22; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.9
ACT= 128.8; REL= 98.4; DIF= 30.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 23; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.9
ACT= 131.6; REL= 73.6x DIF= 58.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 24; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.9
ACT= 141.3; REL= 106.5; DIF= 34.8 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 25; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.5; LEAK RATE= 2.2
ACT= 129.7; REL= 88.3; DIF= 35.4 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 26; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.5; LEAK RATE= 2.2
ACT= 133.6; REL= 98.1; DIF= 35.4 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 27; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.5; LEAK RATE= 2.2
ACT= 131.7; REL= 97.0; DIF= 34.6 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 28; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.5; LEAK RATE= 2.2
ACT= 127.5; REL= 97.0; DIF= 30.5 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 29; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.2
ACT= 132.1; REL= 99.6; DIF= 32.5 PSI; ACTDR= 200.0ms; RELDR= 200.0

30 SER 30; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.2
ACT= 128.3; REL= 100.9; DIF= 27.4 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 31; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.2
ACT= 126.9; REL= 91.0; DIF= 35.9 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 32; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.2
ACT= 132.6; REL= 93.8; DIF= 38.8 PSI; ACTDR= 200.0ms; RELDR= 200.0

17-APR-1992 10:23:28.45 OPER DOOR DID NOT CLOSE 1

SER 33; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=48.6; LEAK RATE= 1.9
ACT= 134.5; REL= 103.7; DIF= 30.9 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 34; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=48.6; LEAK RATE= 1.9
ACT= 130.5; REL= 99.5; DIF= 31.1 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 35; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=48.6; LEAK RATE= 1.9
ACT= [illegible]

SER 36; FIX 6; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=48.6; LEAK RATE= 1.9
ACT= 123.7; REL= 68.6; DIF= 35.1 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 37; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=48.4; LEAK RATE= 2.0
ACT= 135.6; REL= 104.5; DIF= 31.1 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 38; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=48.4; LEAK RATE= 2.0
ACT= 131.7; REL= 98.1; DIF= 33.6 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 39; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=48.4; LEAK RATE= 2.0
ACT= 139.6; REL= 105.9; DIF= 33.6 PSI; ACTDR= 200.0ms; RELDR= 200.0

40 SER 40; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=48.4; LEAK RATE= 2.0
ACT= 133.5; REL= 101.9; DIF= 31.6 PSI; ACTDR= 200.0ms; RELDR= 200.0

17-APR-1992 10:26:35.20 OPER DOOR DID NOT CLOSE 1

SER 41; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 124.9; REL= 94.7; DIF= 30.2 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 42; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 128.4; REL= 103.4; DIF= 24.9 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 43; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 125.9; REL= 93.4; DIF= 32.5 PSI; ACTDR= 200.0ms; RELDR= 200.0

SER 44; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 131.9; REL= 100.9; DIF= 31.0 PSI; ACTDR= 200.0ms; RELDR= 200.0

17-APR-1992 10:27:06.17 OPER DOOR DID NOT CLOSE 1

SER 45; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 2.0
ACT= 129.9; REL= 97.2; DIF= 32.7 PSI; ACTDR= 200.0ms; RELDR= 200.0

[illegible] DIF= [illegible] ACTCR= 200.0ms; RELCR= 200.0

SER 47; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.5; LEAK RATE= 2.0
ACT= 129.2; REL= 96.3; DIF= 32.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 48; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.5; LEAK RATE= 2.0
ACT= 134.0; REL= 100.1; DIF= 33.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:27:52.52 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:28:12.52 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 10:28:26.19 TOOL CYCLE TIMEOUT 1

SER 49; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.1; LEAK RATE= 1.9
ACT= 131.8; REL= 101.4; DIF= 30.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 50; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.1; LEAK RATE= 1.9
ACT= 133.2; REL= 98.8; DIF= 34.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 51; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.1; LEAK RATE= 1.9
ACT= 125.9; REL= 87.1; DIF= 38.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 52; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.1; LEAK RATE= 1.9
ACT= 127.2; REL= 95.2; DIF= 32.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:31:52.41 OPER DOOR DID NOT CLOSE 1

SER 53; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.7; LEAK RATE= 1.9
ACT= 123.3; REL= 92.4; DIF= 30.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 54; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.7; LEAK RATE= 1.9
ACT= 131.2; REL= 93.5; DIF= 37.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 55; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.7; LEAK RATE= 1.9
ACT= 122.5; REL= 85.6; DIF= 36.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 56; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.7; LEAK RATE= 1.9
ACT= 133.5; REL= 99.4; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 57; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.9

SER 58; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.9
ACT= 138.0; REL= 107.9; DIF= 30.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 59; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.9
ACT= 120.8; REL= 87.1; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

60 SER 60; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.9
ACT= 122.5; REL= 88.1; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:32:38.71 OPER DOOR DID NOT CLOSE 1

SER 61; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=48.0; LEAK RATE= 2.1
ACT= 128.1; REL= 94.5; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 62; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=48.0; LEAK RATE= 2.1
ACT= 135.3; REL= 101.8; DIF= 33.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 63; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=48.0; LEAK RATE= 2.1
ACT= 137.1; REL= 104.8; DIF= 32.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 64; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=48.0; LEAK RATE= 2.1
ACT= 135.8; REL= 103.3; DIF= 32.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:33:00.40 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:33:20.40 OPER DOOR STILL DID NOT CLOSE 1

SER 65; FIX 1; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.2; LEAK RATE= 1.7
ACT= 136.9; REL= 104.6; DIF= 32.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 66; FIX 2; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.2; LEAK RATE= 1.7
ACT= 129.3; REL= 90.9; DIF= 38.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 67; FIX 3; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.2; LEAK RATE= 1.7
ACT= 140.6; REL= 104.6; DIF= 36.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 68; FIX 4; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.2; LEAK RATE= 1.7
ACT= 135.5; REL= 104.6; DIF= 30.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 69; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 131.5; REL= 93.6; DIF= 37.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

70 SER 70; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 132.8; REL= 94.5; DIF= 38.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 71; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 134.0; REL= 102.1; DIF= 32.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 72; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 127.4; REL= 92.4; DIF= 35.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:34:29.53 OPER DOOR DID NOT CLOSE 1

SER 73; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.5; LEAK RATE= 2.0
ACT= 130.4; REL= 100.1; DIF= 30.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 74; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.5; LEAK RATE= 2.0
ACT= 122.0; REL= 94.1; DIF= 27.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 75; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.5; LEAK RATE= 2.0
ACT= 122.7; REL= 89.4; DIF= 33.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 76; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.5; LEAK RATE= 2.0
ACT= 125.9; REL= 89.4; DIF= 36.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 77; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.8; MRRD=47.3; LEAK RATE= 2.0
ACT= 127.0; REL= 91.8; DIF= 35.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 78; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.8; MRRD=47.3; LEAK RATE= 2.0
ACT= 126.0; REL= 91.8; DIF= 34.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 79; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.8; MRRD=47.3; LEAK RATE= 2.0
ACT= 129.3; REL= 100.7; DIF= 28.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

