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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
Review Date: 5/21/98
Reviewer: ADD
1st Review Date: 6/01/98
Authority: ADD
Determination (Circle Number(s))
1. Classification Retained
2. Classification Changed to: U
3. Contains No DOE Classified Information
4. Coordinate With:
5. Contains UCNI
6. Comments:

FEB 1 1960

XW-49, 3-2
Project No. T-16532
Case No. 784.10
Ref. Sym: 1613(146)

TO: DISTRIBUTION

Re: Pre-Centrifuge Test of Centrifuge Jig for XW-49-X1

SEP 14 '65

Summary of Test

The centrifuge jig for the XW-49-X1 was statically tested to 100 percent of jig limit load for the Re-entry I Condition; to 90 percent of jig limit for the Re-entry II Condition; and to 100 percent of jig limit load for the powered flight condition. Except as noted below, there was no indication of yielding or failure in the jig after any of the tests.

The forward container of the jig failed between 40 and 60 percent jig limit in the Re-entry I condition. This container was subsequently repaired and tested to 174,000 pounds (100 percent of jig limit load) with no yielding. This load was sufficient to qualify the forward container portion of the jig for centrifuge testing.

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Jig limit loads are equal to 110 percent of the maximum load expected on the centrifuge.

Object of Test

The object of the test was to subject the centrifuge jig to pre-centrifuge loads simulating two re-entry conditions and one powered flight condition which would be encountered by the XW-49-X1 re-entry vehicle. Re-entry I condition assumes that the re-entry vehicle enters the atmosphere head-on so that there are no side load effects. Re-entry II condition assumes that the re-entry vehicle enters the atmosphere at an angle of about 21° from the vertical.

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Authorization for Test

The test was performed in accordance with a Work Order Authorization from R. L. Fourikov, 1245, to A. W. Mager, 1613, dated 6-21-59. D. Lanza, 1245, J. Pruitt, 1245, J. Black, 1282, and L. Johnson, 1613, were consultants for the tests.

FILE
XW-49-X-1
3-2

Equipment and Instrumentation

The following equipment was used in the tests:

25 - Hydraulic Jacks consisting of 1-ton, 30-ton, 50-ton, 40-ton and 125-ton.

12 - Baldwin SR-4 Load Cells [illegible] (2000 lbs), [illegible] (2000 lb), [illegible] (5000 lb), [illegible] (20,000 lb).

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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP
CLASSIFICATION CHANGED TO: U
Emelda Selph 6/18/98
PERSON CHANGING MARKING & DATE
W. C. Layne 6/18/98
PERSON VERIFYING MARKING & DATE
AUTHORITY: W.C. Layne
RECORD ID: 98SN2202
DATED: 6/01/98

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6034 (10,000 lb), 11133 (10,000 lb), 10969 (10,000 lb), 11764 (10,000 lb) 1113 (50,000 lb), 1114 (50,000 lb), 1115 (50,000 lb), 1117 (50,000 lb), 8878 (100,000 lb), 8879 (100,000 lb), 100-673 (100,000 lb).

8 - Calibrated Pull Bars, 1" dia., Nos. 2, 3, 4, 5, 6, 10, "G" and "F".

4 - Calibrated Pull Bars, 2" dia., Nos. 3, 4, 7, & 12.

11 - Baldwin SR-4 Strain Indicators, Nos. 92498, 92699, 175441, 199375, 199392, 391902, 391903, 443137, 443651, 443662, J-59101.

1 - Electric Driven Hydraulic Console.

1 - Sprague Air Operated Hydraulic Pump.

12 - Hand Operated Hydraulic Pumps.

1 - Fairchild Strain Indicator.

1 - R-L-H Universal Testing Machine, 300,000 lb. capacity.

The following instrumentation was used during the tests

4 - SR-4 Strain Gages, Type A-18, Gage Factor 1.79 ± 2%, Lot B-32, 57111-11.

Procedure

Phenomenon I

For this condition, the center container, carrying the XW-49-XL warhead, was removed, and the forward container was fitted with a dummy aluminum nose-section. The rear container held the flared skirt of the re-entry vehicle which had been fitted with a heavy steel loading plate at the forward end.

The centrifuge jig was bolted to the static test jig by means of the Trunion mounting plates and the loads were positioned as shown in Figs. 1, 2 and 3. Loads were applied in the increments given in Table I. The two reactions (See Fig. 2) and strain gages mounted on the two load multipliers (See Fig. 2) were monitored at each increment of load.

When the forward container failed, it was removed and the loading continued with loads P3 and P4 being applied to the forward beam as shown in Figure 4.

The centrifuge jig was then separated from the static test jig and positioned so that it was restrained only by reactions R1 and R2. Loads P1, P2, P5, P6, P10 and P11 were applied in the increments shown in Table II.

Re-entry II

For this condition, the entire re-entry vehicle was positioned in the container. The centrifuge jig was then bolted to the static test jig by means of the Trunion mounting plates and the loads were positioned as shown in Figs. 5 thru 9. Loads were applied in the increments given in Table III. Two reactions (See Fig. 9) and strain gages mounted on the two load-multipliers (See Fig. 2) were monitored at each increment of load.

Powered Flight

Figure 10 shows the test setup for subjecting the centrifuge jig to a load simulating the powered flight condition. The skirt of the re-entry vehicle was bolted to the end member of the frame and a single load was applied as shown. No instrumentation was used during this test. Table IV gives the load applied during this test.

Results

Between 40 percent Jig limit load and 60 percent Jig limit load in the Re-entry I condition, the riveted longitudinal seam of the forward container burst open. Investigation showed that this failure was due to the fact that the contour of the dummy nose section was not the same as that of the foam plastic liner in the container. After the dummy nose section was machined to the correct contour and the forward container repaired, it was subjected to a single load of 174,000 pounds (100 percent Jig limit load) applied through the nose section. The forward container showed no signs of yielding or failure under this load.

After the failure noted above, the forward container was removed and the Re-entry I condition was continued with loads P3 and P4 being applied directly to the frame of the forward container as shown in Figure 4. The Re-entry I test condition was carried to 100% of Jig limit load with no indication of yielding or failure.

Table V gives the measured strains and calculated stresses in the two steel load-multiplying arms during the Re-entry I test. The amount of the load taken by reactions R1 and R2 during this test are also given in Table V. These two reactions were tightened by hand to provide as much pre-stress as possible prior to beginning the test.

During the test of the reactions in which only R1 and R2 restrained the jig from any forward motion, loads were applied as shown in Table II. The measured reactions are also given in this table. Strains were not measured during this test. There was no indication of yielding or failure.

