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SANDIA SYSTEMATIC DECLASSIFICATION [redacted]
DOWNGRADING OR DECLASSIFICATION STAMP

CLASSIFICATION CHANGED TO: U
AUTHORITY: W.C. Layne
Emilda Selph 6/15/98
PERSON CHANGING MARKING & DATE
RECORD ID: 98SN2375
WC Layne 6-15-98
PERSON VERIFYING MARKING & DATE
DATED: 6/11/98

FEB 29 1960
2/27/60

TX-43 3-2
Project No. T-16675
Case No. 734.00

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW

1st Review Date: 5/29/98
Authority: ADD
Name: R B Craner
2nd Review Date: 6/11/98
Authority: ADD
Name: W Layne

Determination (Circle Number)
1. Classification Retained
2. Classification Changed to: U
3. Contains No DOE Classified Information
4. Coordinate With:
5. Contains UCAI?
6. Comments: Releasable

TO: DISTRIBUTION

Re: Static Test of TX-43 Aft Case Section

PROGRAM 04580
CATEGORY 30233
ORG. 000
DATE 6015


Summary

A TX-43 aft case section was tested to failure with simulated parachute deployment loads. Failure occurred at approximately 85 percent of design limit load, and consisted of buckling of the case section forward end near two holes cut for telemetering equipment.


Object

The object of this test was to determine the failure loads for the TX-43 aft case section subjected to statically simulated parachute deployment loads. Details of the case section are given in Dwg. No. 144881. The bulkhead and clamp ring used to mount the case section are detailed in Dwg. Nos. 143999 and 150092, respectively.

Authorization for Test

The test was performed in accordance with a Work Order Authorization from L. A. Dunn, 1222, to A. W. Reger. Mr. G. A. Norris, Jr., [illegible] was the consultant.

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CENTRAL RECORD FILE

Equipment and Instrumentation

The following equipment was used in the test:

1 - Boxed cell bar, Ser. No. 6.
1 - Baldwin load cell, 20,000 pounds capacity, Ser. No. 2246.
2 - Baldwin strain indicators, Ser. Nos. 391902 and J-59101.
1 - Simplex 50-ton hydraulic jack.
1 - Blackhawk 50-ton hydraulic jack.
2 - Hydraulic hand pumps.

The following instrumentation was used:

10 - BR-4 three-element rectangular rosette strain gages, Type FAER-25-12, gage factor 2.1[illegible], resistance 120,[illegible]0.5 ohms, Lot No. [illegible]
3 - Starrett dial indicators, least graduation 0.001 inch, full range 1.0 inch.
2 - Axes dial indicators, least graduation 0.001 inch, full range 3.0 inches.

CENTRAL RECORD FILE
ACCOUNTABILITY CARD
FILE No. TX-43 3-2

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Distribution

Memo No. 2-16475

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**Procedure**

The TX-43 aft case section was instrumented with strain gages as shown in Figs. 1 thru 4. It was then mounted horizontally in the static test jig. The case section was attached to a bulkhead by the clamp ring after the bulkhead had been bolted to the jig back plate. Two loads were applied: an axial load applied to the aft end of the case section, and a side load applied by a strap around the case section near the aft end. Figures 5 thru 7 show the setup and locations of the loads.

Loads were applied in increments of design limit load until failure. Strain gage and dial indicator readings were taken at each increment. Locations of the dial indicators are shown in Figs. 5 and 7.

**Results**

Strain gage readings are given in Table I and calculated principal stresses in Table II. Displacements determined from dial indicator readings are given in Table III.

Failure occurred at approximately 85 per cent of design limit load (strap load of 13,900 pounds plus an axial load of 9300 pounds). Failure consisted of buckling of the case section skin on the compression (upper) side near the forward end. This is shown in Fig. 8 and also in Fig. 3. Buckling occurred near two holes cut in the case skin to accommodate telemetering equipment (see Fig. 2).

**Conclusions**

The test cannot be considered conclusive because failure occurred near telemetering equipment holes. These holes, not present in final design case sections, probably contributed to a premature failure.

W. H. Sigmon

W. H. SIGMON - 1612-1

H. W. Bauder

1613 Project Engineer: D. H. BAUDER - 1613-3

Approved by: R. S. HOOPER - 1613-3

WHS:1612-1:ec

Enc: Figs. 1 thru 8
Tables I thru III

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[redacted]



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Copy to:

L. A. Dunn, 1222
Attn: G. A. Norris, Jr.
W.A. Gardner, 1610
D. M. Bruce, 1282
J. M. Hiesen, 1592
J. R. Harrison, 5523
R. K. Smaltzer, 3421-3