80 SER 80; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.8; MRRD=47.3; LEAK RATE= 2.0
ACT= 138.6; REL= 107.5; DIF= 31.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 81; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=46.8; LEAK RATE= 2.0
ACT= 127.3; REL= 93.3; DIF= 34.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 82; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=46.8; LEAK RATE= 2.0
ACT= 121.7; REL= 89.8; DIF= 31.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 83; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=46.8; LEAK RATE= 2.0
ACT= 129.2; REL= 94.5; DIF= 34.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 84; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=46.8; LEAK RATE= 2.0
ACT= 131.6; REL= 99.6; DIF= 32.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:35:46.00 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:36:06.00 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 10:36:22.20 TOOL CYCLE TIMEOUT 1

SER 85; FIX 1; C= 0000000; BIN=GOOD ; MRRU=43.9; MRRD=47.8; LEAK RATE= 2.1
ACT= 131.6; REL= 96.7; DIF= 34.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 86; FIX 2; C= 0000000; BIN=GOOD ; MRRU=43.9; MRRD=47.8; LEAK RATE= 2.1
ACT= 117.2; REL= 83.0; DIF= 34.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 87; FIX 3; C= 0000000; BIN=GOOD ; MRRU=43.9; MRRD=47.8; LEAK RATE= 2.1
ACT= 130.4; REL= 99.4; DIF= 31.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 88; FIX 4; C= 0000000; BIN=GOOD ; MRRU=43.9; MRRD=47.8; LEAK RATE= 2.1
ACT= 119.8; REL= 90.8; DIF= 29.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:39:38.83 OPER DOOR DID NOT CLOSE 1

SER 89; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 128.0; REL= 96.4; DIF= 31.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

90 SER 90; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 133.9; REL= 99.9; DIF= 34.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 91; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9
ACT= 126.1; REL= 93.8; DIF= 32.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 92; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.8; LEAK RATE= 1.9

17-APR-1992 10:40:40.32 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:41:00.32 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 10:41:17.81 TOOL CYCLE TIMEOUT 1

SER 93; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.8; LEAK RATE= 2.0
ACT= 132.5; REL= 97.4; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 94; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.8; LEAK RATE= 2.0
ACT= 129.3; REL= 94.9; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 95; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.8; LEAK RATE= 2.0
ACT= 138.2; REL= 103.8; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 96; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.8; LEAK RATE= 2.0
ACT= 125.6; REL= 90.2; DIF= 35.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:44:39.52 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:44:59.52 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 10:45:17.91 TOOL CYCLE TIMEOUT 1

SER 97; FIX 1; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.4; LEAK RATE= 1.9
ACT= 132.4; REL= 96.9; DIF= 35.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 98; FIX 2; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.4; LEAK RATE= 1.9
ACT= 132.9; REL= 102.2; DIF= 30.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 99; FIX 3; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.4; LEAK RATE= 1.9
ACT= 123.6; REL= 87.2; DIF= 36.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 100; FIX 4; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.4; LEAK RATE= 1.9
ACT= 124.6; REL= 89.7; DIF= 35.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 102; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.8; LEAK RATE= 1.9
ACT= 132.6; REL= 90.2; DIF= 42.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 103; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.8; LEAK RATE= 1.9
ACT= 138.2; REL= 103.8; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 104; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.8; LEAK RATE= 1.9
ACT= 125.9; REL= 91.4; DIF= 34.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 105; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.8
ACT= 140.4; REL= 113.1; DIF= 27.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 106; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.8
ACT= 133.8; REL= 100.6; DIF= 33.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 107; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.8
ACT= 132.4; REL= 94.4; DIF= 38.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 108; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.2; LEAK RATE= 1.8
ACT= 139.1; REL= 105.9; DIF= 33.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:49:40.16 UPER DOOR DID NOT CLOSE 1

SER 109; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.9; LEAK RATE= 2.0
ACT= 127.6; REL= 100.8; DIF= 26.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

110 SER 110; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.9; LEAK RATE= 2.0
ACT= 137.5; REL= 104.9; DIF= 32.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 111; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.9; LEAK RATE= 2.0
ACT= 131.3; REL= 100.8; DIF= 30.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 112; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=47.9; LEAK RATE= 2.0
ACT= 129.0; REL= 97.0; DIF= 32.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 113; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0
ACT= 125.3; REL= 92.2; DIF= 33.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 114; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0
ACT= 133.2; REL= 102.1; DIF= 31.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 115; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0

SER 116; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0
ACT= 124.3; REL= 93.6; DIF= 30.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 117; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.1
ACT= 132.4; REL= 104.7; DIF= 27.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 118; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.1
ACT= 123.1; REL= 89.9; DIF= 33.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 119; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.1
ACT= 119.8; REL= 88.7; DIF= 31.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

120 SER 120; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.9; LEAK RATE= 2.1
ACT= 132.4; REL= 98.2; DIF= 34.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 121; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.8; LEAK RATE= 2.0
ACT= 135.2; REL= 107.8; DIF= 27.4 PSI; ACTCR= 200.0ms; RELCR= 122.3

SER 122; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.8; LEAK RATE= 2.0
ACT= 130.6; REL= 93.8; DIF= 36.7 PSI; ACTCR= 200.0ms; RELCR= 15.0

SER 123; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.8; LEAK RATE= 2.0
ACT= 128.2; REL= 96.0; DIF= 32.2 PSI; ACTCR= 200.0ms; RELCR= 38.4

124 SER 124; FIX 4; C= 0020000; BIN=CONT ; MRRU=44.1; MRRD=47.8; LEAK RATE= 2.0
ACT= 177.8; REL= 92.6; DIF= 85.2 PSI; ACTCR= 200.0ms; RELCR= 0.6

17-MAR-1992 10:51:29.36 OPER DOOR DID NOT CLOSE 1

SER 125; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.3; LEAK RATE= 2.4
ACT= 128.5; REL= 96.1; DIF= 32.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 126; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.3; LEAK RATE= 2.4
ACT= 123.4; REL= 89.6; DIF= 33.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 127; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.3; LEAK RATE= 2.4
ACT= 125.4; REL= 94.1; DIF= 31.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 128; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.3; LEAK RATE= 2.4
ACT= 131.2; REL= 94.1; DIF= 37.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-MAR-1992 10:51:29.36 TEST DOOR DID NOT CLOSE