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The centrifuge jig showed no indications of yielding or failure when tested to 90 percent of Jig limit load in the Re-entry II condition. Measured strains and calculated stresses in the load-multiplying arms during this test are given in Table VI. The loads measured at reactions R1 and R2 are also given in Table VI.

The powered flight test condition was taken to 100 percent of Jig limit load and produced no indications of yielding or failure.

E. M. [illegible] - 1612-1

1613 Project Engineer: BILL JOHNSON - 1613-3

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

EMN:1612-1:dd

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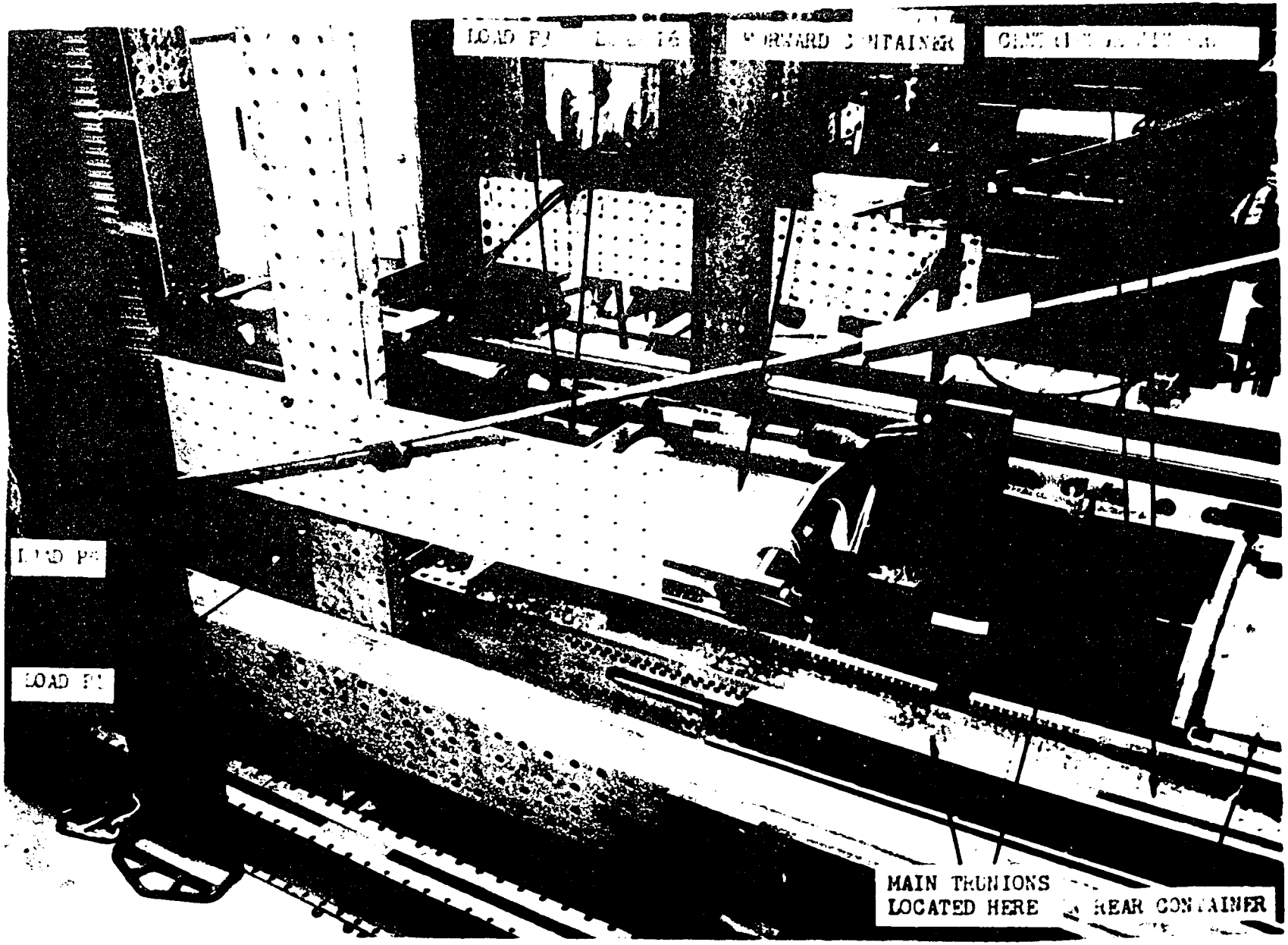

FIGURE 1 - TEST SETUP FOR RE-ENTRY I CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XN-49X-1

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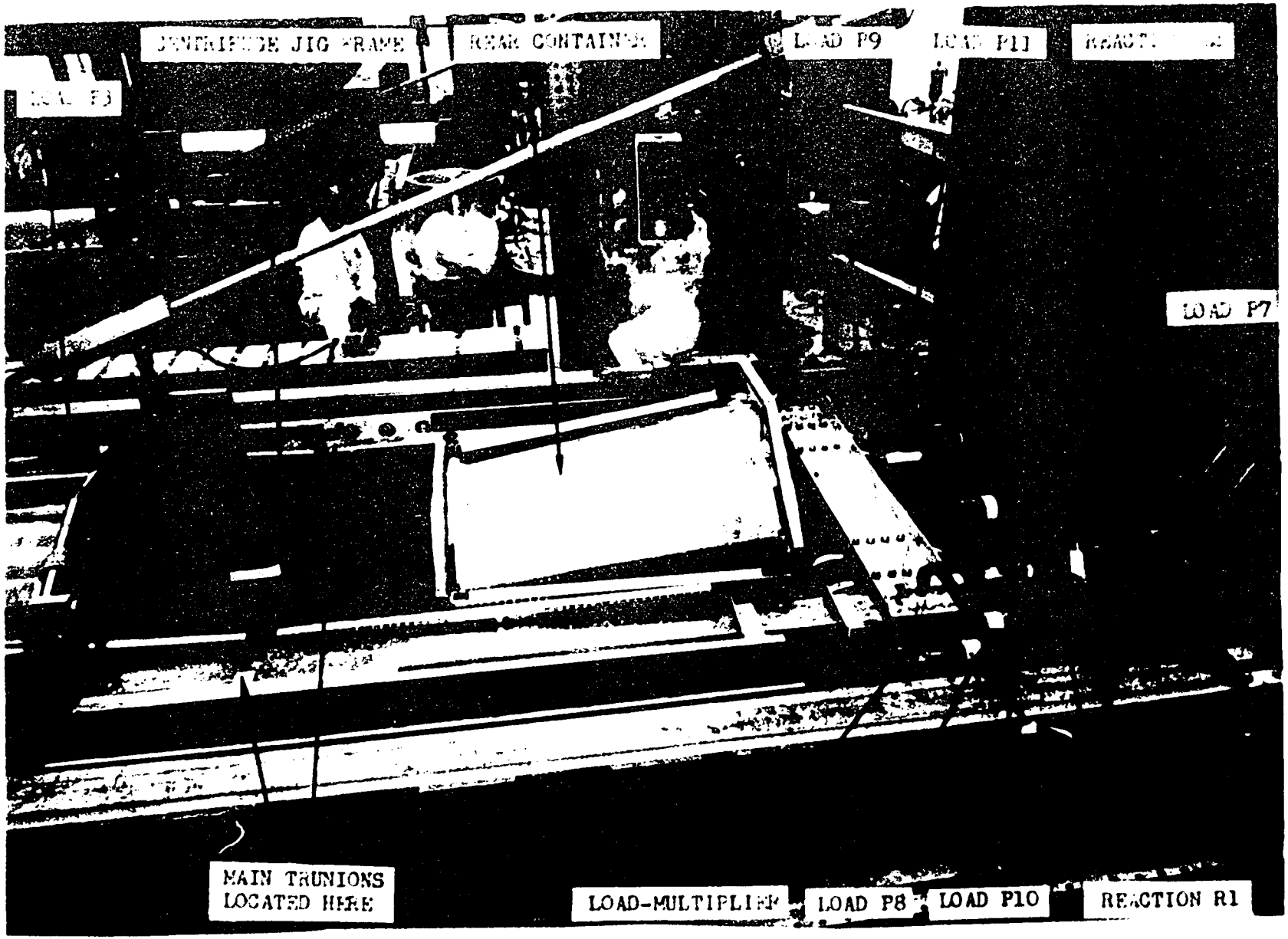

