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1st Review Date: 5/11/98
Authority: ADD
Name: W C Layne
1st Review Date: 5/12/98
Authority: ADD
Name: W C Layne

Classification Cancelled
Classification Changed to: ONCL
Contains No DOE Classified Information
Concurrence With:
Concurrence UCNI
Comments:

SEP 17 1962

File No: XW-59, 3-2
T-18731
Test Completed: 6-18-62
WS 7521/9987

RECEIVED
SEP 18 1962
CENTRAL RECORD FILE

MR. J. W. McKIERNAN - 7147
Attn: J. M. May

Re: Drop Test of the XW-59 Environmental Test Unit No. 2 and the XH-976 Shipping and Storage Container (CRD)

Summary of Results

The XH-976 Shipping and Storage Container, with the XW-59 warhead inside, was subjected to drop tests to determine the ability of the XW-59 and the XH-976 to withstand simulated handling shocks.

The test unit was dropped five times from a height of 12 inches onto a concrete pad. Two vertical drops were made with the test unit stabilized at -65°F and with the container landing flat on its base. Two vertical drops were made with the test unit stabilized at ambient temperature and with the container landing flat on its base. One vertical drop was made with the longitudinal axis of the test unit 47° from vertical such that the container landed on its edge and fell over on its side.

The highest recorded faired acceleration was 75.4g with a pulse duration of 29.4 milliseconds on the XW-59 warhead forward end. The test unit was stabilized at -65°F.

During and upon termination of the test, all components were inspected. The only damage evident was to the XH-976 curled hair cushion pad and the compression ring segment during the ambient drop when the container landed on its edge and fell over on its side.

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Setup for Test

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Figure 1 shows the test setup of the XH-976 Shipping and Storage Container with the XW-59 warhead inside, for the drops such that the container landed flat on its base. Figure 2 shows the test setup for the drop such that the container landed on its edge and fell over on its side.

A forklift and an electrical quick release were used to drop the test unit onto a concrete pad.

ZONE	8	7	6	5	4	3	2	1	CHANGE	8	7	6	5	4	3	2	1	PROOFS
									CRD									

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DOWNGRADING OR DECLASSIFICATION STAMP
CLASSIFICATION CHANGED TO: U
AUTHORITY: W. C. Layne
PERSON CHANGING MARKING & DATE: Emilda Selph 5/13/98
RECORD ID: 98SN2015
PERSON VERIFYING MARKING & DATE: W C Layne 5/18/98
DATED: 5/12/98

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Components making up the unit under test are listed in Table I. Test equipment used is listed in Table II. All instrumentation used, with nomenclature, location, and other description, is listed in Table III and may be seen in Figures 3 and 4.

Procedure

The test unit was assembled and placed in an insulated box. The Conrad Mobile-Temp unit was used to stabilize the test unit at -65°F. A thermocouple placed externally on the forward end of the XW-39 was monitored by the Brown recorder to determine when the test unit was stabilized at the correct temperature. The test unit was removed from the insulated box and raised to a height of 12 inches [illegible] the concrete pad and dropped twice with the container landing flat on its base.

The test unit was then stabilized at ambient temperature and raised to a height of 12 inches above the concrete pad and dropped three times. The container landed flat on the base in the first two drops and, in the third drop, the container landed on its edge and fell over on its side.

Leak rate tests of the warhead were conducted prior to and after the drop tests. The total leak rates were 4.5×10^{-4} cc/sec STP before and 1.9×10^{-4} cc/sec STP afterward. The total leak rate is defined as the air leakage rate at a differential pressure of 30 in of Hg and a temperature of 0°C. The leak rate tests were conducted with an internal gas mixture of 30% argon and 70% dry air at an absolute pressure of 30 in of Hg for the first test and 33 in of Hg for the second test. The internal/external pressure differential was approximately the same as the internal pressure in each instance.

Results

The only evident damage sustained during the drop tests occurred when the container landed on its edge and fell over on its side. This damage was a slight bending of the compression ring segment and a 2.5 inch deep cut into the curled hair cushion pad. This damage is shown in Figure 5.

Accelerations and times measured during the drop tests are listed in Table IV. Typical oscillograph records from each of the three drop conditions are shown in Figures 6, 7, and 8.

Division 7147 Conclusions

These tests demonstrate the ability of the W-39 Mod 0 warhead/M-976 Shipping and Storage Container to withstand the shock loads resulting from rough handling.