17-APR-1992 10:52:29.86 OPER DOOR STILL DID NOT CLOSE 1

SER 129; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.6; LEAK RATE= 2.2
ACT= 134.4; REL= 107.6; DIF= 26.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

130 SER 130; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.6; LEAK RATE= 2.2
ACT= 131.3; REL= 100.8; DIF= 30.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 131; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.6; LEAK RATE= 2.2
ACT= 129.5; REL= 97.1; DIF= 32.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 132; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.6; LEAK RATE= 2.2
ACT= 128.2; REL= 94.6; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

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17-APR-1992 10:53:00.20 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:53:20.20 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 10:59:37.62 TOOL CYCLE TIMEOUT 1

SER 133; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=47.1; LEAK RATE= 1.8
ACT= 137.2; REL= 106.1; DIF= 31.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 134; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=47.1; LEAK RATE= 1.8
ACT= 128.7; REL= 96.9; DIF= 31.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 135; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=47.1; LEAK RATE= 1.8
ACT= 129.1; REL= 99.5; DIF= 29.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 136; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=47.1; LEAK RATE= 1.8
ACT= 127.3; REL= 91.8; DIF= 35.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:54:52.26 OPER DOOR DID NOT CLOSE 1

SER 137; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0

SER 138; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0
ACT= 130.7; REL= 97.1; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 139; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0
ACT= 132.8; REL= 103.5; DIF= 29.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

140 SER 140; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.2; LEAK RATE= 2.0
ACT= 129.9; REL= 93.5; DIF= 36.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 141; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.4; MRRD=47.5; LEAK RATE= 2.0
ACT= 127.7; REL= 96.6; DIF= 31.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 142; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.4; MRRD=47.5; LEAK RATE= 2.0
ACT= 118.7; REL= 87.2; DIF= 31.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 143; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.4; MRRD=47.5; LEAK RATE= 2.0
ACT= 124.4; REL= 88.5; DIF= 35.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 144; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.4; MRRD=47.5; LEAK RATE= 2.0
ACT= 131.7; REL= 104.6; DIF= 27.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 145; FIX 1; C= 0000000; BIN=GOOD ; MRRU=43.8; MRRD=47.1; LEAK RATE= 2.2
ACT= 138.3; REL= 108.9; DIF= 29.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 146; FIX 2; C= 0000000; BIN=GOOD ; MRRU=43.8; MRRD=47.1; LEAK RATE= 2.2
ACT= 126.6; REL= 95.8; DIF= 30.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 147; FIX 3; C= 0000000; BIN=GOOD ; MRRU=43.8; MRRD=47.1; LEAK RATE= 2.2
ACT= 131.5; REL= 97.3; DIF= 34.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 148; FIX 4; C= 0000000; BIN=GOOD ; MRRU=43.8; MRRD=47.1; LEAK RATE= 2.2
ACT= 128.0; REL= 92.4; DIF= 35.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 149; FIX 1; C= 0000000; BIN=6000 ; MRRU=44.2; MRRD=47.1; LEAK RATE= 2.2
ACT= 132.2; REL= 102.1; DIF= 30.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 150; FIX 2; C= 0000000; BIN=6000 ; MRRU=44.2; MRRD=47.1; LEAK RATE= 2.2
ACT= 131.0; REL= 98.3; DIF= 32.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 151; FIX 3; C= 0020012; BIN=CONT ; MRRU=44.2; MRRD=47.1; LEAK RATE= 2.2
ACT= 178.0; REL= 140.7; DIF= 37.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 152; FIX 4; C= 0000000; BIN=6000 ; MRRU=44.2; MRRD=47.1; LEAK RATE= 2.2
ACT= 139.2; REL= 97.1; DIF= 42.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 153; FIX 1; C= 0000000; BIN=6000 ; MRRU=44.4; MRRD=47.5; LEAK RATE= 1.9
ACT= 129.4; REL= 95.8; DIF= 33.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 154; FIX 2; C= 0000000; BIN=6000 ; MRRU=44.4; MRRD=47.5; LEAK RATE= 1.9
ACT= 131.6; REL= 99.9; DIF= 31.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 155; FIX 3; C= 0000000; BIN=6000 ; MRRU=44.4; MRRD=47.5; LEAK RATE= 1.9
ACT= 132.5; REL= 99.9; DIF= 32.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 156; FIX 4; C= 0000000; BIN=6000 ; MRRU=44.4; MRRD=47.5; LEAK RATE= 1.9
ACT= 136.1; REL= 102.3; DIF= 33.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 157; FIX 1; C= 0000000; BIN=6000 ; MRRU=44.5; MRRD=47.6; LEAK RATE= 1.9
ACT= 130.4; REL= 96.6; DIF= 33.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 158; FIX 2; C= 0000000; BIN=6000 ; MRRU=44.5; MRRD=47.6; LEAK RATE= 1.9
ACT= 134.1; REL= 97.8; DIF= 36.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 159; FIX 3; C= 0000000; BIN=6000 ; MRRU=44.5; MRRD=47.6; LEAK RATE= 1.9
ACT= 125.0; REL= 91.8; DIF= 33.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 160; FIX 4; C= 0000000; BIN=6000 ; MRRU=44.5; MRRD=47.6; LEAK RATE= 1.9
ACT= 130.4; REL= 96.6; DIF= 33.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:57:25.69 DRIVER DOOR BID NOT CLOSE 1

SER 161; FIX 1; C= 0000000; BIN=6000 ; MRRU=43.9; MRRD=47.8; LEAK RATE= 1.9
ACT= 133.2; REL= 99.4; DIF= 33.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 162; FIX 2; C= 0000000; BIN=6000 ; MRRU=43.9; MRRD=47.8; LEAK RATE= 1.9
ACT= 131.0; REL= 97.0; DIF= 34.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 163; FIX 3; C= 0000000; BIN=6000 ; MRRU=43.9; MRRD=47.8; LEAK RATE= 1.9
ACT= 177.2; REL= 99.3; DIF= 34.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 165; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 2.0
ACT= 137.2; REL= 102.3; DIF= 34.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 166; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 2.0
ACT= 129.3; REL= 98.3; DIF= 31.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 167; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 2.0
ACT= 126.7; REL= 93.2; DIF= 33.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 168; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 2.0
ACT= 125.3; REL= 86.7; DIF= 38.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 10:58:22.59 OPER DOOR DID NOT CLOSE 1

17-APR-1992 10:58:42.59 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 10:59:00.61 TOOL CYCLE TIMEOUT 1

SER 169; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.7; LEAK RATE= 2.1
ACT= 128.3; REL= 98.1; DIF= 30.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