FIGURE 2 - TEST SETUP FOR RE-ENTRY I CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-49-X1

PROJECT NO. T-16532
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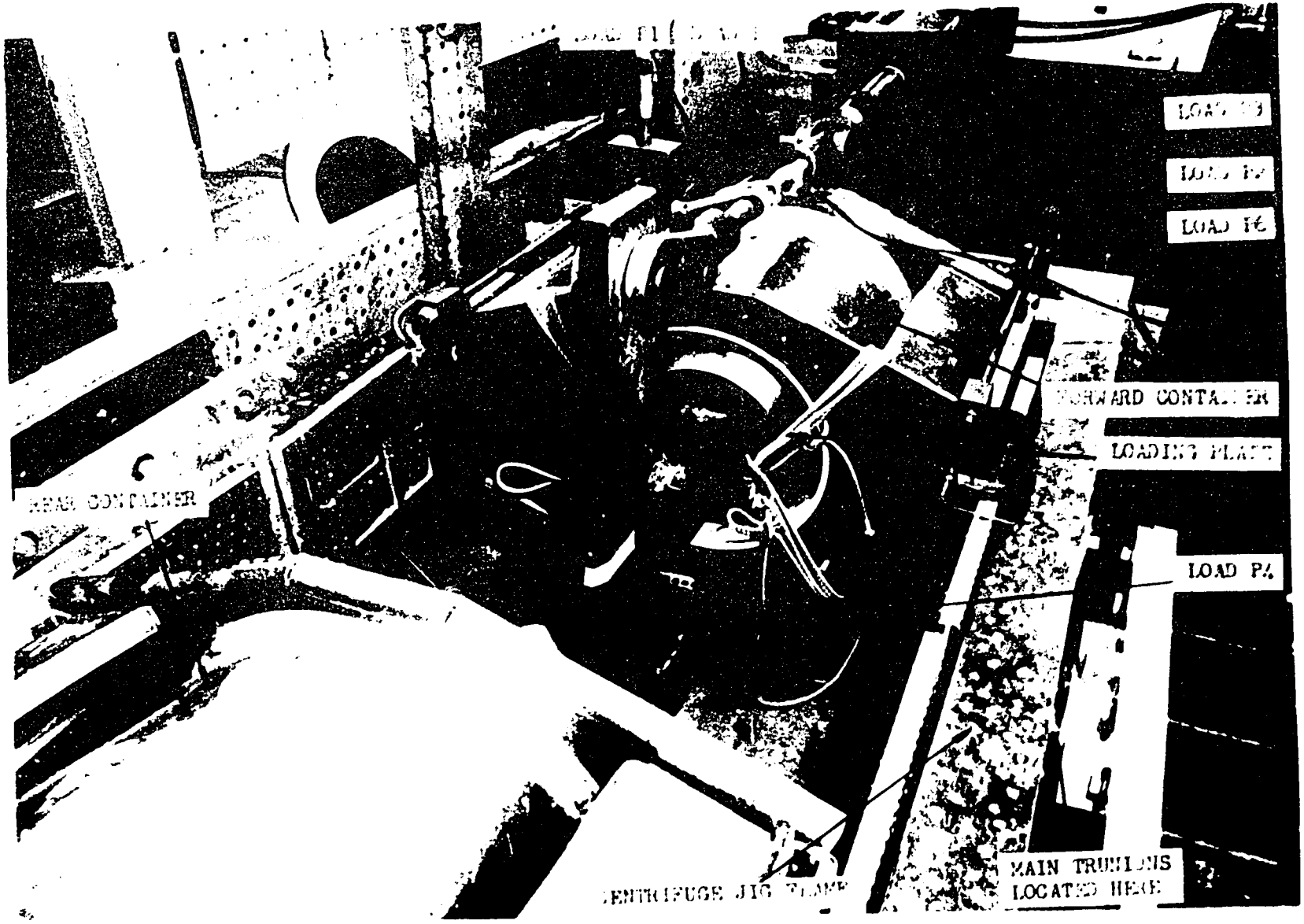

FIGURE 3 - TEST SETUP FOR RE-ENTRY I CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-49-X1

