[redacted]

UNCLASSIFIED 1201

MAR 1958

Case No. 433.00
Ref. Sym: 1612 (626)
Project No. TM-676
File: H-490, 3-2

1st Review Date: 11/5/98
Authority: ADD
Name: P Brown
1st Review Date: 11/10/98
Authority: ADD
Name: W Layne

Classification Retained
Classification Changed to: U
Contains No DOE Classified Information
Contains UCNI
Comments: OK for Openet

TCG-NNT-1

CDL No.
ACCOUNTABILITY
CARD: BM
FILE No. H-490 3-2

MR. L. A. DUNN - 1284

Attn: Mr. G. Neun - 1284

Re: Ramp and Drop Tests of the H-490 Container at Temperatures of +160°F to -65°F

RECEIVED
1958
R & D FILES

Summary of Results

The H-490 warhead container containing an XW-25 dummy warhead was subjected to ramp tests of approximately 6.0 and 8.0 mph and drop tests from 4, 8, and 12 inches at temperatures of +160°F, +130°F, +100°F, +60°F, +30°F, 0°F, -30°F, and -65°F.

Each of the above tests were performed with a medium stafoam (polyurethane polyester) cushioning pad on top, bottom, and around the sides of the container. The XW-25 warhead was supported on a stafoam pad with seven springs extending through holes in the stafoam pad and bearing against the bottom of the H-490 container.

INVENTORIED
SEP 14 '65
3428-3

Maximum faired longitudinal accelerations (with respect to the ramp dolly axes) on the XW-25 warhead measured during the 8 mph ramp tests varied from 47.0 g at -65°F to 27.0 g at +130°F. Maximum accelerations were fairly constant between +30°F and +160°F varying between 27.0 g and 31.0 g.

INVENTORIED
AUG 6 1964
3427-1

Maximum faired accelerations recorded on the XW-25 warhead during the 12-inch drop tests varied between 28.0 g at -65°F and 16.0 g at 0°F. From 0°F the maximum faired accelerations gradually rose with temperature to a value of 20.0 g at +160°F.

Object of Test

The object of this test was to subject an H-490 warhead container containing an XW-25 dummy warhead to ramp and drop tests at high and low temperatures to determine the shock isolation of stafoam thru a range of temperatures from +160°F to -65°F.

INVENTORIED
MAR 2 1959
BY ORG. 4643

Reason for Test

This test was requested in a Work Order Authorization from Mr. R. S. Howard, 1281-2, to Division 1612, dated August 16, 1957.

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION CHECK
CLASSIFICATION CHANGED TO: U
Carmela Gallegos 12/9/98
PERSON CHANGING MARKING & DATE
W C Layne 12/16/98
PERSON VERIFYING MARKING & DATE
AUTHORITY: W C Layne
RECORD ID: 995N0407
DATED: 11/10/98

THIS DOCUMENT CONSISTS OF 22 PAGE(S)

[redacted]

UNCLASSIFIED

Function of Object Tested

The H-490 warhead container is a shipping container for the XW-25 warhead.

Summary of Past Tests

Seven shock and three vibration tests have been performed previously on H-490 warhead containers by Department 1610. All the tests met the maximum requirements of the pertinent specifications of SCS-5. The ambient temperatures for the previous tests could have varied from approximately +30°F to +95°F since the tests were performed in all the seasons of the year and out in the weather. The details of the tests and data obtained are presented in the following reports:

1. Ramp, Drop, and Vibration Test of the H-490 with Springs, from Mr. R. I. Butler and Mr. D. T. Judd, 1612-1, to Mr. L. A. Dunn, 1284, Project No. TM-656, Ref. Sym: 1612 (606), dated November 19, 1957.

2. Ramp, Drop, and Vibration Test of the H-490 Warhead Container, from Mr. R. A. Buck, 1612-3, to Mr. L. A. Dunn, 1284, Project No. TM-545, Ref. Sym: 1612 (483), dated August 14, 1957.

3. Drop Test of the H-490 with Sponge Rubber and Polyurethane Cushioning, from Mr. G. M. Willson, 1612-1, to Mr. L. A. Dunn, 1284, Project No. TM-436, Ref. Sym: 1612 (370), dated September 11, 1956.

4. Ramp Test of the H-490 with Polyurethane Cushioning (X-9030), from Mr. G. M. Willson, 1612-1, to Mr. L. A. Dunn, 1284, Project No. TM-431, Ref. Sym: 1612 (365), dated August 21, 1956.

5. Material Cushioning Properties Test for XH-490, from Mr. R. L. Ault, 1612-1, to Mr. L. A. Dunn, 1284, Project No. TM-416, Ref. Sym: 1612 (350), dated July 25, 1956.

6. Vibration and Shock Test of the H-490, from Mr. R. G. Hamilton, 1611, to Mr. L. A. Dunn, 1284, Project No. ET-3116, Ref. Sym: 1611, dated April 11, 1956.

7. Ramp and Drop Test of H-490 Prototypes 4 and 5, from Mr. R. L. Ault, 1612-1, to Mr. L. A. Dunn, 1284, Project No. TM-354, Ref. Sym: 1612 (286), dated January 30, 1956.

A comparison of shock accelerations sustained by the XW-25 warhead in an H-490 container for various container cushioning systems used in the above tests are tabulated in Table I.

Setup for Test

Figure 1 shows the H-490 tied down on the ramp dolly and Figure 2 setup for drop testing.

The components tested are included in Table II.

The instrumentation, recording, and test equipment used for the test include the following:

Statham accelerometers tabulated in Table III and shown in Figs. 3 and 4.
Thermocouple
Velocity gage
Quick release
Two Consolidated recorders, Type-5-114-Pb, Serial Nos. 625BL19, 679AG12
Two Banks Consolidated System D amplifiers, Type 1-113B
Two Consolidated power supplys, Type 2-105, Serial Nos. 572AL11, 571AL11
Ramp (10° incline in all weather room)
All weather room (+160°F to -65°F)

Procedure

A ramp was installed in the all-weather room located at Eglin Field in Florida as shown in Fig. 5.

The H-490 container containing an XW-25 dummy warhead was tied down on the ramp dolly, this caused the ramp dolly floor to bow so 2 x 6-inch planks were placed on the dolly floor as longitudinal stiffeners, as shown in Fig. 1. Shoring was used to keep the H-490 container from sliding forward. The dolly was raised high enough on the ramp to produce dolly velocities of approximately 6 and 8 mph at the eight temperatures +160°F, +130°F, +100°F, +60°F, +30°F, 0°F, -30°F, and -65°F. Accelerations were recorded from accelerometers 1 thru 5 shown in Figs. 3 and 4.

Drop tests were made from 4, 8, and 12 inches using a sling and quick release, hanging from a hoisting arrangement in the all-weather room, one drop was made from each height at the eight temperatures mentioned above. Accelerations were recorded from accelerometers 1 and 2 shown in Fig. 4.

The accelerometers used for these tests were Statham Model A44a-200-350 with built-in heaters, and Model F-100-350 encased with strip heaters for low temperature testing.

A thermocouple was used to monitor the temperatures on the XW-25 dummy warhead.

A comparison of drop tests performed in the all-weather room with drop tests on concrete may not be made possible due to the construction of the floor in the all-weather room. The floor is made up of 2 x 6-inch planks set on top of 3 x 6-foot sections of steel grating bolted to steel angles that are set in concrete. The container was dropped on a 1/2-inch steel plate placed on the floor and covered with 3/4-inch plywood. The floor deflected more easily than the concrete floor used during ambient temperature drop tests at Sandia.

Construction details of the ramp also make it difficult to make a direct comparison between these tests and those performed at Sandia. The ramp was lag bolted to the 2 x 6-inch chamber floor planks and fastened with turnbuckles and tierods to the walls of the room. Five thousand pounds of lead was piled on the bumper for ballast. Since the bumper was at the base of the incline, the dolly had no horizontal run. Figure 5 shows construction details of the ramp used in the all-weather room.

Results

The H-490 had the aft left tie-down lug torn loose as shown in Fig. 6, during the 6.1 mph run at -30°F. The lug was rewelded to the container and testing continued. During the 8.1 mph run at -65°F, the aft right lug was half torn loose as shown in Fig. 7. The improper method used in the tie-down caused the failure of the lugs. After all testing had been completed, the XW-25 was removed and it was observed one of the springs in the base pad had tilted but not been damaged as shown in Fig. 8. Also the base of the container was deformed as shown in Fig. 9.