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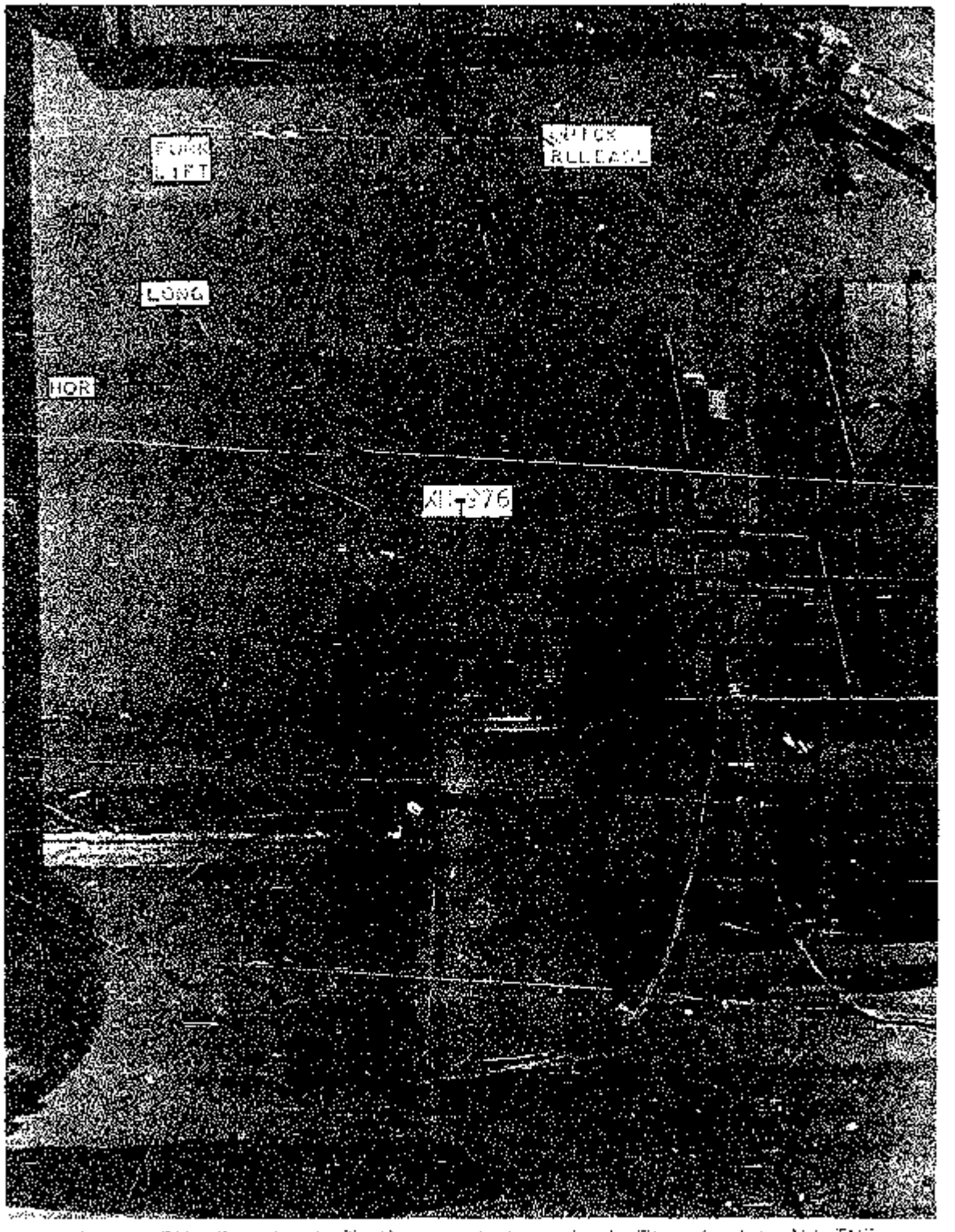

FIG. 1 [illegible] THE XB-70 AND THE XB-976 [illegible]

