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NOV 10 1960

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
1st Review Date: 5/21/98 Authority: ADD Name: P.B. Cramer	Determination (Circle Number): 1. Classification Retained 2. Classification Changed to: UNCL 3. Contains No DOE Classified Information 4. Coordinate With: 5. Contains UCAI? 6. Comments: DECLASSIFY
2nd Review Date: 5/26/98 Authority: ADD Name: WC Layne	

XW-49, 3.2
T-16967
Project No. 13.784.10
Ref. Sym: 7321/9652

INVENTORIED
SEP 14 '65
3428-3

INVENTORIED
AUG 6 1964
3427-4

REC
NOV 1 1960
CENTRAL RECORD FILE

TO: DISTRIBUTION

Re: Static Test of W-49-4 Warhead/Mk-3 Re-entry Vehicle Aft Interface Joint.

Summary of Results

The W-49-4 warhead/Mk-3 R/V Flare interface joint was tested on May 11, 1960 to 152% of Limit Load for Re-entry Condition 2. No failure or detrimental yielding was observed in the threaded interface, but a failure did occur in the flare structure aft of the joint at 152% D. L.

Authorization for Test

This test was requested in a Work Order Authorization from Mr. J. J. Mane, 1245, to Mr. D. Williams, 1613, dated April 7, 1960. The requesting organization's consultant was Mr. J. D. Pruitt.

Object of Test

The purpose of this test was to determine the structural capability of the W-49-4 warhead/MK-3 R/V Flare interface joint under simulated re-entry flight loads Condition 2, and to obtain stress information on the G. E. aft adapter ring.

RECORD FILE
DW
FILE No. XW-49
3.2

Test Background

The XW-49-X1/XW-49-X4 warhead was previously tested to 133% design ultimate loads under seven separate loading conditions. Test Unit "A" satisfactorily completed each loading condition except Re-entry Condition 2. The aft adapter ring (manufactured by ACF to GE Dwg. No. 217E879-PO failed at approximately 100% design ultimate load. The RE Condition 2 test was then repeated with a GE furnished aft adapter ring and this ring failed at 105% design ultimate loads. Refer to Test Report T-16328, R/S 1613/229 for details concerning these tests.

As a result of the above tests the GE aft adapter ring was strengthened by increasing the ring thickness by .060 inch. (GE Dwg. No. 217E906-P3).

Components Tested

The items tested were the W-49-4 warhead Unit X (Ser. No. 133) and the General Electric aft adapter ring. (Part No. 217E906-P3, Ser. No. 12) which was riveted to GE flare structure (Part No. 119R111, Ser. No. 020).

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW DOWNGRADING OR DECLASSIFICATION STAMP	
CLASSIFICATION CHANGED TO: U Emelda Selph 5/27/98 PERSON CHANGING MARKING & DATE WC Layne 5/28/98 PERSON VERIFYING MARKING & DATE	AUTHORITY: W C Layne RECORD ID: 98SN2125 DATED: 5/26/98

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Equipment Used

1. Four Simplex Hydraulic Jacks, 60 ton capacity.
2. Two Simplex Hydraulic Jacks, 30 ton capacity.
3. Two calibrated load links.
4. Two Baldwin SR-4 Strain Indicators, Serial Nos. J-92499, J-59101.

Instrumentation Used

1. Nine Strain Gage Rosettes, FABR-25-12, Res. 120±.5 ohms, G. F. 2.12±1%, Lot No. 19.
2. One Fairchild Data Readout System.

Procedure

The flare structure (with aft adapter ring) and W-49-4 Case Assembly were assembled and mounted in the static jig as shown in Figs. 1 and 2, with the exception that load P_1 was changed to two equal loads pulling on either side of the flare. Strain gages were mounted to the aft adapter ring at the locations shown in Figs. 3 and 4. The two loads were applied simultaneously to the flare structure to test the structural adequacy of the joint between the flare section and the W-49-4. The reaction loads were applied to the W-49-4 Section B (see Fig. 1).

The test unit was loaded in increments, with strain gage readings being taken at each increment of load.

Table I lists magnitudes of loads applied at each increment.

Results

The flare structure failed aft of the adapter ring at 152% of Limit Load (see Fig. 5 for photograph of failure). Maximum calculated stress on the ring was -37,349 psi on rosette elements 7, 8 and 9.

Table II is a list of load-strain data. Table III lists computed Load-Stress Data.

Conclusions

Test results were corrected to standard by Mr. Black, Div. 1282 (Stress Analysis Div.) to verify the integrity of a structure of minimum dimensions and minimum guaranteed materials. It was determined by Mr. Black that the computed failure load for a structure of minimum dimensions and minimum guaranteed materials is higher than the design ultimate load for the structure; therefore, his conclusion was that the structural integrity of the W-49-4 warhead/Mk-3 re-entry vehicle interface joint was adequately proven by this test.