Accelerations recorded during ramp testing are tabulated in Tables IV and V, acceleration directions are with respect to the ramp dolly. The 6.1 mph and 8.1 mph runs were recorded after the unit was soaked at -65°F for 60 hours.

Figure 10 illustrates representative oscillograph records of ramp runs at +160°F, +60°F, and -65°F with ramp velocities of approximately 8.0 mph.

Accelerations recorded during drop testing are tabulated in Table VI.

Figure 11 illustrates representative oscillograph records of drops made from 12 inches at +160°F, +60°F, and -65°F.

UNCLASSIFIED

MAR 1 / 1958

Ref. Sym: 1612 (626)
Project No. Ti-676

Conclusions and Recommendations

The Stafoam cushioning material responded normally to shocks at temperatures from +160°F to +30°F but the resilience decreased at sub zero temperatures.

The Stafoam cushioning material at low temperatures amplified shock loads but they did not exceed design load limit of the XW-25 dummy warhead.

LEO P. NAVODA - 1612-1

Approved by: PAUL H. ADAMS - 1612

LPN:1612-1:as

DISTRIBUTION:
1/6A - L. A. Dunn, 1284
2/6A - W. A. Gardner, 1610
3/6A - P. E. Jockle, ~~1281~~ 1218
4/6A - D. M. Bruce, 1282
5/6A - C. L. Gomel, 5523
6/6A - R. K. Smeltzer, 7221-3

UNCLASSIFIED

UNCLASSIFIED

TABLE I

COMPARISON OF SHOCK ACCELERATIONS SUSTAINED BY XW-25 WARHEAD IN H-490 CONTAINER FOR VARIOUS CONTAINER CUSHIONING SYSTEMS -- RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F

Test No.	Container Cushioning Material	Maximum Faired Shock Accelerations: Vertical 12-Inch Drop Tests, Accel. (g)	Vertical 12-Inch Drop Tests, Pulse Duration (sec.)	Longitudinal Ramp Tests to 7.0 mph, Accel. (g)	Longitudinal Ramp Tests to 7.0 mph, Pulse Duration (sec.)
1	Medium Stafoam, 7 springs	12	.051	16.2	.055
2	Medium Stafoam, 3 Medium Rubber Inserts	17	.040	17	.045
3	Medium Stafoam, 3 Firm Rubb rubber Inserts	17	.040		
3	Medium Stafoam, 4 Medium Rubber Inserts	16	.041		
3	9030 Stafoam, 3 Firm Rubber Inserts	17	.040		
4	X-9030 Stafoam, Plywood Shields on Warhead			19	.054
4	X-9030 Stafoam, Metal Drum Inserts on Warhead			13	.060
5	Stafoam (Designation Unknown)	15	.044	22	.024
6	Medium Stafoam	10	.064		
6	C-8 Stafoam	8.4	.064		
6	X-9530 Stafoam	10	.064		
7	Flexible Alkyd Medium Stafoam	20	.038	20	.050

NOTES:
1. Tests are identified in Summary of Past Tests.
2. Directions of Accelerations are with respect to the normal shipping axes of the container.
3. All Stafoam cushioning materials were polyurethane polyester foam plastic manufactured by the American Latex Products Company.

UNCLASSIFIED

Ref. Sym: 1612 (626)
Project No. TM-676

TABLE II

COMPONENTS TESTED -- RAMP AND DROP TEST OF THE M-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F

	Serial No.	Drawing No.
M-490 Warhead Container	AK-4656-97	321133-00
7 each Springs 4-Inch High 1½-Inch OD	None	None
Top Shock Pad	None	133830-00
*Bottom Shock Pad	None	133831-00
Cylinder Liner	None	133829-00
Insert, Drum, Top	None	SK(1284)60486
Insert, Drum, Bottom	None	SK(1284)60485
XW-25 Warhead, Dummy	AA5-H5	300212
Sphere, Concrete	None	None
MC-672 HE Sphere Case	AA-1005-H5	310236
MC-656 X-Unit	E-48	310219

* One with seven 1½-inch diameter holes.

TABLE III

ACCELEROMETER DATA -- RAMP AND DROP TEST OF THE H-400 CONTAINER AT TEMPERATURES OF +160°F TO -65°F

Ramp Test of H-400

Accelerometer No.	Location and Direction*	Serial No.	Range (g)	Model No.	Natural Freq. (cps)
1	Longitudinal - XW-25	2078	100	Fa-100-300	
2	Vertical - XW-25	2080	100	Fa-100-300	510
3	Longitudinal - Ramp Dolly	342	100	AA4-100-350	820
4	Vertical - Ramp Dolly	325	100	AA4-100-350	800
5	Lateral - Ramp Dolly	183	50	AA4-50-350	620

Drop Test of H-400

Accelerometer No.	Location and Direction*	Serial No.	Range (g)	Model No.	Natural Freq. (cps)
1	Longitudinal - XW-25	2078	100	Fa-100-300	
2	Vertical - XW-25	2080	100	Fa-100-300	510

* Directions are with respect to the normal shipping condition axes of the container.

[redacted]

Ref. Sym: [illegible] (626)
Project No. [illegible]

-9-

UNCLASSIFIED

TABLE IV

*ACCELERATIONS RECORDED DURING 6 MPH RAMP TESTS OF THE H-[illegible] -- RAMP AND DROP TESTS OF THE H-[illegible] CONTAINER AT TEMPERATURES OF +[illegible]°F TO -[illegible]°F

Accelerometer No. and Location	-65°F -- 6.1 mph					-[illegible]°F -- [illegible] mph					[illegible]°F -- [illegible] mph				
	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1 - Longitudinal XW-25	--	43.5	-43.5	0.008	0.016	--	34.5	-[illegible].5	0.007	0.024	--	[illegible]	-[illegible]	0.011	0.031
2 - Vertical XW-25	17.[illegible]	28.0	--	--	--	13.0	15.0	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 - Longitudinal Ramp Dolly	--	61.0	-3[illegible].0	0.005	0.017	--	32.0	-[illegible]6.5	0.005	0.020	--	34.0	-[illegible].0	0.006	[illegible]
4 - Vertical Ramp Dolly	33.0	35.0	--	--	--	--	--	--	--	--	[illegible]	[illegible]	--	--	--
5 - Lateral Ramp Dolly	20.5	15.0	--	--	--	--	--	--	--	--	[illegible]	7.[illegible]	--	--	--

Accelerometer No. and Location	+30°F -- 6.4 mph					+60°F -- 6.1 mph					+100°F -- 6.3 mph				
	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1 - Longitudinal XW-25	--	20.0	-20.0	0.017	0.038	--	25.0	-25.0	0.018	0.038	--	[illegible]3.0	-22.0	0.022	0.042
2 - Vertical XW-25	3.7	3.5	--	--	--	4.0	4.5	--	--	--	3.0	4.0	--	--	--
3 - Longitudinal Ramp Dolly	--	41.5	-24.0	0.006	0.022	--	28.5	-21.0	0.008	0.026	--	[illegible]5.0	-[illegible].0	0.0[illegible]1	0.03[illegible]
4 - Vertical Ramp Dolly	24.0	20.0	--	--	--	[illegible].0	16.0	--	--	--	[illegible]	[illegible]	--	--	--
5 - Lateral Ramp Dolly	12.3	20.0	--	--	--	3.5	2.0	--	--	--	5.5	3.0	--	--	--

Accelerometer No. and Location	+130°F -- 6.2 mph					+160°F -- 6.7 mph				
	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1 - Longitudinal XW-25	--	[illegible]3.0	-20.0	0.021	0.039	--	23.0	-20.0	0.020	0.042
2 - Vertical XW-25	5.0	5.0	--	--	--	4.0	6.5	--	--	--
3 - Longitudinal Ramp Dolly	--	20.0	-15.0	0.015	0.030	--	31.0	-1[illegible].0	0.010	0.030
4 - Vertical Ramp Dolly	20.0	17.0	--	--	--	16.0	14.0	--	--	--
5 - Lateral Ramp Dolly	7.3	8.0	--	--	--	11.7	9.0	--	--	--

* Acceleration directions are with respect to the ramp dolly axes. Plus directions are forward, up, and to the right.

