[redacted]

UNCLASSIFIED

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
1st Review Date: 6/10/98 Authority: DOE/DOC & ADD Name: [illegible] 2nd Review Date: 6-17-98 Authority: ADD Name: W.C. Payne	Determination (Circle Number(s)) 1 Classification Retained 2 Classification Changed to: UNCL 3 Contains No DOE Classified Information 4 Coordinate With: 5 Contains UCNI 6 Comments: [illegible]

9/29/60

SEP 29 1960

TX-43, 3.2

2-17140

Project No. 13.734.00

TO: DISTRIBUTION

Re: Static Test of TX-43 Lug and Sway Brace

PROGRAM 36 | CATEGORY 2 3 3 | ORG. 0 0 0 | DATE 6 0 2 1 1 | 0 4 3 8 0 1 0

Summary of Test

A static test was performed to determine the structural adequacy of the TX-43 lug and sway brace in response to aircraft captive loads. Two different sets of loads were applied, known as Condition Nos. 1 and 3. Design limit loads for Condition No. 1 were: 6,430 pounds horizontal load on the lug, 41,980 pounds vertical load on the lug, and 33,680 pounds sway brace load. Design limit loads for Condition No. 3 were: 18,830 pounds horizontal load on the lug, 10,450 pounds vertical load on the lug, and 5,110 pounds sway brace load.

Failure occurred while increasing the load from 160 to 170 percent design limit, Condition No. 1. The failure consisted of stripping the lug insert out of the case section. Previously, Condition No. 3 loads had been applied up to 150 percent limit with no sign of yielding or failure.

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Object of Test

The object of the test was to determine the structural adequacy of the TX-43 lug and sway brace in response to aircraft captive loads. The test unit was identified as the TX-43 Center Tube Section Assembly, as per Dwg. No. 745812.

Authorization for Test

The test was performed in accordance with a Work Order Authorization from R. H. Wagner, 1222-2, to E. Gallium, Dr., 8113, dated July 13, 1960. Mr. Wagner was the coordinator. Load and instrumentation information was supplied by D. E. Peck and R. H. Davis, 1222-2.

[illegible] FILE
TX-43
3-2

Equipment and Procedure

The following equipment was used in the test:

1 - Hydraulic 440,000 pound load cell, Serial No. [illegible]
2 - Hand pump [illegible]
[illegible]

[redacted]

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP

CLASSIFICATION CHANGED TO: U	AUTHORITY: W.C. Payne
PERSON CHANGING MARKING & DATE: Emelda Sepeh 6/23/98	RECORD ID: 98SN2497
PERSON VERIFYING MARKING & DATE: W.C. Payne 6/24/98	DATED: 6/17/98

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[redacted]

1 - Blackhawk 50-ton hydraulic jack.
2 - Sprague air-operated hydraulic pumps.
1 - Blackhawk hydraulic hand pump.
1 - Strain gage analyzer.

The following instrumentation was used:

5 - Baldwin SR-4 rectangular rosette strain gages, type FABR-25-12, 121.0 ± 0.5 ohms resistance, gage factor 2.12 ± 1%, Lot No. 19.

Procedure

The TX-43 center case section was mounted in the static test jig by a mounting fixture screwed into the nose of the case section and bolted to the jig back plate. The aft end of the case section was supported on beams by wood saddles cut to fit the outside diameter.

Three loads were applied simultaneously, two to the forward lug and the third to the sway brace location. These were: P_X, a horizontal load on the lug in the aft direction; P_Z, a vertical tension load on the lug; P_R, the simulated sway brace load. Locations of these loads are shown in Figure 1.

Two different sets of loads, Condition Nos. 1 and 3, were applied. Design limit loads were as follows: for Condition No. 1, P_X was 6,430 pounds, P_Z was 41,900 pounds, and P_R was 33,680 pounds; for Condition No. 3, P_X was 18,810 pounds, P_Z was 19,450 pounds, and P_R was 8,110 pounds.

Condition No. 1 loads were applied first, in increments up to 115 percent design limit. These loads were then released, and Condition No. 3 loads applied up to 115 percent design limit. The same procedure was followed in going to higher loads. Condition No. 1 loads were applied in increments up to 150 percent design limit, released, and Condition No. 3 loads applied up to 150 percent limit. This was followed by application of Condition No. 1 loads to failure.