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L. Woolrich
L. WOOLRICH - 7322-1

G. Willson
7321 Project Engineer: G. WILLSON - 7321-5

Approved by: R. S. HOOPER - 7321-5

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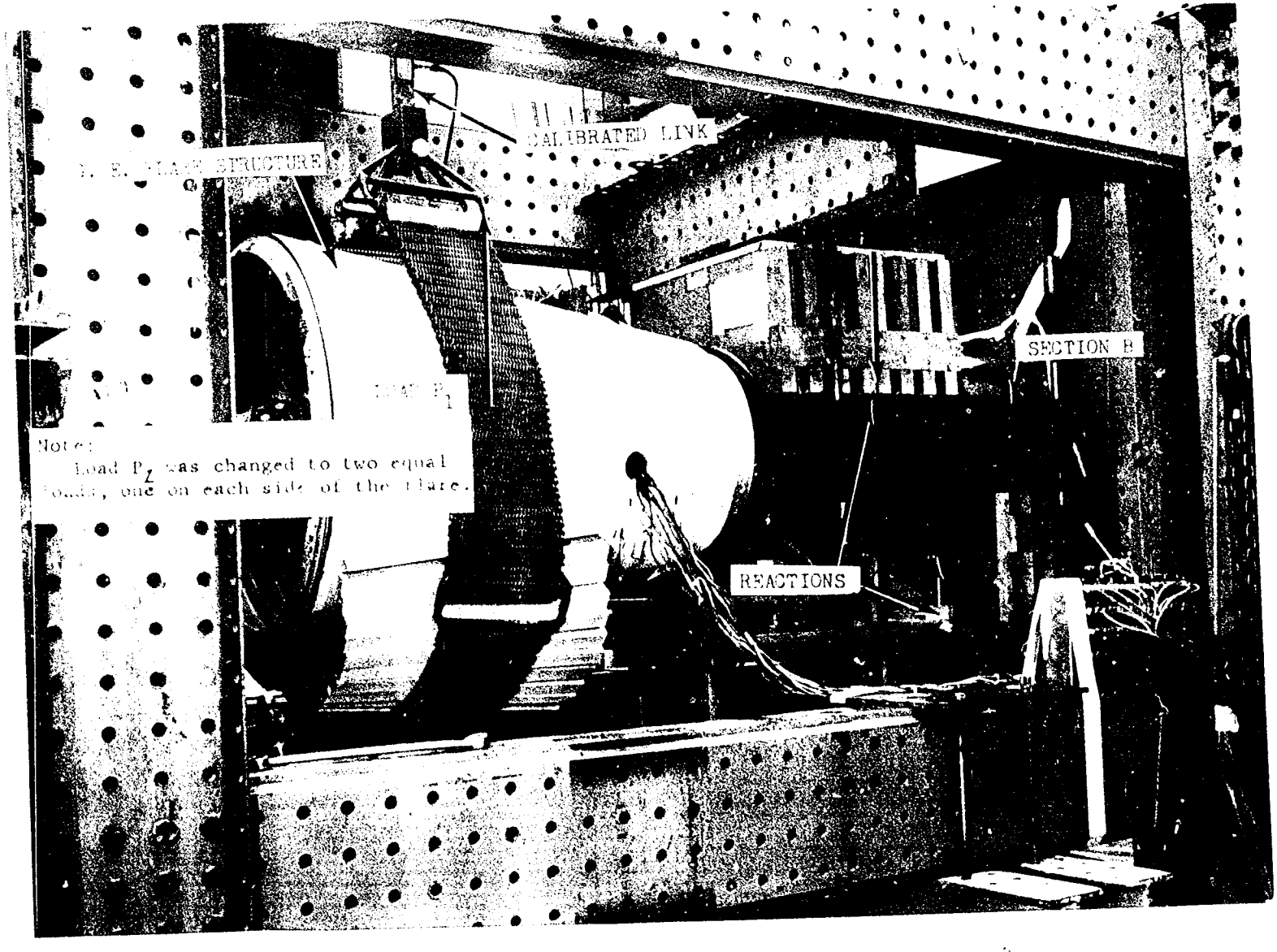

FIGURE 1 -- Test Setup for Static Test of W-49-4 Warhead/Mk. 3 Re-entry Vehicle Aft Interface Joint.