[redacted]

UNCLASSIFIED

[redacted]

Ref. Sym: 1612 (626)
Project No. T-676

UNCLASSIFIED

TABLE 7

*ACCELERATIONS RECORDED DURING 8 MPH RAMP TESTS OF THE H-[illegible] -- RAMP [illegible] DROP TESTS OF THE H-[illegible] CONTAINER AT TEMPERATURES OF [illegible] TO [illegible]

Accelerometer No. and Location	-65°F -- 3.1 mph					-30°F -- 7.[illegible] mph					[illegible]°F -- [illegible]				
	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1 - Longitudinal XW-25	--	52.0	-[illegible]	[illegible]	[illegible]	--	3[illegible]	-3[illegible]	0.[illegible]	[illegible]	--	37.5	-[illegible]	[illegible]	[illegible]
2 - Vertical XW-25	19.5	17.0	--	--	--	[illegible]7.5	1[illegible]	--	--	--	[illegible]	[illegible]	-[illegible]	0.[illegible]	[illegible]
3 - Longitudinal Ramp Dolly	--	45.0	-3[illegible].5	0.007	0.018	--	47.0	-35.0	0.004	0.020	--	[illegible]	-[illegible]	[illegible]	[illegible]
4 - Vertical Ramp Dolly	29.0	[illegible]	--	--	--	--	--	--	--	--	1[illegible].0	23.5	--	--	--
5 - Lateral Ramp Dolly	7.3	11.5	--	--	--	--	--	--	--	--	11.5	[illegible].5	--	--	--

Accelerometer No. and Location	+30°F -- [illegible].1 mph					+60°F -- 7.[illegible] mph					+[illegible]°F -- [illegible] mph				
	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1 - Longitudinal XW-25	--	28.5	-28.0	0.007	0.037	--	32.0	-[illegible]	0.01[illegible]	0.037	--	32.0	-[illegible]	0.01[illegible]	[illegible]
2 - Vertical XW-25	4.0	5.0	--	--	--	3.5	6.0	--	--	--	[illegible]	[illegible]	--	--	--
3 - Longitudinal Ramp Dolly	--	51.5	-2[illegible].5	0.004	0.021	--	45.0	-[illegible]	0.007	0.026	--	3[illegible].7	-[illegible].5	[illegible]	[illegible]
4 - Vertical Ramp Dolly	18.0	34.0	--	--	--	20.0	29.0	--	--	--	14.0	[illegible]	--	--	--
5 - Lateral Ramp Dolly	16.5	14.0	--	--	--	16.5	13.0	--	--	--	7.[illegible]	7.5	--	--	--

Accelerometer No. and Location	+130°F -- [illegible].0 mph					+160°F -- [illegible].1 mph				
	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)	Max. Accel. +g	Max. Accel. -g	Max. Faired Pulse (g)	Rise Time (sec)	Pulse Time (sec)
1 - Longitudinal XW-25	--	28.5	-27.0	0.020	0.040	--	31.0	-[illegible]	0.021	0.0[illegible]2
2 - Vertical XW-25	5.0	3.0	--	--	--	[illegible]	6.0	--	--	--
3 - Longitudinal Ramp Dolly	--	19.5	-16.0	0.015	0.030	--	2[illegible].0	-25.0	0.01[illegible]	0.031
4 - Vertical Ramp Dolly	11.5	10.0	--	--	--	20.0	17.0	--	--	--
5 - Lateral Ramp Dolly	9.0	5.3	--	--	--	8.5	9.0	--	--	--

* Acceleration directions are with respect to the ramp dolly axes. Plus directions are forward, up, and to the right.

[redacted]

UNCLASSIFIED

Ref. Sym: [illegible]
Project No. TM-[illegible]

UNCLASSIFIED

TABLE VI

*ACCELERATIONS RECORDED DURING DROP TESTS OF THE M-[illegible] -- RAMP AND DROP TESTS OF THE M-[illegible] CONTAINER AT TEMPERATURES OF +[illegible] F TO -65°F

Drop Height (in)	Accelerometer No. and Location	-65°F Max. Accel. +g	-65°F Max. Accel. -g	-65°F Max. Faired Pulse (g)	-65°F Rise Time (sec)	-65°F Pulse Time (sec)	-30°F Max. Accel. +g	-30°F Max. Accel. -g	-30°F Max. Faired Pulse (g)	-30°F Rise Time (sec)	-30°F Pulse Time (sec)	[illegible]°F Max. Accel. +g	[illegible]°F Max. Accel. -g	[illegible]°F Max. Faired Pulse (g)	[illegible]°F Rise Time (sec)	[illegible]°F Pulse Time (sec)
4	1 - Longitudinal XW-25	--	--	--	--	--	--	3.0	--	--	--	2.0	2.0	--	--	--
	2 - Vertical XW-25	--	15.0	14.0	0.037	0.045	--	15.0	[illegible]	0.037	0.0[illegible]	--	8.0	8.0	0.0[illegible]	0.047
8	1 - Longitudinal XW-25	--	3.5	--	--	--	1.0	3.5	--	--	--	2.0	3.0	--	--	--
	2 - Vertical XW-25	--	25.0	24.0	0.037	0.029	--	21.0	19.0	0.036	0.048	--	12.5	12.5	0.029	0.042
12	1 - Longitudinal XW-25	2.0	3.0	--	--	--	2.0	1.0	--	--	--	2.0	3.0	--	--	--
	2 - Vertical XW-25	--	20.0	23.0	0.036	0.024	--	24.0	24.0	0.037	0.039	--	16.0	16.0	0.0[illegible]	0.031

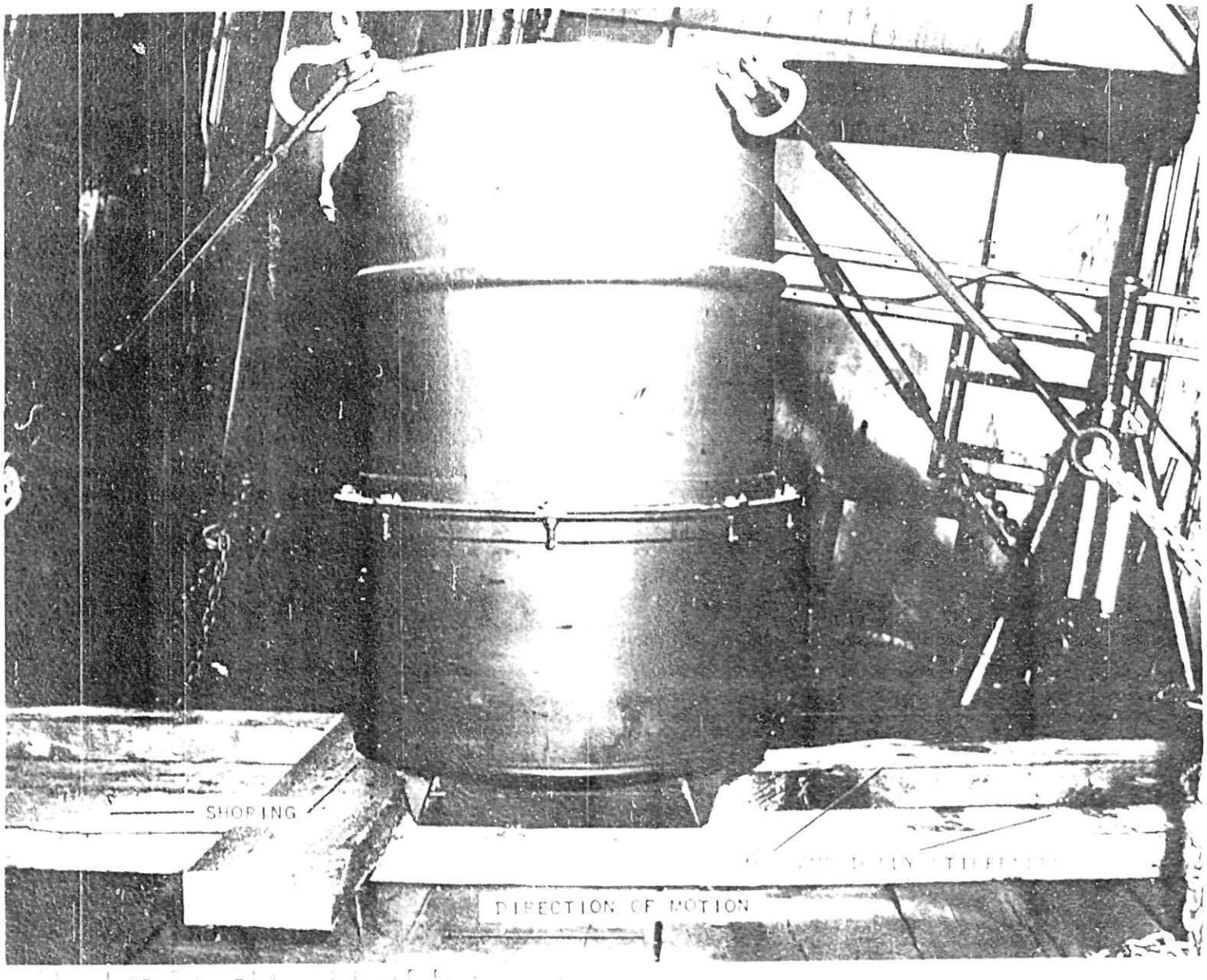
Drop Height (in)	Accelerometer No. and Location	+20°F Max. Accel. +g	+20°F Max. Accel. -g	+20°F Max. Faired Pulse (g)	+20°F Rise Time (sec)	+20°F Pulse Time (sec)	+60°F Max. Accel. +g	+60°F Max. Accel. -g	+60°F Max. Faired Pulse (g)	+60°F Rise Time (sec)	+60°F Pulse Time (sec)	+100°F Max. Accel. +g	+100°F Max. Accel. -g	+100°F Max. Faired Pulse (g)	+100°F Rise Time (sec)	+100°F Pulse Time (sec)
4	1 - Longitudinal XW-25	1.0	1.0	--	--	--	--	--	--	--	--	0.5	1.3	--	--	--
	2 - Vertical XW-25	--	8.0	8.0	0.013	0.053	--	9.0	9.0	0.020	0.052	--	8.0	8.0	0.017	0.047
8	1 - Longitudinal XW-25	--	2.0	--	--	--	2.0	2.0	--	--	--	3.0	3.5	--	--	--
	2 - Vertical XW-25	--	11.0	11.0	0.020	0.045	--	12.0	12.0	0.023	0.047	--	10.0	8.0	0.016	0.050
12	1 - Longitudinal XW-25	3.0	2.0	--	--	--	2.0	3.0	--	--	--	2.0	3.0	--	--	--
	2 - Vertical XW-25	--	17.0	17.0	0.020	0.050	--	18.0	18.0	0.020	0.045	--	20.0	16.0	0.016	0.045

