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1695

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CENTRAL RECORD FILE
ACCOUNTABILITY CARD
FILE No. Mk 28
3-2

INVENTORIED
SEP 14 '65
3428-2

NOV 9

File No: M-28, 3-2
T-17980
Date Completed: 8-8-61
RS 7321/9823

RECEIVED
NOV 13 1961
CENTRAL RECORD FILE

MR. V. E. BLAKE, JR. - 7110
Attn: B. C. Caskey - 7115-1

Re: Ejection Load Test of Mk 28 Case Section (U)

Summary of Test

A Mk 28 case section was subjected to a static load simulating the force exerted when the weapon is ejected from the CF-104 aircraft. Two ejection pads, differing only in thickness, were compared with regard to stresses set up in the coupling ring in the forward case joint. At the limit load of 18,000 pounds, the maximum stress in the ring was 43, 250 psi tension when using the thinner ejection pad, and 50,909 psi tension when using the thicker pad. Maximum test loads were 110 per cent limit with the thin pad and 150 percent limit with the thick pad. Some yielding of both the case section and ejection pads was noted after load was released.

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Object of Test

An ejection system used when the Mk 28 weapon is carried on the CF-104 aircraft exerts a force of 18,000 pounds on the case joint forward of the suspension lugs. The object of this test was to determine if the coupling ring on the MC-706 warhead case section would adequately withstand such a force, and to compare two different ejection pads with regard to stresses set up in the ring.

Authorization for Test

The test was performed in accordance with Environmental Test Order No. 17980, from Division 7115 to Division 7321, dated July 24, 1961. Test consultants were B. C. Caskey, 7115-1 and I. B. White, 7182-2.

Equipment and Instrumentation

The loading equipment consisted of a Miller hydraulic cylinder, operated from a hand pump; a boxed pull bar, Serial No. 3, used in compression; and a Baldwin strain indicator, Serial No. 443662. Strain measurements were recorded on the B & F Model 100-451 strain gage scanning, recording and digital readout system.

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
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CLASSIFICATION CHANGED TO: U
AUTHORITY: R. A. Cramer
RECORD ID: 98SN3781
DATED: 8/20/98

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Instrumentation consisted of nine Baldwin type FABR-12-12 three-element rosette strain gages, mounted with Eastman 910 cement on the inner surface of the 7075-T6 aluminum coupling ring. Gage locations and numbering are shown in Figure 1. The center row of gages was directly beneath the load application point.

Procedure

The MC-706 warhead case section, with a forward case section attached, was set up in the static jig as shown in Figure 2. The load was applied with a simulated ejector pad, centered 0.36 inch forward of the aft edge of the coupling ring. The case section was supported by a wooden saddle and restrained by a beam across the aft end.

In the first test an ejector pad 0.060 inch thick was used. Load was applied in increments up to 19,800 pounds (110 percent of the 18,000 pounds limit load). Strain gage readings were taken at each increment of load.

A second test was performed, using an ejector pad identical to the first, except 0.188 inch thick. Setup and procedure were the same as before. Maximum load applied was 27,000 pounds (150 percent limit load).

Results

Strain readings with corresponding principal stress magnitudes and directions are given in Tables I and II. Material constants used in stress calculations were 10.3 million psi for the modulus of elasticity and 0.333 for the Poisson ratio.

As expected, the highest readings were obtained from the center row of strain gages, these being nearest the loading point. Directions of the principal stresses at these gage locations were found to be approximately circumferential and longitudinal. In general, stresses in the second test did not differ greatly from those in the first test except at rosette No. 5 (gage Nos. 13, 14, and 15 in Figure 1), directly beneath the ejector pad. At this location, the two principal stresses for the limit load of 18,000 pounds were 43,250 psi tension and 12,981 psi compression in the first test, and 50,909 psi and 34,521 psi, both tension, in the second test.

Several strain readings in Table II are marked as questionable. These were so far out of line with other readings as to cast doubt upon their validity.

Permanent set in the case section near the loading point was noted, both visually and from the high residual strain remaining after the test. Bending of the ejector pad was also observed, being more prominent with the

thinner pad used in the first test.