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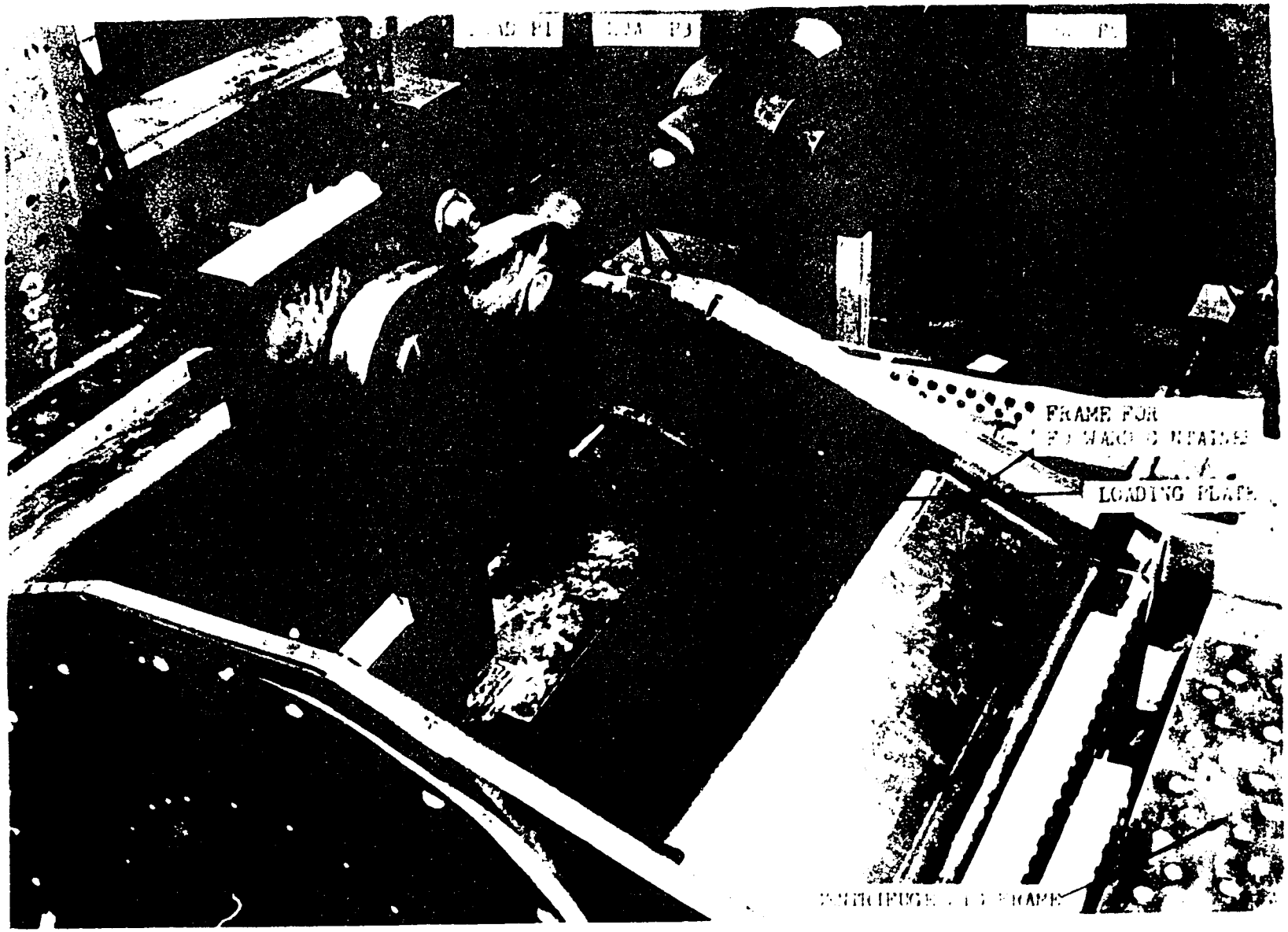

FIGURE 4 - TEST SETUP FOR RE-ENTRY I CONDITION, FORWARD CONTAINER REMOVED - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XM-49-X1

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G.F. SYM: 1/13(146)

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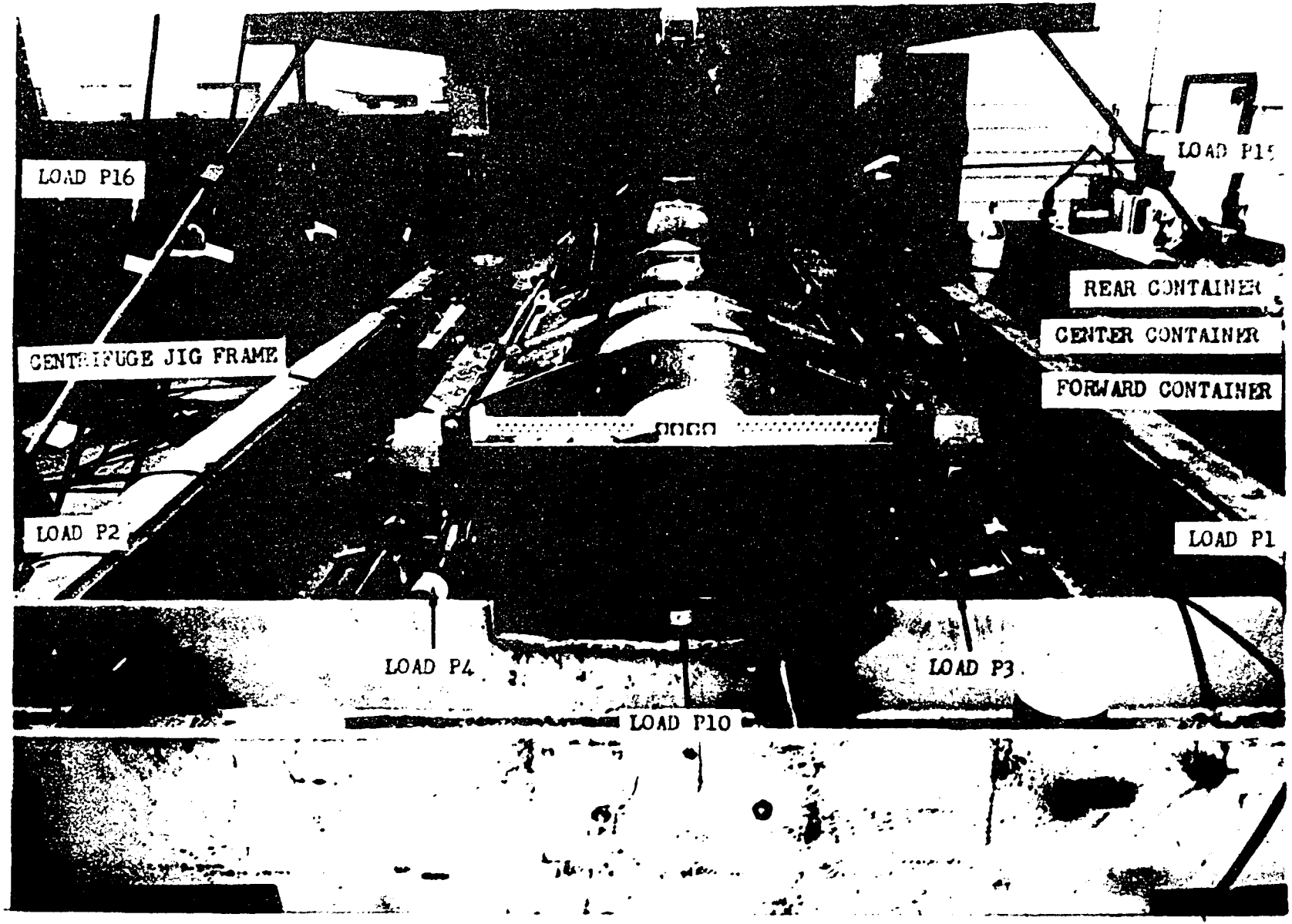