PROJECT NO. 1-1731
REF. SYM: 7351/2087

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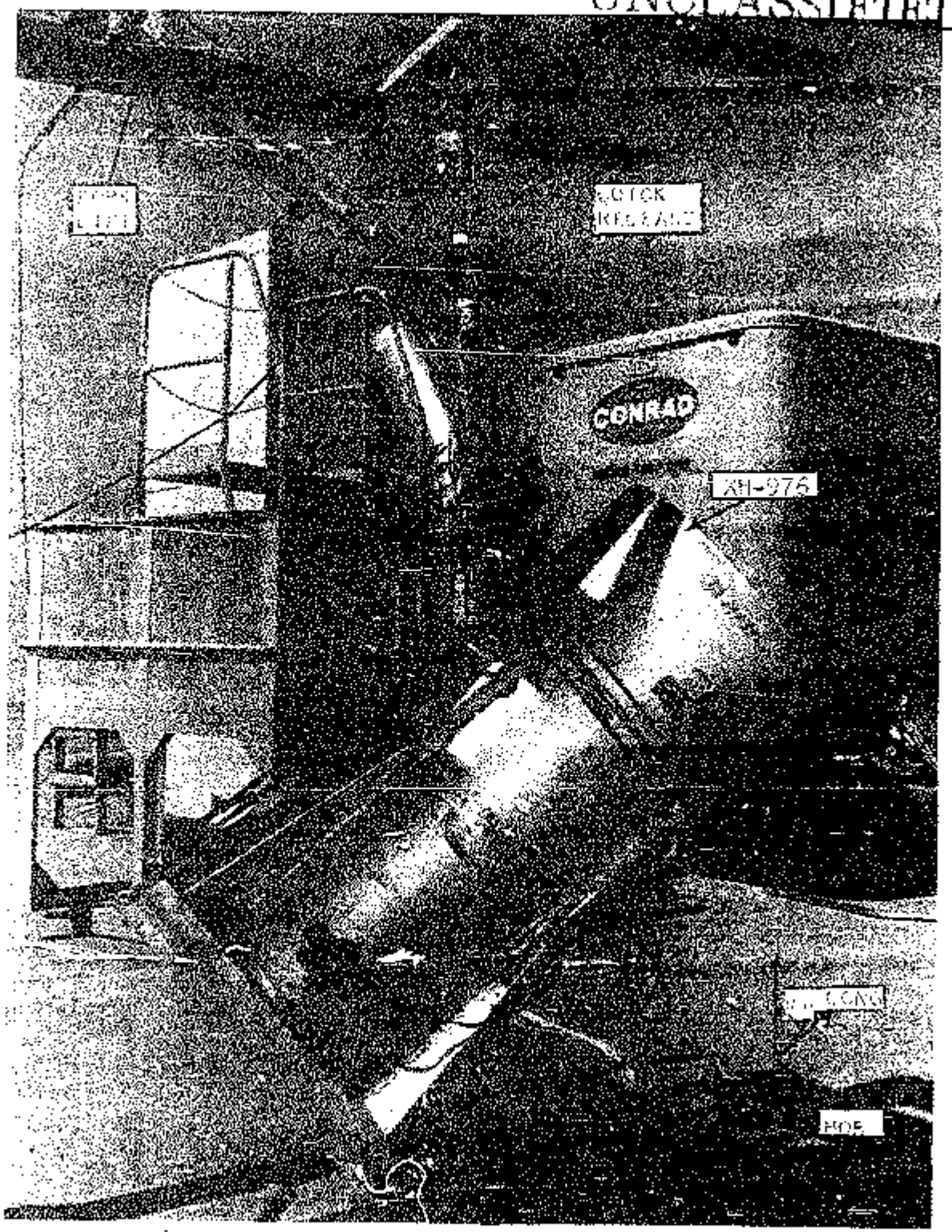

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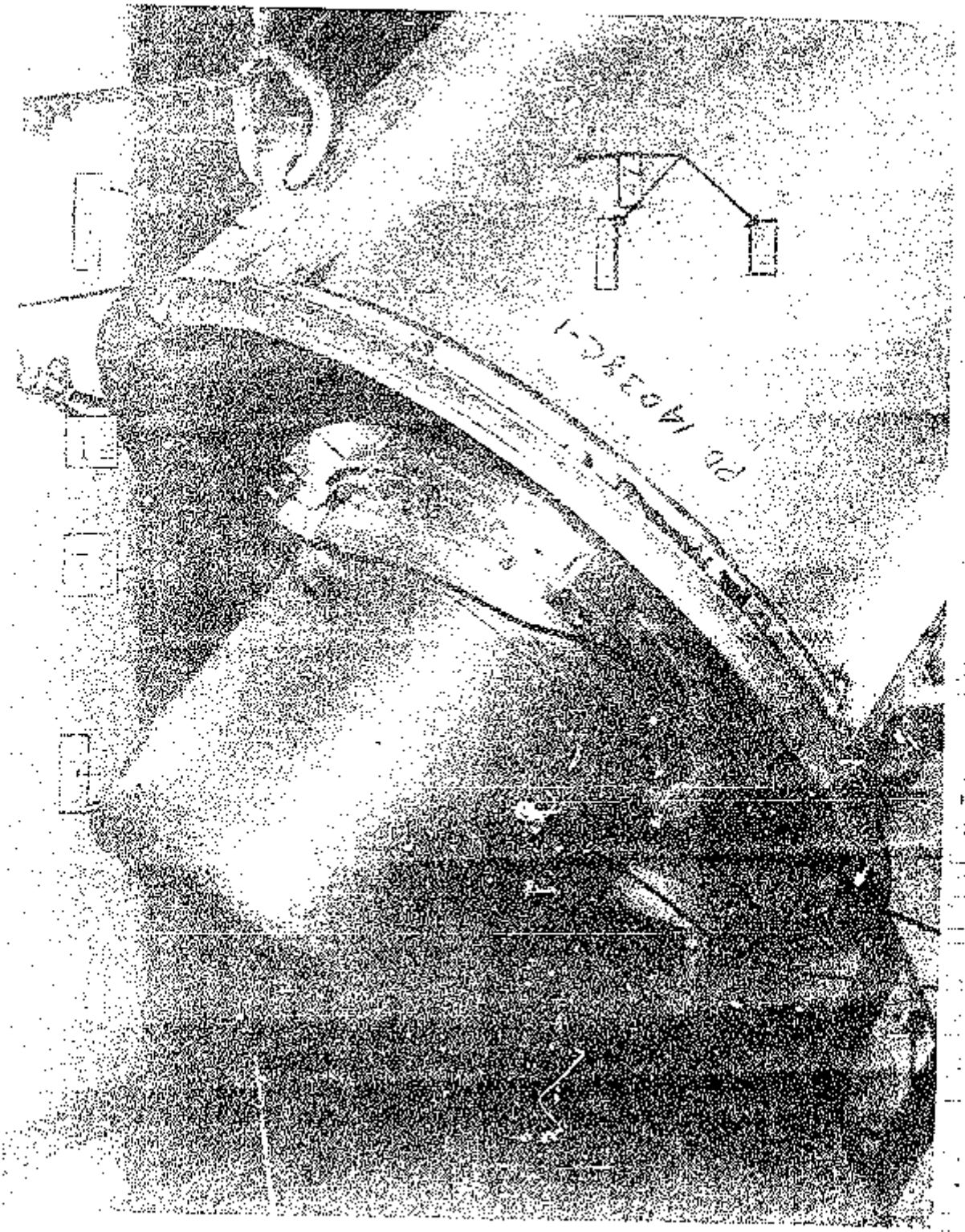