W. M. Sigmon
W. M. SIGMON - 7322-1

R. G. Hamilton
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Approved By: R. S. HOOPER - 7321-5

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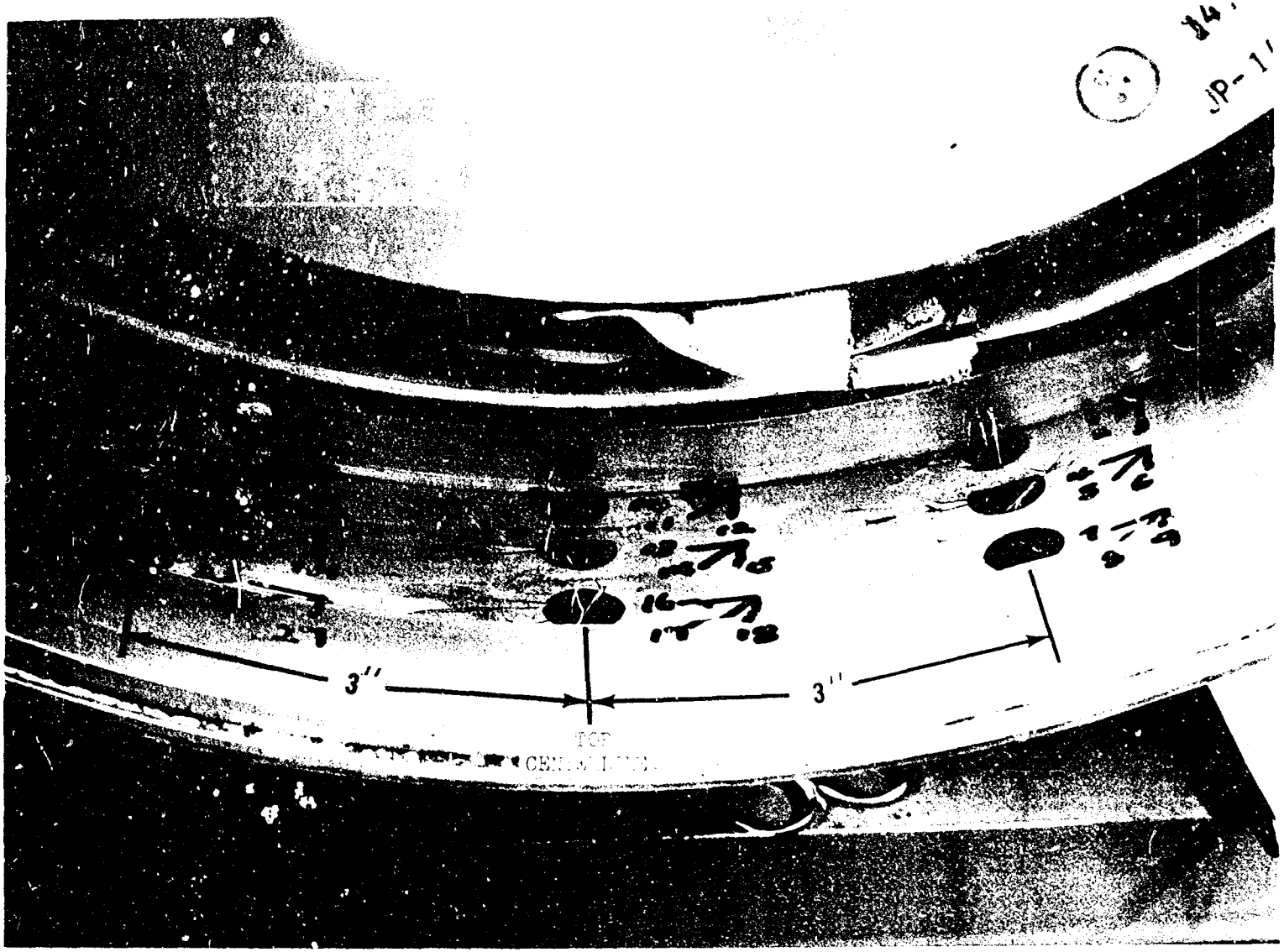

FIG. 1. [illegible]
CASE SECTION.