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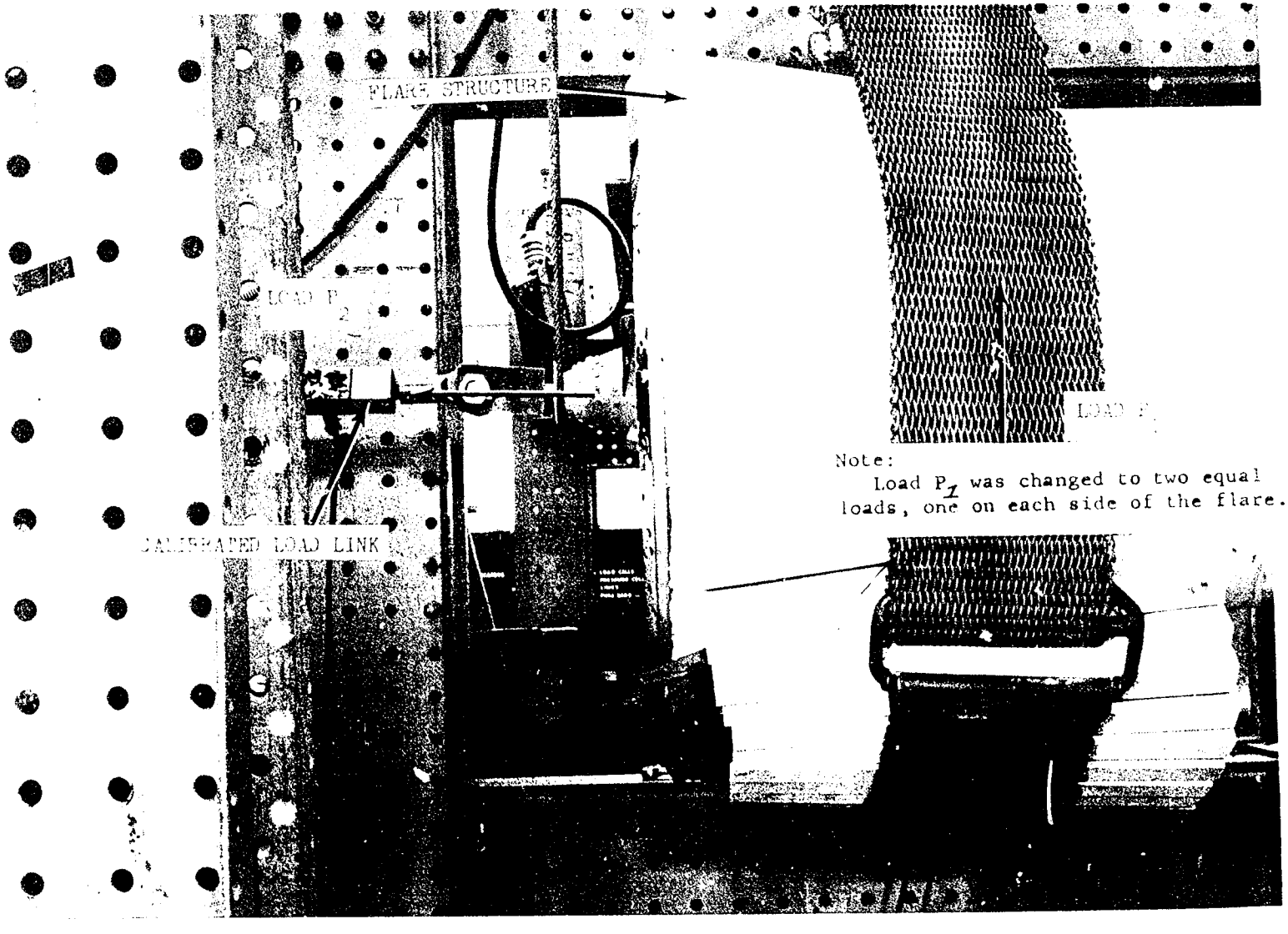

FIGURE 2 -- TEST SETUP FOR STATIC TEST OF W-49-4 WARHEAD/ MK. 3 RE-ENTRY VEHICLE AFT INTERFACE JOINT.