Drop Height (in)	Accelerometer No. and Location	+130°F Max. Accel. +g	+130°F Max. Accel. -g	+130°F Max. Faired Pulse (g)	+130°F Rise Time (sec)	+130°F Pulse Time (sec)	+160°F Max. Accel. +g	+160°F Max. Accel. -g	+160°F Max. Faired Pulse (g)	+160°F Rise Time (sec)	+160°F Pulse Time (sec)
4	1 - Longitudinal XW-25	2.0	2.0	--	--	--	2.0	2.0	--	--	--
	2 - Vertical XW-25	--	10.0	8.0	0.016	0.050	--	11.0	9.0	0.017	0.042
8	1 - Longitudinal XW-25	2.0	2.0	--	--	--	2.0	6.0	--	--	--
	2 - Vertical XW-25	--	14.0	13.0	0.020	0.046	--	15.0	14.0	0.020	0.040
12	1 - Longitudinal XW-25	1.0	3.0	--	--	--	3.0	5.0	--	--	--
	2 - Vertical XW-25	--	21.0	19.0	0.020	0.040	--	22.0	20.0	0.017	0.040

* Direction of accelerations are with respect to normal shipping orientation of container.

[redacted]

UNCLASSIFIED


SHORING
DIRECTION OF MOTION

#1213

UNCLASSIFIED

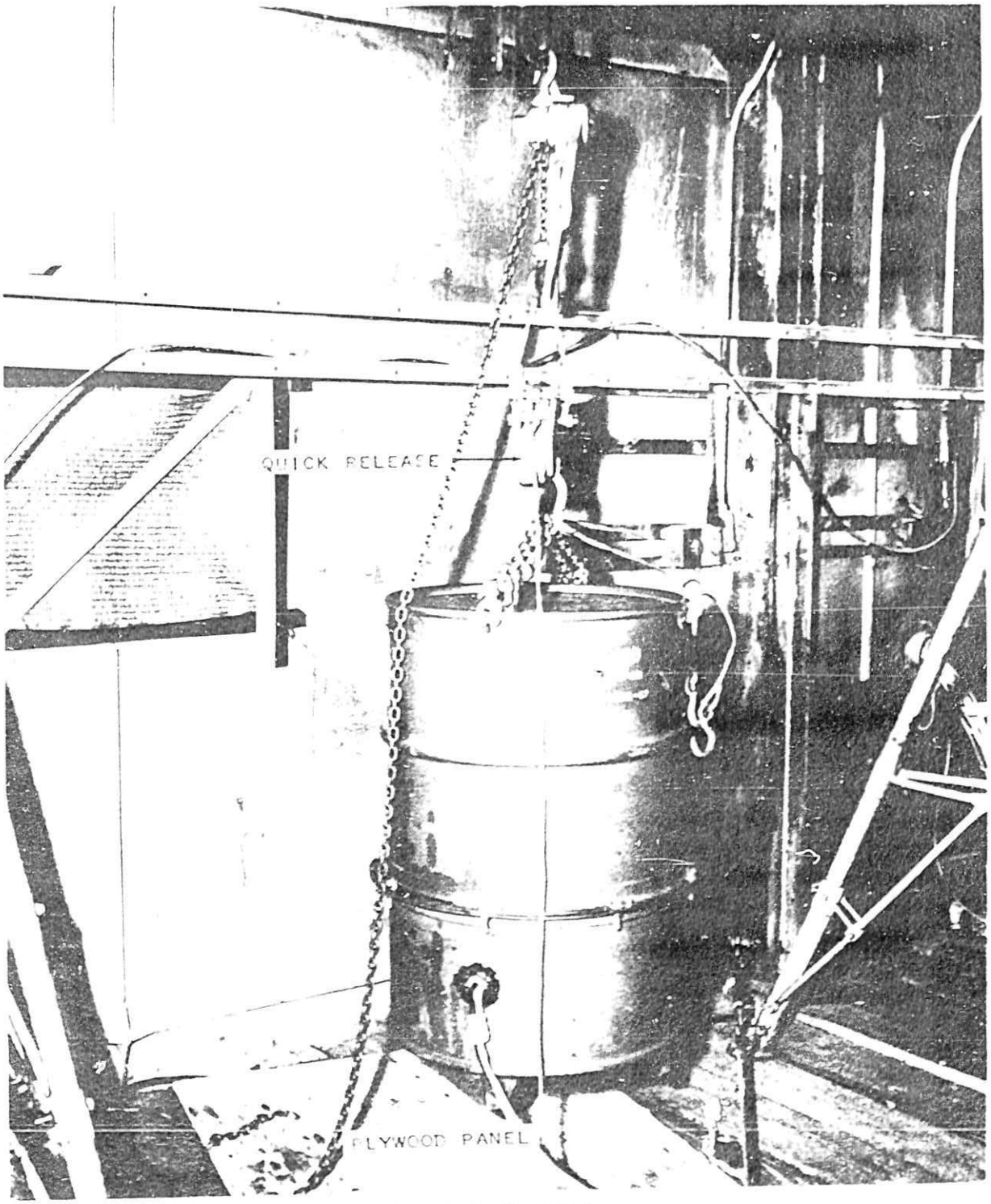


FIG. 2 -- THE [illegible] SETUP FOR [illegible] TESTING [illegible] TEMPERATURES OF +100°F TO -65°F.