D# 61-18032

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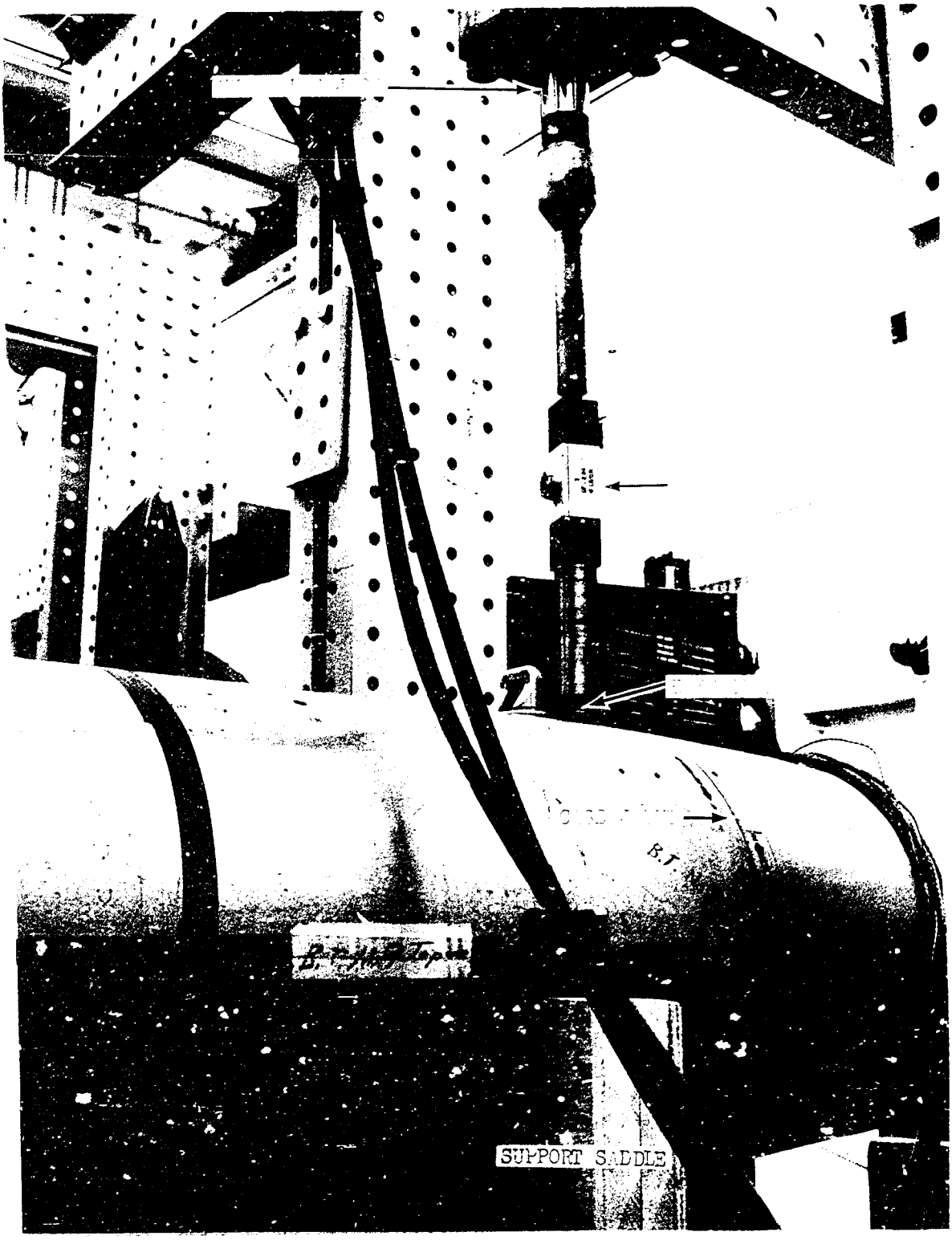

FIG. 2. SETUP FOR EJECTION LOAD TEST OF MK. 28 CASE SECTION.

D#61-1803 [redacted]

T-17200
RS 7321/9823

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TABLE I

STRAIN READINGS AND CORRESPONDING PRINCIPAL STRESSES
TEST NO. 1 (WITH 0.060" THICK EJECTOR PAD)
EJECTION LOAD TEST OF MK. 28 CASE SECTION