FIGURE 5 - TEST SETUP FOR RE-ENTRY II CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-49-X1

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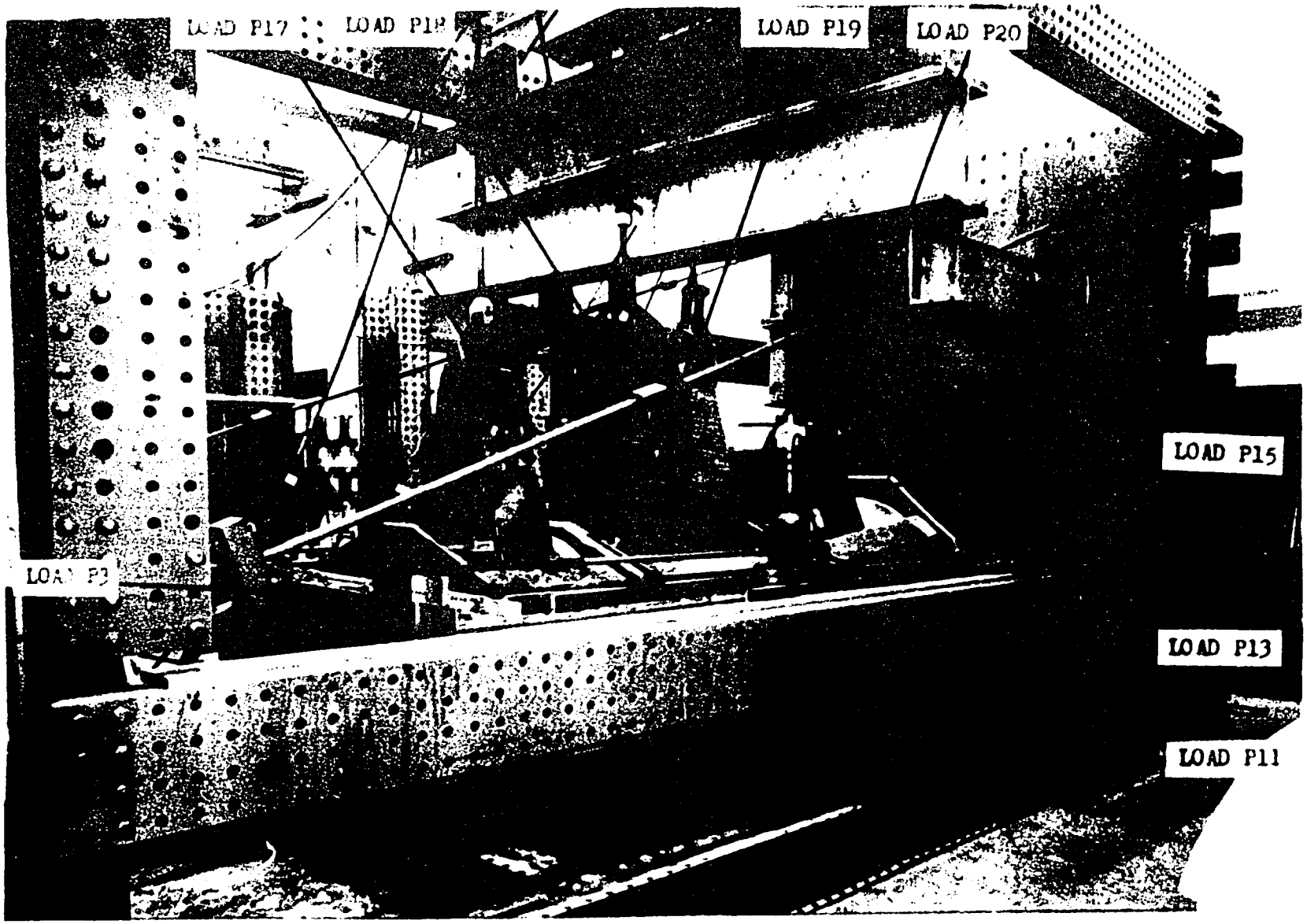

FIGURE 6 - TEST SETUP FOR RE-ENTRY II CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-49-X1

PROJECT NO. T-16532
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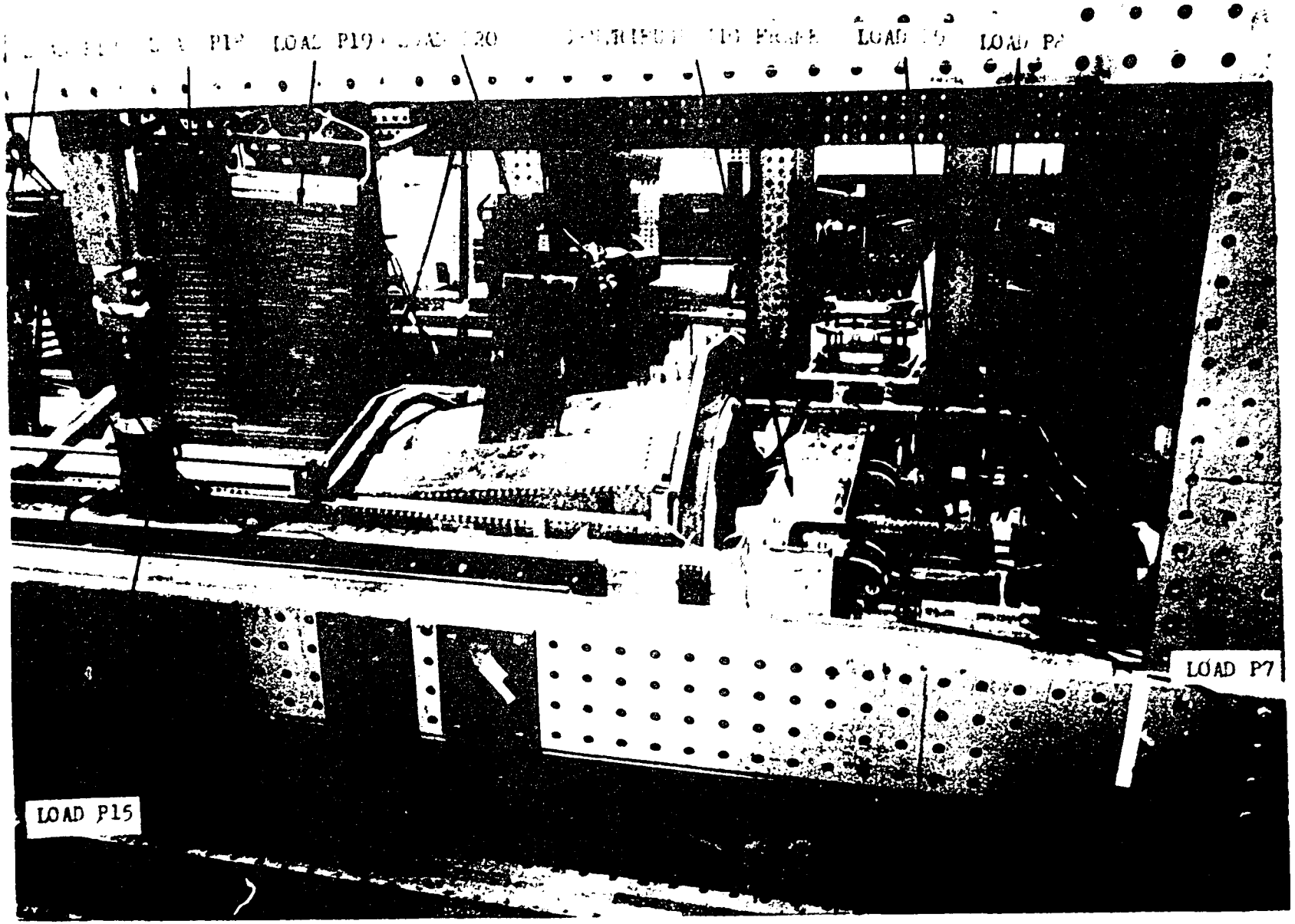