D#102741

REF. SYM: [illegible] (626)
PROJECT [illegible]

UNCLASSIFIED

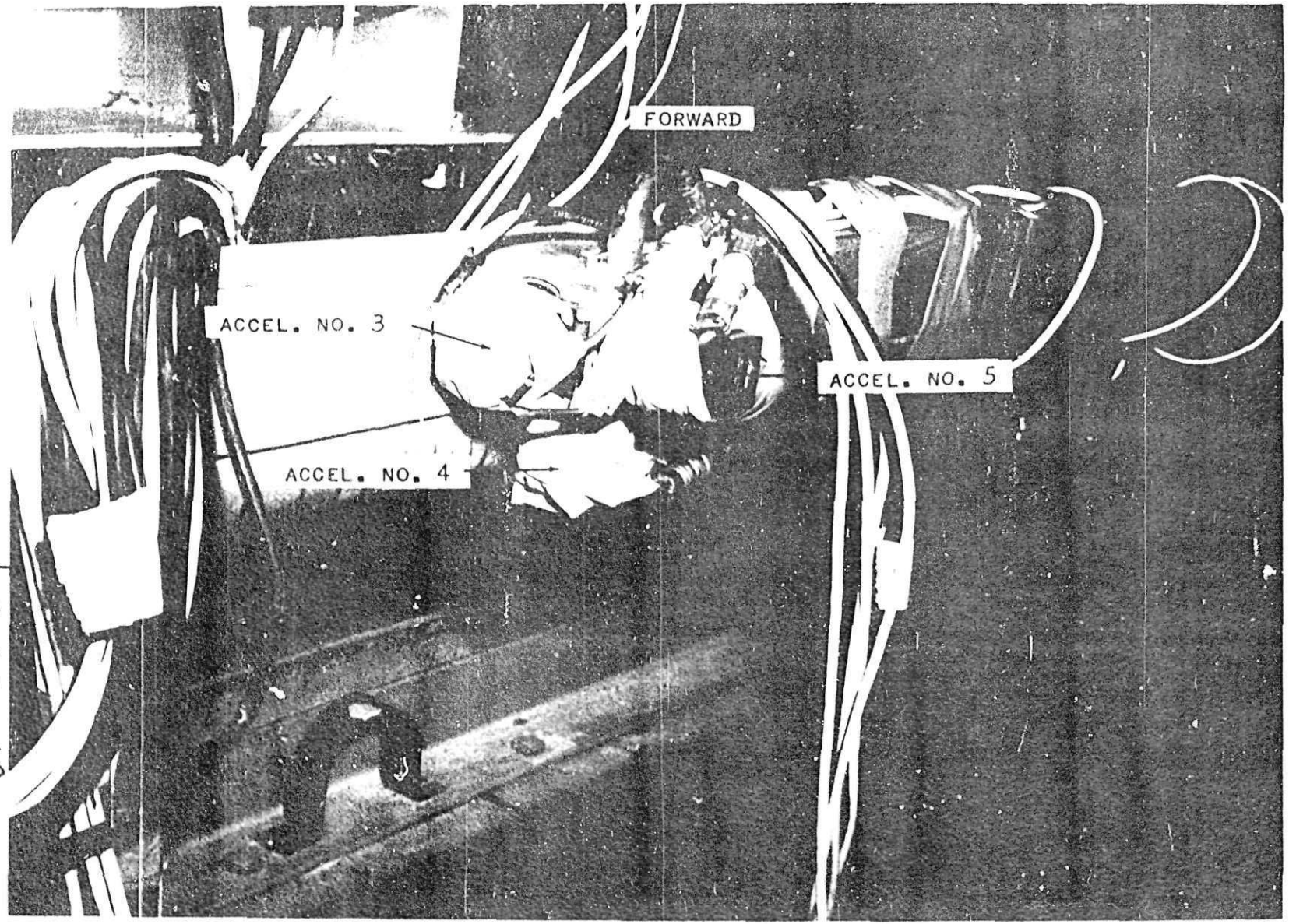


FIG. 3 -- LONGITUDINAL, VERTICAL, AND LATERAL ACCELEROMETERS MOUNTED ON RAMP DOLLY RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F.

REF. SYM: 1612 (626)
PROJECT NO. TN-676

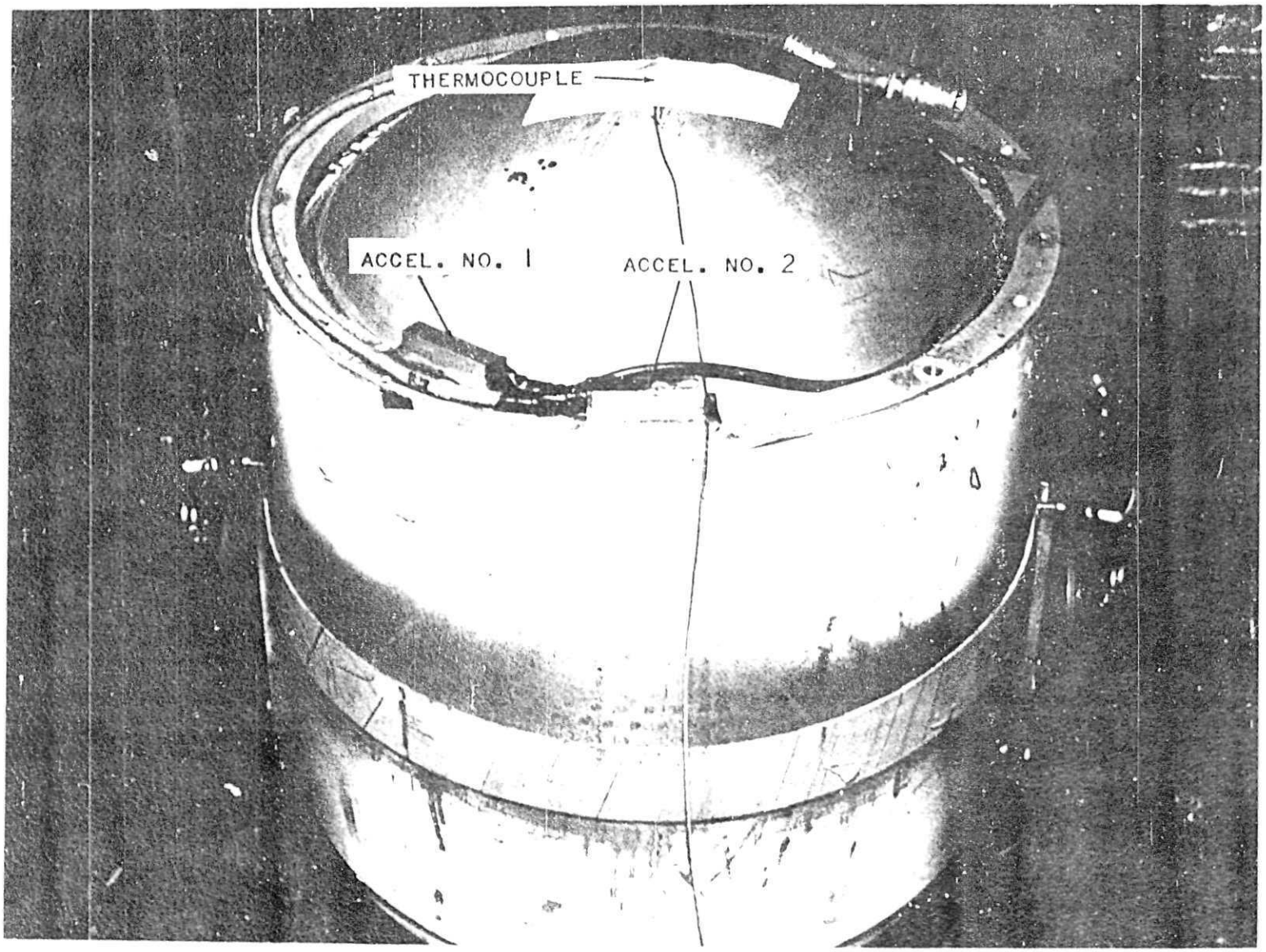
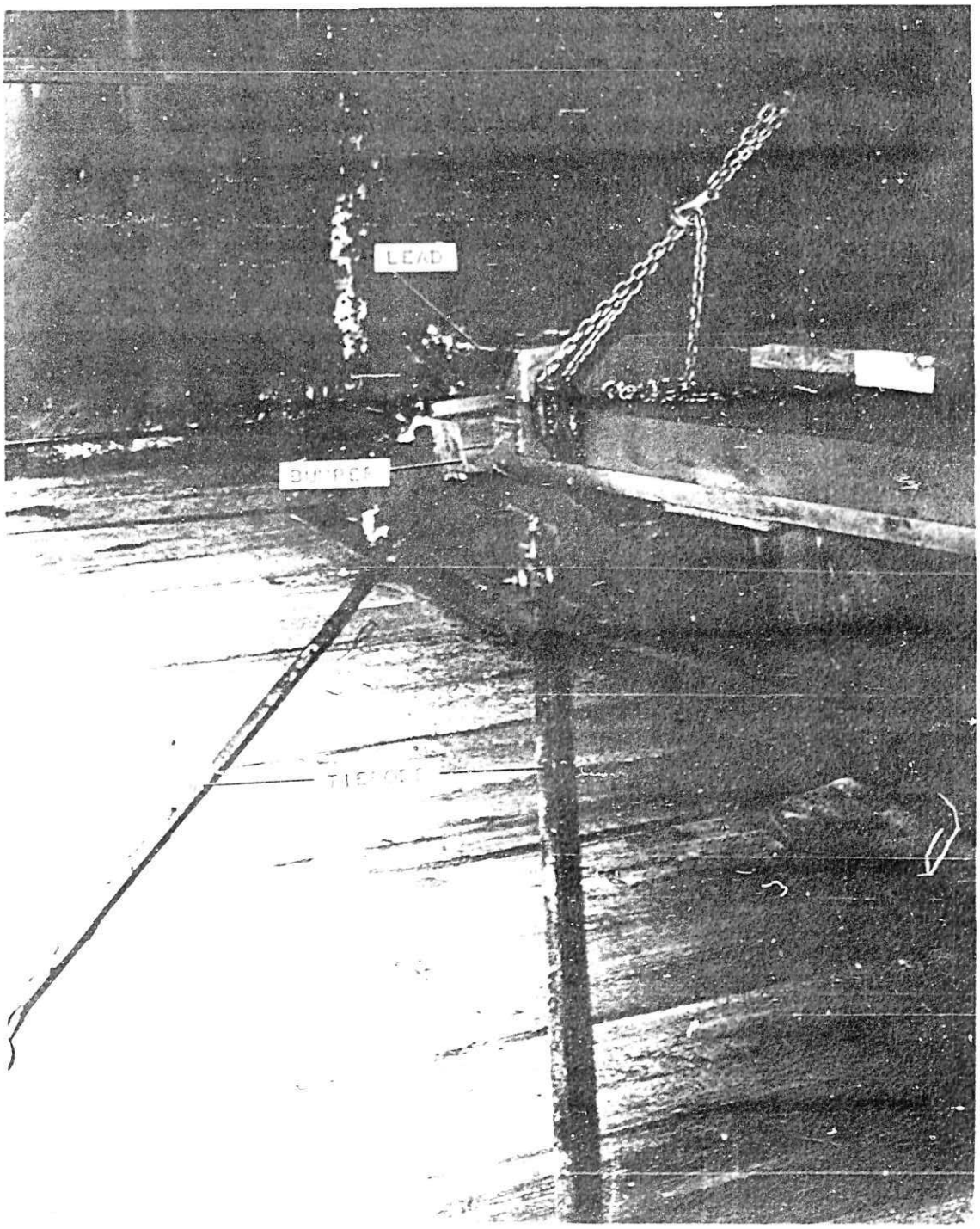