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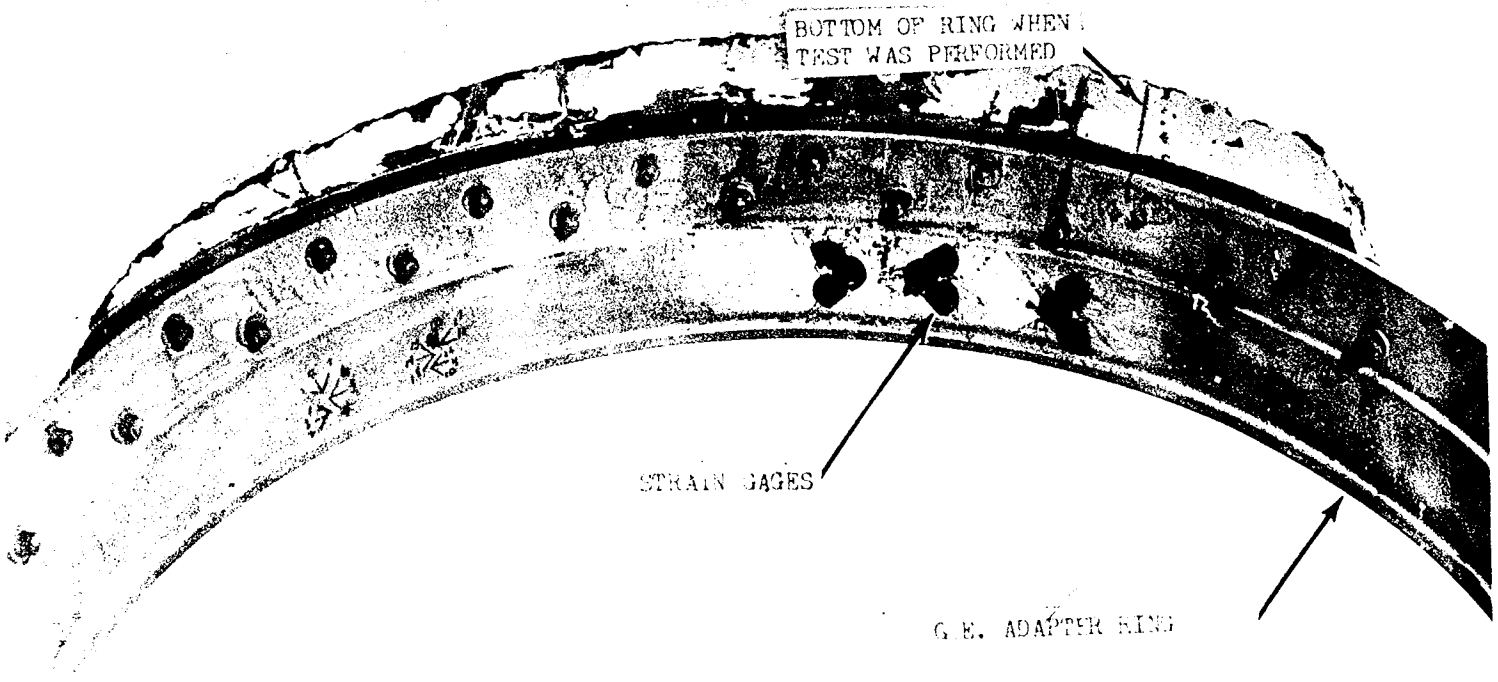

FIGURE 5 -- LOCATION OF STRAIN GAGES ON AFT ADAPTER RING -- STATIC TEST OF W-69-4 WARHEAD/MK. 3 RE-ENTRY VEHICLE AFT INTERFACE JOINT.

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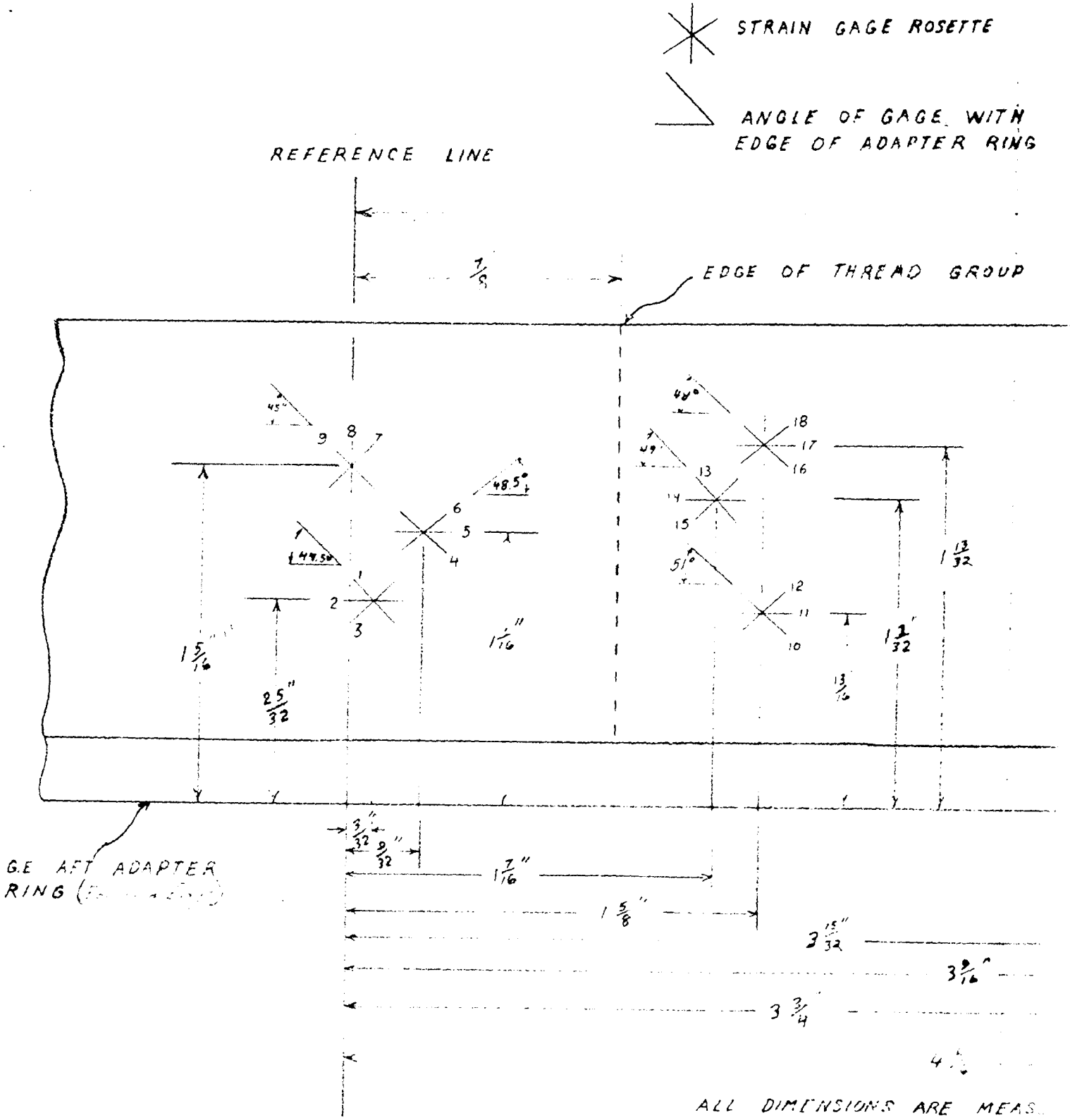