170 SER 170; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.7; LEAK RATE= 2.1
ACT= 126.5; REL= 90.9; DIF= 35.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 171; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.7; LEAK RATE= 2.1
ACT= 127.1; REL= 94.4; DIF= 32.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 172; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.7; LEAK RATE= 2.1
ACT= 123.6; REL= 96.7; DIF= 26.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:00:53.08 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:01:13.08 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:01:29.18 TOOL CYCLE TIMEOUT 1

SER 173; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.0; LEAK RATE= 2.2
ACT= 134.0; REL= 100.3; DIF= 33.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 174; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.0; LEAK RATE= 2.2
ACT= 142.9; REL= 112.3; DIF= 30.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 175; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.0; MRRD=47.0; LEAK RATE= 2.2
ACT= 135.9; REL= 105.3; DIF= 30.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:03:27.36 OPER DOOR DID NOT CLOSE 1

SER 177; FIX 1; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.4; LEAK RATE= 1.9
ACT= 132.2; REL= 101.0; DIF= 31.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 178; FIX 2; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.4; LEAK RATE= 1.9
ACT= 128.0; REL= 98.4; DIF= 29.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 179; FIX 3; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.4; LEAK RATE= 1.9
ACT= 131.7; REL= 97.2; DIF= 34.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

180 SER 180; FIX 4; C= 0000000; BIN=0000 ; MRRU=43.7; MRRD=47.4; LEAK RATE= 1.9
ACT= 126.3; REL= 92.3; DIF= 33.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:03:52.53 OPER DOOR DID NOT CLOSE 1

SER 181; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.5; LEAK RATE= 2.0
ACT= 131.7; REL= 97.7; DIF= 34.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 182; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.5; LEAK RATE= 2.0
ACT= 128.5; REL= 96.4; DIF= 32.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 183; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.5; LEAK RATE= 2.0
ACT= 133.1; REL= 101.5; DIF= 31.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 184; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.5; LEAK RATE= 2.0
ACT= 131.7; REL= 101.1; DIF= 30.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:04:18.31 OPER DOOR DID NOT CLOSE 1

SER 185; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.0

SER 186; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.0
ACT= 135.3; REL= 104.0; DIF= 31.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 187; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.0
ACT= 129.9; REL= 97.6; DIF= 32.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 188; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.0
ACT= 132.6; REL= 102.6; DIF= 30.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:04:44.23 DRER DOOR DID NOT CLOSE 1

SER 189; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=48.5; LEAK RATE= 1.8
ACT= 135.8; REL= 106.3; DIF= 29.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

190 SER 190; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=48.5; LEAK RATE= 1.8
ACT= 125.0; REL= 90.4; DIF= 34.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 191; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=48.5; LEAK RATE= 1.8
ACT= 128.7; REL= 95.2; DIF= 33.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 192; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.5; LEAK RATE= 1.8
ACT= 132.4; REL= 100.0; DIF= 32.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 193; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.7; LEAK RATE= 2.0
ACT= 136.0; REL= 102.9; DIF= 33.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 194; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.7; LEAK RATE= 2.0
ACT= 133.3; REL= 98.0; DIF= 35.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 195; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.7; LEAK RATE= 2.0
ACT= 130.6; REL= 100.4; DIF= 30.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 196; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.7; LEAK RATE= 2.0
ACT= 122.1; REL= 90.6; DIF= 31.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 198; FIX 2; C= 0000000; BIN=5000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 2.2
ACT= 129.8; REL= 95.5; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 199; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 2.2
ACT= 133.1; REL= 104.1; DIF= 28.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

200 SER 200; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 2.2
ACT= 132.7; REL= 101.6; DIF= 31.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 201; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=46.2; LEAK RATE= 2.3
ACT= 141.4; REL= 111.0; DIF= 30.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 202; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=46.2; LEAK RATE= 2.3
ACT= 140.5; REL= 111.0; DIF= 29.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 203; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=46.2; LEAK RATE= 2.3
ACT= 130.8; REL= 100.3; DIF= 30.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 204; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=46.2; LEAK RATE= 2.3
ACT= 138.7; REL= 104.0; DIF= 34.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:06:27.81 OPER DOOR DID NOT CLOSE 1

SER 205; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.0; LEAK RATE= 2.1
ACT= 133.4; REL= 98.3; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 206; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.0; LEAK RATE= 2.1
ACT= 131.7; REL= 102.2; DIF= 29.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 207; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.0; LEAK RATE= 2.1
ACT= 134.6; REL= 102.2; DIF= 32.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 208; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.0; LEAK RATE= 2.1
ACT= 129.9; REL= 100.9; DIF= 29.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:07:09.87 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:07:29.87 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:07:46.87 TOOL CYCLE TIMEOUT 1

[illegible] LEAK RATE= 1.7
ACT= 128.4; REL= 97.6; DIF= 30.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 210; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=47.4; LEAK RATE= 1.9
ACT= 126.5; REL= 95.1; DIF= 31.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 211; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=47.4; LEAK RATE= 1.9
ACT= 132.9; REL= 96.3; DIF= 36.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 212; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=47.4; LEAK RATE= 1.9
ACT= 126.0; REL= 94.2; DIF= 31.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 213; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.5; MRRD=47.5; LEAK RATE= 2.1
ACT= 129.8; REL= 97.4; DIF= 32.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 214; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.5; MRRD=47.5; LEAK RATE= 2.1
ACT= 133.3; REL= 97.4; DIF= 35.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 215; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.5; MRRD=47.5; LEAK RATE= 2.1
ACT= 136.9; REL= 104.0; DIF= 32.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 216; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.5; MRRD=47.5; LEAK RATE= 2.1
ACT= 127.2; REL= 93.7; DIF= 33.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:16:06.02 OPER DOOR DID NOT CLOSE

SER 217; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 133.4; REL= 102.5; DIF= 30.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 218; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 125.0; REL= 92.7; DIF= 32.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 219; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 139.7; REL= 108.2; DIF= 31.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 220; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 125.3; REL= 90.3; DIF= 35.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:16:31.42 OPER DOOR DID NOT CLOSE 1

SER 221; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 134.7; REL= 103.5; DIF= 31.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 222; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 127.5; REL= 94.6; DIF= 32.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 223; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 126.6; REL= 94.6; DIF= 32.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 224; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 133.8; REL= 101.1; DIF= 32.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:16:56.88 OPER DOOR DID NOT CLOSE 1