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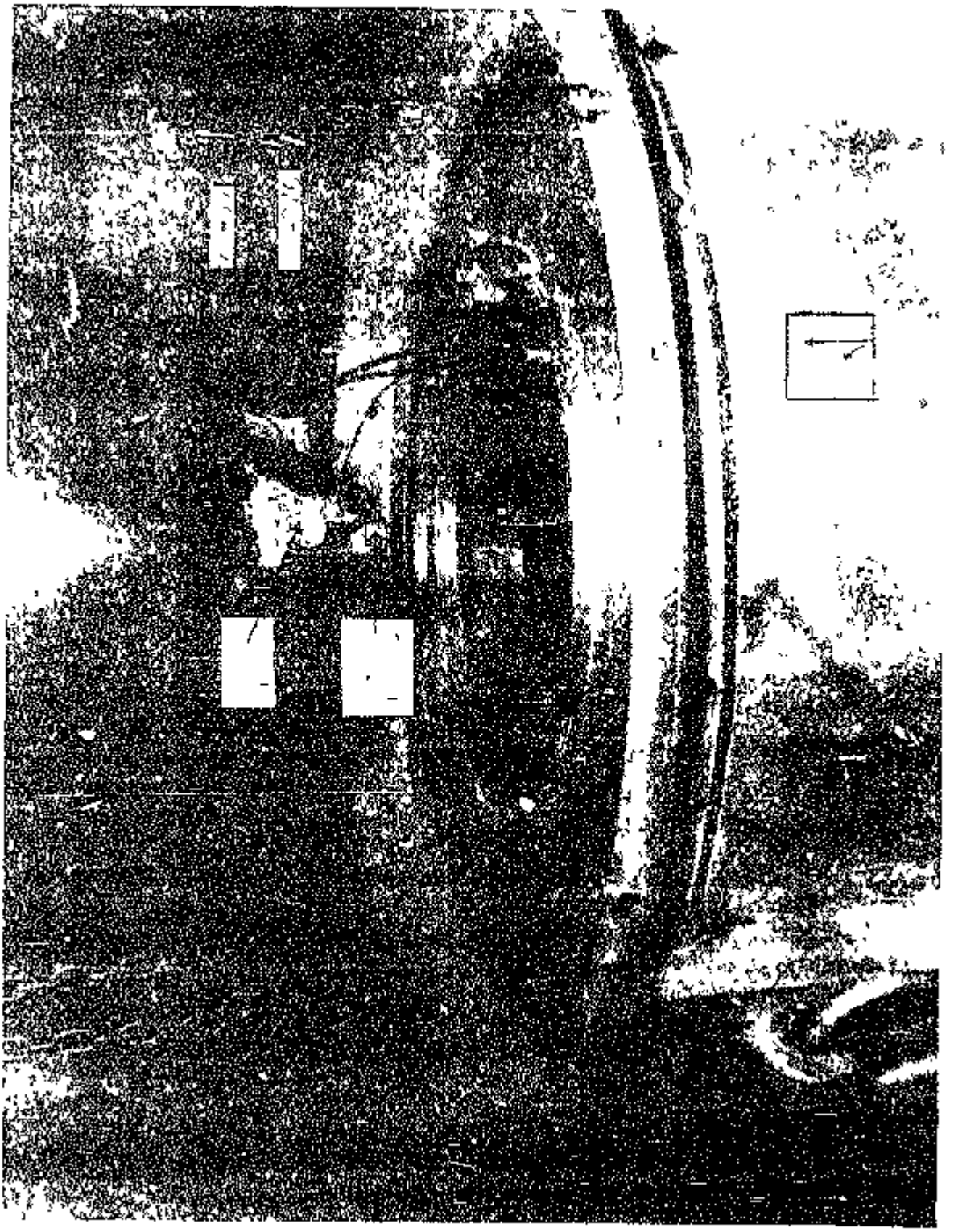