FIGURE 4 -- SKETCH OF SECTION OF ADAPTER RING
(SEE FIG. 3 FOR PHOTOGRAPH) -- STAT
MK.3 RE-ENTRY VEHICLE AFT INTERFACE

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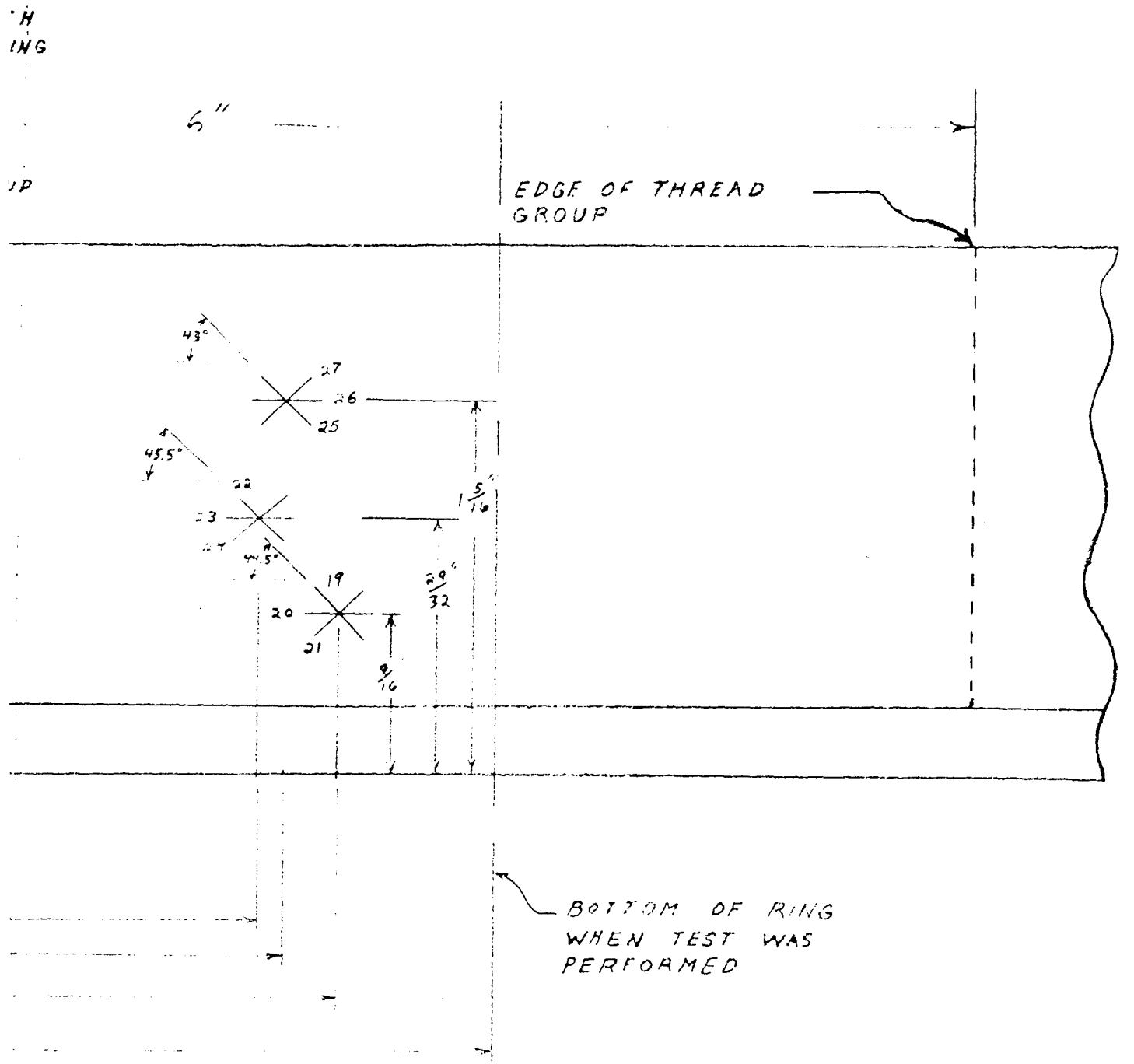

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NG SHOWING STRAIN GAGE LOCATIONS,
STATIC TEST OF [illegible]-4 WARHEAD/
FACE JOINT.