Strain gage readings were taken at each increment of load. Locations of the strain gages are shown in Figure 2.

Results

Failure of the test unit occurred while increasing the load from 160 to 170 percent design limit for Condition No. 1. The lug insert was stripped out of the case section, and the case section was cracked in several places around the insert. The nature of the failure may be seen in Figures 2 and 3.

Strain gage readings obtained are presented in Tables I and II, with the corresponding calculated principal stresses and stress directions given in Tables III and IV. The highest stress obtained for Condition No. 1 at 160 percent design limit load (highest load at which readings were taken) was

[redacted]

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54,330 psi compression at strain gage Nos. 4, 5, and 6 (see Figure 2). The highest stress obtained for Condition No. 3 at 150 percent design limit load was 53,920 psi compression at strain gage Nos. 13, 14, and 15 (see Figure 2).

W. M. Sigmon

W. M. SIGMON - 1612-1

1613 Project Engineer: H. W. NUNEZ - 1613-3

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

WMS:1612-1:ma

Enc: Figures 1-3
Tables I-IV

Copy to:
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D. Williams, 7311
D. S. Dressen, 7522
E. K. Smeltzer, 3421-3

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P_r = Sway Brace Load

P_x = Horizontal Lug Load

P_z = Vertical Lug Load

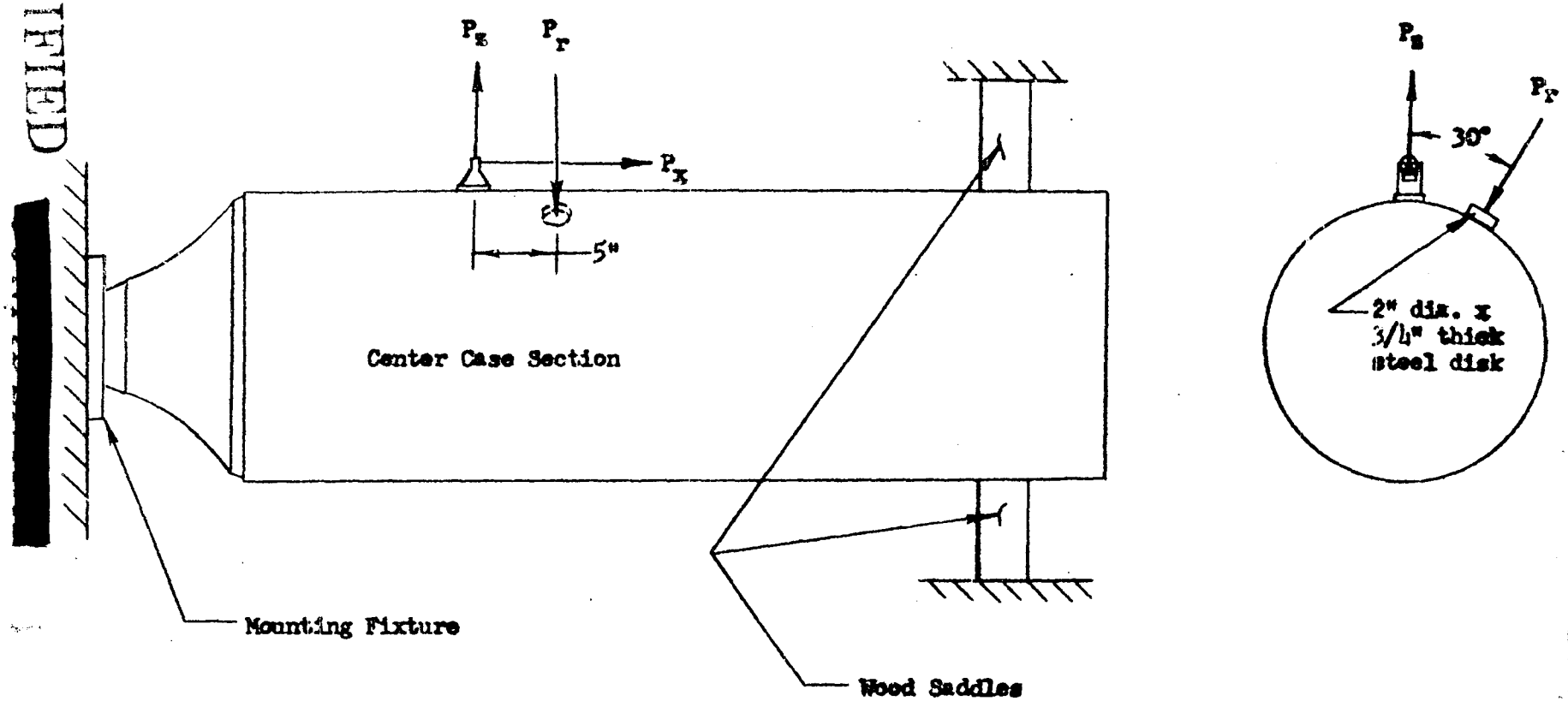

Fig. 1. Locations of Loads in Static Test of TX-43 Lug and Sway Brace.

T-17149

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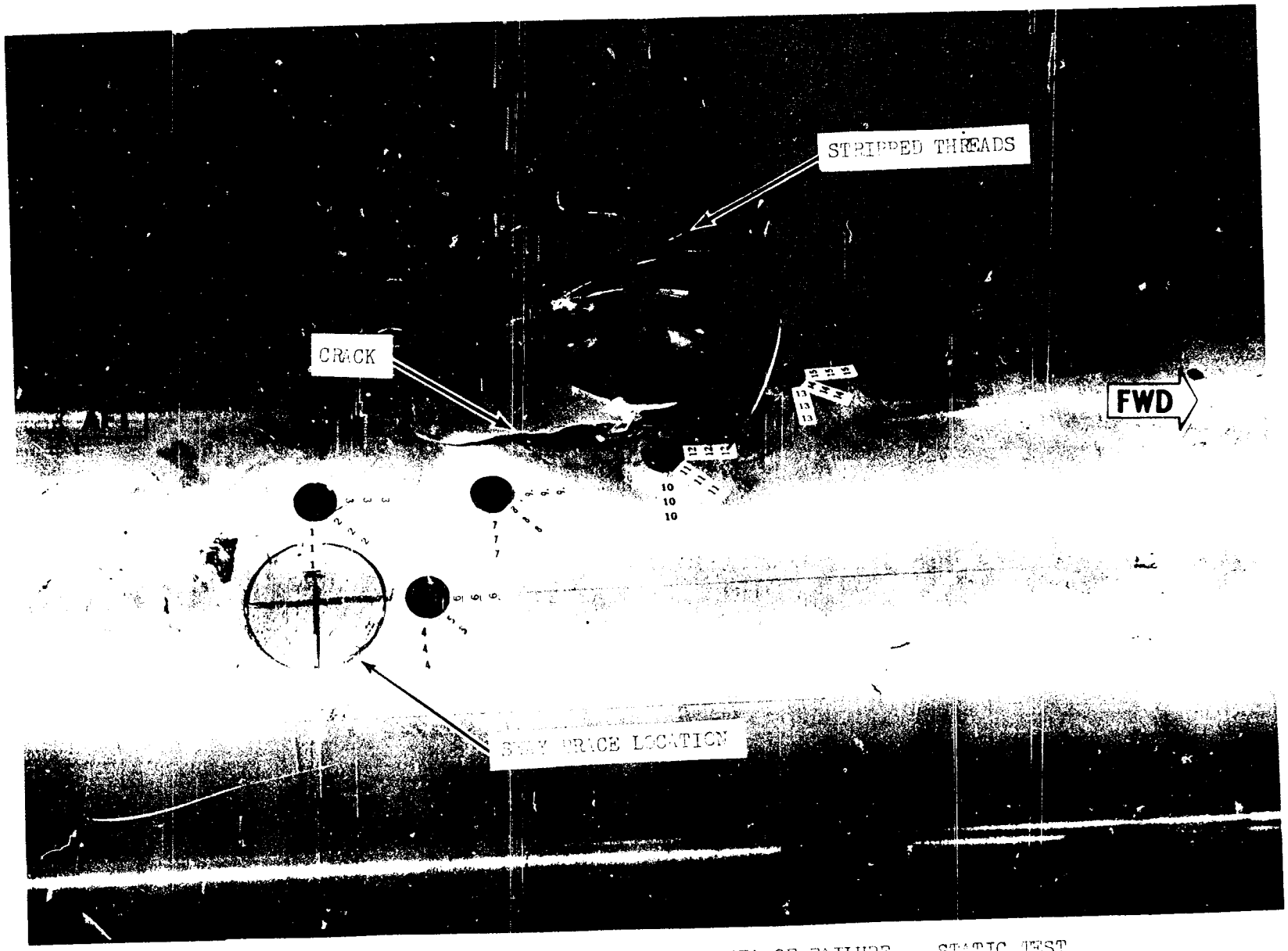