SER 225; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=46.7; LEAK RATE= 1.9
ACT= 132.5; REL= 98.0; DIF= 34.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 226; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=46.7; LEAK RATE= 1.9
ACT= 129.9; REL= 90.3; DIF= 39.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 227; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=46.7; LEAK RATE= 1.9
ACT= 133.5; REL= 105.4; DIF= 28.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 228; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=46.7; LEAK RATE= 1.9
ACT= 126.6; REL= 89.3; DIF= 37.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:17:29.27 OPER DOOR DID NOT CLOSE 1

SER 229; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.6
ACT= 124.9; REL= 92.3; DIF= 32.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

230 SER 230; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.6
ACT= 127.2; REL= 93.5; DIF= 33.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 231; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.6

SER 232; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.5; LEAK RATE= 1.8
ACT= 130.8; REL= 97.1; DIF= 33.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:17:52.80 OPER DOOR DID NOT CLOSE 1

SER 233; FIX 1; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.6; LEAK RATE= 1.9
ACT= 117.2; REL= 82.4; DIF= 34.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 234; FIX 2; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.6; LEAK RATE= 1.9
ACT= 128.9; REL= 95.0; DIF= 33.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 235; FIX 3; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.6; LEAK RATE= 1.9
ACT= 129.3; REL= 95.0; DIF= 34.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 236; FIX 4; C= 0000000; BIN=0000 ; MRRU=43.8; MRRD=47.6; LEAK RATE= 1.9
ACT= 129.7; REL= 96.3; DIF= 33.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 237; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.9; LEAK RATE= 1.7
ACT= 126.6; REL= 93.8; DIF= 32.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 238; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.9; LEAK RATE= 1.7
ACT= 132.4; REL= 98.7; DIF= 33.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 239; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.9; LEAK RATE= 1.7
ACT= 132.4; REL= 99.9; DIF= 32.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 240; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=47.9; LEAK RATE= 1.7
240 ACT= 126.9; REL= 92.6; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 241; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.5; MRRD=47.5; LEAK RATE= 1.8
ACT= 135.2; REL= 108.3; DIF= 26.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 242; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.5; MRRD=47.5; LEAK RATE= 1.8

SER 243; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=47.5; LEAK RATE= 1.8
ACT= 126.5; REL= 93.9; DIF= 32.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 244; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.5; MRRD=47.5; LEAK RATE= 1.8
ACT= 136.0; REL= 103.0; DIF= 33.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:19:07.88 OPEN DOOR DID NOT CLOSE 1

17-APR-1992 11:19:27.88 OPEN DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:19:46.19 TOOL CYCLE TIMEOUT 1

SER 245; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.4; LEAK RATE= 1.8
ACT= 138.9; REL= 104.2; DIF= 34.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 246; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.4; LEAK RATE= 1.8
ACT= 130.4; REL= 100.2; DIF= 30.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 247; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.4; LEAK RATE= 1.8
ACT= 126.4; REL= 96.4; DIF= 30.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 248; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=47.4; LEAK RATE= 1.8
ACT= 139.3; REL= 108.1; DIF= 31.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 249; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.1
ACT= 126.4; REL= 92.3; DIF= 34.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

250 SER 250; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.1
ACT= 137.5; REL= 109.2; DIF= 28.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 251; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.1
ACT= 131.7; REL= 102.4; DIF= 29.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 252; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.6; LEAK RATE= 2.1
ACT= 128.2; REL= 92.3; DIF= 35.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:22:27.92 OPEN DOOR DID NOT CLOSE 1

17-APR-1992 11:22:47.92 OPEN DOOR STILL DID NOT CLOSE 1

SER 253; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.0; LEAK RATE= 2.0
ACT= 131.7; REL= 100.8; DIF= 30.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 254; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.0; LEAK RATE= 2.0
ACT= 134.4; REL= 99.5; DIF= 34.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 255; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.2; MRRD=47.0; LEAK RATE= 2.0

SER 256; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=47.0; LEAK RATE= 2.0
ACT= 120.5; REL= 87.5; DIF= 33.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:23:22.47 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:23:42.47 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:23:59.21 TOOL CYCLE TIMEOUT 1

SER 257; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.6; MRRD=47.8; LEAK RATE= 1.8
ACT= 130.3; REL= 95.2; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 258; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.6; MRRD=47.8; LEAK RATE= 1.8
ACT= 133.4; REL= 100.1; DIF= 33.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 259; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.6; MRRD=47.8; LEAK RATE= 1.8
ACT= 124.2; REL= 98.8; DIF= 25.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 260; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.6; MRRD=47.8; LEAK RATE= 1.8
ACT= 133.9; REL= 101.2; DIF= 32.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:30:18.24 OPER DOOR DID NOT CLOSE 1

SER 261; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.1; LEAK RATE= 2.1
ACT= 133.7; REL= 101.4; DIF= 32.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 262; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.1; LEAK RATE= 2.1
ACT= 130.6; REL= 102.8; DIF= 27.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 263; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.1; LEAK RATE= 2.1
ACT= 128.1; REL= 92.7; DIF= 35.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 264; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.2; MRRD=48.1; LEAK RATE= 2.1
ACT= 128.9; REL= 101.4; DIF= 27.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 265; FIX 1; C= 0000000; BIN=8000 ; MRRU=44.4; MRRD=47.7; LEAK RATE= 2.3
ACT= 130.8; REL= 95.9; DIF= 35.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 266; FIX 2; C= 0000000; BIN=8000 ; MRRU=44.4; MRRD=47.7; LEAK RATE= 2.3
ACT= 133.3; REL= 101.0; DIF= 32.3 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 267; FIX 3; C= 0000000; BIN=8000 ; MRRU=44.4; MRRD=47.7; LEAK RATE= 2.3
ACT= 127.2; REL= 92.5; DIF= 34.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 268; FIX 4; C= 0000000; BIN=8000 ; MRRU=44.4; MRRD=47.7; LEAK RATE= 2.3
ACT= 130.8; REL= 95.9; DIF= 35.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 269; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.0; MRRD=47.3; LEAK RATE= 2.0
ACT= 129.5; REL= 93.7; DIF= 35.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 270; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.0; MRRD=47.3; LEAK RATE= 2.0
ACT= 130.3; REL= 95.5; DIF= 31.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 271; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.0; MRRD=47.3; LEAK RATE= 2.0
ACT= 142.8; REL= 107.8; DIF= 34.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 272; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.0; MRRD=47.3; LEAK RATE= 2.0
ACT= 126.1; REL= 94.9; DIF= 31.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 273; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.7; LEAK RATE= 1.5
ACT= 127.1; REL= 91.1; DIF= 36.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 274; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.7; LEAK RATE= 1.5
ACT= 130.7; REL= 97.2; DIF= 33.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 275; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.7; LEAK RATE= 1.5
ACT= 134.7; REL= 104.8; DIF= 29.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 276; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.7; LEAK RATE= 1.5
ACT= 127.6; REL= 97.2; DIF= 30.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:32:08.07 OPER DOOR DID NOT CLOSE