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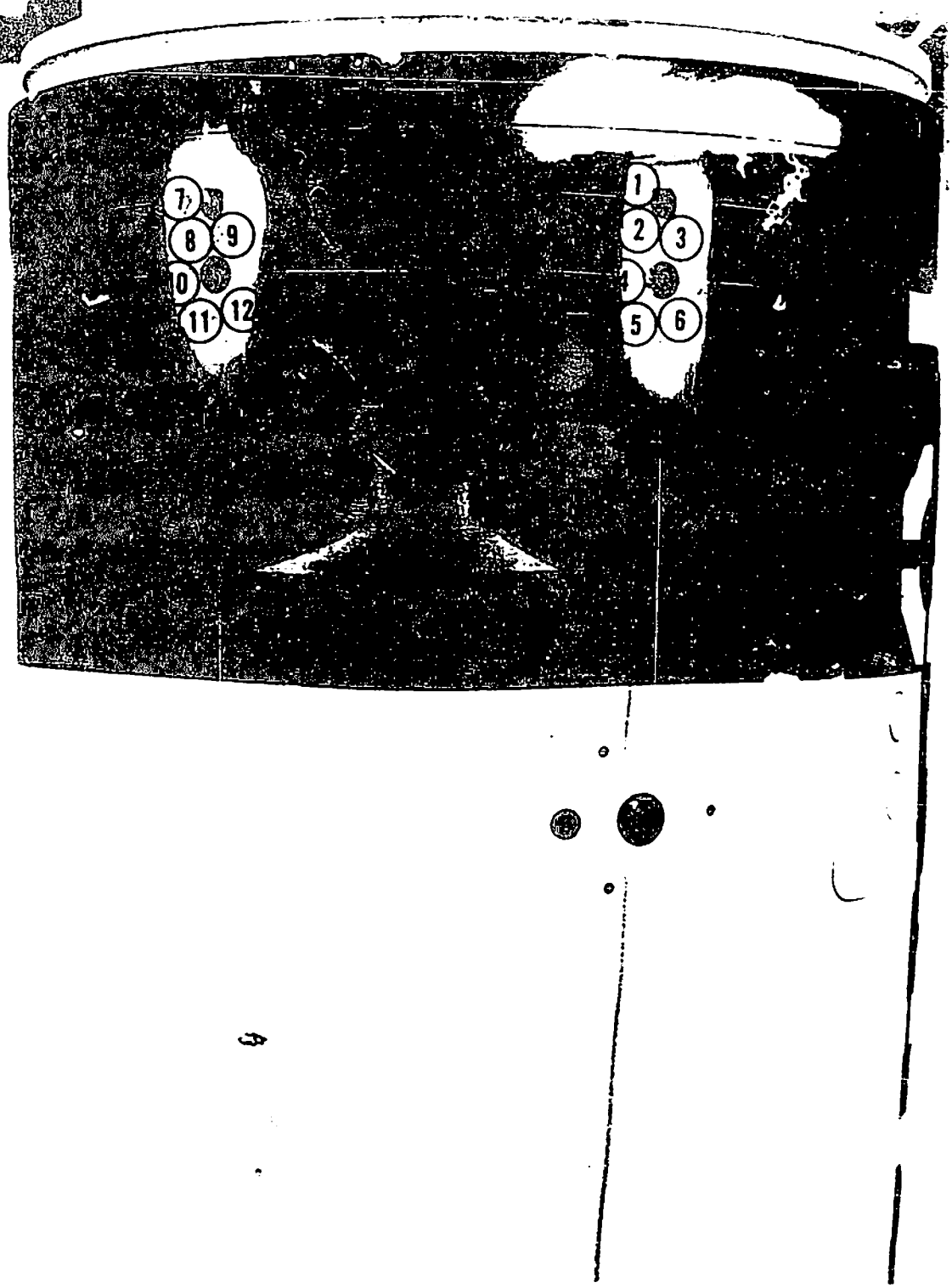


FIGURE 1 - LOCATION OF STRAIN GAGES ON OUTSIDE OF SKIN ON TENSION SIDE OF CASE - STATIC TEST OF TX-43 AFT CASE SECTION

PROJECT NO. T-16675

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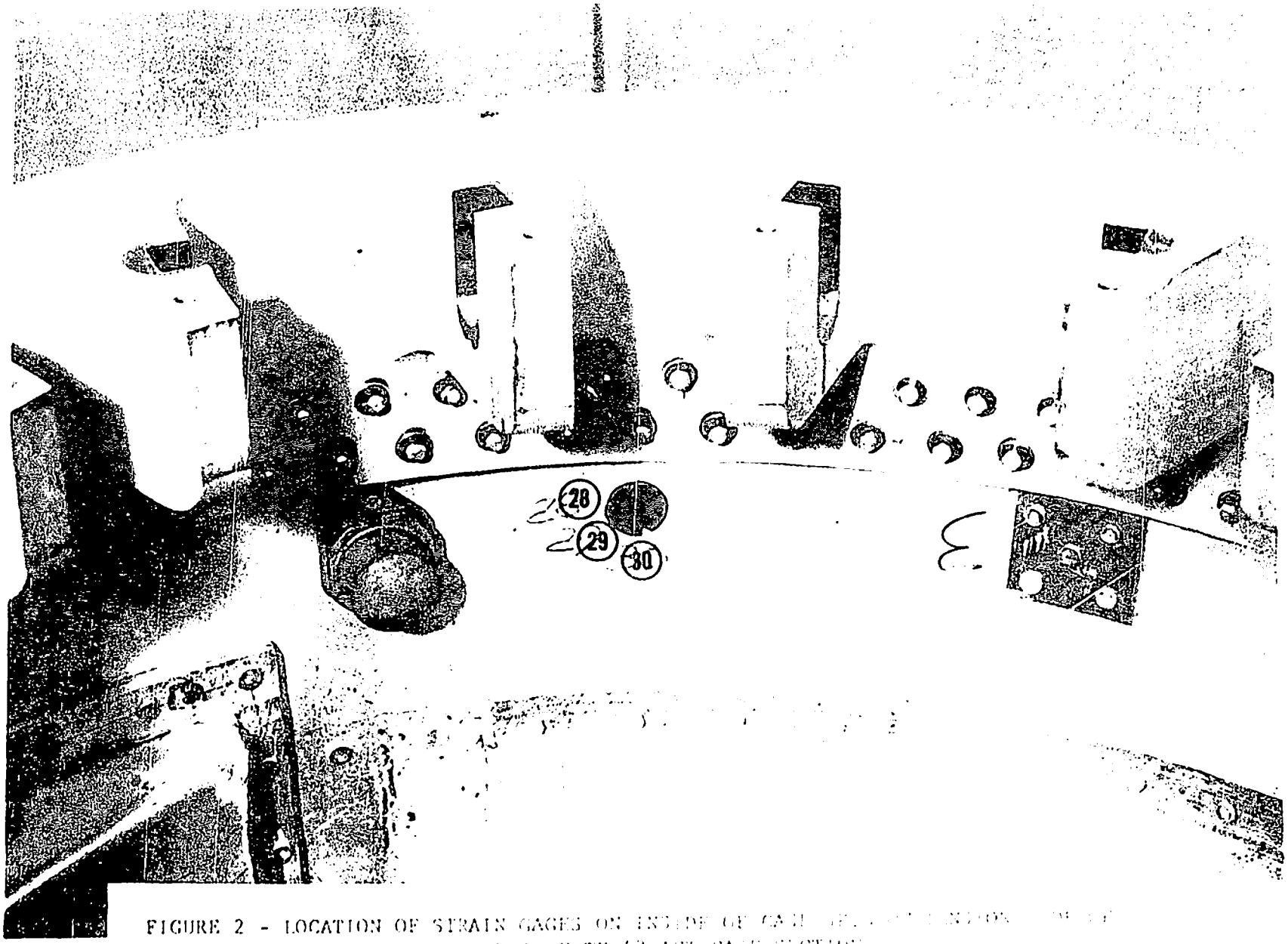