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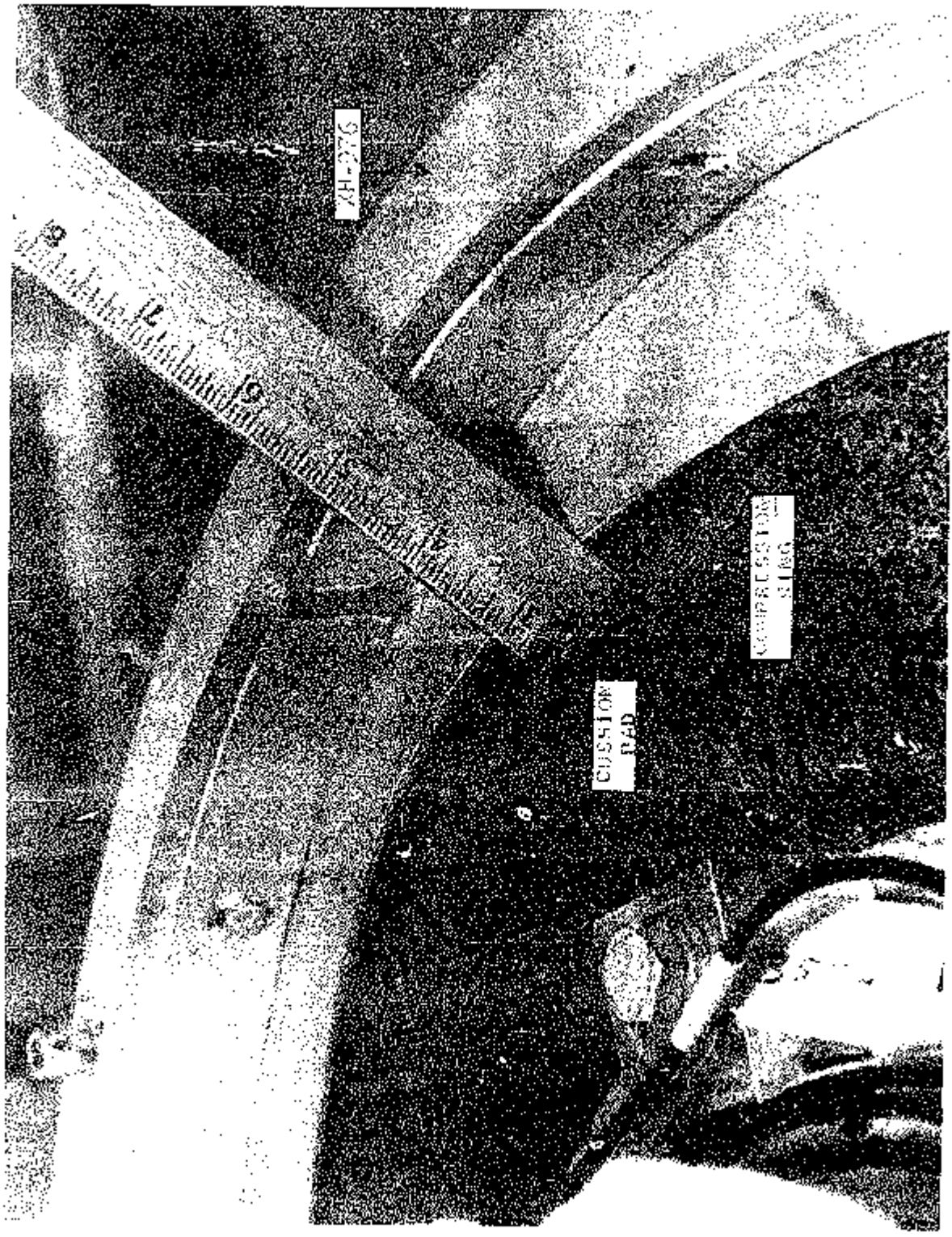