T- [illegible]
REF. SYM: 732[illegible]/9652

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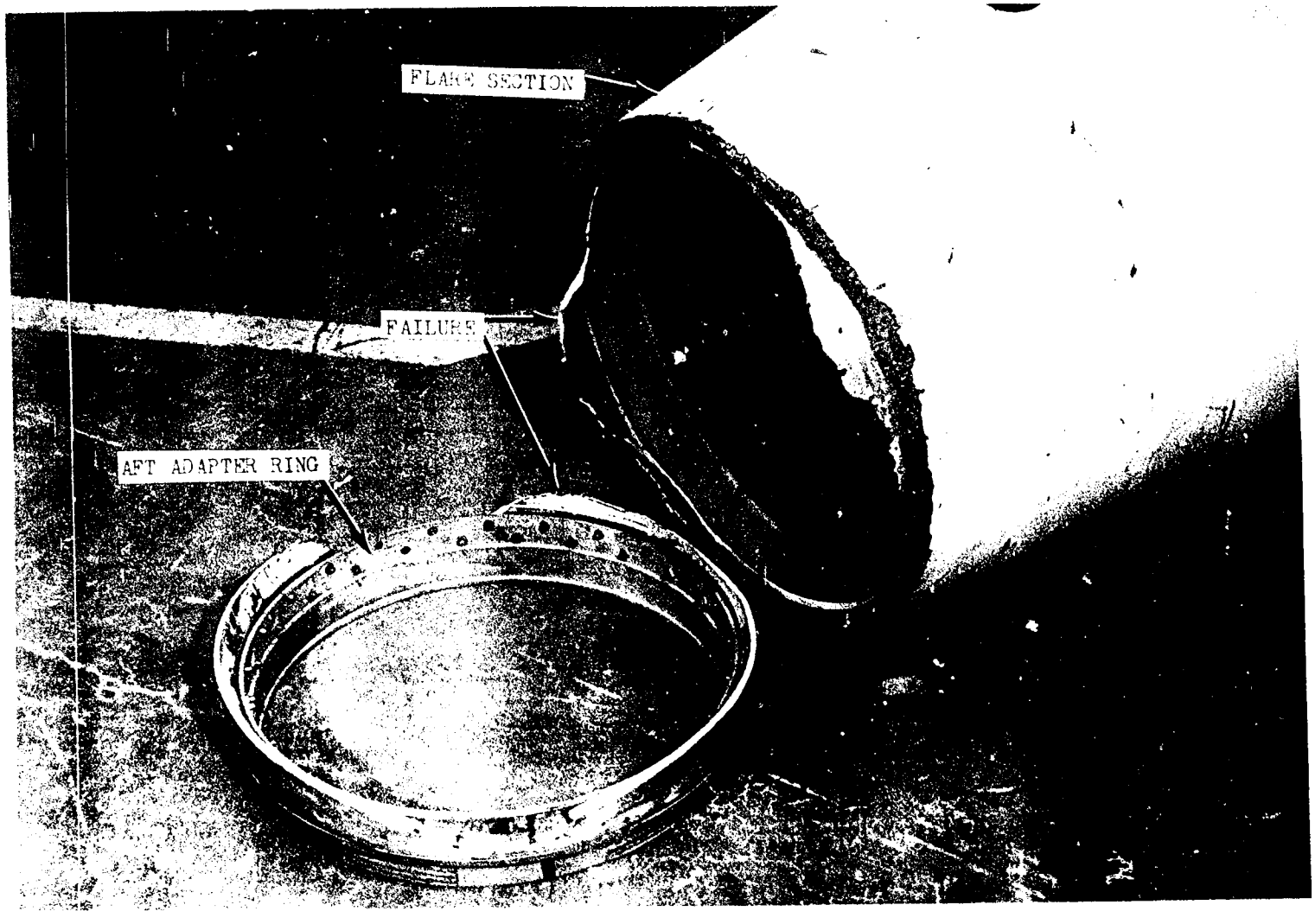

FIGURE 5 -- FAILURE OF FLARE STRUCTURE -- STATIC TEST OF W-49-4 WARHEAD/MK. 3 RE-ENTRY VEHICLE AFT INTERFACE JOINT.