FIGURE 2 - LOCATION OF STRAIN GAGES ON INSIDE OF CASE [illegible]
CASE - STATIC TEST OF TX-43 AFT CASE SECTION
[illegible] NO. 1-[illegible]

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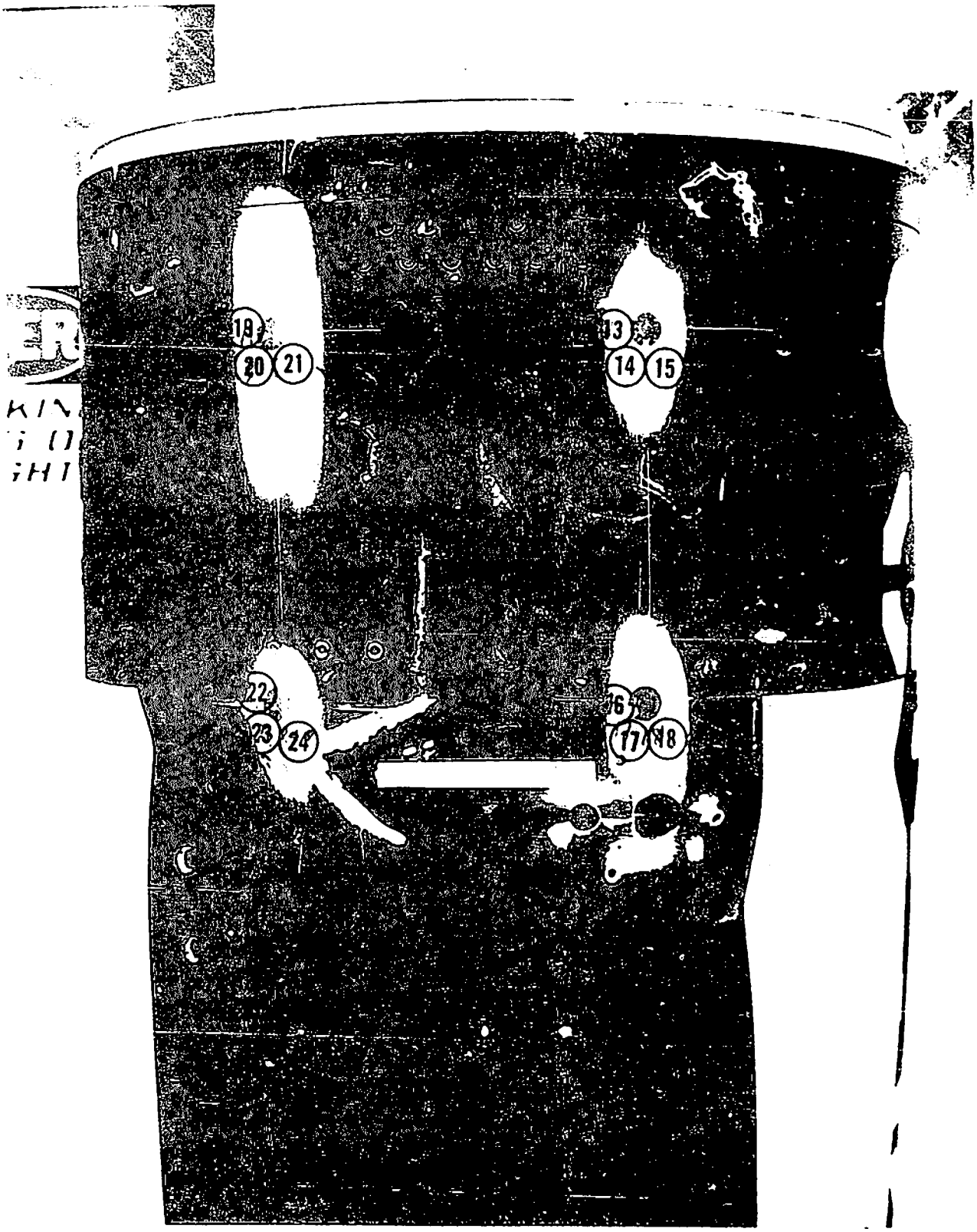


FIGURE 5 - LOCATION OF STRAIN GAGES ON OUTSIDE OF SKIN ON COMPRESSION SIDE OF CASE - STATIC TEST OF TX-43 AFT CASE SECTION