FIGURE 7 - TEST SETUP FOR RE-ENTRY II CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-42-X1

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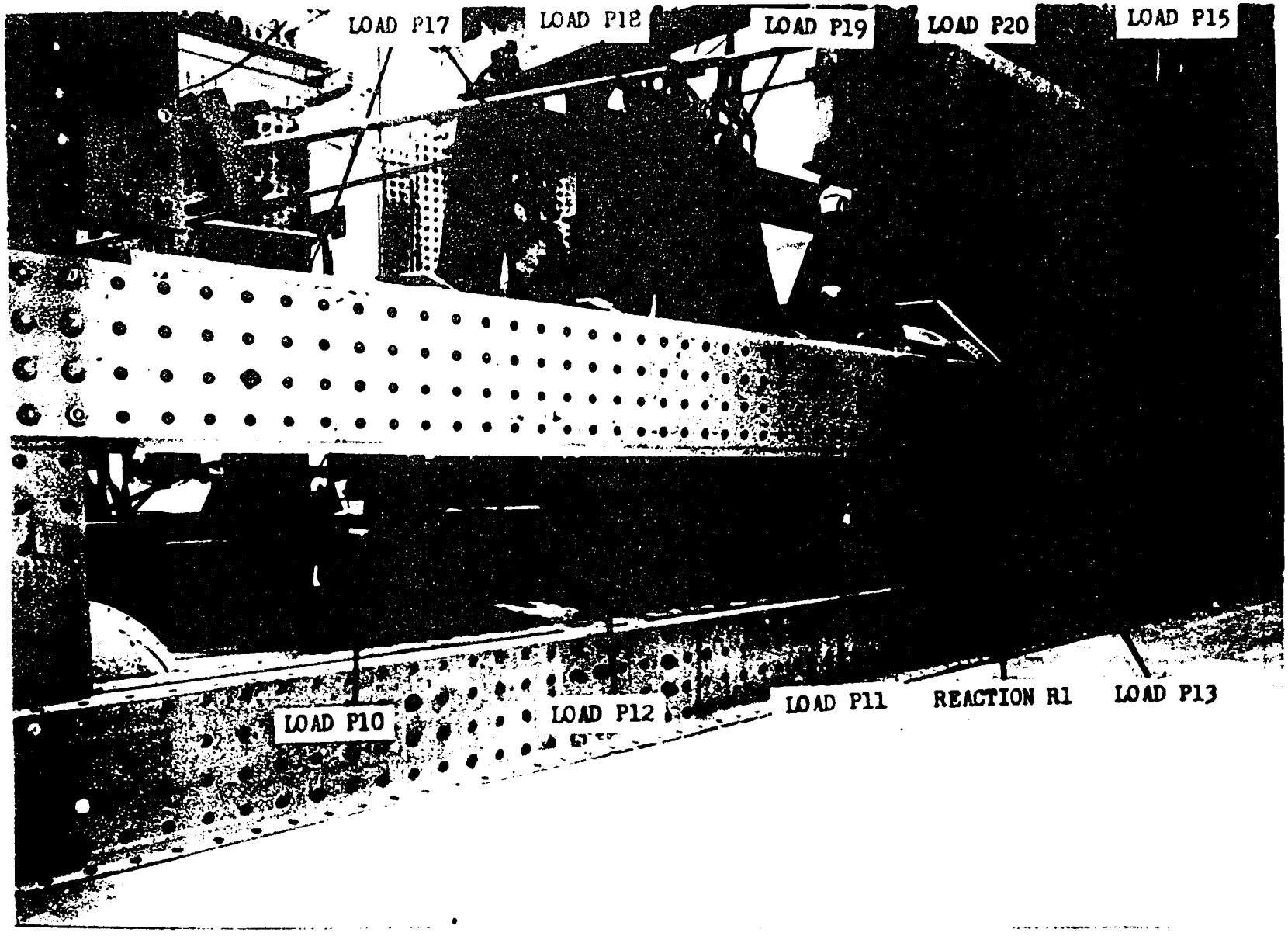

FIGURE 8 - TEST SETUP FOR RE-ENTRY II CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-49-X1