SER 277; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.0; LEAK RATE= 1.8
ACT= 127.2; REL= 93.6; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 278; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.0; LEAK RATE= 1.8
ACT= 123.1; REL= 89.0; DIF= 34.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 279; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.0; LEAK RATE= 1.8
ACT= 129.9; REL= 96.1; DIF= 33.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 280; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.4; MRRD=48.0; LEAK RATE= 1.8
ACT= 125.2; REL= 88.0; DIF= 37.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:32:33.64 OPER DOOR DID NOT CLOSE 1

SER 281; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 130.5; REL= 100.6; DIF= 29.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 282; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 123.6; REL= 93.2; DIF= 30.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 283; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 131.3; REL= 96.8; DIF= 34.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 284; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=47.7; LEAK RATE= 1.9
ACT= 134.2; REL= 100.6; DIF= 33.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:33:01.28 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:33:21.28 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:33:37.15 TOOL CYCLE TIMEOUT 1

SER 285; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.7; LEAK RATE= 2.1
ACT= 131.5; REL= 99.6; DIF= 32.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 286; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.7; LEAK RATE= 2.1
ACT= 137.6; REL= 103.6; DIF= 34.0 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 287; FIX 3; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.7; LEAK RATE= 2.1
ACT= 125.6; REL= 89.8; DIF= 35.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 288; FIX 4; C= 0000000; BIN=GOOD ; MRRU=44.3; MRRD=48.7; LEAK RATE= 2.1
ACT= 129.1; REL= 99.6; DIF= 29.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:42:46.51 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:43:06.51 OPER DOOR STILL DID NOT CLOSE 1

SER 289; FIX 1; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=48.0; LEAK RATE= 2.0
ACT= 133.1; REL= 98.5; DIF= 34.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

290 SER 290; FIX 2; C= 0000000; BIN=GOOD ; MRRU=44.1; MRRD=48.0; LEAK RATE= 2.0
ACT= 126.6; REL= 101.1; DIF= 25.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 291; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=48.0; LEAK RATE= 2.0
ACT= 129.4; REL= 99.6; DIF= 29.8 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 292; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.1; MRRD=48.0; LEAK RATE= 2.0
ACT= 137.5; REL= 103.6; DIF= 33.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:43:52.41 OPER DOOR DID NOT CLOSE 1

SER 293; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 129.9; REL= 95.5; DIF= 34.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 294; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 125.2; REL= 93.0; DIF= 32.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 295; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 134.0; REL= 104.4; DIF= 29.5 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 296; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.6; LEAK RATE= 2.0
ACT= 122.9; REL= 87.3; DIF= 35.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:44:31.03 OPER DOOR DID NOT CLOSE 1

SER 297; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 1.9
ACT= 131.0; REL= 99.1; DIF= 31.9 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 298; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 1.9
ACT= 123.8; REL= 90.6; DIF= 33.2 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 299; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 1.9
ACT= 123.8; REL= 97.5; DIF= 26.4 PSI; ACTCR= 200.0ms; RELCR= 200.0

300 SER 300; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.2; MRRD=47.2; LEAK RATE= 1.9
ACT= 126.9; REL= 91.8; DIF= 35.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:45:11.54 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:45:31.54 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:45:46.25 TOOL CYCLE TIMEOUT 1

SER 301; FIX 1; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.7; LEAK RATE= 1.9

SER 302; FIX 2; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.7; LEAK RATE= 1.9
ACT= 127.6; REL= 89.5; DIF= 38.1 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 303; FIX 3; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.7; LEAK RATE= 1.9
ACT= 129.8; REL= 103.2; DIF= 26.7 PSI; ACTCR= 200.0ms; RELCR= 200.0

SER 304; FIX 4; C= 0000000; BIN=0000 ; MRRU=44.3; MRRD=47.7; LEAK RATE= 1.9
ACT= 133.4; REL= 101.8; DIF= 31.6 PSI; ACTCR= 200.0ms; RELCR= 200.0

17-APR-1992 11:46:18.12 OPER DOOR DID NOT CLOSE 1

7749 PRESSURE TESTER LOT REPORT

RATING:77PSL2-1
LOT ID:1-A-2107
LOT STARTED:17-APR-1992 10:11:04.08
TIME PRINTED:17-APR-1992 11:46:42.95

SETUP DATA:
DIBC LOT ID: 0.00
DIBC MEAN ACT: 23.4 MEAN REL: 12.7
LIMIT (NC)
ACTUATION: 90.0 TO 160.0 PSI
RELEASE: 20.0 TO 120.0 PSI
DIFFERENTIAL: 0.0 TO 160.0 PSI
MAX MILLIVOLT: 500.0 PSI
ACT CREEP TIME: 25.0 PSI
REL CREEP TIME: 150.0 PSI
PRECYCLE PRESS: 800.0 PSI
PRECYCLE COUNT: 2

NUMBER OF PIECES TESTED: 304
NUMBER OF PIECES GOOD: 302
YIELD: 99.34 %

REJECT COUNTS

LEAK	0	0.00 %
CONT	2	100.00 %
ACCP	0	0.00 %
ACLO	0	0.00 %
ACHI	0	0.00 %
RLHI	0	0.00 %
RLLO	0	0.00 %
DFLO	0	0.00 %
RLCR	0	0.00 %
DFHI	0	0.00 %

STATISTICS	MEAN	SIGMA	[redacted]
ACTUATION:	130.6	4.89	2.00
RELEASE:	97.7	5.96	1.25
MILLIVOLT:	0.0	0.00	0.00
DIFFERENTIAL:	32.9	3.19	3.44

HISTOGRAM OF ACTUATION PRESSURE

```
          10  20  30  40  50  60  70  80  90 100
          ---+---+---+---+---+---+---+---+---+---+
 UNDER   0| |
 117.5   3| |**
 120.0   5| |***
 122.5  17| |*********
 125.0  29| |****************
 127.5  54| |*******************************
 130.0  58| |*********************************
 132.5  64| |************************************
 135.0  32| |******************
 137.5  21| |************
 140.0  14| |********
 142.5   5| |***
  OVER   0| |
```

HISTOGRAM OF RELEASE PRESSURE

```
          10  20  30  40  50  60  70  80  90 100
          ---+---+---+---+---+---+---+---+---+---+
 UNDER   0| |
  75.0   1| |*
  80.0   1| |*
  85.0  10| |*****
  90.0  46| |************************
  95.0  91| |************************************************
 100.0  91| |************************************************
 105.0  45| |************************
 110.0  15| |********
 115.0   2| |*
  OVER   0| |
```