PROJECT NO. T-16675

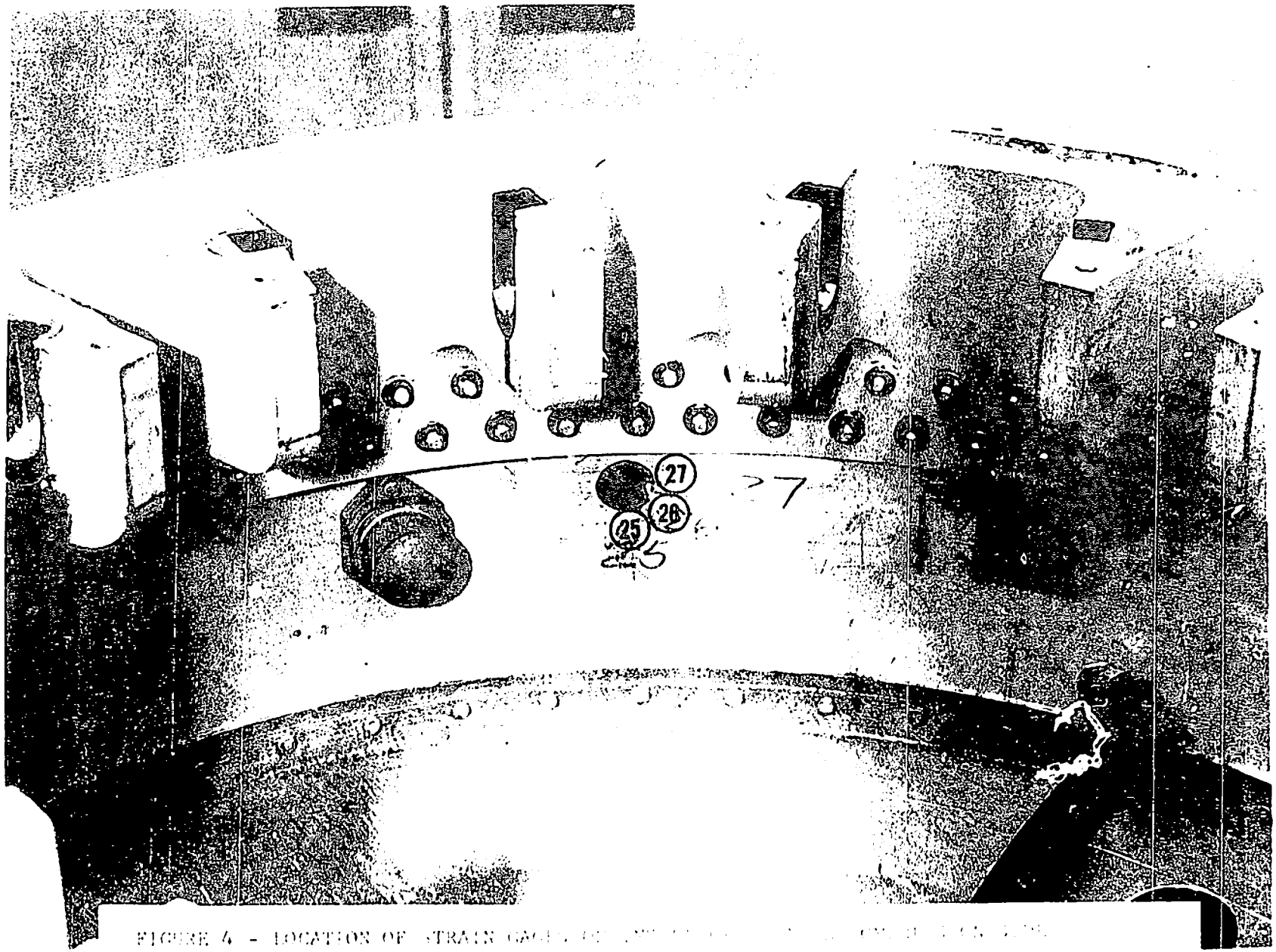


FIGURE 4 - LOCATION OF STRAIN GAGES [illegible]
OF CASE - STATIC TEST OF [illegible]

