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1814

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW	
1st Review Date: 7/20/98 Authority: ☐ADC ☒ADD Name: W Layne 2nd Review Date: 7/23/98 Authority: ADD Name: RB Craner	Determination (Circle Number): 1. Classification Retained 2. Classification Changed to: U 3. Contains No DOE Classified Information 4. Coordinate With: 5. Contains UCAI? no 6. Comments: OK for Openmt

MAY 22 1962

File No: XW-53, 3-2
T-17817
Date Completed: 1-11-62
RS 7321/9943

INVENTORIED AUG 6 1964 3427

MR. J. J. KANE - 7145
Attn: C. D. Gragg

Re: Hydrostatic Pressure Test of XW-53 Pressure Cover, ACX-26011-L1 (U)

Summary of Test

The XW-53 pressure cover was hydrostatically pressurized after being stress-coated and instrumented with 24 rosette strain gages. There was no indication of yielding to the cover from either the strain gage data or the stresscoat data, at an internal pressure of 83.4 psi. A 0.033-inch deflection was measured at the top center of the cover at 83.4 psi.

Object of Test

The object of this test was to obtain results which will assist in the structural certification of the W-53. Twenty-four rosette strain gages were to be mounted along a line from the top center to the bottom of the pressure cover. Stresscoat was to be applied to the remaining surface of the pressure cover. The original work order requested an internal pressure of 100 psi. This was changed to 83.4 psi by addendum to 17817.

INVENTORIED SEP 14 '65 RECEIVED MAY 23 1962 CENTRAL RECORD FILE

Authorization for Test

This test was requested in an Environmental Test Order from Division 7145 to Division 7321, dated May 22, 1961. Mr. C. D. Gragg, 7145-1 was the consultant.

CENTRAL RECORD FILE
ACCOUNTABILITY CARD: BB
FILE No. XW53 3-2

Test Equipment and Instrumentation

The following equipment was used:

1 - Baldwin SR-4 strain indicator, Serial No. 391905
1 - Baldwin SR-4 pressure cell, 100-psi capacity, Serial No. 10653
1 - Sprague air operated hydraulic pump

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW DOWNGRADING OR DECLASSIFICATION STAMP	
CLASSIFICATION CHANGED TO: U Emelda Selph 7/30/98 PERSON CHANGING MARKING & DATE W. C. Layne 7/30/98 PERSON VERIFYING MARKING & DATE	AUTHORITY: R.B. Craner RECORD ID: 98SN3070 DATED: 7/23/98

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The following instrumentation was used:

24 - Rosette strain gages, Type FABR 12-12, gage factor 2.12
7 - Starrett dial indicators, least graduation 0.001 inch
stresscoat No. 1206, sensitivity at time of test 800 microinches/inch

Procedure

The 40 pressure cover bolts were torqued to 130 to 140 inch pounds. The 32 bolts attaching the Section D to the "D" Section Adapter Plate, M18069, were torqued to 190 to 200 inch pounds. Dial indicators were mounted at locations as shown in Figures 1 and 2. Strain gages were mounted at locations as shown in Figures 3 through 6. Stresscoat was applied to the cover in the area opposite the strain gages. Pressure was applied with a Sprague air-operated hydraulic pump and measured with a Baldwin SR-4 pressure cell used in conjunction with a Baldwin SR-4 strain indicator.

Results

There was no indication of yielding of the M4-53 Pressure Cover from the strain gage or stresscoat data obtained when the 83.4 psi internal pressure was applied. Figures 7 through 11 are photos of the stresscoat crack patterns. For deflection data see Table I. Table II lists the strain and maximum and minimum principal stresses.

For plots of stress vs distance at various pressures for strain gage Nos. 25 through 48 (see Figure 3), see Figures 12 through 14. Distance of rosette 25-26-27, is 1.80 inches from edge of the cover. Stresses plotted are stresses in the circumferential and transverse directions.

Harry Warrick
HARRY WARRICK - 7322-1

D T Judd
7321 Project Engineer: D. T. JUDD - 7321-5

R S Hooper
Approved By: R. S. HOOPER - 7321-5

HW:7322-1:mw

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1816

Distribution:
1/7A - J. J. Kane, 7145
2/7A - D. M. Bruce, 7182
Attn: T. G. Priddy,
3/7A - J. M. Wiesen, 1442
4/7A - D. S. Bliss, 2344
5/7A - E. H. Copeland, 7321
6/7A - C. L. Johnson, 7523
7/7A - R. E. Smelkmer, 3421-3

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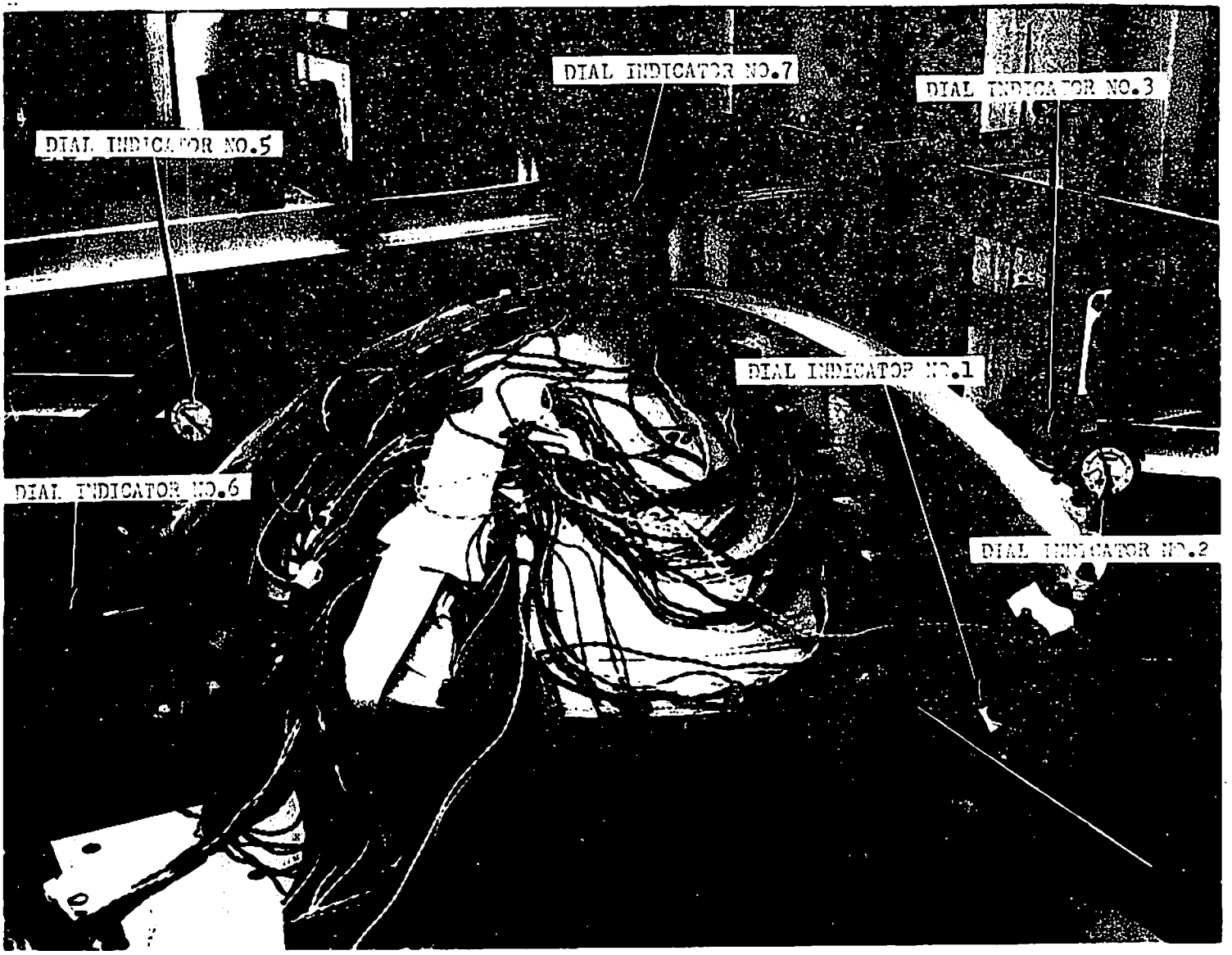