HISTOGRAM OF DIFFERENTIAL PRESSURE

```
                  20   40   60   80  100  120  140  160  180  200
                ---+----+----+----+----+----+----+----+----+----+
UNDER     0|      |
 25.0    13|      |***
 30.0   121|      |**********************************
 35.0   153|      |***********************************************
 40.0    14|      |*****
 45.0     0|      |
 50.0     0|      |
 55.0     0|      |
 60.0     1|      |
 OVER     0|      |
```

HISTOGRAM OF ACTUATION CREEP

```
                   5   10   15   20   25   30   35   40   45   50
                 ----+----+----+----+----+----+----+----+----+----+
UNDER     0|      |
 35.0     0|      |
 OVER   302|      |+++++++++++++++++++++++++++++++++++++++++++++++++++
```

HISTOGRAM OF RELEASE CREEP

```
                   5   10   15   20   25   30   35   40   45   50
                 ----+----+----+----+----+----+----+----+----+----+
UNDER     0|      |
 15.0     1|      |*
 20.0     0|      |
 25.0     0|      |
 30.0     0|      |
 35.0     0|      |
 40.0     1|      |*
 45.0     0|      |
 50.0     0|      |
 55.0     0|      |
 60.0     0|      |
 65.0     0|      |
 70.0     0|      |
 75.0     0|      |
 80.0     0|      |
 85.0     0|      |
 90.0     0|      |
 95.0     0|      |
100.0     0|      |
105.0     0|      |
110.0     0|      |
115.0     0|      |
120.0     1|      |*
125.0     0|      |
130.0     0|      |
135.0     0|      |
140.0     0|      |
145.0     0|      |
150.      0|      |
```

```
160.0    0|
165.0    0|
170.0    0|
175.0    0|
180.0    0|
185.0    0|
 OVER  299|
```

17-APR-1992 11:46:54.31 OPER DOOR DID NOT CLOSE 1

17-APR-1992 11:47:14.31 OPER DOOR STILL DID NOT CLOSE 1

17-APR-1992 11:47:30.04 TOOL CYCLE TIMEOUT 1

TEST REPORT

TI-NHTSA 008457

INITIAL SAMPLE WARRANT

No. 360068

PART INFORMATION

Part Name NEXT GENERATION SPEED CONTROL DEACTIVATION SWITCH Part Number F2AC-9F924-AA

Control Item ☐ Yes ☒ No Engineering Change Level _____ Date _____

Engineering Change Authorization _____ Date _____

Shown on Drawing No. F2AC-9F924-AA Part Weight .062 kg

Reason for Initial Sample:

- ☒ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling Transfer
- ☐ Other — Please Specify _____
- ☐ Change in Optional Construction or Material
- ☐ Additional, Replacement, or Refurbished Tooling
- ☐ Correction of Discrepancy (Resubmission No. _____)
- ☐ Process Change
- ☐ Change in Subcontractor or Source
- ☐ Parts Produced at Additional Location

SUPPLIER INFORMATION (Manufacturing Location)

Supplier Name TEXAS INSTRUMENTS INC. Street Address 34 FOREST STREET

City ATTLEBORO State MA. Postal Code 02703 Country USA

Supplier Mfg. Location Code — DUNS T095A/7325814 Customer Assigned _____

CUSTOMER INFORMATION

Customer Name DANA CORPORATION Buyer GRANT SIMMONS Buyer Code _____

Purchase Order Number _____ Sample Acceptance Level _____

Application NEXT GENERATION SPEED CONTROL DEACTIVATION SWITCH

RESULTS

The results for dimensional measurements [X], material tests [X], and functional (ES) tests [X] meet all drawing and specification requirements ☒ Yes ☐ No

Submission Checklist

- ☑ Checked Print
- ☐ Auxiliary Drawings/Sketches
- ☑ Correct Number of Samples
- ☑ Dimensional Results
- ☑ Material Test Results
- ☑ Certifications
- ☑ Functional (ES) Test Results
- ☐ Product Engineering Approval
- ☑ Control Plan
- ☑ Process Capability Results
- ☑ Process Flow Diagram
- ☑ Gage (Measurement) Studies

Supporting data for all requirements are available upon request.

COMMENTS:

_____

_____

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts and have been made to the applicable customer drawings and specifications from specified materials, on regular production tooling with no operations other than the regular production process.

Authorized Signature J. Watt. Fops QI Date 8/19/92

Print Name JIM WATT Title QRA ENGINEER Phone No. (508)699-1719

APPROVAL (when required by customer procedure) ☐ Approved ☐ Rejected

Signature _____ Date _____

INITIAL SAMPLE WARRANT

No. 112389

PART INFORMATION

Part Name: Next Generation Speed Control Deactivation Safety Switch — Part Number: F2AC-9F924-AA

Control Item ☐ Yes ☐ No — Engineering Change Level: _____ — Date: _____

Engineering Change Authorization: Bruce Haeroff — Date: _____

Shown on Drawing No.: F2AC-9F924-AA — Part Weight: .062 lb

Reason for Initial Sample:

- ☐ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling Transfer
- ☐ Change in Optional Construction or Material
- ☐ Additional, Replacement, or Refurbished Tooling
- ☐ Correction of Discrepancy (Resubmission No. _____)
- ☐ Process Change
- ☐ Change in Subcontractor or Source
- ☐ Parts Produced at Additional Location
- ☐ Other — Please Specify: _____

SUPPLIER INFORMATION (Manufacturing Location)

Supplier Name: Texas Instruments — Street Address: 34 Forest St.

City: Attleboro — State: MA — Postal Code: 02703 — Country: USA

Supplier Mfg. Location Code – DUNS: T097K/7325814 — Customer Assigned: _____

CUSTOMER INFORMATION

Customer Name: Ford Motor Co. NAAO — Buyer: Fred Bandarahot — Buyer Code: 165

Purchase Order Number: _____ — Sample Acceptance Level: _____

Application: Next Generation Speed Control Deactivation Safety Switch

RESULTS

The results for dimensional measurements ☒, material tests ☒, and functional (ES) tests ☒ meet all drawing and specification requirements ☒ Yes ☐ No — PARTIAL

Submission Checklist

- ☒ Checked Print
- ☐ Auxiliary Drawings/Sketches
- ☐ Correct Number of Samples
- ☒ Dimensional Results
- ☐ Material Test Results
- ☒ Certifications
- ☒ Functional (ES) Test Results Partial
- ☐ Product Engineering Approval
- ☒ Control Plan
- ☐ Process Capability Results
- ☒ Process Flow Diagram
- ☒ Gage (Measurement) Studies

Supporting data for all requirements are available upon request.