UNCLASSIFIED

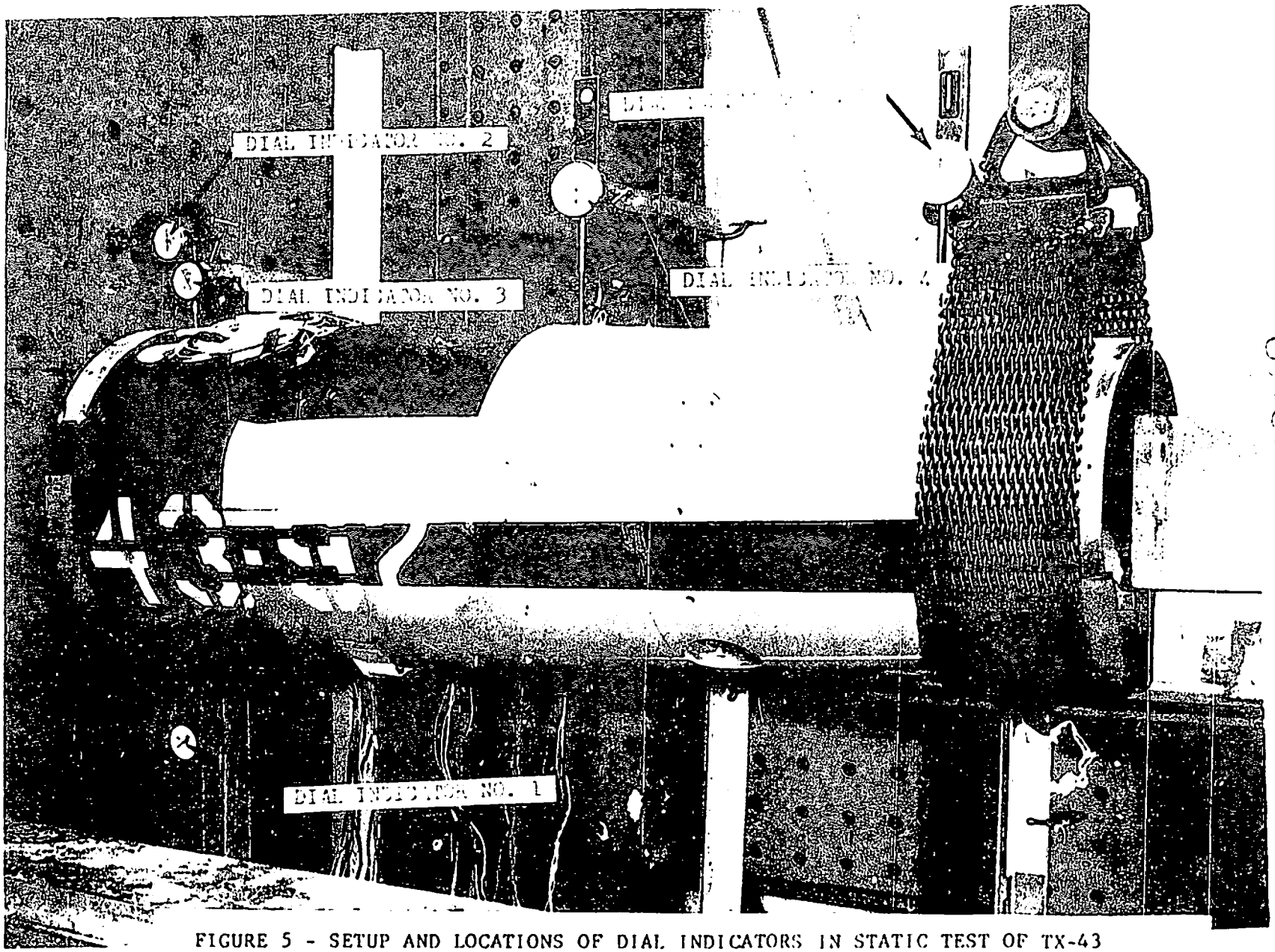


FIGURE 5 - SETUP AND LOCATIONS OF DIAL INDICATORS IN STATIC TEST OF TX-43 AFT CASE SECTION PROJECT NO. T-16675

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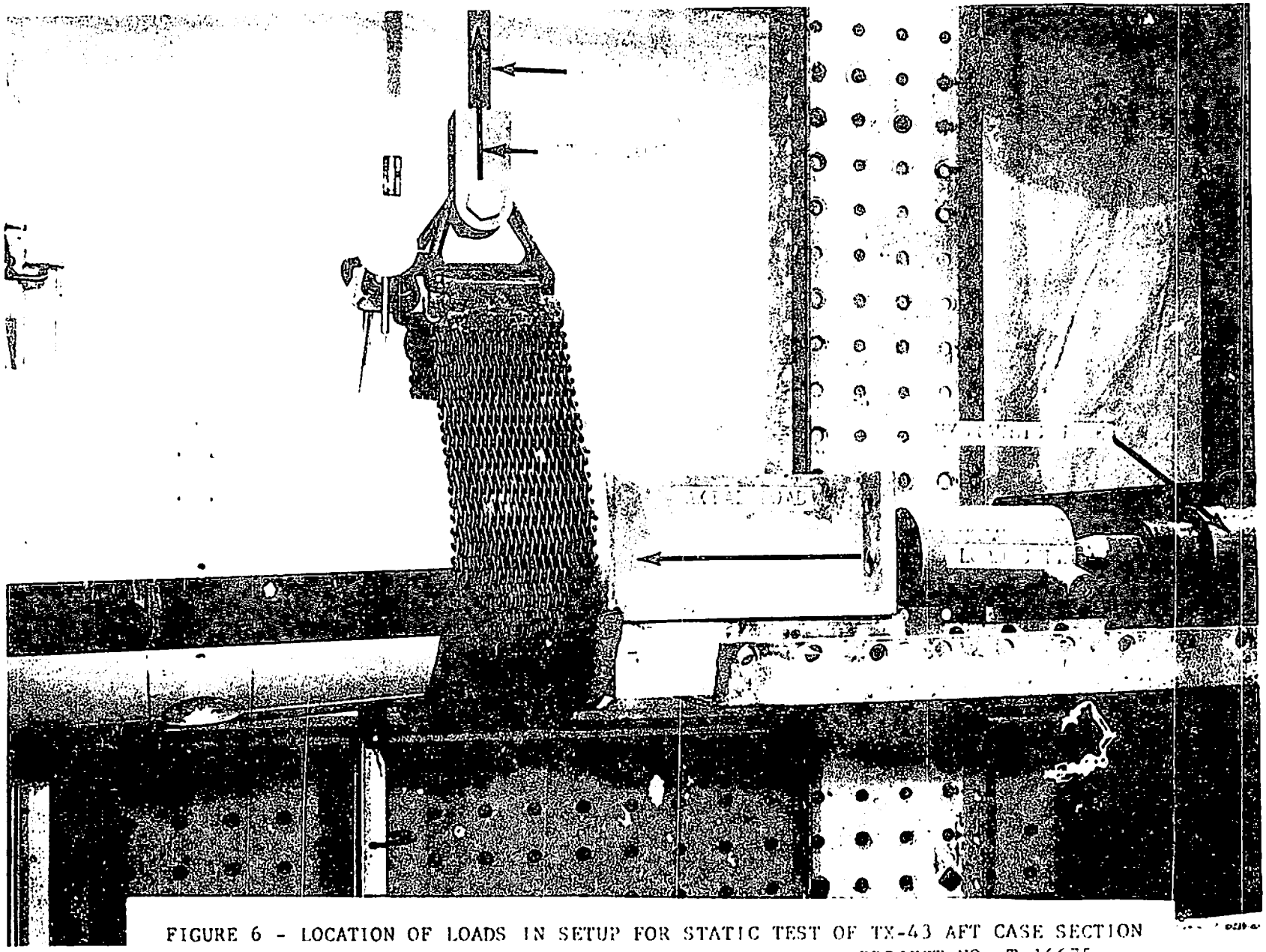