D#62-14657

FIG.1--DIAL INDICATOR LOCATIONS--HYDROSTATIC PRESSURE TEST OF XN-53 PRESSURE COVER

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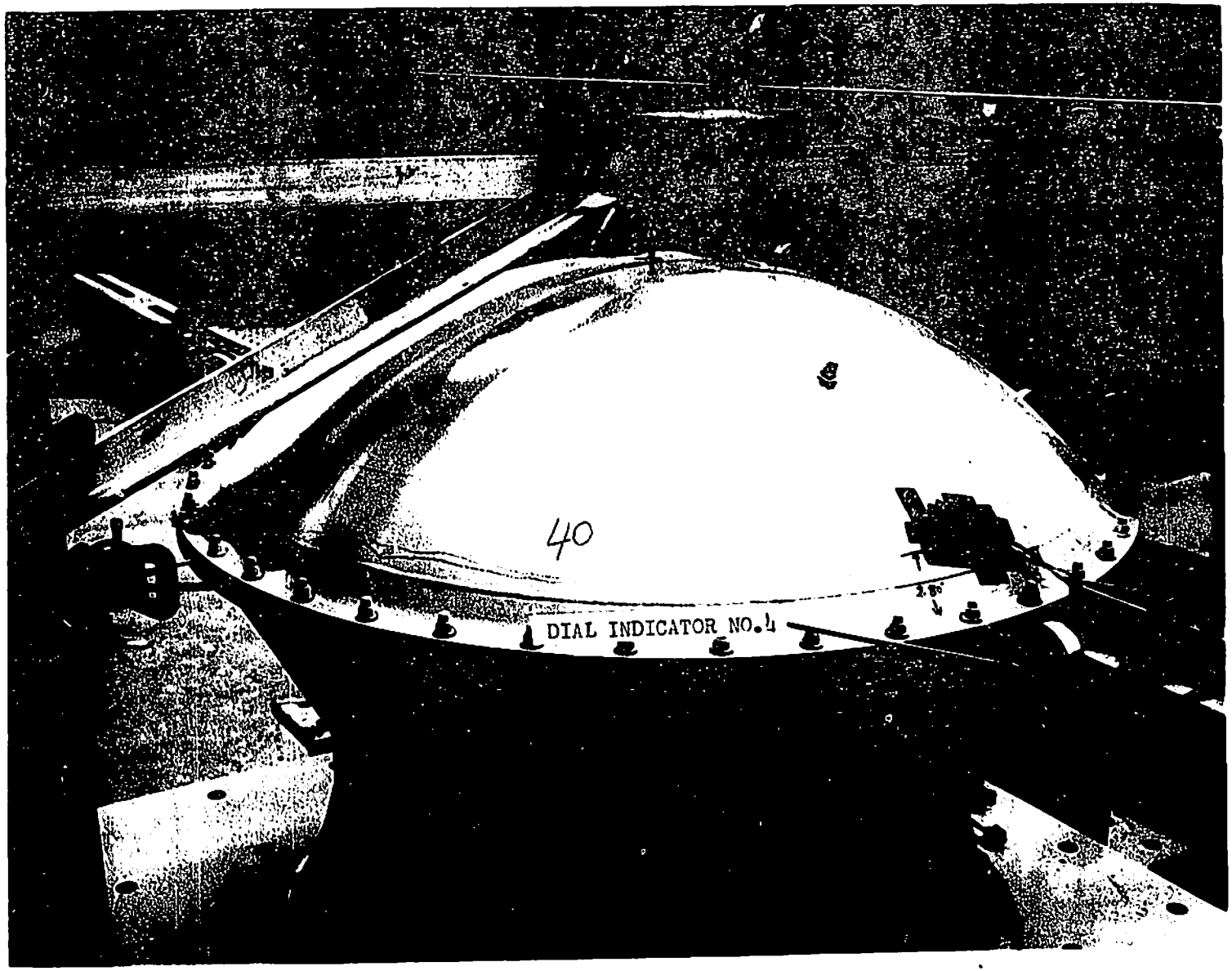

FIG. 2--DIAL INDICATOR LOCATIONS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

D#62-14658

T-17817 RS 7321/9943

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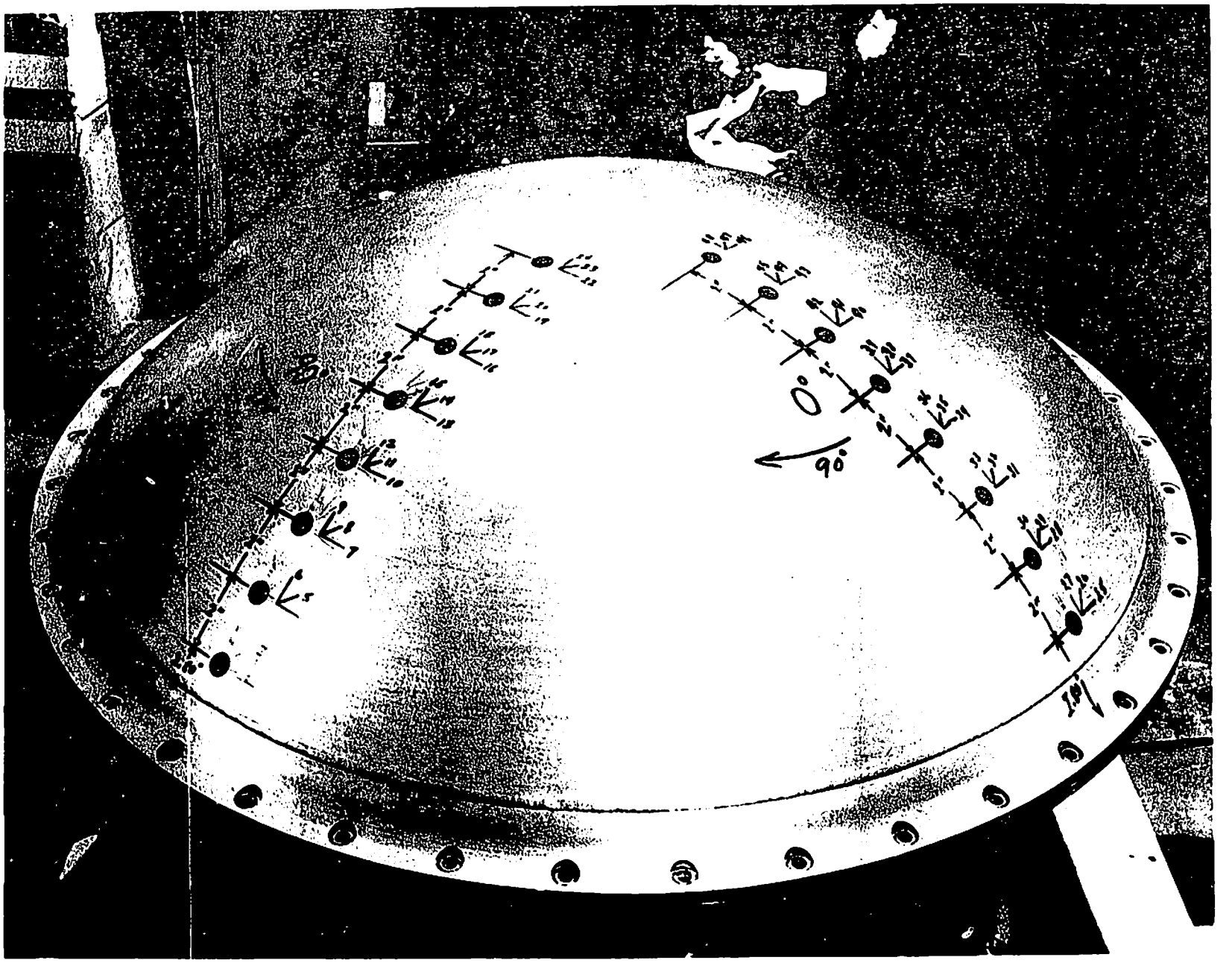

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D#61-19984

FIG. 3--STRAIN GAGE LOCATIONS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