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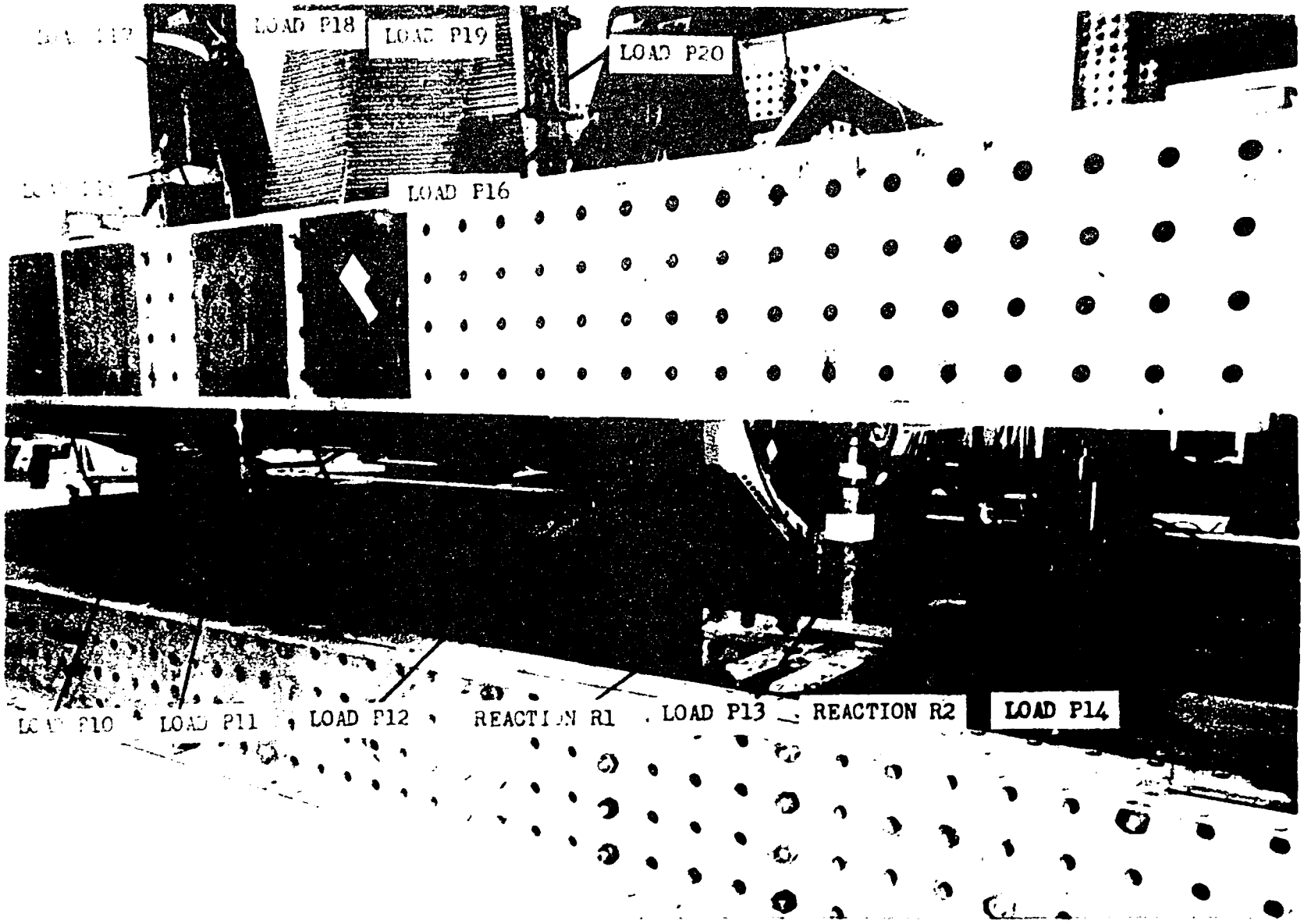

FIGURE 9 - TEST SETUP FOR RE-ENTRY II CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XW-49-X1

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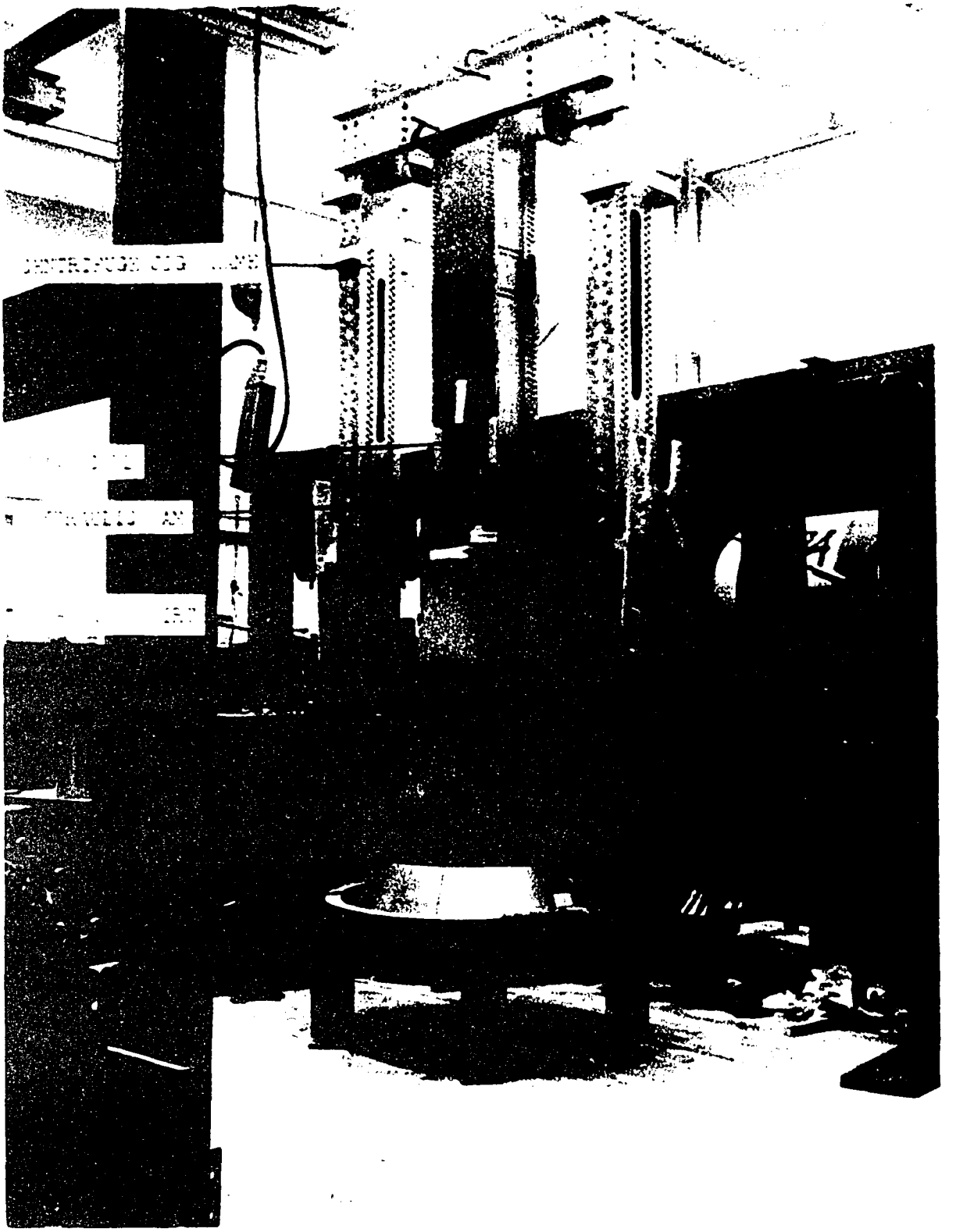