FIG. 4 -- LONGITUDINAL AND VERTICAL ACCELEROMETERS MOUNTED ON XW-25 RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F.

REF. SYM: 1612 (626)
PROJECT NO. TN-676

#1216

UNCLASSIFIED



#102735

UNCLASSIFIED

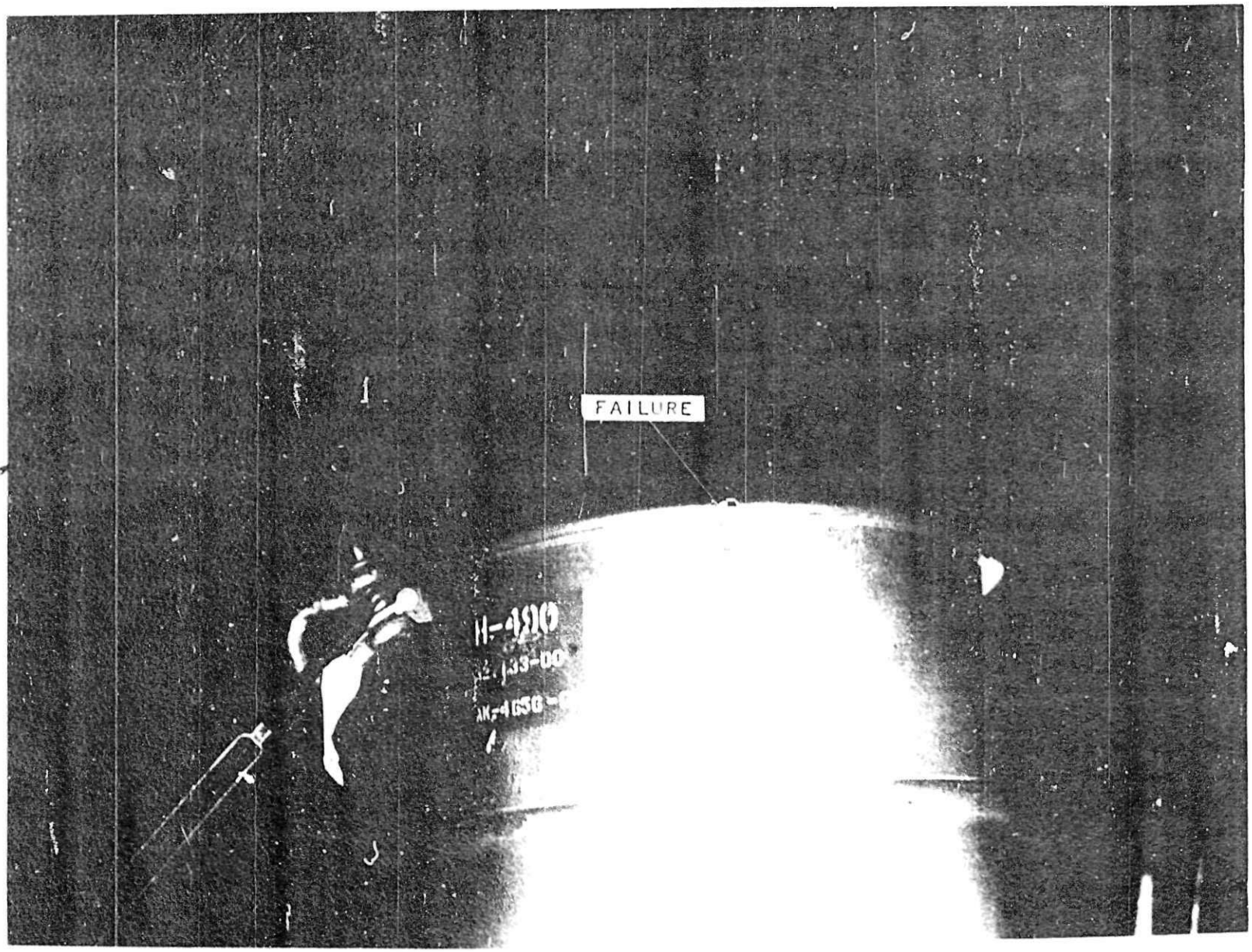


FIG. 6 -- AFT LEFT LUG FAILURE
RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F.