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FIG. 2 - STRAIN GAGE LOCATIONS AND AREA OF FAILURE -- STATIC TEST OF TY-43 LUG AND STAY BRACE.

Project No. T-17119

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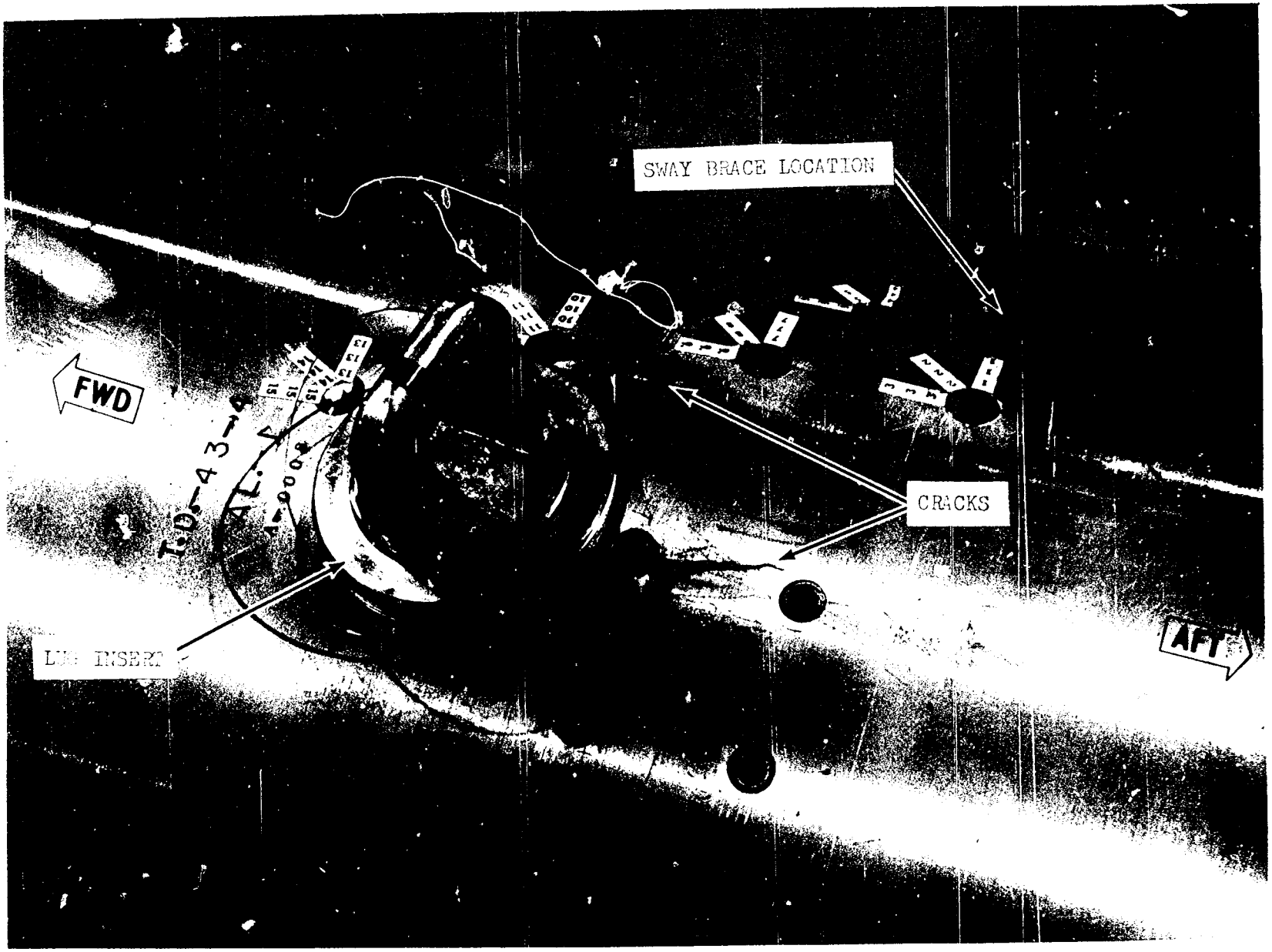