TABLE I - SEQUENCE OF LOAD APPLICATION FOR RE-ENTRY I CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XM-49-X1

PERCENT OF JIG LIMIT LOAD	LOAD, (POUNDS)												
	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	P_{10}	P_{11}	P_{12}	P_{13}
0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	3876	3876	20,850	20,850	7620	7620	6514	1118	1118	9280	9280	3000	3000
40	7752	7752	41,700	41,700	15,240	15,240	13,028	2236	2236	18,560	18,560	6000	6000
0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	3876	3876	20,850	20,850	7620	7620	6514	1118	1118	9280	9280	3000	3000
40	7752	7752	41,700	41,700	15,240	15,240	13,028	2236	2236	18,560	18,560	6000	6000
60	11,628	11,628	62,550	62,550	22,860	22,860	19,542	3354	3354	27,840	27,840	9000	9000
80	15,504	15,504	83,400	83,400	30,480	30,480	26,056	4472	4472	37,120	37,120	12,000	12,000
90	17,420	17,420	93,950	93,950	34,290	34,290	29,270	5032	5032	41,700	41,700	13,500	13,500
100	19,380	19,380	104,250	104,250	38,100	38,100	32,570	5590	5590	46,400	46,400	15,000	15,000
20	3876	3876	20,850	20,850	7620	7620	6514	1118	1118	9280	9280	3000	3000
0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TABLE II - SEQUENCE OF LOAD APPLICATION DURING REACTIONS CHECK
ASSEMBLY 7 CONDITION - PRE-CENTRIFUGE TEST OF
CENTRIFUGE JIG FOR XM-49-X1

PERCENT OF FULL LOAD (%)	MEASURED REACTIONS, (POUNDS) R_1	R_2	P_1	P_2	P_5	P_6	P_{10}	P_{11}
0	0	0	0	0	0	0	0	0
20	29,300	33,150	8000	8000	13,000	13,000	11,000	11,000
40	61,600	65,800	16,000	16,000	26,000	26,000	22,000	22,000
60	93,500	97,700	24,000	24,000	39,000	39,000	33,000	33,000
80	128,000	123,800	32,000	32,000	52,000	52,000	44,000	44,000
90	140,800	144,800	36,000	36,000	58,500	58,500	49,500	49,500
100	157,000	158,500	40,000	40,000	65,000	65,000	55,000	55,000
0	0	0	0	0	0	0	0	0

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TABLE III - SEQUENCE OF LOAD APPLICATION FOR RE-ENTRY II CONDITION - PRE-CERTIFICATE TEST OF CENTRIFUGE JIG FOR MA-40-AL

LOAD, (POUNDS)

Minutes of Application	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9
0	0	0	0	0	0	0	0	0	0
20	558	558	1230	1230	308	308	878	878	9800
40	1,116	1,116	2460	2460	616	616	1756	1756	19,600
60	1,674	1,674	3690	3690	924	924	2634	2634	29,400
80	2,232	2,232	4920	4920	1232	1232	3512	3512	39,200
90	2,510	2,510	5580	5580	1386	1386	3950	3950	44,100
0	0	0	0	0	0	0	0	0	0

LOAD, POUNDS

Minutes of Application	P_{10}	P_{11}	P_{12}	P_{13}	P_{14}	P_{15}	P_{16}	P_{17}	P_{18}	P_{19}	P_{20}
0	0	0	0	0	0	0	0	0	0	0	0
20	1,665	3313	3313	1331	1331	19,715	19,715	5889	9345	9345	7116
40	3,330	6626	6626	2662	2662	39,430	39,430	11,778	18,690	18,690	14,232
60	5,000	9939	9939	3993	3993	59,145	59,145	17,667	28,035	28,035	21,348
80	6,740	13,251	13,251	5324	5324	78,860	78,860	23,556	37,380	37,380	28,464
90	7,585	14,900	14,900	5990	5990	88,720	88,720	26,500	42,050	42,050	32,020
0	0	0	0	0	0	0	0	0	0	0	0

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TABLE IV - SEQUENCE OF LOAD APPLICATION FOR POWERED FLIGHT CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XL-49-X1

PERCENT OF JIG LIMIT LOAD	LOAD, (POUNDS)
0	0
20	6600
40	13,200
60	19,800
80	26,400
100	33,000
0	0

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TABLE V - DATA OBTAINED AS A RESULT OF RE-ENTRY I CONDITION - PRE-CENTRIFUGE TEST OF CENTRIFUGE JIG FOR XM-40-X1

PERCENT OF FULL TIME LOAD	STRAIN, (MICROINCHES/INCH) 1	2	3	4	STRESS, (PSI) 1	2	3	4	REACTIONS, (POUNDS) R_1	R_1
0	0	0	0	0	0	0	0	0	15,500	15,500
30	-110	100	90	-110	-3300	3000	2200	-3300	36,500	37,700
40	-240	240	210	-240	-7200	7200	6300	-7200	53,200	56,300
0	0	0	0	0	0	0	0	0	15,500	15,500
20	-160	110	120	-150	-4800	3300	3600	-4500	40,300	41,500
40	-280	240	260	-300	-8400	7200	7800	-9000	60,500	57,000
60	-450	400	390	-470	-13,500	12,000	11,700	-14,100	76,300	75,300
80	-630	620	520	-600	-18,900	18,600	15,600	-18,000	96,500	96,500
90	-720	750	630	-680	-21,600	22,500	18,900	-20,400	106,500	104,800
100	-750	820	750	-800	-22,500	24,600	22,500	-24,000	116,500	115,000
20	-170	160	150	-170	-5100	4800	4500	-5100	48,200	43,800
0	0	0	0	0	0	0	0	0	22,700	15,800

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TABLE VI - DATA OBTAINED AS A RESULT OF INQUIRY II CONDITION -
PRE-CALIBRATION TEST OF CENTERPIECE JIG NOR 00-40-01

Load (Pounds)	Strain (Microinches/inch) 1	2	3	4	Stress (PSI) 1	2	3	4	Reaction, (Pounds) R_1	R_2
0	0	0	0	0	0	0	0	0	0	0
10	-40	40	30	-40	-1070	1410	930	-1260	1200	1190
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2880	1860	-2560	2750	2750
30	-140	170	100	-90	-4260	5100	3000	-2700	3900	3775
40	-190	170	140	-150	-5700	5100	4200	-3900	5400	5020
50	[illegible]	[illegible]	150	-150	-6600	7200	4500	-4500	6325	5375
0	0	0	0	0	0	0	0	0	0	0

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