COMMENTS:

Partial ISW to expedite use of "Quiet"Switch, full submission to be complete by 6/22/92. Bruce Haeroff visited TI on 4/13, 4/14 to review program status.

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts and have been made to the applicable customer drawings and specifications from specified materials, on regular production tooling with no operations other than the regular production process.

Authorized Signature: Michael DeMattia — Date: 4-13-92

Print Name: Michael DeMattia — Title: SQA ENGINEER — Phone No. (508) 699-3090

APPROVAL (when required by customer procedure) ☐ Approved ☐ Rejected

Signature: _____ — Date: _____

Quality Doc 292c

TI-NHTSA 006459

Initial Sample Report – Dimensional

No. 112389

Page ____ of ____

TO BE COMPLETED BY SUPPLIER

SUPPLIER LOCATION	CODE	PART NUMBER
Texas Instruments Incorporated Attleboro, MA	Y097K	E2AC-9F824-AA

BUYER CODE	FORD CONSUMER DIV.	NO. OF SAMPLES	PRODUCT SHOWN DESIGNATED CONTROL ITEM (▽)
			YES ☐ NO ☐

REASON FOR SAMPLES

NEW PART ☐ CHANGED PART ☐ NEW LOCATION ☐ NEW TOOLS ☐ MULTIPLE CAVITY DIES ☐

PART NAME		
Next Generation Speed Control Deactivation Safety Switch		
E/P DATE: Pending	MODEL YEAR AND PROGRAM NAME: 92.5 EN53	
ECI DISPOSITION PENDING ☐	ENGINEERING DEVIATION NO.	

SAMPLE MADE ON PRODUCTION SET-UP AND TOOLS	YES ☐ NO ☐	ADDITIONAL HAND OR TOOL ROOM WORK PERFORMED	YES ☐ NO ☐	WE HEREBY CERTIFY THE INSPECTION RESULTS BELOW ARE CORRECT AND THAT OUR SAMPLE MEETS YOUR MINOR QUALITY SPECIFICATIONS.
SAMPLE MADE TO E/P DATED		DATE INSPECTED		SIGNATURE OF SUPPLIER'S REPRESENTATIVE: Richard Wilhelm Quality Engr 4/18/02

CHARACTERISTIC DIMENSION OR SPECIFICATION	CLASS ▽		SUPPLIER INSPECTION RESULTS	CONSUMER VERIFICATION OF INSPECTION RESULTS	PROCESS CAPABILITY STUDY REQUIRED	PROCESS CAPABILITY STUDY COMPLETED
Partial			VAI Results recorded on TI Format			

TO BE COMPLETED BY CONSUMER

DISPOSITION	SERIAL NO.	APPROVED	REJECTED	NOT RECD.			
					INSPECTION AND TESTING INSTRUCTIONS APPROVED	YES ☐ NO ☐	SPECIAL BANDS APPROVED YES ☐ NO ☐ NOT RECD ☐
DIMENSIONAL E/P DATED	XXXX				INITIAL SAMPLE APPROVAL MUST BE RE-SUBMITTED BY APPROVAL OF FIRST PRODUCTION SHIPMENT	YES ☐ NO ☐	CONTROL PLAN APPROVED YES ☐ NO ☐ NOT RECD ☐
MATERIAL TEST 370a FORM					APPROVED BY STYLING	YES ☐ NO ☐ NOT RECD ☐	APPROVED BY FORD ENGINEERING YES ☐ NO ☐ NOT RECD ☐
MI TEST 344 FORM					DIVISION	AUTHORIZED SIGNATURE	DATE

Prod Qual Dept QE 292a

*DESIGNATED CHARACTERISTIC CLASS

FORM 4

Ford

INITIAL SAMPLE WARRANT

No. 112384

PART INFORMATION

Part Name: NEXT GENERATION SPEED CONTROL — Part Number: F2VC-9F924-AB

Control Item: ☒ Yes ☐ No — Engineering Change Level: G — Date: 4-11-91

Engineering Change Authorization: ~~ADVICE PENDING~~ — Date:

Shown on Drawing No.: F2VC-9F924-AB — Part Weight: 062 lb

Reason for Initial Sample:

- ☐ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling Transfer
- ☐ Other -- Please Specify
- ☐ Change in Optional Construction or Material
- ☐ Additional, Replacement, or Refurbished Tooling
- ☒ Correction of Discrepancy (Resubmission No. ____) SEE BELOW
- ☐ Process Change
- ☐ Change in Subcontractor or Source
- ☐ Parts Produced at Additional Location

SUPPLIER INFORMATION (Manufacturing Location)

Supplier Name: TEXAS INSTRUMENTS — Street Address: 34 FOREST STREET

City: ATTLEBORO — State: MA — Postal Code: 02703 — Country: USA

Supplier Mfg. Location Code -- DUNS: TQ97K — Customer Assigned: FORD MOTOR CO - EED

CUSTOMER INFORMATION

Customer Name: FORD MOTOR CO - EED — Buyer: FRED HENDERSHOT — Buyer Code: 165

Purchase Order Number: — Sample Acceptance Level: 2

Application: NEXT GENERATION SPEED CONTROL

RESULTS

The results for dimensional measurements ☒, material tests ☒, and functional (ES) tests ☐ meet all drawing and specification requirements ☒ Yes ☐ No

Submission Checklist

- ☐ Checked Print
- ☐ Auxiliary Drawings/Sketches
- ☐ Correct Number of Samples
- ☒ Dimensional Results
- ☐ Material Test Results
- ☐ Certifications
- ☒ Functional (ES) Test Results
- ☐ Product Engineering Approval
- ☐ Control Plan
- ☐ Process Capability Results
- ☐ Process Flow Diagram
- ☐ Gage (Measurement) Studies

Supporting data for all requirements are available upon request.

COMMENTS:

ISR SUPPLEMENT WITH ADDITIONAL TESTING TO CLOSE OUT ALERT NO. A10166193;

ALSO, CORRECTED BASE MOLD DIMENSIONS. PART PREVIOUSLY APPROVED ON ISIR #112384, DATED 9/27/91

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts and have been made to the applicable customer drawings and specifications from specified materials, on regular production tooling with no operations other than the regular production process.

Authorized Signature: Jim Watt — Date: 12/20/91

Print Name: JIM WATT — Title: QA ENGINEER — Phone No.: 508-699-1719

APPROVAL (when required by customer Procedure) ☒ Approved ☐ Rejected

Signature: Patricia Chalifoux SQA — Date: 1/14/92

Form No. 292C

TI-NHTSA 006461

DRAWINGS AVAILABLE UPON REQUEST