FIG. 3 - APPEARANCE OF FAILURE AREA -- STATIC TEST OF TX-43 LUG AND SWAY BRACE.

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Project No. T-1/142

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TABLE I

STRAIN GAGE READINGS (MICROINCHES PER INCH) T-1714

LOAD CONDITION NO. 1

STATIC TEST OF TX-43 LUG AND SWAY BRACE

PER CENT LIMIT LOAD	LOAD (POUNDS)			ROSETTE NO. 1			2			3			4			5		
				STRAIN GAGE ELEMENT NO.														
	P_x	P_z	P_R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	640	4190	3370	*	-70	-120	-300	-240	-80	-50	-10	-30	-150	110	290	240	390	-150
20	1290	8380	6740	—	-150	-230	-600	-440	-140	-120	-20	-50	-310	220	600	480	780	-300
30	1930	12,570	10,100	—	-250	-350	-920	-660	-200	-190	-10	-80	-490	350	950	750	1160	-480
40	2570	16,760	13,500	—	-310	-450	-1170	-850	-260	-250	-10	-90	-660	490	1240	950	1580	-660
50	3220	20,800	16,840	—	-360	-550	-1460	-1000	-310	-310	-10	-110	-820	600	1560	1180	1980	-830
10	640	4170	3370	—	-120	-160	-420	-280	-70	-80	-10	-30	-190	120	400	310	500	-190
0	0	0	0	—	-20	-70	-150	-100	-30	-40	-40	-10	-20	10	60	60	90	-10
60	3860	25,100	20,200	—	-440	-660	-1770	-1200	-380	-410	-10	-130	-1000	710	1900	1410	2370	-960
70	4500	27,300	23,600	—	-470	-760	-2080	-1410	-440	-470	0	-140	-1150	770	2240	1660	2780	-1140
80	5150	33,500	27,000	—	-560	-870	-2380	-1620	-510	-550	0	-170	-1320	880	2580	1900	3180	-1340
90	5770	37,200	30,300	—	-620	-980	-2700	-1820	-560	-630	10	-180	-1520	990	2960	2160	3610	-1540
100	6430	41,700	33,700	—	-680	-1070	-3000	-2050	-640	-710	0	-210	-1700	1100	3270	2370	4010	-1730
115	7400	48,100	38,800	—	-770	-1220	-3410	-2310	-710	-810	10	-230	-1960	1260	3750	2670	4630	-2030
10	640	4170	3370	—	-170	-220	-500	-310	-70	-120	-10	-20	-220	130	450	320	630	-270
0	0	0	0	—	-110	-110	-200	-130	-30	-60	-30	10	-40	30	100	80	220	-80
10	640	4170	3370	—	-160	-150	-340	-240	-70	-70	-40	-10	-210	-160	420	280	610	-270
50	3220	20,800	16,840	—	-2[illegible]	-510	-1470	-1020	-330	-320	-20	-80	-880	680	1670	1200	2170	-930
115	7400	48,100	38,800	—	[illegible]	-1120	-3270	-2260	-640	-710	10	-190	-1960	1350	3790	2720	4720	-2070
120	[illegible]	50,[illegible]	40,[illegible]	—	[illegible]	-1160	-3400	-2330	-660	-740	0	-200	-2060	1430	3970	2860	4980	-2200
130	8330	54,[illegible]	43,800	—	[illegible]	-1260	-3650	-2500	-670	-800	0	-210	-2270	1520	4350	3090	5450	[illegible]
140	[illegible]	55,[illegible]	47,150	—	[illegible]	-1370	-3900	-2610	-720	-870	20	-220	-2480	1620	4700	3310	5740	[illegible]
150	9410	62,300	51,[illegible]	—	[illegible]	-1470	-4200	-2880	-750	-950	30	-230	-2710	1700	5040	[illegible]	6070	-2770
10	640	4170	3370	—	[illegible]	-150	-360	-200	-30	-60	50	0	-410	270	[illegible]	360	1010	-540
0	0	[illegible]	[illegible]	—	[illegible]	-60	[illegible]	-60	-10	-10	0	0	-160	[illegible]	[illegible]	110	540	-210
10	640	[illegible]	[illegible]	—	[illegible]	-150	[illegible]	-220	-60	-70	0	0	[illegible]	[illegible]	510	270	910	-430
50	3220	[illegible]	[illegible]	—	[illegible]	[illegible]	[illegible]	-1060	-310	[illegible]	0	[illegible]	[illegible]	620	1680	900	2340	-1170
115	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	-2400	[illegible]	[illegible]	[illegible]	[illegible]	-2100	1300	3810	2050	[illegible]	-2150
150	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	-2730	-750	[illegible]	[illegible]	-230	-2750	1670	5050	2320	5650	-2460
160	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	-3020	[illegible]	[illegible]	70	-240	-2730	1760	5350	2410	[illegible]	-2660