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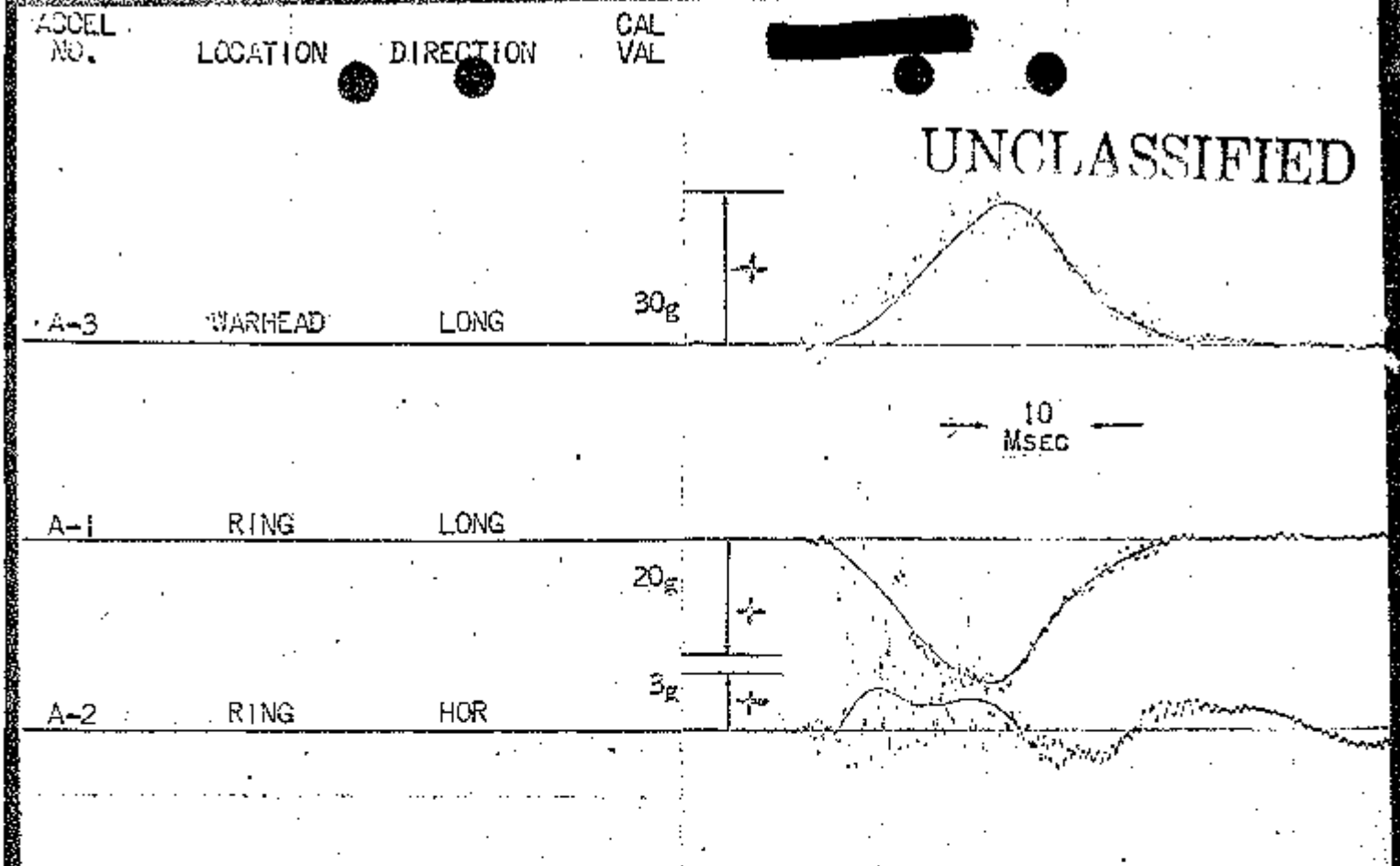

FIG. 6 OSCILLOGRAPH RECORD FOR DROP NO. 2. (12 INCH FLAT DROP AT -65°F)
DROP TEST OF THE XW-59 AND THE XH-976 SHIPPING AND STORAGE CONTAINER
PROJECT NO. T-18731
REF. SYM: 7321/9987

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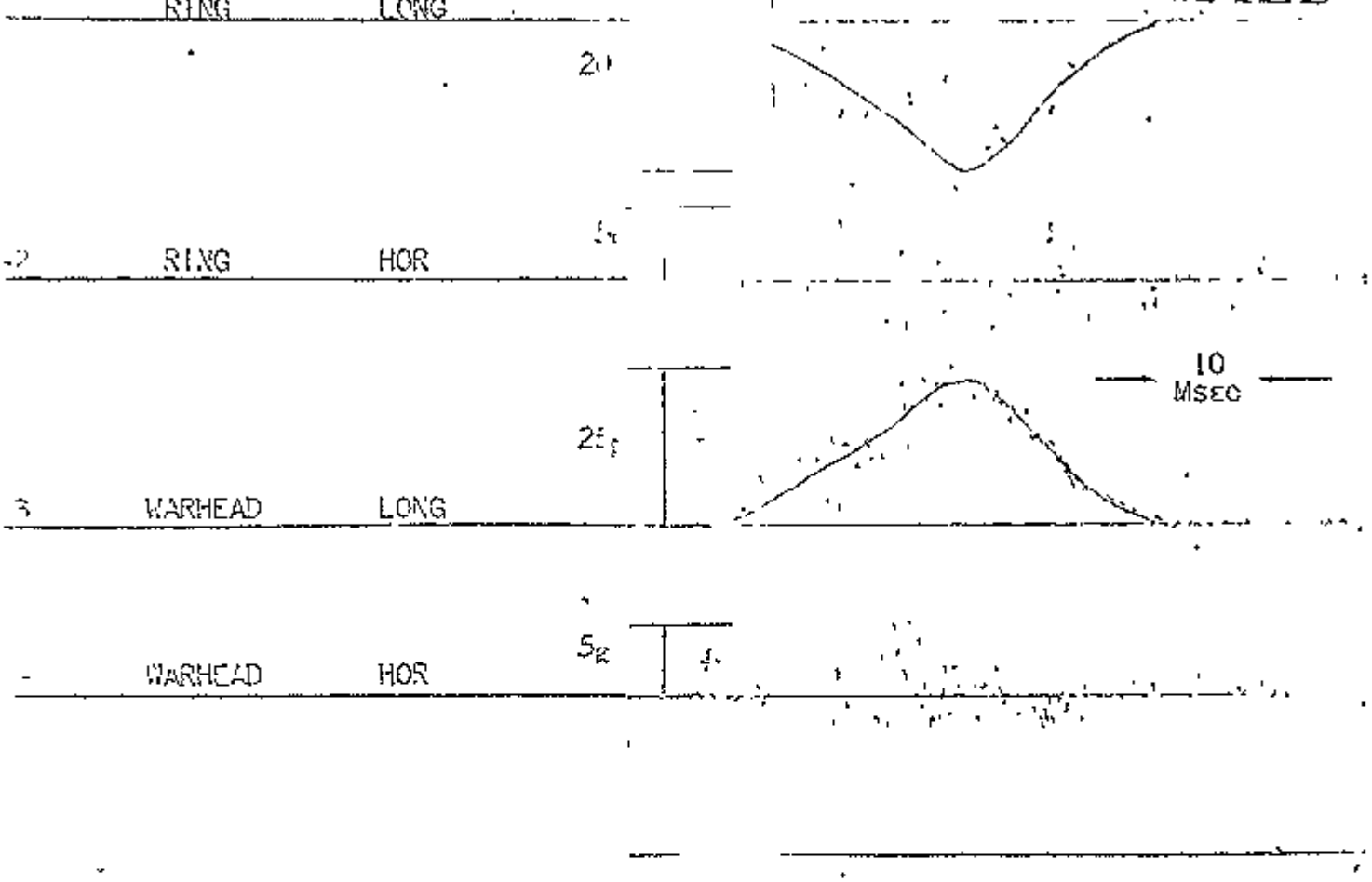