FIGURE 6 - LOCATION OF LOADS IN SETUP FOR STATIC TEST OF TX-43 AFT CASE SECTION
PROJECT NO. T-16675

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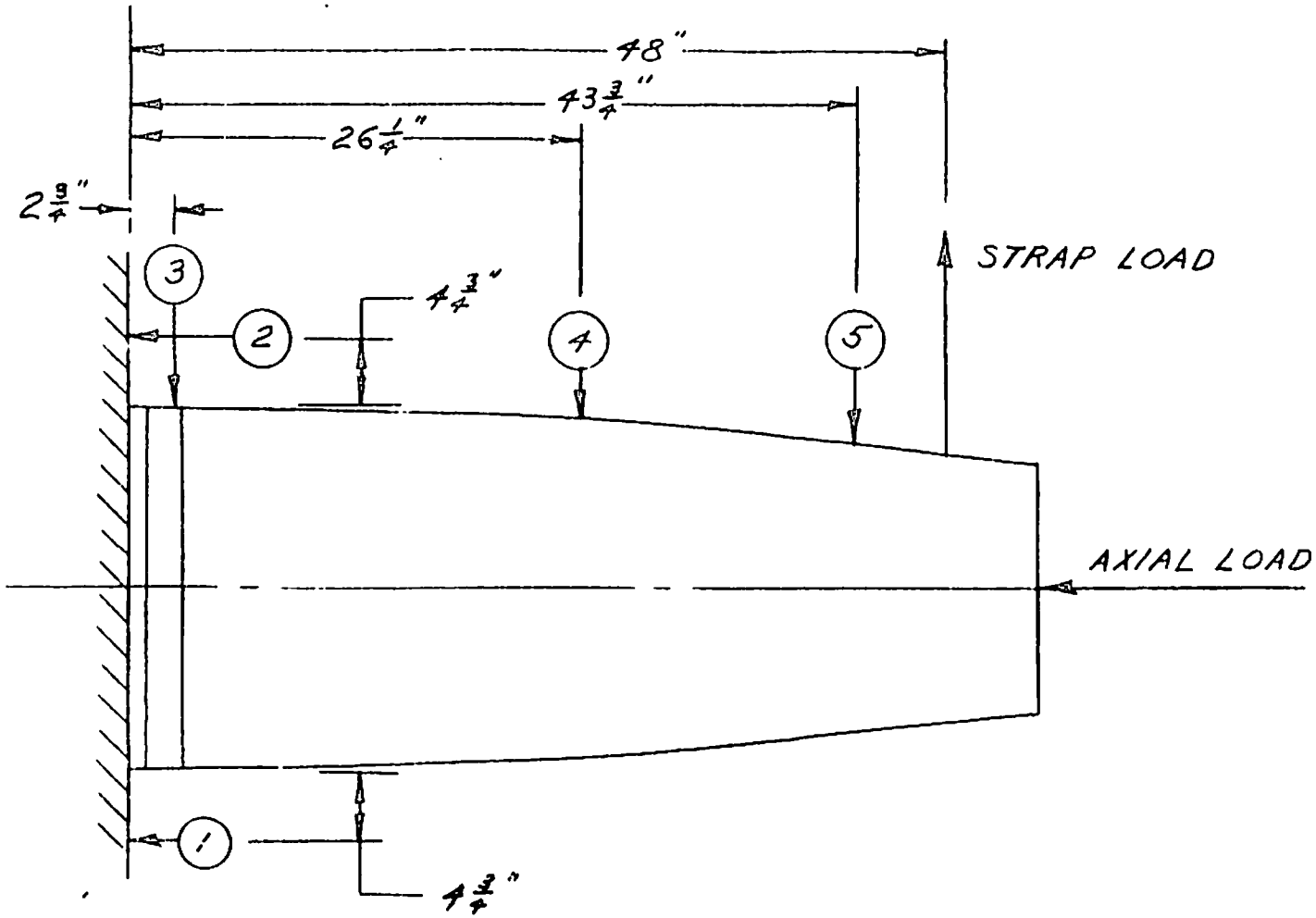


FIGURE 7 - LOCATION OF DIAL INDICATORS AND LOADS - STATIC TEST OF TX-43
AFT [illegible] SECTION PROJECT NO. T-16[illegible]