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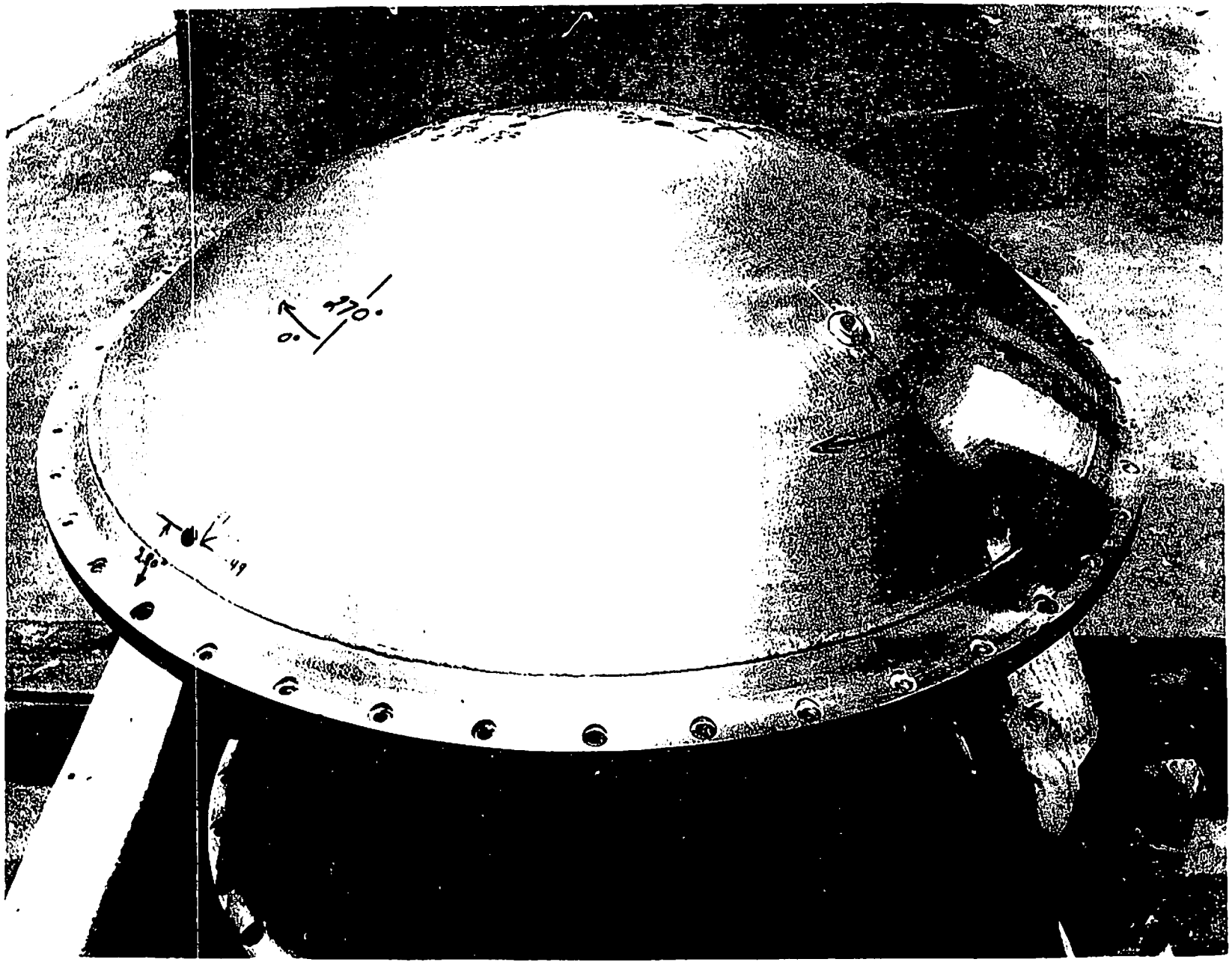

D#61-19982

FIG.4--STRAIN GAGE LOCATIONS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

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FIG. 5 --STRAIN GAGE LOCATIONS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

D462-14659

T-17817 RS 7321/9943

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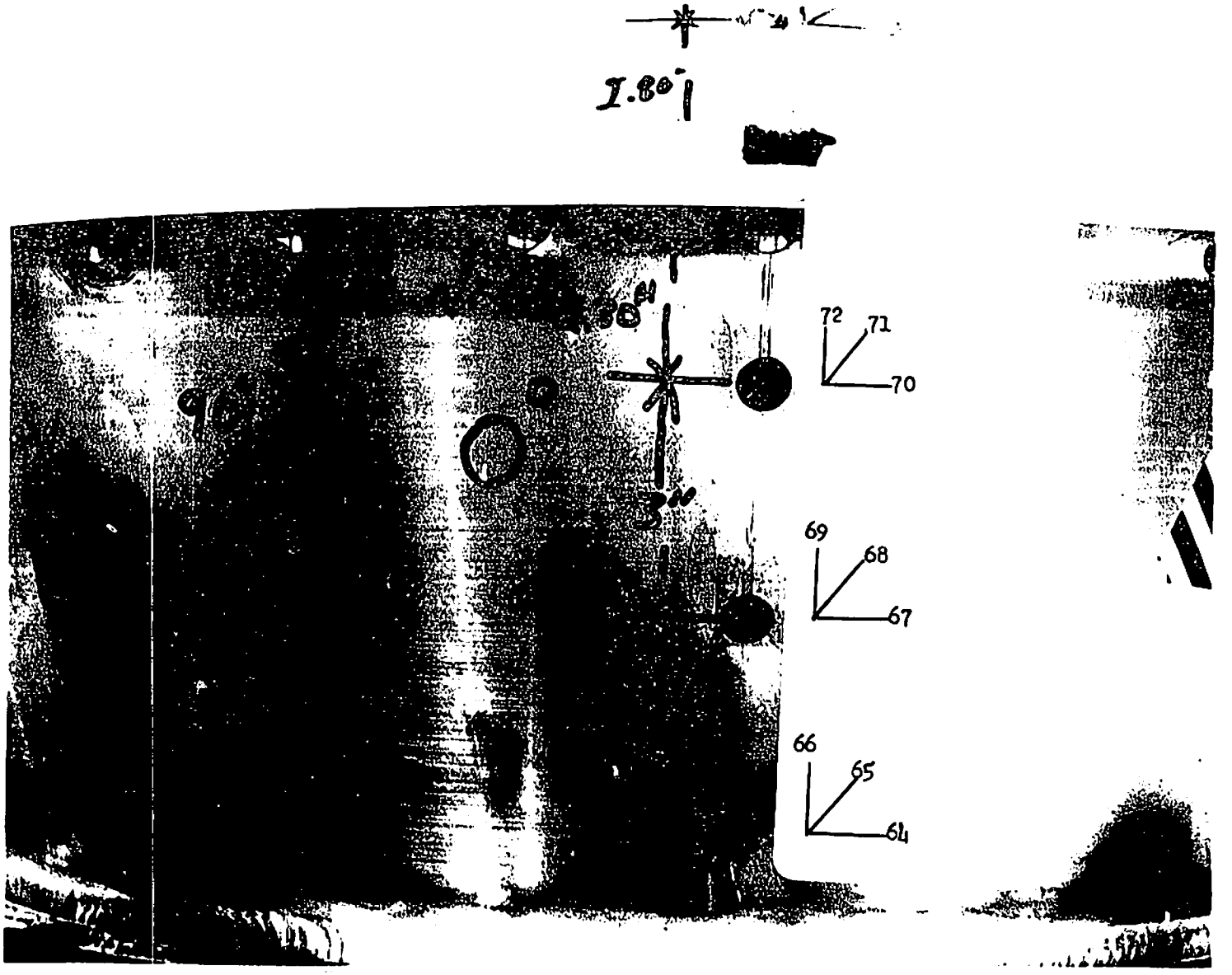

FIG.6 —STRAIN GAGE LOCATIONS—HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

D#62-14660

T-17817 RS 7321/9943

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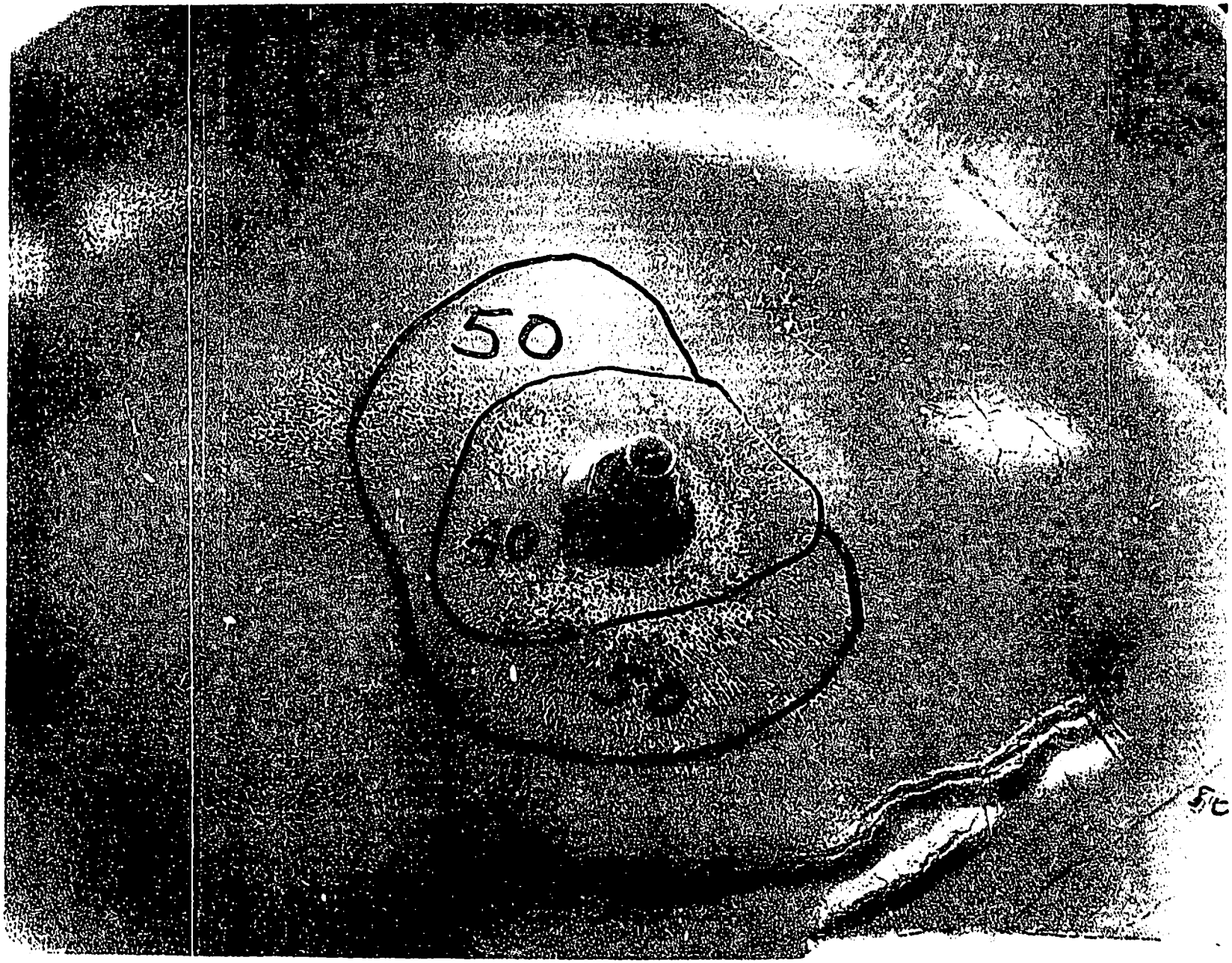