FIG. 7 OSCILLOGRAPH RECORD FOR DROP NO. 4. (12 INCH FLAT DROP AT AMBIENT) DROP TEST OF THE XM-59 AND THE XH-976 SHIPPING AND STORAGE CONTAINER.
PROJECT NO. T-18751
REF. SYM: 7321/9987

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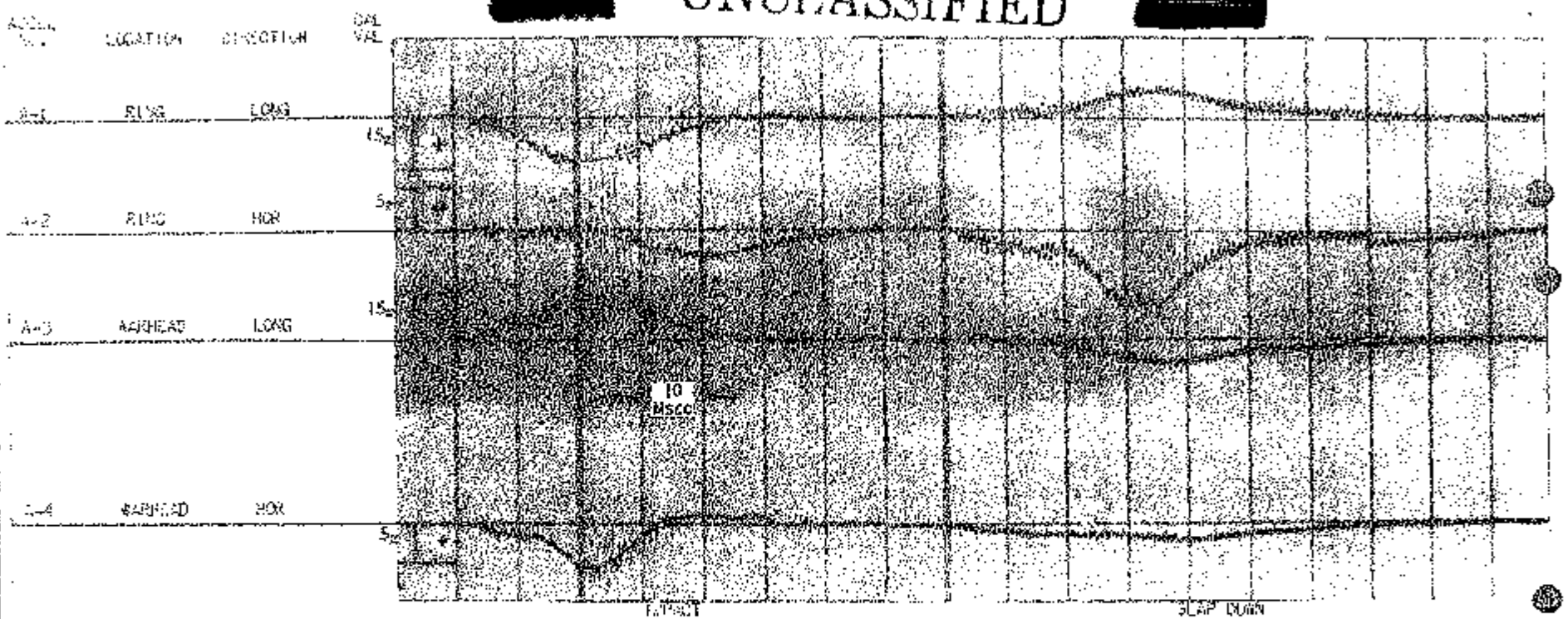

FIG. 9 OSCILLOGRAPH RECORD FOR DROP NO. 5, (12 INCH DROP ON EDGE AT AMBIENT) DROP TEST OF THE XM-69 AND THE XM-976 SHIPPING AND STORAGE CONTAINER.