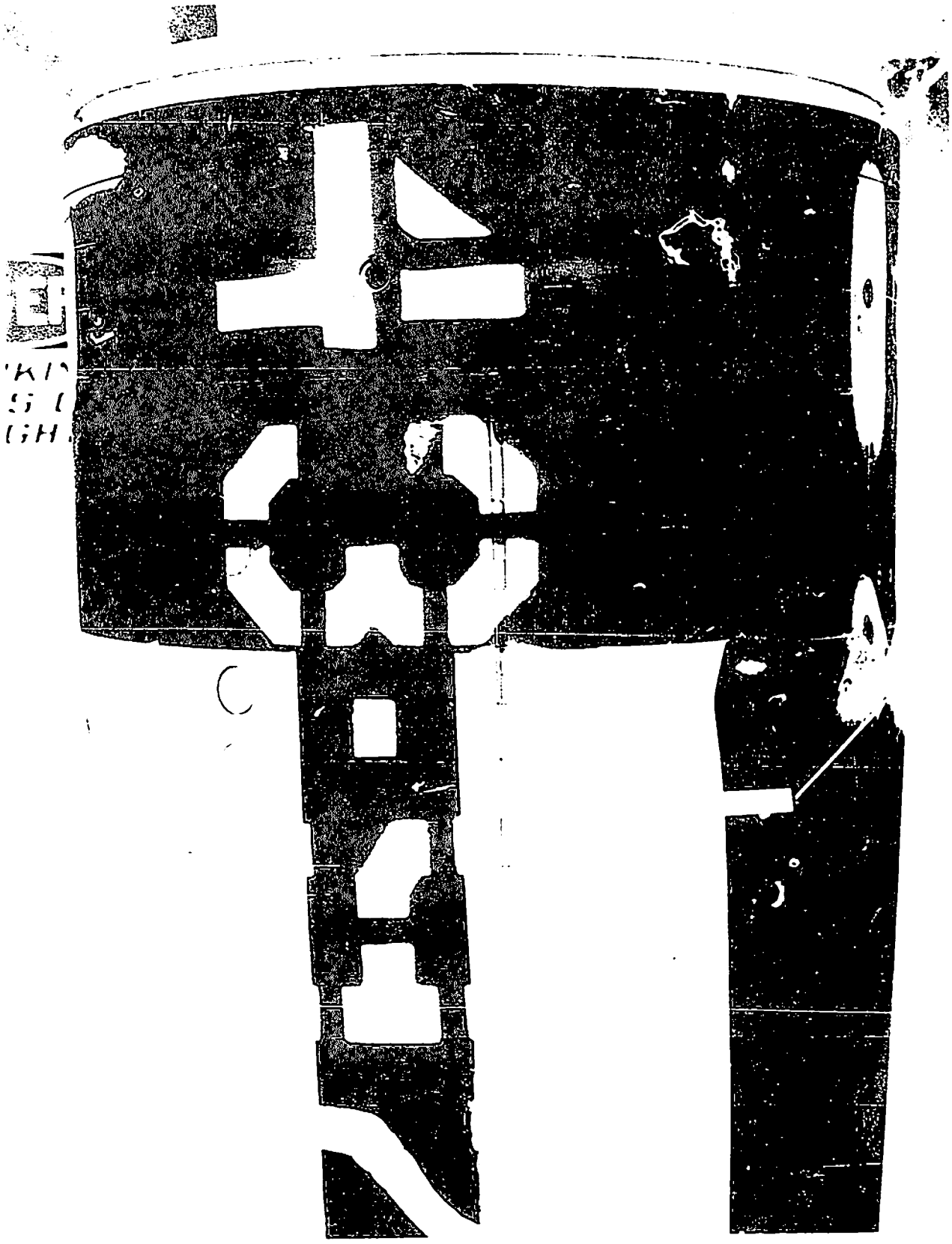

FIGURE 3 - SIDE VIEW OF AREA OF BUCKLING ON FAILED CASE - STATIC TEST OF TX-43
AFT CASE SECTION PROJECT NO. T-16675

[redacted]

TABLE I

PROJECT T-16675

[illegible]

POSITIVE NUMBER

| PER CENT DESIGN LIMIT | LOADS POUNDS AXIAL | LOADS POUNDS STRAP | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | 6 | | | 7 | | | 8 | | | 9 | | | 10 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | STRAIN GAGE [illegible] NUMBER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 20 | 2175 | 3300 | -60 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 410 | [illegible] | [illegible] | [illegible] | [illegible] | -460 | [illegible] | [illegible] | -270 | -480 | 130 | -200 | -330 | -1170 | -350 | 400 | -160 | 200 | 480 |
| 50 | 5435 | 8250 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | -1560 | 440 | -630 | 1070 | 2670 | -840 | 740 | -350 | 470 | 1820 |
| 20 | 2175 | 3300 | -2[illegible] | 140 | 510 | -1[illegible] | [illegible] | 500 | -50 | [illegible] | [illegible] | -2[illegible] | 210 | 550 | [illegible] | [illegible] | [illegible] | 200 | -5[illegible] | 140 | 250 | [illegible] | -680 | 170 | -260 | -430 | -1130 | -380 | 350 | -160 | 220 | 530 |
| 0 | 0 | 0 | [illegible] | -40 | 30 | -20 | -20 | 40 | -60 | 110 | 12[illegible] | [illegible] | 20 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | -20 | [illegible] | 30 | [illegible] | -1[illegible] | 20 | -2[illegible] | -40 | -30 | -30 | -20 | -10 | 40 | 60 |
| 50 | 5435 | 8250 | -2[illegible] | 430 | 1270 | -440 | 250 | 1240 | 10 | [illegible] | [illegible] | -40[illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | -1240 | -2[illegible] | 620 | -1[illegible] | -1550 | 440 | -630 | -1060 | 2660 | -840 | 950 | -360 | 510 | 1300 |
| 60 | 6520 | 9900 | -4[illegible] | 530 | 15[illegible] | -530 | 270 | 1450 | 0 | 1030 | 1250 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | -1450 | 330 | [illegible] | [illegible] | -1620 | 55[illegible] | -760 | 1270 | -3140 | -770 | 1100 | -420 | 620 | 1570 |
| 70 | 7610 | 11,550 | [illegible] | 680 | [illegible] | -62[illegible] | [illegible] | 1250 | 50 | 1170 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | -1440 | 2110 | [illegible] | -700 | -1530 | -3660 | -1160 | 1270 | -470 | 750 | 1870 |
| 20 | 2175 | 3300 | -50 | 220 | [illegible] | -2[illegible] | 70 | 520 | 100 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 170 | -45[illegible] | -12[illegible] | [illegible] | 450 | -750 | 190 | -28[illegible] | 470 | -1070 | -410 | 300 | -170 | 240 | 570 |
| 80 | 8700 | 13,200 | -200 | 910 | 2510 | -720 | 410 | 2020 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 510 | [illegible] | [illegible] | 740 | -1[illegible] | -2370 | 750 | -1020 | -1730 | -4240 | -1370 | 1510 | -550 | 870 | 2180 |
| 20 | 2175 | 3300 | -70 | 300 | 870 | -2[illegible] | 70 | 520 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 250 | -480 | -770 | 170 | -270 | -510 | -1090 | -370 | 320 | -150 | 240 | 570 |
| * 20 | 2175 | 3300 | -200 | 770 | 1700 | -370 | 310 | [illegible] | [illegible] | [illegible] | [illegible] | 280 | 310 | [illegible] | [illegible] | [illegible] | [illegible] | 4320 | 4600 | ** | 30 | -210 | -270 | ** | ** | -379 | -340 | 40 | 230 | -100 | 380 | 1110 |
| * 0 | 0 | 0 | -160 | 450 | 750 | -1[illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 160 | [illegible] | [illegible] | 3150 | ** | [illegible] | [illegible] | 170 | ** | ** | 10[illegible] | 240 | 750 | 90 | 70 | 140 | 400 |