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TABLE I

Project No. T-16967

Loads Applied in Static Test of W49-4 Warhead/Mk 3 Re-entry Vehicle Aft Interface Joint

Load (% Des Lim)	P_1^* (lbs)	P_2^{**} (lbs)
0	0	0
20	3,134	2,738
40	6,268	5,476
60	9,402	8,214
80	12,536	10,952
90	14,103	12,321
100	15,670	13,690
110	17,237	15,059
120	18,804	16,428
125	19,588	17,113
128	20,058	17,523
131	20,528	17,934
134	20,998	18,345
137	21,468	18,755
140	21,938	19,166
143	22,400	19,550
146	22,900	19,950
149	23,380	20,400
152	23,800	20,800

*See Figure 1

**See Figure 2

Note: 100-percent limit loads at interface.
Moment = 540,100 in-lbs
Shear = 15,670 lbs
Axial load = 13,690 lbs tension

TABLE II

Load-Strain Data - Static Tes
Re-entry Vehicle Aft

Strain in micr

Load (% Des Lim)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	0	0	0	0	0	0	0	0	0	0	0	0	0	[illegible]
20	102	136	-51	-48	14	-320	-293	-455	-81	103	45	-241	8	9[illegible]
40	270	270	-137	-38	52	-707	-628	-962	-138	245	93	-552	67	21[illegible]
60	416	414	-210	-33	82	-960	-820	-1280	-168	355	137	-793	107	31[illegible]
80	560	550	-220	0	190	-1290	-1310	-1750	-140	470	180	-980	150	41[illegible]
100	700	690	-320	0	130	-1610	-1420	-2200	-210	580	220	-1240	200	51[illegible]
110	760	740	-380	0	140	-1760	-1560	-2400	-240	640	230	-1370	220	55[illegible]
120	830	800	-420	0	170	-1890	-1680	-2590	-250	690	240	-1490	240	59[illegible]
125	870	830	-450	0	180	-1960	-1740	-2690	-260	720	250	-1550	260	61[illegible]
128	900	840	-520	0	180	-2060	-1840	-2820	-290	760	230	-1660	280	62[illegible]
131	910	850	-530	0	190	-2080	-1860	-2850	-290	770	240	-1670	290	62[illegible]
134	930	870	-540	0	190	-2120	-1880	-2900	-290	780	240	-1710	290	63[illegible]
137	950	890	-570	0	200	-2160	-1920	-2970	-290	800	250	-1750	310	66[illegible]
140	970	900	-580	0	210	-2190	-1950	-3020	-300	810	240	-1780	310	66[illegible]
143	990	920	-630	0	230	-2230	-2010	-3110	-300	840	250	-1840	320	66[illegible]
146	1010	940	-640	0	240	-2280	-2040	-3160	-310	850	250	-1870	330	69[illegible]
149	1040	970	-680	0	260	-2340	-2090	-3240	-320	880	280	-1910	360	73[illegible]
152	1070	990	-700	0	260	-2380	-2120	-3290	-320	900	290	-1950	360	74[illegible]

Note: Positive strains indicate tension and negative strains indicate compres

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TABLE II

Project No. T-16967

:a - Static Test of W49-4 Warhead/Mk 3
; Vehicle Aft Interface Joint

Strain in microinches per inch

12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-241	8	95	-222	20	-103	96	-143	-200	-91	-71	-109	-74	-38	-10	-54
-552	67	212	-489	91	-240	263	-282	-410	-178	-139	-206	-159	-55	0	-96
-793	107	311	-702	141	-377	387	-418	-587	-236	-222	-281	-224	-96	0	-140
-980	150	410	-870	200	-488	510	-500	-690	-200	-230	-280	-200	-90	0	-90
-1240	200	510	-1110	250	-630	640	-650	-850	-250	-330	-350	-270	-130	3	-130
-1370	220	550	-1220	280	-720	700	-730	-960	-280	-370	-400	-300	-170	3	-150
-1490	240	590	-1330	320	-800	740	-810	-1050	-300	-420	-450	-330	-210	1	-170
-1550	260	610	-1390	330	-840	770	-840	-1100	-310	-450	-470	-340	-230	1	-180
-1660	280	620	-1490	360	-910	780	-920	-1200	-340	-510	-540	-360	-270	0	-180
-1670	290	620	-1500	370	-930	790	-930	-1220	-350	-520	-550	-370	-270	0	-190
-1710	290	630	-1540	380	-930	800	-970	-1250	-350	-540	-570	-380	-280	0	-200
-1750	310	660	-1560	400	-990	830	-990	-1280	-360	-550	-580	-390	-290	0	-210
-1780	310	660	-1590	400	-1010	840	-1010	-1310	-370	-570	-590	-390	-300	0	-220
-1840	320	660	-1640	420	-1050	860	-1040	-1350	-380	-590	-610	-410	-310	0	-230
-1870	330	690	-1670	420	-1070	870	-1050	-1370	-390	-610	-630	-410	-320	0	-240
-1910	360	730	-1720	460	-1110	930	-1080	-1400	-390	-620	-640	-420	-320	0	-240
-1950	360	740	-1750	480	-1130	950	-1100	-1430							

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REF. SYM: 7521/9652

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TABLE I

Computed Load-Stress Data - Static
Re-entry Vehicle Aft

Stress (psi)

