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REPORT DOCUMENTATION PAGE

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4. TITLE AND SUBTITLE Performance Oriented Packaging Testing of Container, Shipping and Storage, Mk 714			5. FUNDING NUMBERS	
6. AUTHOR(S) Milt Meeds				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Undersea Warfare Engineering Station Keyport, Washington 98345-5000			8. PERFORMING ORGANIZATION REPORT NUMBER DODPOPHM/USA/DOD/ NADTR91004	
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13. ABSTRACT (Maximum 200 words) Qualification tests were performed to determine whether the in-service Mk 714 Container could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 1,201 pounds. The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods and the Department of Transportation's Title 49 CFR and the Final Rulings published in the Federal Register Volume 55 on 21 December 1990. The container has conformed to the POP requirements; i.e., the container successfully retained its contents throughout the specified tests.				
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DODPOPHM/USA/DOD/NADTR91004

**PERFORMANCE ORIENTED PACKAGING TESTING
OF
CONTAINER, SHIPPING AND STORAGE, MK 714**

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Performing Activity:
Naval Undersea Warfare Engineering Station
Keyport, Washington 98345-5000

21 February 1991

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INTRODUCTION

An EX 714 Shipping and Storage Container that had been modified to the Mk 714 configuration was subjected to five drop tests to determine whether the container would meet international performance requirements. Stacking and vibration tests were conducted previously by Naval Weapons Station (WPNSTA) Earle (Test Report 40-050-89 of 11 January 1990). The drop tests were conducted on 7 January 1991 using EX 714 Container S/N 0011 loaded with a Mk 50 Stainless Steel Ballistic Mockup test shape. The test shape was missing the top control fin. The shape was banded with Mk 89 Suspension Bands to simulate an air launch configuration torpedo, but a parapack was not available for installation. Total test shape weight was 776 pounds. All drops were conducted on concrete from a minimum height of 4 feet. The shipping container was opened following each drop to inspect the torpedo mounting hardware for damage. Enclosure (1) contains photographs of test setups of each drop and container and test shape damage following each drop.

NOTE

Stacking test conducted previously by WPNSTA Earle was 16,814 pounds for 1 hour.

TESTS PERFORMED

These tests were performed in accordance with the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SO/AC.10/1, Revision 6, Chapter 9, paragraph 9.7.3. One container was used for all of the drops instead of the required five containers (one for each drop). The drops were performed at ambient temperature ($+70 \pm 20$ °F) from a height of 4 feet onto concrete in the following sequence:

- a. Flat on Bottom
- b. Flat on Long Side
- c. Flat on Short Side
- d. Aft End Bottom Corner
- e. Flat on Top

PASS/FAIL (UN CRITERIA)

The shape must be retained within the container by the saddle straps, and the container must exhibit no damage liable to affect safety during transport.

TEST RESULTS

1. Drop on Bottom

No visible external or internal damage.

2. Drop on Long Side

Lift eyes on the impacting side of the container were taped to the container wall to prevent damage. Following impact there was no visible external or internal damage.

3. Drop on Short Side (End)

The container impacted on the fwd end and then rolled over onto the container cover. During impact, one of the cover latches popped open (Photograph A), and the fwd end was bent in approximately 1 to 1.5 inches (Photographs B and C). On opening the container, both aft saddle strap latches were broken free (Photographs D and E) and one fwd saddle strap latch was broken at the retaining pin (Photographs F and G). The test shape was held in place by the remaining fwd saddle strap latch. Test shape damage was limited to the aft suspension band wedge which popped free (Photograph H), partially releasing the suspension band. The suspension band remained securely attached to the test shape by the safety bolt. Container cover damage and test shape fin damage may have occurred if the top control fin had been installed.

NOTE

The aft suspension band wedge was removed and both saddle straps were replaced prior to continuing with the tests.

4. Drop on Corner

The container impacted on an aft end bottom corner and then landed upright on the container base. Two cover latches at the impact corner popped open and the container base at the impact point was damaged (Photographs I and J). On opening the container, both fwd saddle strap latches were broken at the retaining pins (Photographs K and L). There was no visible damage to the test shape.

NOTE

The fwd saddle strap was replaced prior to continuing the tests.