* [illegible]

** [illegible] (OVER [illegible])



[redacted]

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TABLE II

PRINCIPAL STRESSES - POUNDS PER SQUARE INCH
STATIC TEST OF XB-43 AFT CASE SECTION

| PER CENT DESIGN LIMIT | LOADS, POUNDS AXIAL | LOADS, POUNDS STRAP | 1 (1, 2 & 3) $S_u$ | $S_v$ | $\theta$ | 2 (4, 5) $S_u$ | $S_v$ | $\theta$ | 3 (6, 7, 8) $S_u$ | $S_v$ | $\theta$ | 4 (9, 10, 11, 12) $S_u$ | $S_v$ | $\theta$ | 5 (13, 14, 15) $S_u$ | $S_v$ | $\theta$ | 6 (16, 17, & 18) $S_u$ | $S_v$ | $\theta$ | 7 (19, 20, 21) $S_u$ | $S_v$ | $\theta$ | 8 (22, 23, 24) $S_u$ | $S_v$ | $\theta$ | 9 (25, 26, & 27) $S_u$ | $S_v$ | $\theta$ | 10 (28, 29, & 30) $S_u$ | $S_v$ | $\theta$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | STRAIN GAGE ELEMENT NUMBER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | 2175 | 3300 | 152 | 56 | [illegible] | 44 | [illegible] | [illegible] | [illegible] | [illegible] | 115 | 4[illegible] | [illegible] | 75 | [illegible] | [illegible] | 182 | 4[illegible] | [illegible] | [illegible] | 48 | [illegible] | 11 | 410 | [illegible] | [illegible] | 18[illegible] | [illegible] | 76 | [illegible] | [illegible] | 74 |
| 50 | 5435 | 8250 | 14[illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 11,[illegible] | [illegible] | 75 | [illegible] | 12,6[illegible] | 176 | [illegible] | [illegible] | [illegible] | [illegible] | 16,[illegible] | 14 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 13,[illegible] | 770 | 70 |
| 20 | 2175 | 3300 | 575 | 155 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 55[illegible] | [illegible] | 74 | [illegible] | [illegible] | 179 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 11 | [illegible] | [illegible] | [illegible] | [illegible] | 11,740 | [illegible] | 5540 | 156 | [illegible] |
| 0 | 0 | 0 | 78 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 111 | [illegible] | [illegible] | 70 | [illegible] | [illegible] | 17 | 151 | [illegible] | 30 | [illegible] | [illegible] | 174 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 50 | 5435 | 8250 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 75 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 75 | [illegible] | [illegible] | 176 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 14 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 71 |
| 60 | 6521 | 9900 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 95 | [illegible] | [illegible] | 177 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 14 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 70 | [illegible] | 1110 | 91 |
| 70 | 7611 | 11,550 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 75 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 71 |
| 20 | 2175 | 3300 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 72 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 11 | [illegible] | [illegible] | [illegible] | [illegible] | 11,245 | [illegible] | [illegible] | [illegible] | 73 |
| 80 | 5700 | 13,200 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 75 | [illegible] | [illegible] | 177 | [illegible] | [illegible] | 58 | [illegible] | [illegible] | 14 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 71 |
| 20 | 2175 | 3300 | [illegible] | [illegible] | 73 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 70 | [illegible] | [illegible] | 77 | [illegible] | [illegible] | 41 | [illegible] | [illegible] | 11 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 72 |
| * 20 | 2175 | 3300 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | 59 | [illegible] | [illegible] | [illegible] | [illegible] | — | — | [illegible] | [illegible] | 17 | [illegible] | — | — | [illegible] | [illegible] | [illegible] | [illegible] | 2170 | 24 |
| * 0 | 0 | 0 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | — | — | [illegible] | [illegible] | 57 | [illegible] | — | — | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

[illegible]

** [illegible]

$S_u$ IS THE ALGEBRAICALLY [illegible] STRESS.
$S_v$ IS THE ALGEBRAICALLY SMALLER PRINCIPAL STRESS.
$\theta$ IS THE ANGLE IN DEGREES, BETWEEN THE AXIS OF THE [illegible] AND THE [illegible] ANGLE [illegible]

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SC 3640 B (10-50)

TABLE III

DISPLACEMENTS - INCHES

[illegible] OF YW-43 AFT CASE SECTION

PROJECT 7-16675

| | INDICATOR NO. 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| | .014 | -.016 | .017 | .123 | .215 |
| | .037 | -.054 | .051 | .337 | .601 |
| | .013 | -.030 | .043 | .183 | .308 |
| | .001 | -.013 | .034 | .077 | .109 |
| | .037 | -.053 | .070 | .364 | .628 |
| | .043 | -.079 | .081 | .429 | .752 |
| | .050 | -.083 | .095 | .509 | .895 |
| | .010 | -.045 | .081 | .258 | .411 |
| | .053 | -.101 | .117 | .602 | 1.051 |
| | .006 | -.059 | .091 | .290 | .462 |
| | .005 | -.046 | .089 | .393 | .839 |
| | -.010 | -.036 | .069 | .217 | .410 |

* READINGS TAKEN AFTER FAILURE.

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[redacted]

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