T-17980
RS 7321/9823

STRAIN - MICROINCHES PER INCH

LOAD (POUNDS)	ROSETTE 1 CH 1	CH 2	CH 3	ROSETTE 2 CH 4	CH 5	CH 6	ROSETTE 3 CH 7	CH 8	CH 9	ROSETTE 4 CH 10	CH 11	CH 12	ROSETTE 5 CH 13	CH 14	CH 15
01800	-140	-170	20	-170	-150	80	-180	-120	20	560	140	-190	650	450	240
03600	-250	-300	50	-290	-280	110	-330	-200	100	1030	330	-280	1080	700	320
07200	-370	-540	70	-470	-550	70	-510	-360	140	1740	600	-450	1800	1200	500
10800	-420	-800	50	-570	-960	-150	-620	-630	110	2430	850	-640	2550	1450	-110
14400	-500	-1090	40	-750	-1440	-370	-870	-980	0	3250	1110	-950	3540	1330	-1330
16200	-530	-1300	30	-870	-1670	-480	-1000	-1140	130	3520	1240	-1150	4050	1340	-1950
18000	-580	-1470	40	-980	-1950	-590	-1180	-1310	140	4070	1360	-1350	4590	1320	-2620
19800	-670	-1650	30	-1100	-2220	-710	-1370	-1460	150	4580	1520	-1550	3900	1250	-3440
000	10	-10	-30	-10	-60	-50	-70	-110	0	40	-90	-30	60	-150	-450

STRESS - POUNDS PER SQUARE INCH

LOAD (POUNDS)	ROSETTE 1 SU	SV	PHI	ROSETTE 2 SU	SV	PHI	ROSETTE 3 SU	SV	PHI	ROSETTE 4 SU	SV	PHI	ROSETTE 5 SU	SV	PHI
01800	134	-1978	63	576	-1959	70	-393	-2066	79	5776	-90	3	8430	5245	179
03600	405	-3478	63	759	-3525	68	28	-3562	79	10860	663	2	13706	7805	0
07200	1172	-5782	60	360	-6506	64	24	-5709	76	18421	1400	1	22732	12607	178
10800	2270	-7955	55	-595	-10468	55	146	-7982	67	25677	1826	1	29227	8264	175
14400	3466	-10534	54	-1613	-15596	51	-1269	-12099	64	33980	1359	1	35968	-2011	177
16200	4598	-12280	52	-2498	-18245	51	332	-13700	64	36345	70	179	39539	-7272	177
18000	5476	-13773	52	-2889	-21234	50	4	-15984	65	41941	-148	0	43250	-12981	177
19800	5763	-15597	52	-3582	-24229	49	-518	-18227	66	47080	-523	180	33114	-26046	172
000	2	-309	0	-161	-741	28	105	-1180	58	863	-709	35	-985	-5007	175

UNSIGNED NUMBER SIGNIFIES TENSION
NUMBER SIGNED (-) SIGNIFIES COMPRESSION
SU IS THE MAXIMUM PRINCIPAL STRESS (LARGEST ALGEBRAIC VALUE)
SV IS THE MINIMUM PRINCIPAL STRESS (SMALLEST ALGEBRAIC VALUE)
PHI IS THE ANGLE FROM LOWEST NUMBERED GAGE IN ROSETTE TO SU MEASURED OPPOSITE TO SYSTEM OF GAGES

[redacted]

1700

STRAIN - MICROINCHES PER INCH

LOAD (POUNDS)	ROSETTE 6 CH 16	CH 17	CH 18	ROSETTE 7 CH 19	CH 20	CH 21	ROSETTE 8 CH 22	CH 23	CH 24	ROSETTE 9 CH 25	CH 26	CH 27
01800	280	160	-30	-160	50	40	-170	20	100	-170	-100	30
03600	570	370	20	-270	120	90	-330	20	140	-320	-180	60
07200	970	670	160	-430	230	140	-530	50	150	-570	-300	140
10800	1590	1170	430	-550	380	180	-750	120	120	-940	-430	240
14400	2710	1770	780	-710	780	220	-1070	200	100	-1350	-570	380
16200	3040	2060	920	-800	680	230	-1250	230	60	-1510	-590	420
18000	3590	2420	1070	-880	790	250	-1390	270	-10	-1660	-590	430
19800	4130	2800	1260	-970	910	270	-1550	290	-110	-1830	-600	460
000	3380	250	40	-10	0	-10	-20	-10	-10	-20	-10	0

STRESS - POUNDS PER SQUARE INCH

LOAD (POUNDS)	ROSETTE 6 SU	SV	PHI	ROSETTE 7 SU	SV	PHI	ROSETTE 8 SU	SV	PHI	ROSETTE 9 SU	SV	PHI
01800	3217	932	175	233	-2076	114	594	-1670	101	-265	-1886	82
03600	6746	2319	172	765	-3531	115	572	-3491	103	-472	-3523	83
07200	11930	5432	173	1430	-5886	116	312	-6151	108	-469	-6138	83
10800	20191	10846	172	2381	-8066	119	-63	-9617	113	-754	-10001	86
14400	34308	19316	179	4976	-12505	123	-457	-14447	115	-702	-14202	87
16200	38678	22168	178	4115	-12873	121	-962	-17322	116	-872	-15876	89
18000	45610	25991	178	4798	-14478	121	-1512	-20000	117	-1332	-17567	91
19800	52582	30235	178	5527	-16283	122	-2413	-23093	119	-1609	-19441	92
000	43500	9049	21	-76	-231	45	-176	-285	113	-76	-231	90