REF. SYM: 1612 (626)
PROJECT NO. TM-476

#102749

#1217

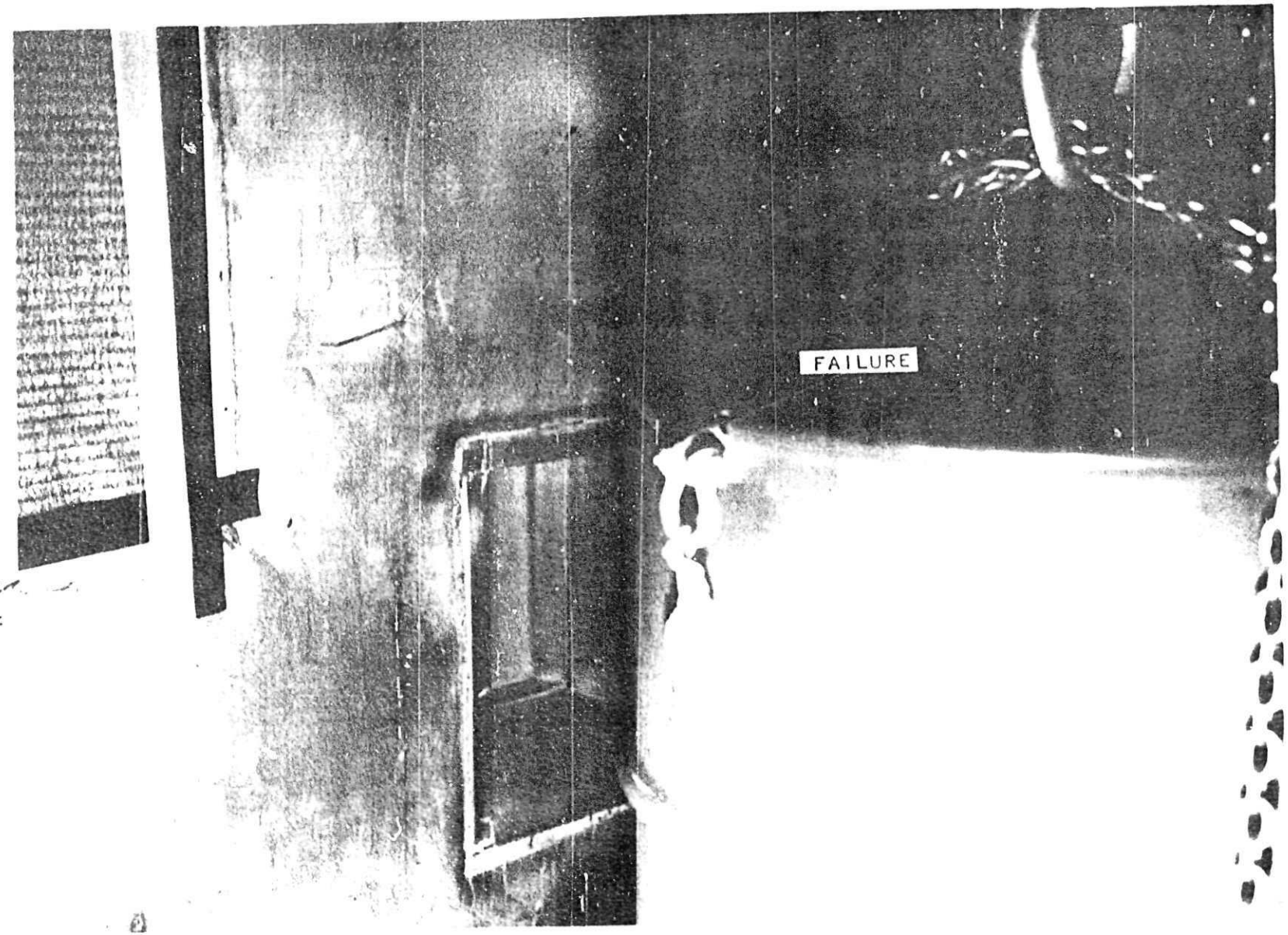


FIG. 7 -- LEFT RIGHT LUG FAILURE
PAST AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F.

REF. [illegible]

#1318

#D2739

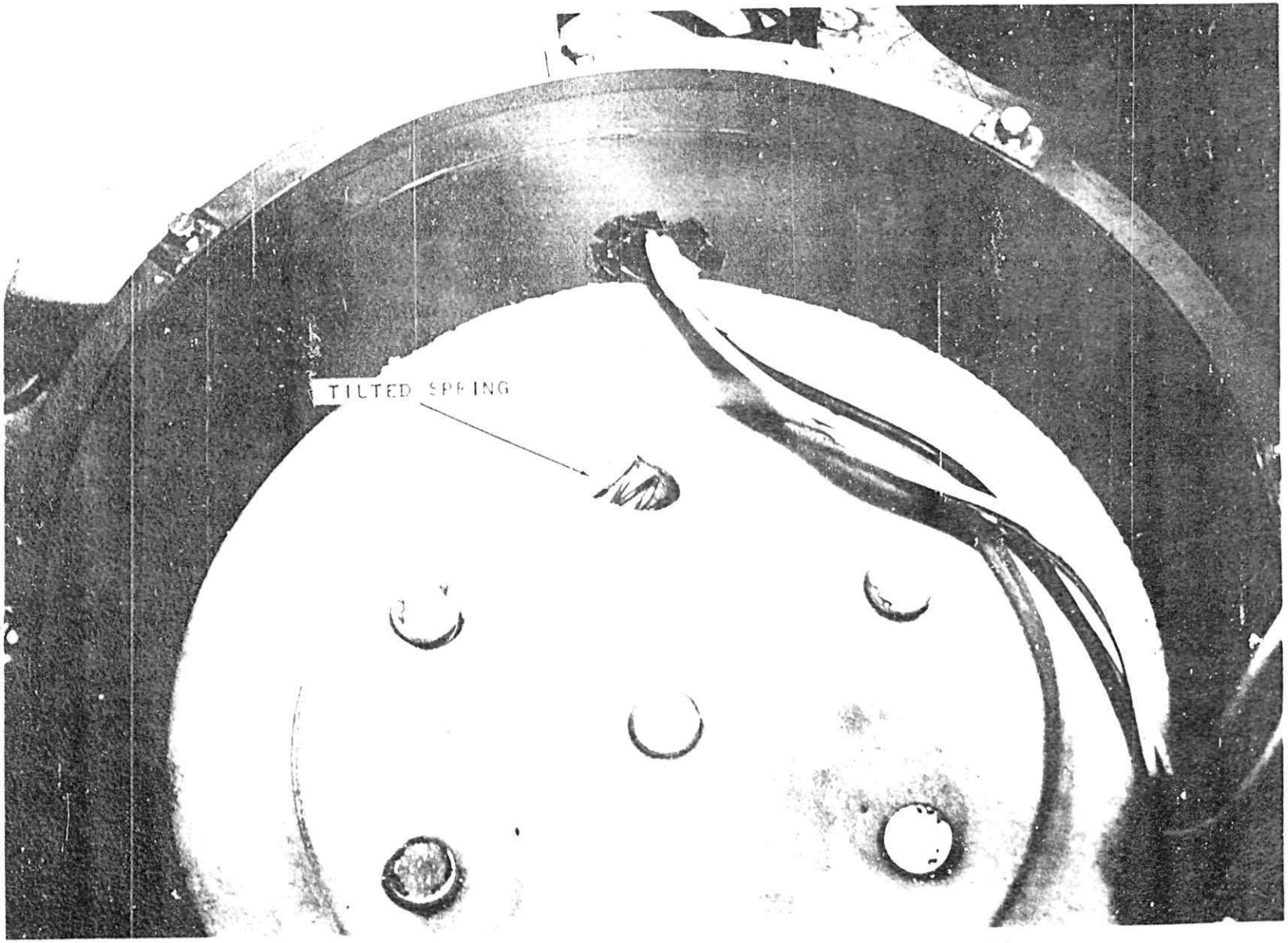


FIG. 8 -- TILTED SPRING IN THE BASE PAD CUSHION OF THE H-490 CONTAINER RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F.

REF. SYM: 1612 [illegible]
PROJECT NO. [illegible]