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D#62-924

FIG.7--STRESSCOAT CRACK PATTERNS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

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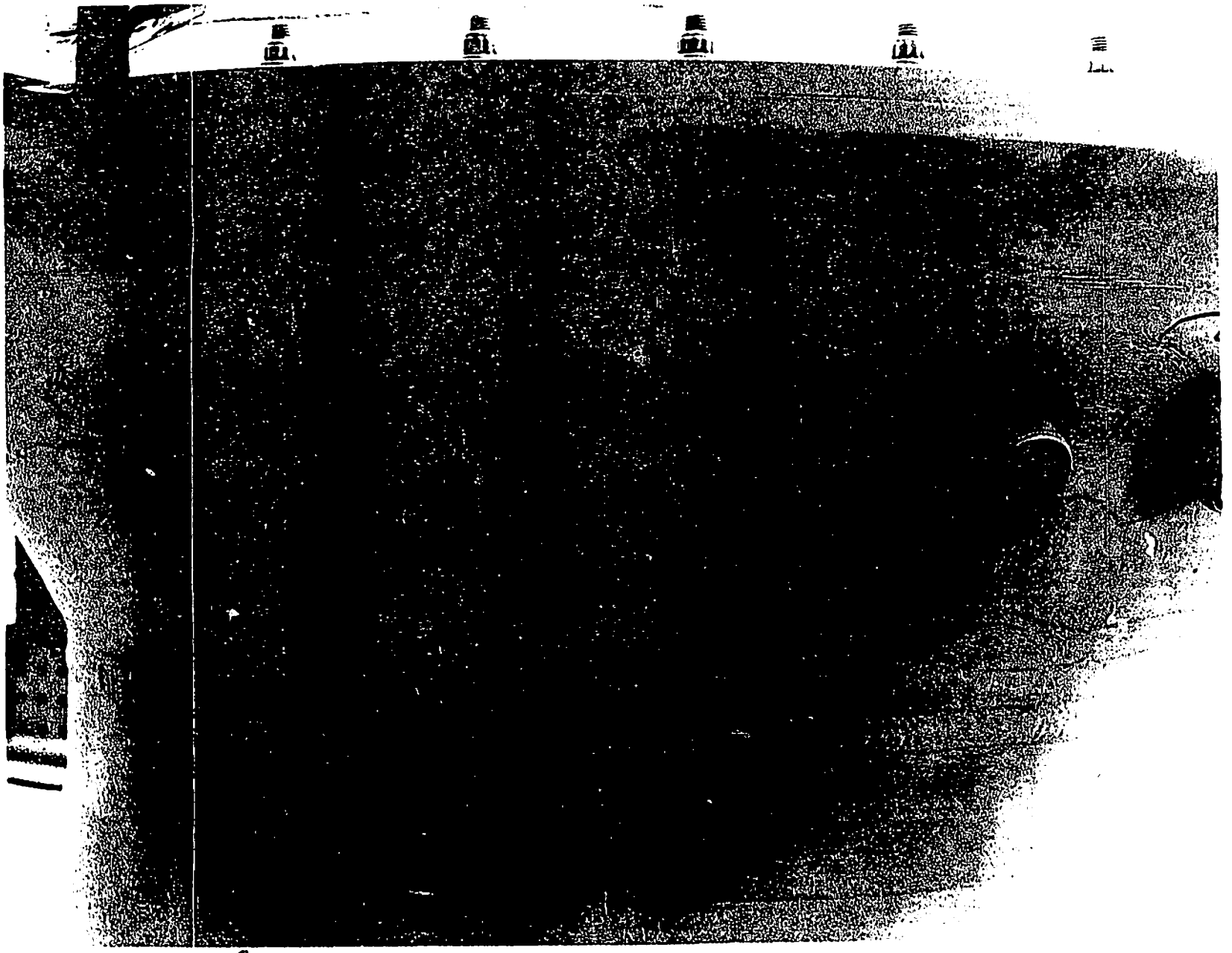

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J#62-795

FIG.8--STRESSCOAT CRACK PATTERNS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

T-17817

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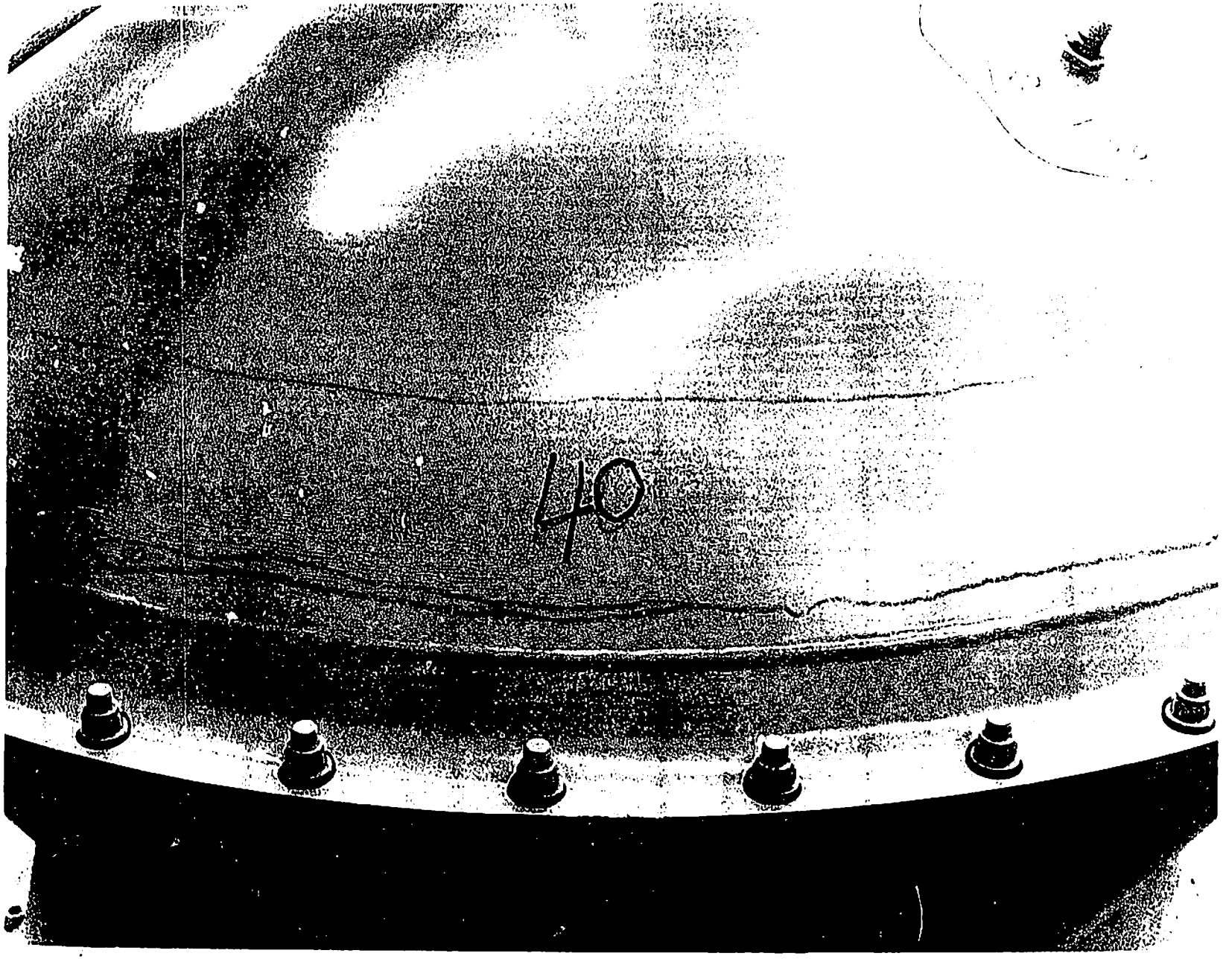