* GAGE DEFECTIVE - NO READING

POSITIVE NUMBERS ARE TENSILE STRAINS

NEGATIVE NUMBERS ARE COMPRESSIVE STRAINS.

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TABLE [illegible]

STRAIN GAGE READINGS (MICROINCHES PER INCH) T-17149

LOAD CONDITION NO. 3

STATIC TEST OF TX-43 LUG AND SWAY BRACE

ROSETTE NO.

[illegible] LOAD	LOAD (POUNDS)			1			2			3			4			5		
				STRAIN GAGE LIFMENT NO.														
	P_x	P_z	P_R	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	*	-110	-110	-200	-130	-30	-60	-30	10	-40	30	100	80	220	-80
10	1850	1950	810	—	-120	-140	-270	-160	-30	-50	-10	-20	-140	240	310	240	650	-200
20	3700	3700	1620	—	-130	-170	-340	-170	-40	-60	0	-30	-230	360	470	380	900	-410
30	5640	5550	2430	—	-130	-170	-400	-210	-30	-70	30	-30	-300	530	650	540	1160	-550
40	7510	7800	3240	—	-120	-210	-480	-240	-20	-70	70	-40	-400	740	870	740	1570	-720
50	7400	9750	4050	—	-170	-300	-710	-400	-80	-120	40	-60	-510	910	1030	830	1910	-850
10	1850	1950	810	—	-170	-200	-370	-240	-70	-100	-50	-30	-140	170	280	210	530	-240
0	0	0	0	—	-30	-40	-70	-40	-10	-20	0	0	-40	50	-110	80	210	-80
60	11,300	11,700	4860	—	-70	-230	-580	-300	-30	-70	70	-50	-560	1070	1220	1020	2260	-1000
70	13,170	13,650	5670	—	-70	-280	-740	-370	-50	-90	100	-70	-660	1280	1460	1220	2660	-1180
80	15,[illegible]	15,600	6480	—	-70	-330	-860	-480	-80	-110	110	-80	-740	1470	1670	1400	3020	-1340
90	[illegible]	17,550	7290	—	-80	-350	-970	-520	-70	-120	130	-100	-860	1670	1910	1600	3420	-1530
100	[illegible]	19,450	8110	—	-80	-370	-1050	-590	-120	-140	130	-120	-930	1830	2090	1760	3750	-1670
115	21,620	22,380	9330	—	-80	-430	-1210	-690	-150	-160	160	-140	-1050	2140	2420	2020	4290	-1930
10	1850	1950	810	—	-80	-120	-250	-150	-30	-40	-40	-20	-140	220	330	240	590	-260
0	0	0	0	—	-30	-30	-70	-40	-10	-20	-40	0	-40	60	130	80	220	-80
	1850	1950	810	—	-10	-60	-120	-60	0	0	30	0	-260	270	410	240	900	-440
30	7[illegible]	9750	4050	—	0	-130	-390	-140	0	0	70	0	-590	930	1130	690	2200	-1030
115	[illegible]	22,380	9330	—	0	-320	-1060	-470	0	-90	240	-60	-1250	2170	2590	1610	4500	-2060
120	[illegible]	23,350	9730	—	0	-340	-1120	-510	-10	-110	220	-70	-1250	2250	2650	1670	4630	-2110
130	[illegible]	25,250	10,550	—	0	-370	-1210	-560	-30	-120	240	-90	-1340	2440	2870	1800	4960	-2270
140	[illegible]	27,200	11,360	—	0	-400	-1340	-630	-70	-150	250	-110	-1450	2630	3110	1930	5300	-2440
150	[illegible]	29,180	12,160	—	0	-440	-1490	-720	-100	-190	260	-130	-1580	2820	3350	2040	5640	-2620
10	[illegible]	1950	810	—	0	-60	-140	-60	0	0	40	0	-300	350	510	290	960	-470
0	0	0	0	—	-10	-50	-90	-50	-10	-20	0	0	-170	140	240	110	550	-220