UNSIGNED NUMBER SIGNIFIES TENSION
NUMBER SIGNED (-) SIGNIFIES COMPRESSION
SU IS THE MAXIMUM PRINCIPAL STRESS (LARGEST ALGEBRAIC VALUE)
SV IS THE MINIMUM PRINCIPAL STRESS (SMALLEST ALGEBRAIC VALUE)
PHI IS THE ANGLE FROM LOWEST NUMBERED GAGE IN ROSETTE TO SU MEASURED OPPOSITE TO SYSTEM OF GAGES

TABLE II

[illegible]

[illegible]

STRAIN - MICROINCHES PER INCH

LOAD (POUNDS)	ROSETTE 1 CH 1	CH 2	CH 3	ROSETTE 2 CH 4	CH 5	CH 6	ROSETTE 3 CH 7	CH 8	CH 9	ROSETTE 4 CH 10	CH 11	CH 12	ROSETTE 5 CH 13	CH 14	CH 15
3600	-370	-430	60	-430	-360	190	-380	-260	60	1300	430	-400	1400	1090	650
7200	-480	-670	110	-620	-590	240	-640	-420	140	2400	740	-620	2500	1820	1150
10800	-570	-930	110	-800	-930	120	-840	-540	220	3100	1040	-790	3100	2290	1360
14400	-570	-1180	50	-840	-1490	-390	-860	-950	90	3500	1250	*-4830	1400	1660	-540
000	-10	-10	-10	-10	-40	-60	-60	-60	-10	100	20	-30	100	[illegible]	-60
10800	-570	-900	100	-750	-930	80	-820	-540	210	3100	1040	-710	2500	1940	1040
14400	-670	-1170	90	-940	-1290	-30	*-2990	-740	220	3600	1280	*-4050	3200	2480	1340
18000	-730	-1430	60	-1050	-1660	-280	-1110	-970	160	4200	1550	-1150	3800	3050	1760
19800	-750	-1550	60	-1130	-1880	-410	-1250	-1110	170	4500	1680	-1310	4300	3190	1460
21600	-810	-1680	60	-1230	-2110	-510	-1370	-1280	170	4900	1790	-1450	4800	3240	1010
23400	-870	-1860	50	-1350	-2320	-600	-1510	-1400	210	5200	1930	-1610	5300	3220	350
25200	-930	-2030	50	-1450	-2550	-740	-1650	-1570	220	5700	2050	-1800	6000	3000	-370
27000	-970	-2190	60	-1550	-2770	-900	-1790	-1680	220	6200	2180	*-4430	4500	3050	-1260
000	-40	-70	-30	-60	-90	-90	-90	-100	-30	200	60	-180	100	150	-140

* [illegible]

STRESS - POUNDS PER SQUARE INCH

LOAD (POUNDS)	ROSETTE 1 SU	SV	PHI	ROSETTE 2 SU	SV	PHI	ROSETTE 3 SU	SV	PHI	ROSETTE 4 SU	SV	PHI	ROSETTE 5 SU	SV	PHI
3600	329	-5022	64	1201	-4888	71	-582	-4335	78	13517	312	1	18705	12794	175
7200	1566	-7251	61	1641	-7480	69	-537	-7145	78	25459	1891	3	33283	22799	[illegible]
10800	2509	-9577	58	586	-11034	64	-277	-9250	78	32877	2616	2	41036	27492	178
14400	3544	-11534	54	-2434	-16465	52	-183	-11648	65	25381	-45816	168	18771	-5557	154
000	-154	-154	6	-440	-736	6	-263	-812	67	1056	20	6	948	-333	7
10800	2172	-9393	58	486	-10781	62	-290	-9082	78	33204	3519	2	33017	21376	173
14400	2988	-11895	57	-371	-14633	60	-7848	-34713	101	28463	-35377	169	42283	27475	174
18000	3892	-14187	55	-1933	-18503	56	-1046	-13551	71	44206	2658	180	50909	34521	173
19800	4571	-15173	54	-2769	-20893	54	-1227	-15368	71	47076	1939	179	55538	32965	174
21600	4920	-16444	54	-3341	-23395	53	-1242	-17196	69	51166	1844	179	59579	29692	175
23400	5513	-18113	54	-4138	-25824	53	-1126	-18849	69	54043	1118	179	62869	23943	175
25200	6165	-19681	54	-5194	-28455	52	-1147	-20825	69	59093	831	179	68028	18478	178
27000	7063	-21045	53	-6562	-31083	51	-1611	-22512	69	54898	-33848	172	49861	-79	167
000	-263	-812	49	-988	-1317	23	-534	-1310	63	1679	-1372	173	1309	-1923	153