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D#62-927

FIG.9--STRESSCOAT CRACK PATTERNS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

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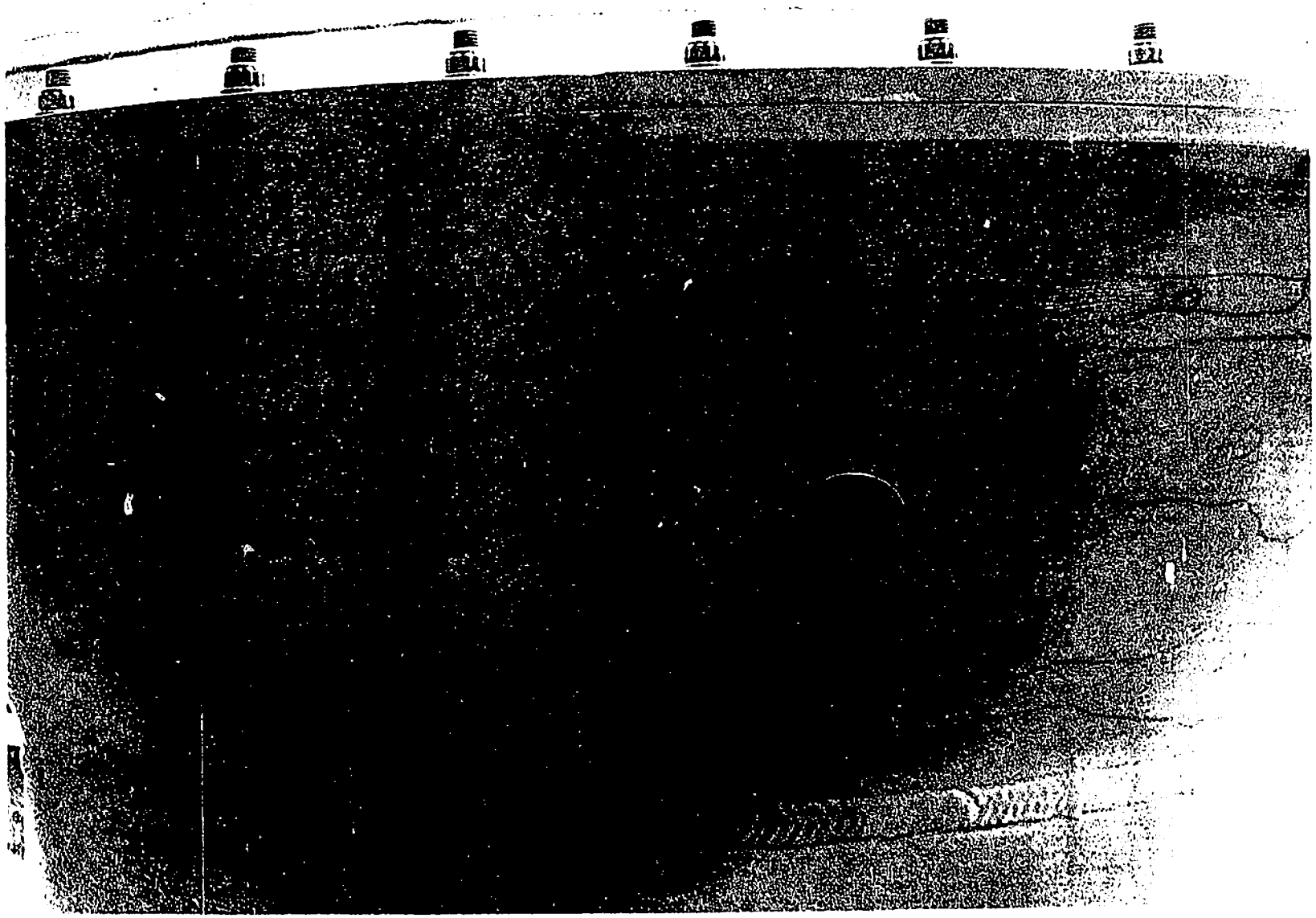
40



D#62-926

FIG.10--STRESSCOAT CRACK PATTERNS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

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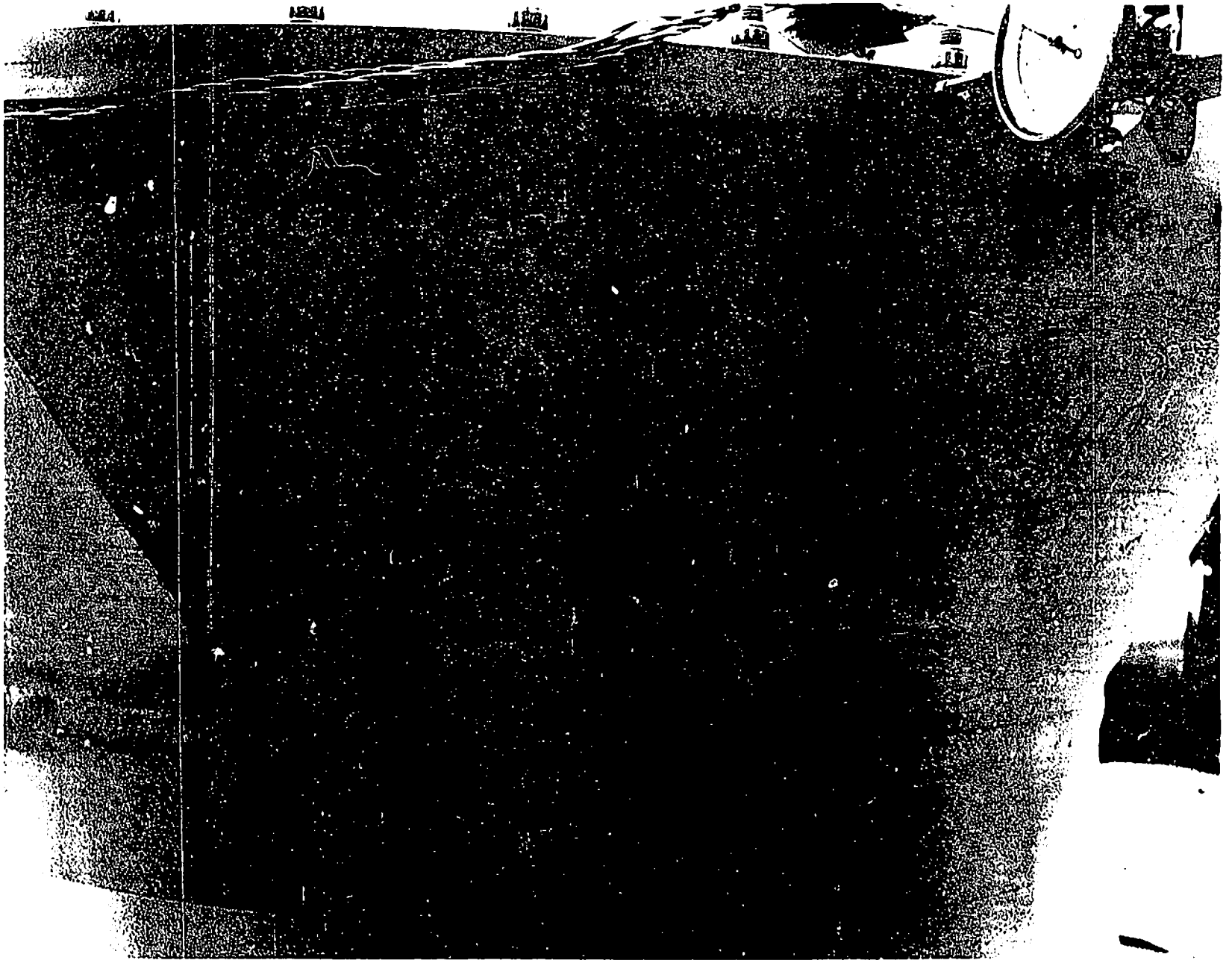

D#62-296

FIG.11-STRESSCOAT CRACK PATTERNS--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