* GAGE DEFECTIVE - NO READING.

POSITIVE NUMBERS ARE TENSILE STRAINS.
NEGATIVE NUMBERS ARE COMPRESSIVE STRAINS.

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(8)

PRINCIPAL STRESSES (PSI)

LOAD CONDITION NO. 1

STATIC TEST OF 7X-43 LUG AND SWAY BRACE

PER CENT LIMIT LOAD	ROSETTE NO. 2			3			4			5		
	S_u	S_v	θ	S_u	S_v	θ	S_u	S_v	θ	S_u	S_v	θ
0	0	0	—	0	0	—	0	0	—	0	0	—
10	-1980	-3860	78	-370	-860	126	2810	-660	95	3770	-2380	150
20	-3820	7550	82	-730	-1880	121	5810	-1350	95	7540	-4770	150
30	-5710	-11,510	82	-1020	-3140	123	9200	-2130	95	11,360	-7200	150
40	-7310	-14,680	82	-1220	-4000	122	12,000	-3080	96	15,000	-10,540	150
50	-9050	-18,160	84	-1470	-4960	122	15,100	-3720	95	18,730	-13,350	150
10	-2620	-5220	86	-450	-1240	120	3910	-680	71	4850	-3010	150
0	-910	-1860	85	-220	-550	67	630	-10	83	960	-190	147
60	-11,130	-22,220	85	-1860	-6440	121	18,360	-4520	95	22,480	-15,570	149
70	-12,[illegible]	-25,850	85	-2000	-7380	121	21,650	-4900	94	26,380	-18,380	150
80	-14,830	-29,600	85	-2370	-8690	121	24,950	-5580	94	30,070	-21,490	150
90	-16,620	-33,500	85	-2560	-9890	121	28,580	-6450	93	34,140	-24,610	150
100	-18,640	-37,310	84	-3010	-11,140	121	31,520	-7380	94	37,690	-27,850	150
115	-21,0[illegible]	-42,530	85	-3300	-12,684	121	36,100	-8590	94	43,154	-33,010	147
10	-2[illegible]	-6060	87	-470	-1680	115	4370	-940	91	5610	-4840	145
0	-1[illegible]	-2440	85	-110	-660	86	1000	-80	90	1820	-1320	145
10	-2[illegible]	-4230	83	-350	-845	90	4810	-1580	70	5240	-5080	147
50	-9410	-18,570	85	-400	-4750	118	16,220	-4070	96	19,910	-15,760	147
115	-17,570	-40,530	83	-2520	-11,020	120	36,640	-8510	94	43,860	-33,860	149
120	-20,370	-42,100	84	-3020	-11,430	120	38,600	-8730	94	46,170	-36,030	149
130	-21,570	-45,130	84	-3220	-12,300	120	41,950	-9980	94	50,180	-40,340	149
140	-22,150	-48,070	85	-3320	-13,440	120	45,220	-11,090	94	54,200	-45,280	149
150	-24,270	-51,800	83	-3500	-14,640	120	48,280	-12,460	94	52,170	-51,560	147
10	-1720	-4280	89	200	-1120	125	6430	-2280	97	7840	-10,610	146
0	-400	-990	78	-20	-130	113	2060	-1140	101	3980	-5520	143
10	-1980	-4170	86	-150	-920	113	4770	-2160	99	6920	-9380	145
50	-9240	-18,900	83	-1070	-4620	117	16,010	-4770	95	19,140	-21,630	146
115	-20,560	-42,310	83	-3070	-11,820	120	36,340	-10,060	94	39,620	-41,160	147
150	-24,410	-51,530	83	-3280	-14,710	121	48,250	-12,310	94	47,050	-47,200	146
160	-25,460	-54,330	82	-3420	-15,650	121	51,020	-13,820	94	49,700	-53,600	146