UNSIGNED NUMBER SIGNIFIES TENSION
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SU IS THE MAXIMUM PRINCIPAL STRESS (LARGEST ALGEBRAIC VALUE)
SV IS THE MINIMUM PRINCIPAL STRESS (SMALLEST ALGEBRAIC VALUE)
PHI IS THE ANGLE FROM LOWEST NUMBERED GAGE IN ROSETTE TO SU MEASURED OPPOSITE TO SYSTEM OF GAGES

STRAIN - MICROINCHES PER INCH

LOAD (POUNDS)	ROSETTE 6 CH 16	CH 17	CH 18	ROSETTE 7 CH 19	CH 20	CH 21	ROSETTE 8 CH 22	CH 23	CH 24	ROSETTE 9 CH 25	CH 26	CH 27
036[illegible]	[illegible]	360	-30	-400	130	150	-440	20	230	-440	-190	70
072[illegible]	[illegible]	680	80	-560	270	150	-700	60	290	-720	-370	140
108[illegible]		1000	370	-690	400	180	-910	100	220	-4010	-470	210
144[illegible]		1680	780	-800	580	200	-1150	140	70	-1400	-590	330
000		0	-10	-50	-10	-10	-10	-50	[illegible]	-30	-30	-30
108[illegible]		1020	330	-700	390	180	-920	90	230	-1000	-480	200
144[illegible]		1340	580	-840	540	210	-1150	140	240	-2670	-590	290
180[illegible]		1580	840	-970	680	250	-1400	190	180	-1610	-730	380
198		1850	940	*-2940	780	250	-1510	230	120	-1710	-740	400
216[illegible]		2090	1040	-1090	880	280	-1630	240	40	-1830	-740	400
234[illegible]		2420	1200	-1190	1000	290	-1760	250	-30	-1950	-730	410
252[illegible]		2770	1530	-1250	1100	310	-1890	300	-110	-2080	-710	420
270[illegible]		3180	2290	-2640	1220	320	-2050	310	-230	-2210	-710	440
000		240	120	-90	-10	-40	-80	-70	-10	-60	-70	-60

*[illegible]

STRESS - POUNDS PER SQUARE INCH

LOAD (POUNDS)	ROSETTE 6 SU	SV	PHI	ROSETTE 7 SU	SV	PHI	ROSETTE 8 SU	SV	PHI	ROSETTE 9 SU	SV	PHI
036[illegible]				610	-5220	114	1163	-4390	100	-862	-4823	89
072[illegible]				1455	-7755	117	1210	-7510	104	-1059	-7852	85
108[illegible]				2188	-10024	118	284	-10886	109	-9400	-48987	107
144[illegible]				3250	-12469	120	-1203	-15391	114	-1490	-14951	88
000				-241	-681	113	275	-428	48	-461	-461	[illegible]
108[illegible]				2100	-10090	118	296	-10900	109	-1445	-10847	86
144[illegible]				2951	-12631	119	114	-14096	110	-5883	-30686	101
180[illegible]				3831	-14894	120	-642	-18104	113	-1671	-17228	87
198[illegible]				-33	-41299	117	-1105	-20252	114	-1845	-18283	88
216[illegible]				5085	-17531	121	-1888	-22542	116	-2325	-19647	89
234[illegible]				5727	-19556	121	-2608	-24895	116	-2662	-21000	91
252[illegible]				6392	-20835	122	-3131	-27599	118	-3001	-22505	93
270[illegible]				3941	-39588	119	-4222	-30810	119	-3219	-23977	94
000				-530	-1468	123	-357	-1025	72	-844	-1000	45

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