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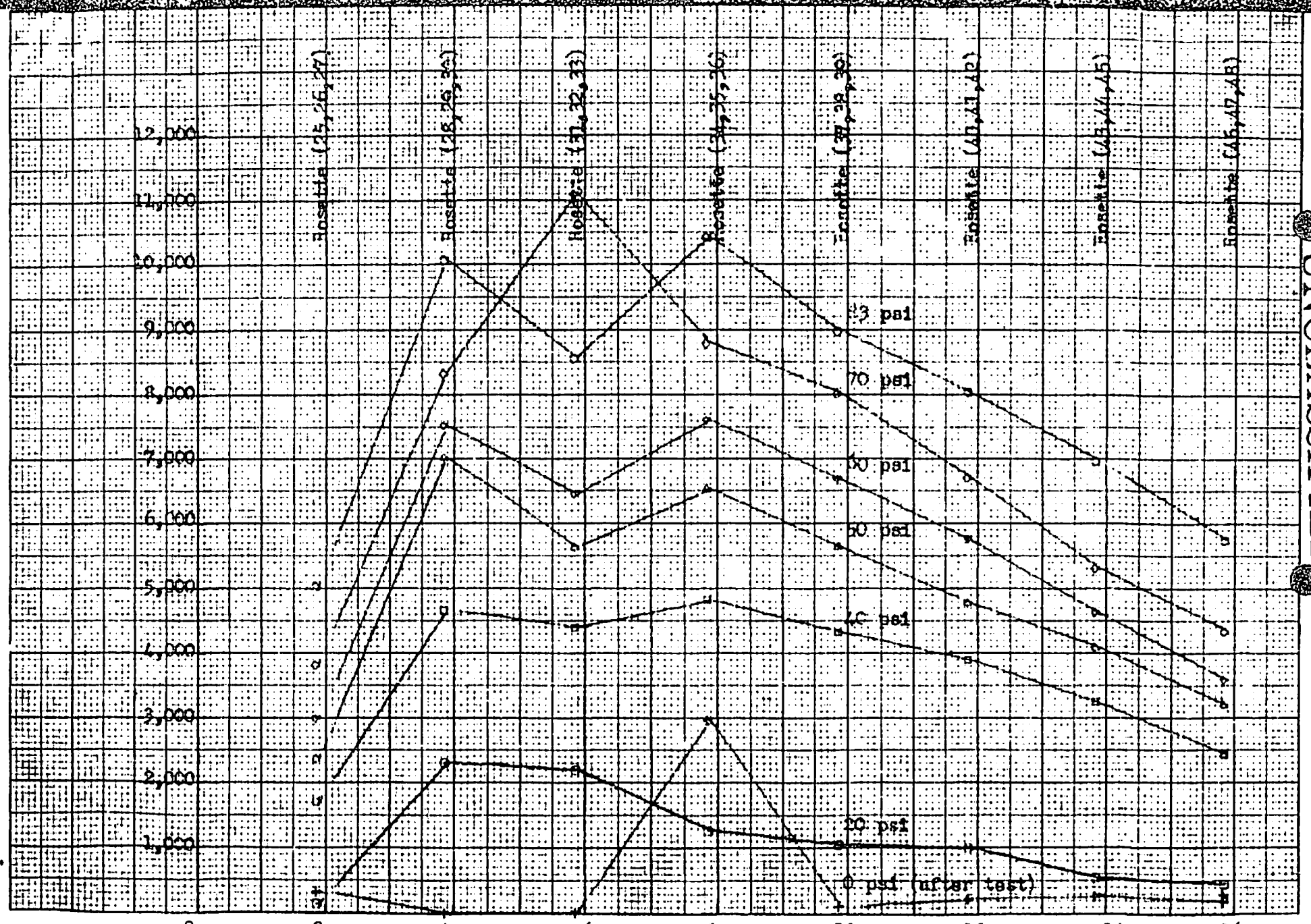

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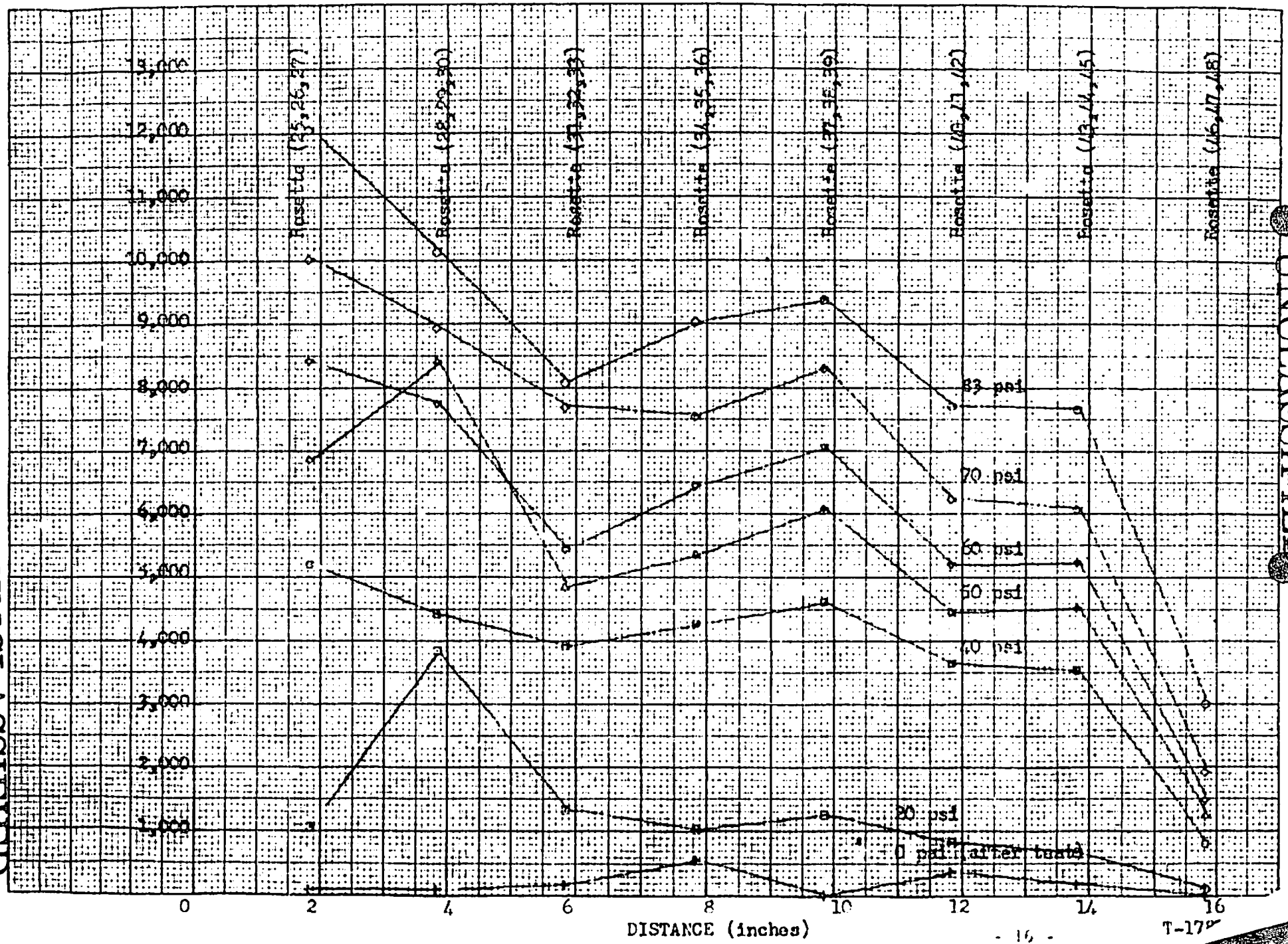
Fig. 13 TRANSVERSE STRESS VS. DISTANCE
HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

RS 7321-943



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T-17

K&E 10 X 10 TO THE 1/2 INCH KEUFFEL & ESSER CO. 359-11

Fig. 14 SHEAR STRESS VS. DISTANCE
HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