#1219

Δ #103745

#1220

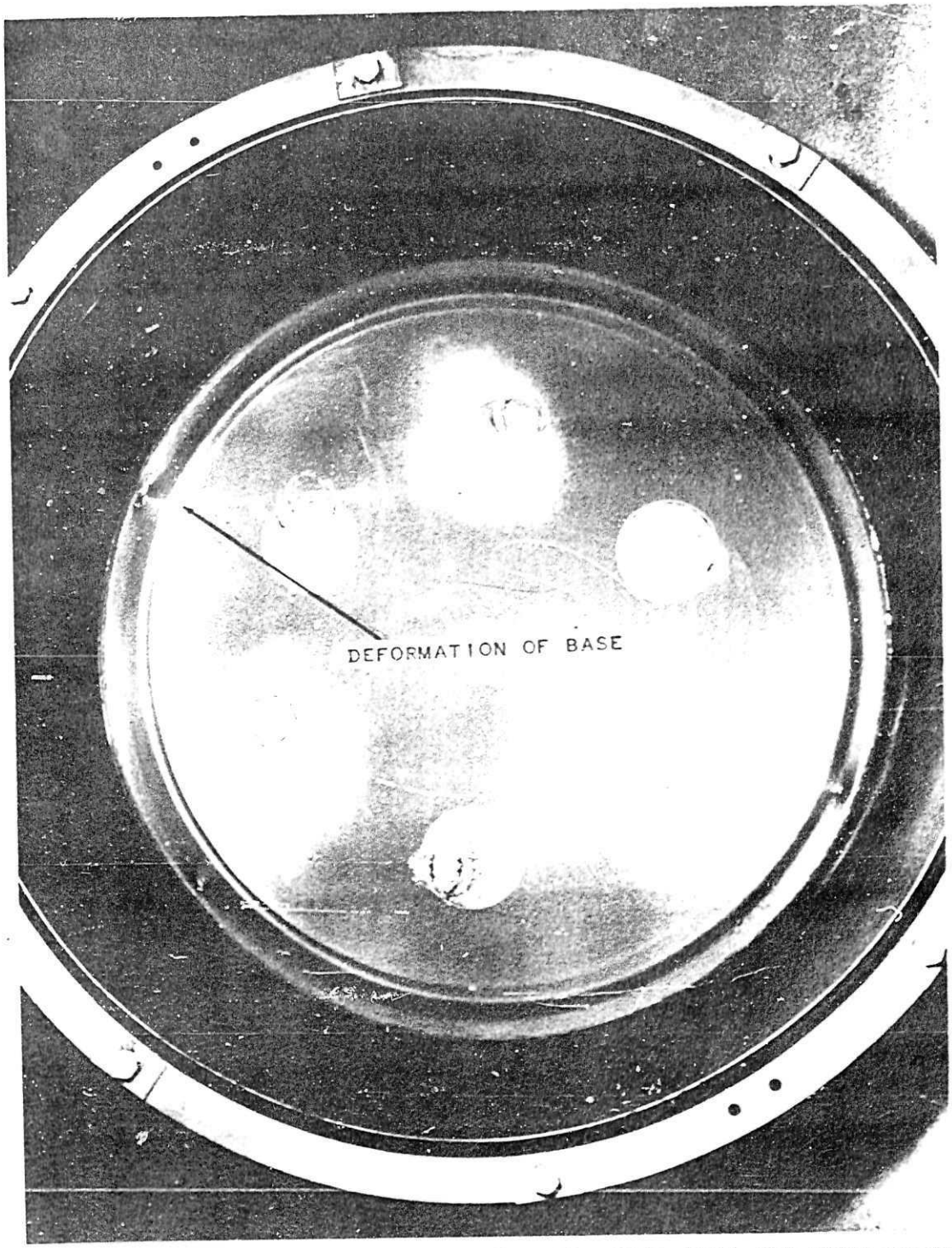


FIG. 9 -- DEFORMATION OF H-490 CONTAINER AFTER RAMP AND DROP TESTING
RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES
OF +160°F TO -65°F.

REF. SYM: 1612 (626)
PROJECT NO. TM-676

 #102738

#1221

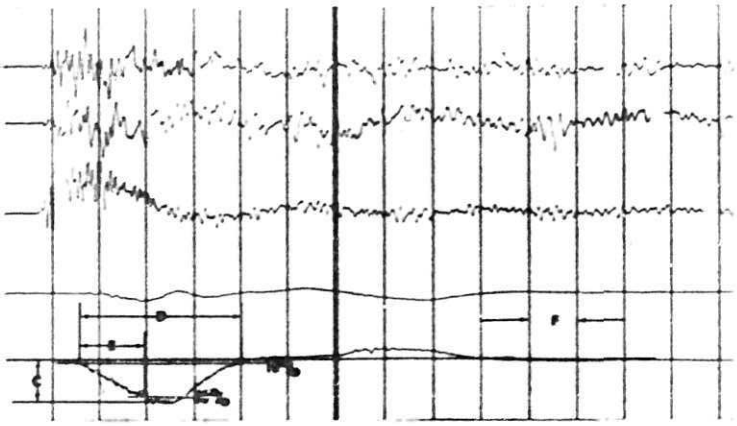
SECRET

UNCLASSIFIED

5	LATERAL	[illegible] DOLLY	[illegible]
4	VERTICAL	[illegible] DOLLY	64.0
3	LONGITUDINAL	[illegible] DOLLY	[illegible]
2	VERTICAL	[illegible]	65.0
1	LONGITUDINAL	[illegible]	71.0

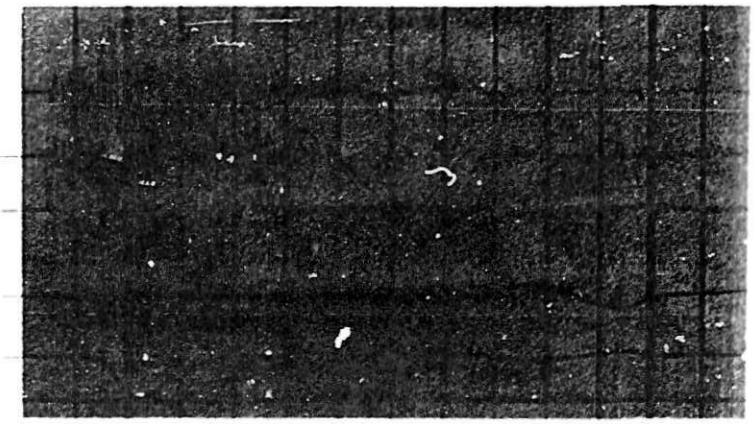
.1 MPH +160°F

5	LATERAL	[illegible] DOLLY	[illegible]
4	VERTICAL	[illegible] DOLLY	86.0
3	LONGITUDINAL	[illegible] DOLLY	[illegible]
2	VERTICAL	[illegible]	[illegible]
1	LONGITUDINAL	[illegible]	75.0



7.6 MPH +60°F

5	LATERAL	[illegible] DOLLY	[illegible]
4	VERTICAL	[illegible] DOLLY	74.0
3	LONGITUDINAL	[illegible] DOLLY	[illegible]
2	VERTICAL	[illegible]	[illegible]
1	LONGITUDINAL	[illegible]	[illegible]



9.1 MPH -65°F

[illegible] -400 [illegible] TEMPERATURES OF +160°F TO -65°F.

REF. [illegible] 1612 [illegible]

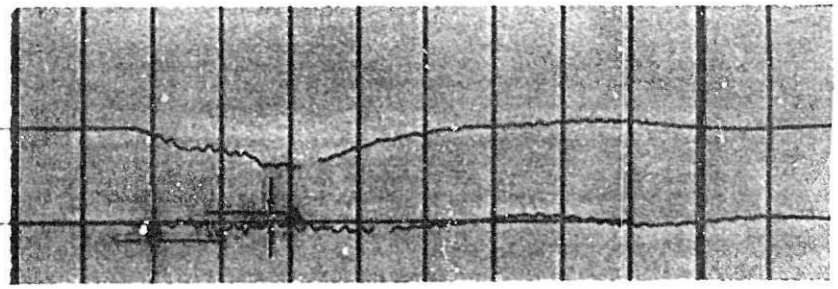
UNCLASSIFIED

D#102755

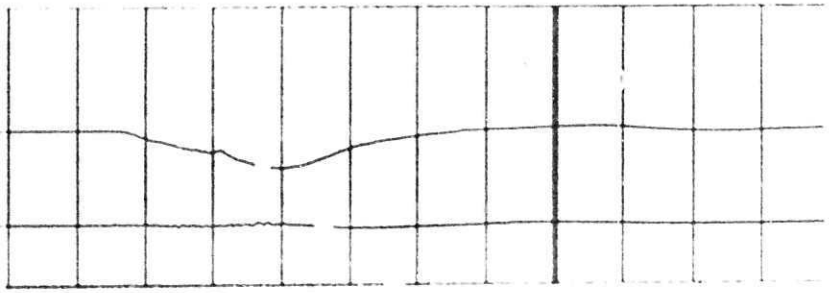
SECRET

SECRET

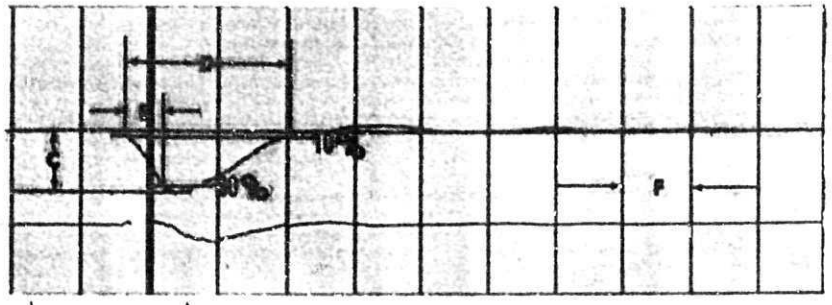
ACCEL. NO.	DIRECTION	LOCATION	CAL. G/IN.
2	VERTICAL	XW-25	77.0
1	LONGITUDINAL	XW-25	53.5
2	VERTICAL	XW-25	78.5
1	LONGITUDINAL	XW-25	110.0
2	VERTICAL	XW-25	74.5
1	LONGITUDINAL	XW-25	71.5



8.1 MPH +160°F



7.6 MPH +60°F



8.1 MPH -65°F

A = MAX. POS. C = MAX. FAIRED AMP. E = RISE TIME
B = MAX. NEG. D = PULSE DURATION F = 0.01 SEC.

0 1 SCALE INCH

FIG. 11 -- REPRESENTATIVE OSCILLOGRAPH RECORDS DROP TESTS
RAMP AND DROP TESTS OF THE H-490 CONTAINER AT TEMPERATURES OF +160°F TO -65°F.

REF. SYM: 1612 (626)
PROJECT NO. TM-676

#1222

SECRET

#102750