5. Drop on Top

Following impact, all container cover latches remained securely fastened. The container was damaged due to impact from the test shape suspension bands (Photograph M). On opening the container, the desiccant basket had broken free from the container cover and was found next to the test shape (Photograph N). The saddle strap latches appeared to receive minimal to no damage. The test shape was held securely in the saddles during the test, but cover damage was caused by motion allowed by the rubber isolators. Test shape damage was limited to the suspension band lugs and the remaining wedge which popped free, partially releasing the suspension band. Both suspension bands remained securely attached to the test shape by the safety bolts.

NOTE

Additional cover damage and test shape fin damage may have occurred if the top control fin had been installed on the test shape. The desiccant basket may have suffered damage during the previous tests before failing here.

DISCUSSION

The container met all criteria for passing the test. The test shape was held in the container by the saddle straps, and the container exhibited no damage liable to affect safety during transport.

REFERENCE MATERIAL

- A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6
- B. DOD Hazardous Materials Packaging Test Plan (Attachment 1)

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TEST DATA SHEET

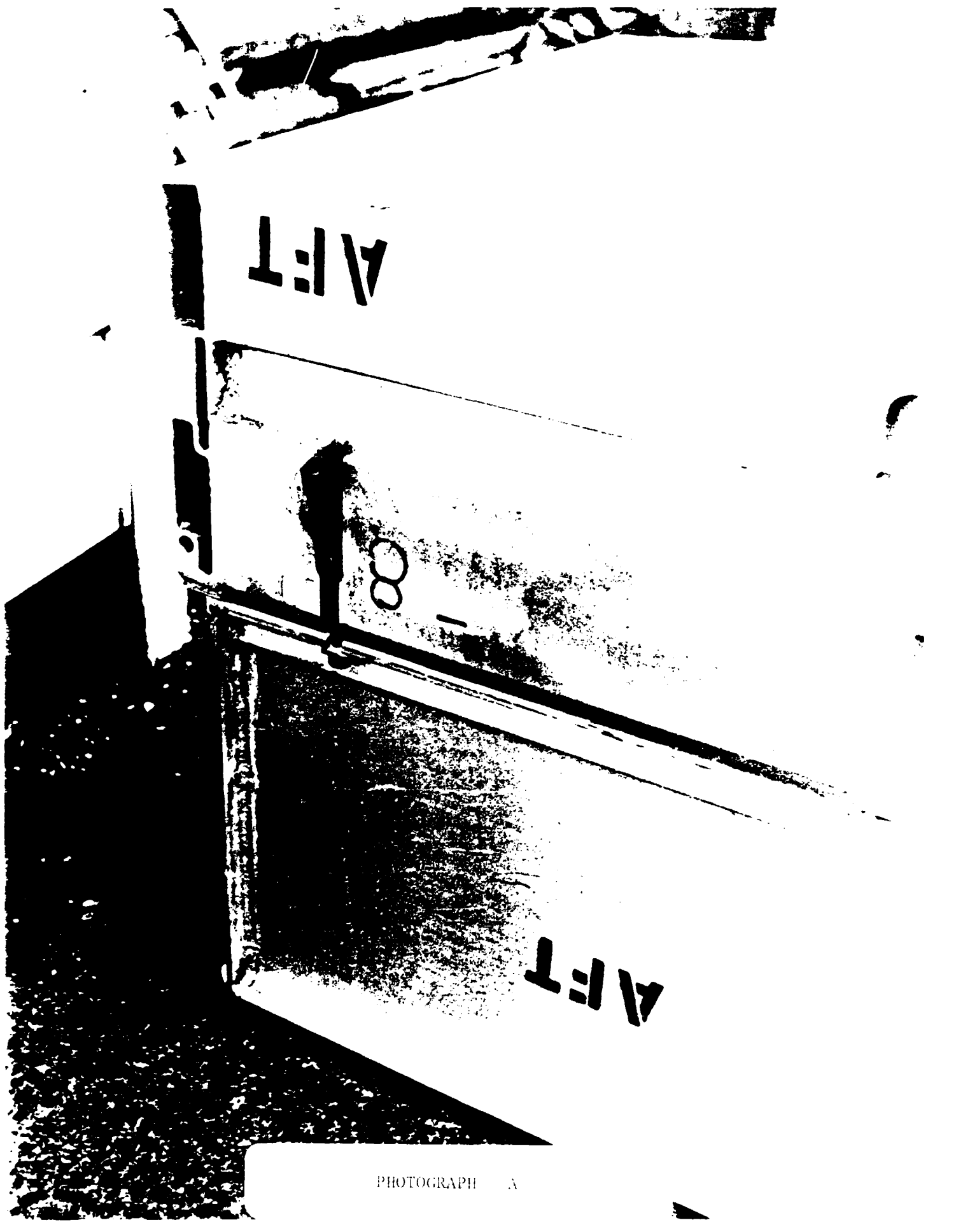
DATA SHEET:	
Container: Container, Shipping and Storage, Mk 714	
Type: 4B1	Container P/N or NSN: P/N 5167617
Specification Number: Drawing DL 5167617	Material: Aluminum
Capacity: 544.4 kg (1,201 pounds)	Dimensions: 137" L x 23.03" W x 24.375" H
Closure (Method/Type): Removable Lid	Tare Weight: 192.7 kg (425 pounds)
Additional Description: Reusable extruded aluminum shipping and storage container with a removable cover	
PRODUCT:	
Name: See table	NSN(s): See table
United Nations ID Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A At 50 °C: N/A At 55 °C: N/A	
Consistency/Viscosity: N/A	Density/Specific Gravity: N/A
Amount Per Container:	Flash Point: N/A
Net Weight:	
TEST PRODUCT:	
Name: Stainless Steel Ballistic Mockup	Physical State: Solid
Consistency: N/A	
Density/Specific Gravity: N/A	
Test Pressure (Liquids Only): N/A	
Amount Per Container: One	Gross Weight: 351.8 kg (776 pounds)