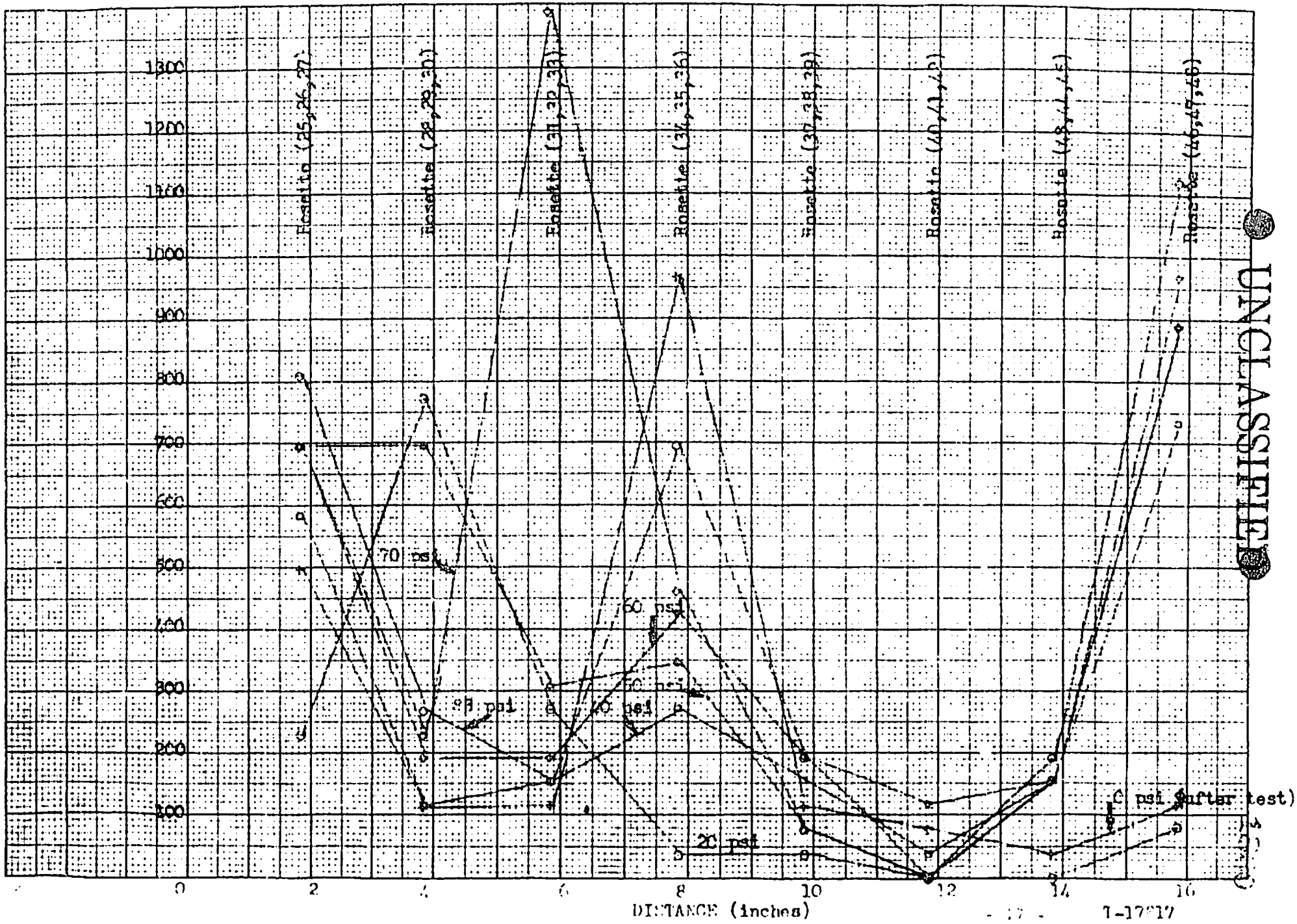

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TABLE I

LOAD DEFLECTION DATA--HYDROSTATIC PRESSURE TEST OF
XW-53 PRESSURE COVER

Pressure (PSI)	Deflections (Inches) No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
0	0	0	0	0	0	0	0
20	-.007	0	-.002	.003	-.001	-.002	.005
0	-.001	0	-.001	.000	-.001	0	.000
40	-.011	.001	-.008	.019	-.008	-.004	.001
0	-.002	.002	0	.000	-.004	-.002	.000
50	-.014	.005	-.010	.049	-.009	-.005	.016
0	-.003	.001	-.001	.001	-.005	-.004	.001
60	-.016	.010	-.012	.082	-.010	-.006	.020
0	-	.003	-.002	.002	-.005	-.004	.001
70	-	.015	-.013	.113	-.01	-.010	.026
83.4	-	.020	-.014	.109	-.010	-.012	.033
0	-	.003	.006	.003	-.005	-.009	.000

\- Denotes movement away from dial

\+ Denotes movement towards dial

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TABLE II

STRESS-STRAIN DATA--HYDROSTATIC PRESSURE TEST OF XW-53 PRESSURE COVER

STRAIN - MICROINCHES PER INCH

LOAD	ROSETTE 1			ROSETTE 2			ROSETTE 3			ROSETTE 4			ROSETTE 5		
PSI	CH 1	CH 2	CH 3	CH 4	CH 5	CH 6	CH 7	CH 8	CH 9	CH 10	CH 11	CH 12	CH 13	CH 14	CH 15
000	-1	1	-1	-1	-1	1	1	1	1	1	-1	-1	-1		-20
020	-50	50	110	120	100	120	120	100	100	80	60	50	60		60
000	-40	-1	1	-1	-1	10	10	1	10	1	-1	-1	-1		-10
040	-40	270	470	310	300	330	290	270	270	250	250	240	270		300
000	-10	10	20	10	10	20	20	20	20	10	10	1	10		-20
060	-10	450	610	410	390	430	380	350	330	300	280	280	340		390
000	-10	20	50	20	20	30	20	20	20	20	10	10	10		10
080	-20	440	740	490	460	490	450	420	410	370	340	330	410		450
000	-10	30	50	20	10	20	20	20	20	10	10	1	10		-10
070	-30	520	870	540	530	540	510	480	460	430	410	410	480		540
080	-1	650	1050	680	630	630	580	560	540	520	510	510	570		650
000	-20	90	40	-1	-10	-1	-1	10	10	-1	-10	-30	-20		-30

STRESS - POUNDS PER SQUARE INCH

LOAD	ROSETTE 1			ROSETTE 2			ROSETTE 3			ROSETTE 4			ROSETTE 5		
PSI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI
000		-31	45	11	-11	67	15	15		11	-11	23			
020	1318	-89	93	1999	1688	45	1800	1580	23	1122	876	9			
000	-85	-514	111	130	9	67	224	84	45	11	-11	23			
040	5329	1279	96	5090	4743	58	4412	4192	23	3819	3710	157			
000	150	-303	105	285	176	67	307	307		134	35	157			
050	6984	1329	95	6699	6208	54	5653	5257	6	4566	4346	23			
000	474	-167	97	439	329	67	307	307		285	176	23			
060	8547	2516	96	7762	7296	45	6781	6433	13	5551	5204	13			
000	501	-194	103	385	230	45	307	307		134	35	157			
070	10133	2874	96	8375	8219	45	7650	7254	6	6563	6344	23			
080	12255	3863	97	10339	9790	23	8760	8449		7968	7858	23			
000	1367	-146	115	55	-85	45	130	0	113	-118	-359	170			

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
Gages mounted on 6061-T6
"E" 10.3×10^6
"μ" = .333

1632

Table II (Cont'd)

T-1/817
RS 7321/9943

STRAIN - MICROINCHES PER INCH

LOAD	ROSETTE 6			ROSETTE 7			ROSETTE 8			ROSETTE 9			ROSETTE 10		
P/D	CH 16	CH 17	CH 18	CH 19	CH 20	CH 21	CH 22	CH 23	CH 24	CH 25	CH 26	CH 27	CH 28	CH 29	CH 30
000	-10	-10	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	-1	1
020	50	40	50	30	30	30	30	30	30	-20	20	100	100	100	320
000	-10	-1	-1	-1	-1	-1	-1	-1	-1	-10	1	-1	-1	-1	20
040	250	220	220	200	200	210	210	210	210	-1	300	450	310	310	280
000	-10	-1	1	-1	-1	-1	-1	-1	-1	-10	20	10	10	10	20
050	290	280	280	250	270	270	270	270	270	10	390	590	410	410	590
060	10	10	20	1	1	1	1	1	10	-1	10	20	20	20	20
060	350	310	320	280	290	310	310	300	300	20	460	720	450	470	510
000	-1	1	10	-1	-1	-1	-1	-1	-1	-10	10	20	10	10	100
070	420	390	390	320	340	360	370	360	340	50	540	850	520	530	800
080	510	490	490	420	450	470	470	460	440	100	660	1010	650	620	660
000	-20	-10	1	-30	-20	-20	-20	-10	-20	-30	50	1	-1	-10	10