S_u IS THE ALGEBRAICALLY LARGER STRESS.
S_v IS THE ALGEBRAICALLY SMALLER STRESS.
θ IS THE ANGLE IN DEGREES BETWEEN S_u AND THE AXIS OF THE LOWEST NUMBERED GAGE IN THE ROSETTE, MEASURED COUNTERCLOCKWISE.

POSITIVE NUMBERS ARE TENSILE STRESSES
NEGATIVE NUMBERS ARE COMPRESSIVE STRESSES.

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PRINCIPAL STRESSES (PSI) T-17149

LOAD CONDITION NO. 3

STATIC TEST OF TX-43 LUG AND SWAY BRACE

PER CENT LIMIT LOAD	ROSETTE NO. 2			3			4			5		
	Su	Sv	θ	Su	Sv	θ	Su	Sv	θ	Su	Sv	θ
0	-1100	-2440	85	-110	-660	86	1000	-80	90	1820	-1820	145
10	-1370	-3240	88	-310	-760	120	3430	-820	107	5220	-6140	146
20	-1760	-4050	90	-320	-1060	126	5140	-1450	107	7510	-7970	147
30	-1870	-4340	91	-130	-1410	128	7290	-1710	105	9910	-10,060	148
40	-2060	-5630	91	130	-1520	132	10,080	-2550	109	13,520	-13,220	148
50	-3630	-5520	90	-350	-2420	127	11,320	-3840	110	16,110	-16,420	147
10	-2290	-4780	88	-700	-1300	102	2980	-730	[illegible]	4350	-4810	146
0	-380	-850	90	-40	-260	113	-140	-2160	143	1740	-1740	145
60	-2550	-6820	91	240	-2070	133	14,060	-3910	110	19,300	-18,970	147
70	-3370	-8750	90	170	-2630	133	16,840	-4550	110	22,820	-22,210	147
80	-4200	-10,250	89	140	-3060	133	19,330	-5030	110	26,000	-25,070	147
90	-4930	-11,560	91	170	-3560	134	22,020	-5560	110	29,490	-28,420	147
100	-5380	-12,600	90	20	-4020	134	24,140	-6300	110	32,370	-31,000	147
115	-6340	-14,520	89	100	-4710	134	28,110	-7050	110	37,040	-35,660	147
10	-1290	-3010	87	-350	-510	70	3530	-610	104	4870	-5200	146
0	-380	-850	90	92	-400	50	1360	20	95	1820	-1820	145
10	-460	-1390	90	230	-250	40	4160	-1860	105	6660	-9740	144
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12,570	-4270	107	16,960	-22,170	145
115	-4010	-12,270	93	1300	-3600	134	27,220	-8620	107	35,870	-42,810	146
120	-4360	-13,020	93	1030	-3800	133	30,100	-8580	109	37,030	-43,790	146
130	-4930	-14,140	93	1070	-4300	134	32,640	-9120	109	39,700	-46,930	146
140	-5870	-15,800	93	960	-4950	133	35,310	-9770	109	42,420	-50,260	146
150	-6790	-17,650	93	810	-5730	133	37,730	-10,720	109	45,010	-53,720	146
10	-530	-1620	94	310	-310	40	5290	-2060	106	7290	-10,050	145
0	-460	-1080	90	-40	-260	113	2330	-1250	104	4020	-5710	143

POSITIVE NUMBERS ARE TENSILE STRESSES.
NEGATIVE NUMBERS ARE COMPRESSIVE STRESSES.

Su IS THE ALGEBRAICALLY LARGER STRESS.
Sv IS THE ALGEBRAICALLY SMALLER STRESS.
θ IS THE ANGLE IN DEGREES BETWEEN Su AND THE AXIS OF THE LOWEST NUMBERED GAGE IN THE ROSETTE, MEASURED COUNTERCLOCKWISE.

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