TABLE

NALC	NSN	Name and Drawing #	DOD Hazard/Class Compatibility Group	UN ID	Net Weight (pounds)
1685	1356-01-273-1245	Mk 50 Torpedo Exercise 5624425-10 Tube Launched	1.4S	0173	702
1687	1356-01-273-1246	Mk 50 Torpedo Exercise 5624425-11 Fixed Wing	1.4S	0173	721
1689	1356-01-273-1247	Mk 50 Torpedo Exercise 5624425-12 Rotary	1.4S	0173	722

PHOTOGRAPHS OF CONTAINER
AND TEST SHAPE DAMAGE

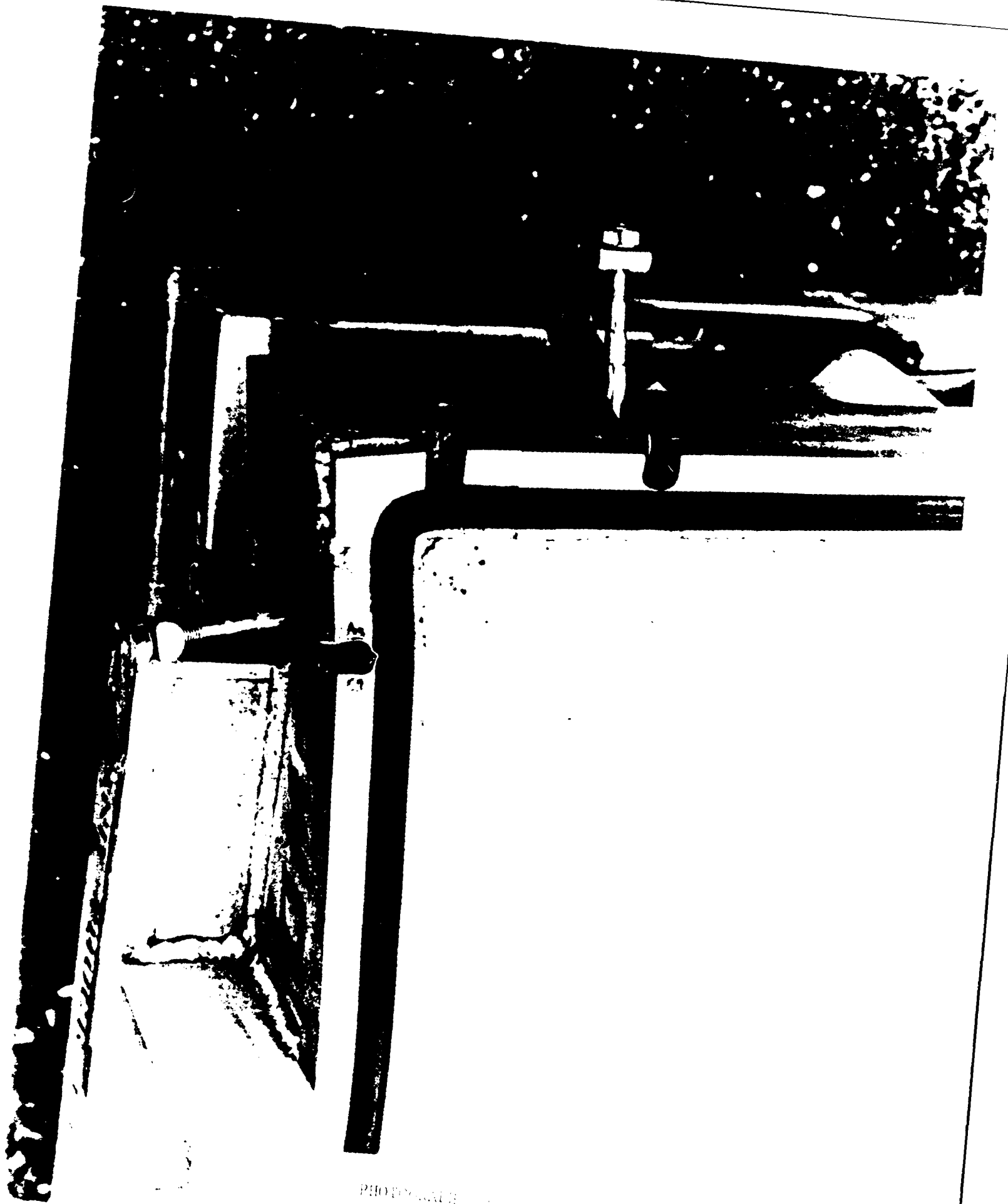
Enclosure (1)