Load (% Des Lim)	Rosette 1 Su	Rosette 2 Sv	Rosette 3 θ	Rosette 4 Su	Rosette 5 Sv	Rosette 6 θ	Rosette 7 Su	Rosette 8 Sv	Rosette 9 θ	Rosette 10 Su	Rosette 11 Sv	Rosette 12 θ	Rosette 13 Su
0	0	0	0	0	0	0	0	0	0	0	0	0	
20	1460	-633	152	-1113	-4853	152	-788	-5275	56	488	-2725	163	[illegible]
40	3318	-1162	157	-1832	-10246	154	-1315	-11103	56	1159	-6136	164	53
60	5105	-1765	158	-2278	-13820	154	-1334	-14633	56	1708	-8808	164	86
80	6995	-1483	158	-2243	-18670	154	-2566	-20941	60	2448	-10716	165	135
100	8640	-2480	158	-3446	-22655	155	-1447	-24978	57	2928	-13627	164	170
110	9246	-3086	158	-3779	-24753	155	-1833	-27348	57	3175	-15009	165	180
120	10041	-3394	158	-3942	-26698	155	-1824	-29465	57	3355	-16324	165	190
125	10454	-3645	158	-4066	-27709	155	-1849	-30574	57	3513	-16968	165	201
125	10354	-4193	159	-4282	-28465	155	-2322	-31560	57	3430	-17696	165	189
128	10574	-4413	159	-4328	-29068	155	-2330	-32200	57	3510	-18100	165	195
131	10684	-4523	159	-4321	-29399	155	-2319	-32536	57	3616	-18206	165	200
134	10930	-4607	159	-4426	-29943	155	-2164	-33015	57	3600	-18676	165	195
137	11124	-4963	159	-4471	-30546	155	-2070	-33758	57	3717	-19118	165	223
140	11317	-4995	159	-4490	-31013	155	-2149	-34327	57	3691	-19416	165	215
143	11459	-5623	159	989	-4604	144	-2113	-35335	57	3848	-20060	165	209
146	11705	-5707	159	1047	--4743	144	-2193	-35905	57	3860	-20396	165	227
149	12009	-6173	159	1176	--4970	144	-2260	-36810	57	4150	-20848	165	261
152	12312	-6314	159	1163	-5022	144	-2207	-37349	57	4268	-21290	165	259

Notes: 1. θ is the angle of the maximum principal stress measured clockwise from the axis of the least numbered gage in each rosette.

2. Positive stress indicates tension and negative stress indicates compress

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'ABLE III

Project No.T-16967

Static Test of W49-4 Warhead/Mk 3
.e Aft Interface Joint

ps')

	Rosette			Rosette			Rosette			Rosette			Rosette		
	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	Su	Sv	θ	Su	Sv	θ	Su	Sv	θ	Su	Sv	θ	Su	Sv	θ
)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	75	-3544	150	2228	-348	52	-1220	-2574	54	-891	-1460	44	-459	-1033	141
4	520	-7361	152	6184	-445	51	-2270	-5187	53	-1965	-2866	40	-615	-1833	143
4	865	-10511	152	9361	-801	50	-3157	-7446	55	-3164	-4067	45	-979	-2847	140
5	1354	-13026	152	12366	-856	50	-2781	-8567	57	-2966	-4005	51	-758	-2160	45
4	1703	-16455	152	15719	-1291	50	-3814	-10777	58	-4410	-5317	60	-862	-3353	45
5	1805	-18017	152	17504	-1617	50	-4235	-12138	58	-4856	-6006	59	-1113	-4075	133
5	1908	-19578	152	19074	-1890	49	-4663	-13332	59	-5398	-6760	60	-1515	-4645	132
5	2017	-20336	153	19872	-2039	49	-4744	-13900	58	-5680	-7128	63	-1638	-5008	132
5	1892	-20859	153	20293	-2298	49	-5015	-14763	58	-5859	-7759	62	-1826	-5307	130
5	1957	-21572	153	20877	-2396	49	-5235	-15192	58	-6048	-8056	63	-1861	-5434	129
5	2002	-21618	153	21271	-2465	49	-5327	-15423	58	-6210	-8219	63	-1911	-5546	130
5	1958	-22223	153	21510	-2380	49	-5511	-15888	59	-6398	-8516	63	-1997	-5785	130
5	2239	-22503	153	22576	-2636	49	-5633	-16253	59	-6561	-8678	63	-2082	-6024	130
5	2159	-22910	153	22855	-2753	49	-5754	-16617	59	-6675	-8888	65	-2167	-6263	131
5	2099	-23498	153	23642	-2892	49	-5905	-17116	59	-6999	-9212	65	-2252	-6502	131
5	2279	-24003	153	23922	-3009	49	-5997	-17347	58	-7052	-9484	65	-2337	-6741	131
5	2615	-24663	153	25437	-2903	49	-6083	-17747	59	-7214	-9646	65	-2337	-6741	131
5	2598	-25132	153	26070	-2888	49									

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