STRESS - POUNDS PER SQUARE INCH

LOAD	ROSETTE 6			ROSETTE 7			ROSETTE 8			ROSETTE 9			ROSETTE 10		
P/D	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI
000	-35	-134	67	-15	-15		-15	-15			-31	45	11	-11	67
020	846	491	45	461	461		461	461		1136	94	103	4171	1975	67
000	-35	-134	113	-15	-15		-15	-15		-23	-146	118	261	31	67
040	3776	3446	23	3205	3095	67	3227	3227		5296	1603	99	4497	4368	157
000	-19	-120	106	-15	-15		-15	-15		174	-174	122	944	285	67
050	4434	4324	23	4105	3885	113	4149	4149		6967	2252	99	8471	6494	67
000	285	176	67	15	15		134	35	67	325	-33	121	307	307	
060	5174	4921	30	4655	4410	81	4741	4631	23	8491	2879	97	7832	7379	60
000	120	19	74	-15	-15		-15	-15		303	-150	120	1339	351	67
070	6388	6059	23	5379	5069	90	5577	5332	171	10098	3730	96	8993	8216	72
080	7728	7483	9	7035	6639	96	7114	6868	171	12154	4901	96	10339	9790	49
000	-64	-228	89	-329	-439	113	-230	-385	45	292	-738	128	190	-51	55

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

1633

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Table II (Cont'd)

T-17817
RS 7321/9943

STRAIN - MICROINCHES PER INCH

LOAD	ROSETTE 11			ROSETTE 12			ROSETTE 13			ROSETTE 14			ROSETTE 15		
D/O	CH 31	CH 32	CH 33	CH 34	CH 35	CH 36	CH 37	CH 38	CH 39	CH 40	CH 41	CH 42	CH 43	CH 44	CH 45
000	1	-1	-1	-1	-1	-1	-1	1	1	-1	-1	-1	-1	-1	-1
020	170	80	60	90	70	60	60	80	90	70	60	50	30	40	50
000	270	920	20	40	1	-1	10	30	20	10	1	-1	-1	-1	-1
040	300	250	240	330	260	260	270	310	310	260	250	230	200	200	240
000	180	10	1	70	10	1	10	10	10	10	10	-1	-1	1	1
050	390	300	290	460	340	310	390	390	410	320	300	280	250	260	310
000	20	10	10	130	30	10	20	60	50	20	20	10	1	10	10
060	450	360	320	530	400	380	420	470	470	390	340	320	280	300	360
000	70	10	1	170	20	1	10	20	20	10	10	1	-1	-1	1
070	830	430	390	610	470	450	510	540	550	450	420	390	320	350	420
083	570	520	510	720	540	540	570	620	620	530	510	490	430	450	520
000	10	-20	-20	270	-10	-40	-10	10	1	-10	-10	-30	-20	-20	-10

STRESS - POUNDS PER SQUARE INCH

LOAD	ROSETTE 11			ROSETTE 12			ROSETTE 13			ROSETTE 14			ROSETTE 15		
D/O	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI
000	11	-11	23	-15	-15		11	-11	113	-15	-15		-15	-15	
020	2273	1261	16	1275	1030	9	1275	1030	99	1000	844		692	537	90
000	5298	-842	144	514	85	21	353	108	126	120	19	16	-15	-15	
040	4429	3869	17	4917	4148	23	4676	4236	113	3887	3642	171	3600	3161	67
000	2325	456	21	879	212	18	154	154		130	9	157	11	-11	113
050	5721	4727	19	6595	5236	15	6084	5593	99	4765	4454		4582	4022	73
000	285	176	23	1636	516	17	764	311	120	285	176	157	134	35	113
060	6456	5375	11	7713	6269	18	7112	6563	113	5750	5159	12	5264	4570	77
000	879	212	18	2144	483	19	285	174	113	134	35	157	11	-11	67
070	11580	7165	20	8920	7347	18	8317	7970	103	6686	6220		6103	5267	79
083	8577	8017	17	10668	8692	23	9417	8868	113	7991	7681		7698	6899	75
000	88	-242	23	3313	221	19	91	-190	125	-197	-417	157	-176	-285	67

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]

Table II (Cont'd)

T-17817
RS 7321/9943

STRAIN - MICROINCHES PER INCH

LOAD	ROSETTE 16			ROSETTE 17			ROSETTE 18			ROSETTE 19			ROSETTE 20		
D/O	CH 46	CH 47	CH 48	CH 49	CH 50	CH 51	CH 52	CH 53	CH 54	CH 55	CH 56	CH 57	CH 58	CH 59	CH 60
000	-1	-1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1
020	40	30	-1	10	20	120	-1	10	110	70	60	70	70	30	10
000	-1	-1	1	-1	-1	10	-1	-1	1	-1	1	1	10	-1	-10
040	210	200	1	110	190	440	1	150	420	270	270	260	280	200	130
000	-1	-1	-1	1	1	30	1	1	10	10	10	10	10	-1	-10
050	270	260	20	200	280	560	10	250	540	350	340	310	350	260	180
000	10	10	10	10	20	60	10	10	30	20	20	20	20	1	-1
060	300	290	30	240	320	650	20	300	630	430	410	370	410	290	200
000	1	1	1	1	10	70	1	1	20	10	20	10	10	-1	-10
070	340	320	50	290	390	800	30	350	750	490	460	420	480	340	230
083	440	430	110	350	510	950	60	470	890	600	540	510	550	440	270
000	-20	-20	10	-20	40	120	10	10	20	10	10	-40	-1	-40	-50

STRESS - POUNDS PER SQUARE INCH

LOAD	ROSETTE 16			ROSETTE 17			ROSETTE 18			ROSETTE 19			ROSETTE 20		
D/O	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI
000	11	-11	67	11	-11	67	11	-11	23	11	-11	67	11	-11	23
020	478	121	166	1551	447	70	1390	285	71	1153	998	45	860	369	9
000	11	-11	67	130	9	67	11	-11	67	11	-11	113	78	-78	3
040	2715	527	159	5667	2784	76	4928	1541	82	4127	4017	157	3734	2566	2
000	-15	-15		397	79	67	134	35	67	154	154		78	-78	3
050	3547	909	159	7438	4240	75	6292	2158	87	5244	4897	167	4733	3411	2
000	154	154		764	311	75	417	197	67	307	307		251	41	19
060	3964	1106	159	8702	4973	74	7370	2617	88	6392	5900	171	5510	3863	4
000	15	15		879	212	72	266	57	67	231	76	45	78	-78	3
070	4449	1651	162	10691	6057	74	8805	3180	87	7266	6717	176	6432	4477	3
083	6144	2614	160	12558	7416	77	10521	4079	90	8896	8159	9	7519	5234	175
000	88	-242	67	1317	219	86	285	176	67	44	-505	157	-171	-613	15

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 (Cont'd)

T-17817
RS 7321/9943

STRAIN - MICROINCHES PER INCH

LOAD	ROSETTE 21			ROSETTE 22			ROSETTE 23			ROSETTE 24			ROSETTE 25		
G/S	CH 61	CH 62	CH 63	CH 64	CH 65	CH 66	CH 67	CH 68	CH 69	CH 70	CH 71	CH 72	CH 0	CH 0	CH 0
000	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1			
021	-10	-1	90	60	50	50	50	40	20	-1	50	40			
000	-20	-10	1	-1	-1	-1	-1	-1	-10	-10	-10	-10			
040	10	90	330	250	240	240	260	220	170	10	290	210			
000	-20	-10	10	10	1	1	1	10	-1	-10	-1	-1			
050	10	200	450	300	300	310	310	280	210	40	380	260			
000	-1	-1	20	20	10	10	10	10	1	-1	1	1			
060	40	230	500	350	330	350	380	300	240	40	460	290			
000	-20	-1	10	10	1	1	1	1	-1	-10	-1	-1			
070	60	290	570	420	420	440	460	370	270	60	540	360			
083	120	360	690	510	510	520	540	470	330	110	650	470			
000	-20	-20	-1	-1	-20	-20	-20	-10	-40	-20	-20	-40			

STRESS - POUNDS PER SQUARE INCH

LOAD	ROSETTE 21			ROSETTE 22			ROSETTE 23			ROSETTE 24			ROSETTE 25		
G/S	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI	SU	SV	PHI
000	-15	-15		11	-11	23	-15	-15		-15	-15				
021	1117	112	70	900	790	23	661	418	171	585	14	118			
000	-64	-228	89	-15	-15		-35	-134	157	-154	-154				
040	4001	1223	77	3819	3710	23	3655	2952	177	3289	91	120			
000	46	-200	81	134	35	23	78	-78	138	-35	-134	113			
050	5148	2028	85	4741	4631	67	4413	3977	169	4285	325	122			
000	261	31	67	285	176	23	134	35	157	11	-11	113			
060	5961	2334	85	5533	5222	45	5312	4214	4	5023	47	124			
000	44	-197	97	134	35	23	11	-11	157	-35	-134	113			
070	6830	2950	87	6717	6497	67	6347	4869	178	6042	412	123			
083	8463	3982	86	7968	7858	67	7543	5824	171	7581	1330	122			
000	-57	-266	87	-57	-266	23	-287	-635	148	-351	-571	157			

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