PROJECT NO. T-18731
REF. SYM: 7321/9907

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TABLE I

[illegible]
Drop [illegible] of the XM-59 and the XM-976 Shipping and Storage Containers

[illegible]	[illegible] of Component	Drawing or part No.	Serial No.
[illegible]	[illegible] Generator	311133-01	GC-103143-B1
[illegible]	Neutron Generator	311133-01	GC-105357-B1
[illegible]	[illegible] S	317306-02	[illegible]
[illegible]	[illegible] Switch [illegible]	317331-00	[illegible]
-	[illegible] (dummy)	-	X4-106-MU-0320
-	1% Reservoir (dummy)	-	DM-063
-	Cover	166778-00	[illegible] 57009
-	M 976	320130	18
	Cushion Pad	170230	
-	Compression Ring Segment	170232	

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[illegible]

Equipment Used
Brown [illegible] the [illegible] and the XH-976 Shipping and Storage Containers

[illegible]	Type	Model No.	Serial No.	Sandia No.
CaO recording oscillograph	5 119 R		9088	89956
Electric drill [illegible]	-	5044	-	113277
[illegible]	-			
Shock [illegible]	-	-	-	-
Ground mobile temperature unit	-	-	-	-
[illegible] Electronic [illegible]		153762P13-X-13	507118	7720

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TABLE III

Instrumentation
Drop Test of the XW-59 and the XR-976 Shipping and Storage Container

Gage No.*	Location	Orientation	Type* or Model No.	Serial No.	Nat. Freq (cps)	Fig. Ref.
A1	Ring	Long.	A69TC-100-350	3503	1800	3
A2	Ring	Hor.	A69TC-100-350	3511	1800	3
A3	Warhead	Long.	A69TC-100-350	3518	1800	4
A4	Warhead	Hor.	A69TC-100-350	3554	1800	4

*All accelerometers were Statham strain-gage type.

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TABLE IV

Accelerations and Times
Drop Test of the XN-59 and the XN-976 Shipping and

Accel No.	Location	Direction	Drop No. 1 -65°F (Flat Impact) Acceleration (g's) Max (+)	Max (-)	Period	Time (ms) Rise	Pulse	Drop No. -65°F (Flat I Acceleration (g's) Max (+)	Max (-)	Pulse
A1	Ring	Long.	3.0	6.3	26.3	10	26.6	33.1	10.1	25
A2	Ring	Hor.	6.6	3.2	3.1	4	25.8	7.7	3.3	2
A3	Warhead	Long.	32.3	6.9	28.4	9.4	29.4	34.3	4.2	27
A4	Warhead	Hor.	Accelerometer failed to operate at -65°F							

Accel No.	Location	Direction	Drop No. 4 Ambient (Flat Impact) Max (+)	Max (-)	Period	Rise	Pulse	Drop No. Ambient (Impact Max (+)	Max (-)	Pulse
A1	Ring	Long.	26.3	1.1	20.2	12.5	35.2	22.3	0.8	13
A2	Ring	Hor.	7.6	6.3	-	-	-	5.3	8	-3
A3	Warhead	Long.	25.9	2.2	22.6	16.3	36.3	22.4	0	16
A4	Warhead	Hor.	5.5	2.3	-	-	-	3.4	5.1	-3

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TABLE IV

Accelerations and Times
and the XM-976 Shipping and Storage Container

	Drop No. 2 -65°F (Flat Impact)					Drop No. 3 Ambient (Flat Impact)				
	Acceleration (g's)			Time (ms)		Acceleration (g's)			Time (ms)	
...s) ...se	Max (+)	Max (-)	Trained	Rise	Pulse	Max (+)	Max (-)	Trained	Rise	Pulse
.6	33.1	10.1	25	11.1	27.2	25.8	1.4	20.8	16.2	35.8
.8	7.7	5.3	2.5	3.9	17	6.3	8.3	-	-	-
.4	34.3	4.2	27.5	11.5	29.6	29	2.8	21.6	15.6	-
are at -65°F						8.6	9.3	-	-	-

	Drop No. 5 Ambient (Impact on Edge)					Drop No. 5 Ambient (Slapdown)				
.2	22.3	0.3	12.5	10.7	35	2.1	8.7	-8.7	9.8	34.8
	3.3	8	-3.2	11.9	33.2	0	10.2	-8.5	28.4	51.7
.3	22.4	0	14.7	12.2	38.8	4.6	8.9	-7.3	9.2	42.8
	1.8	8.1	-5.8	11.9	24.5	0.8	-2.5	-2	26.2	51.7

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