PHOTOGRAPH A

LEND





PHOTOGRAPH

EX 714 CONT.
QUALIFICATION

4 FOOT
END

DROP TEST
MANUFACTURER
NUWES

JAN 7 1991
NUWES KEYPORT

PHOTOGRAPH D



PHOTOGRAPH E

FWD

EX 714 CONT.
QUALIFICATION

4 FOOT

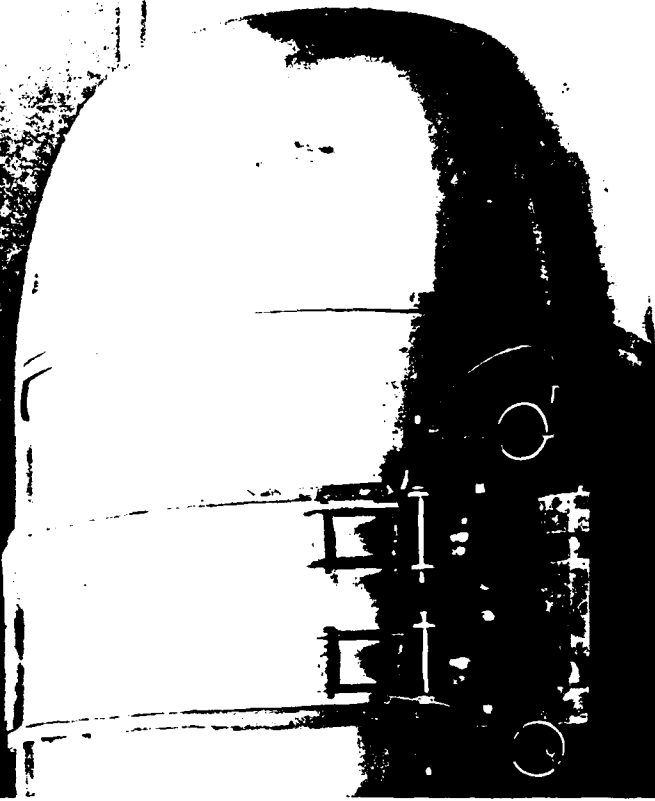
END

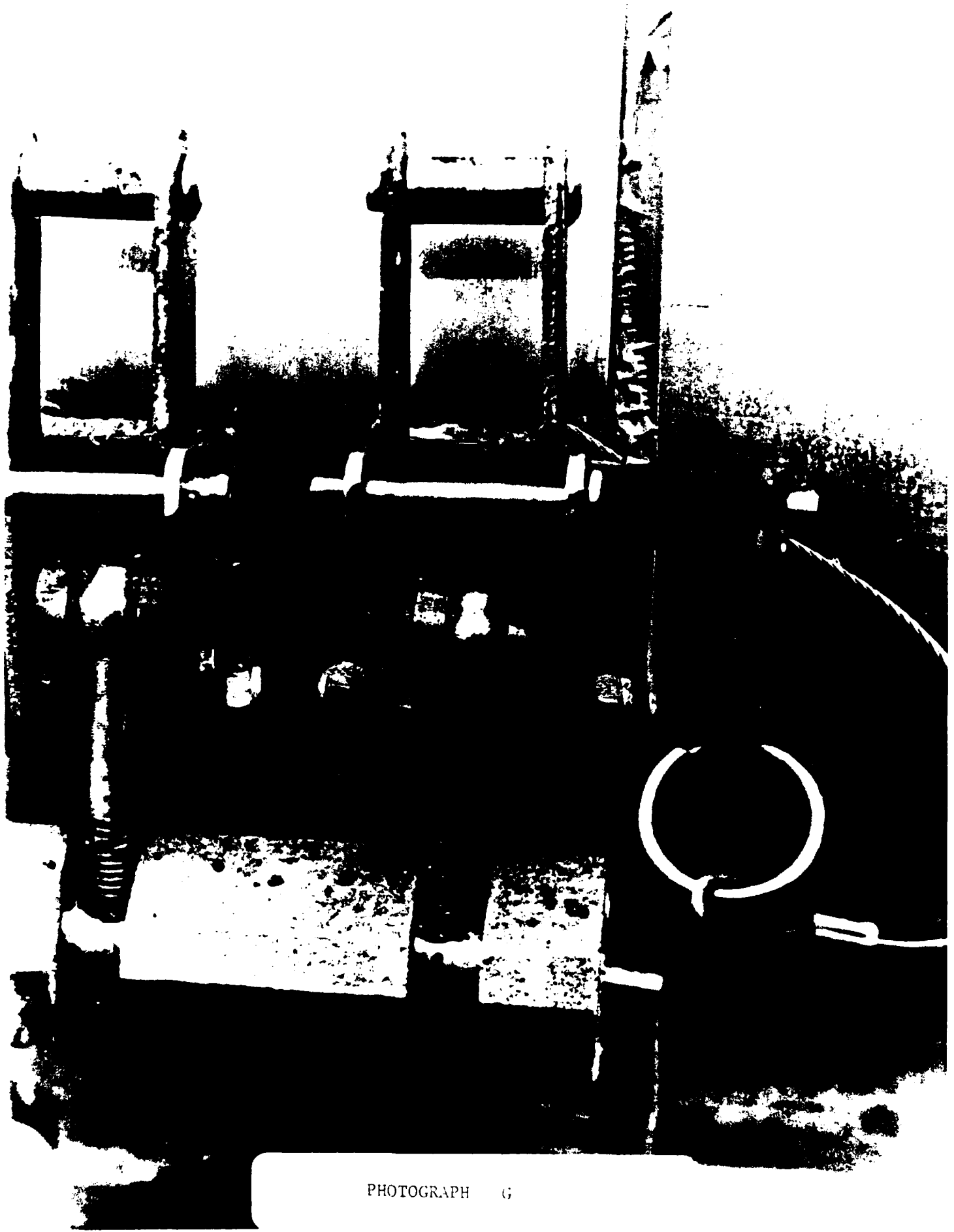
DROP TEST
MANUFACTURER
NUWES

JAN 7 1991
NUWES KEYPORT

EX 714

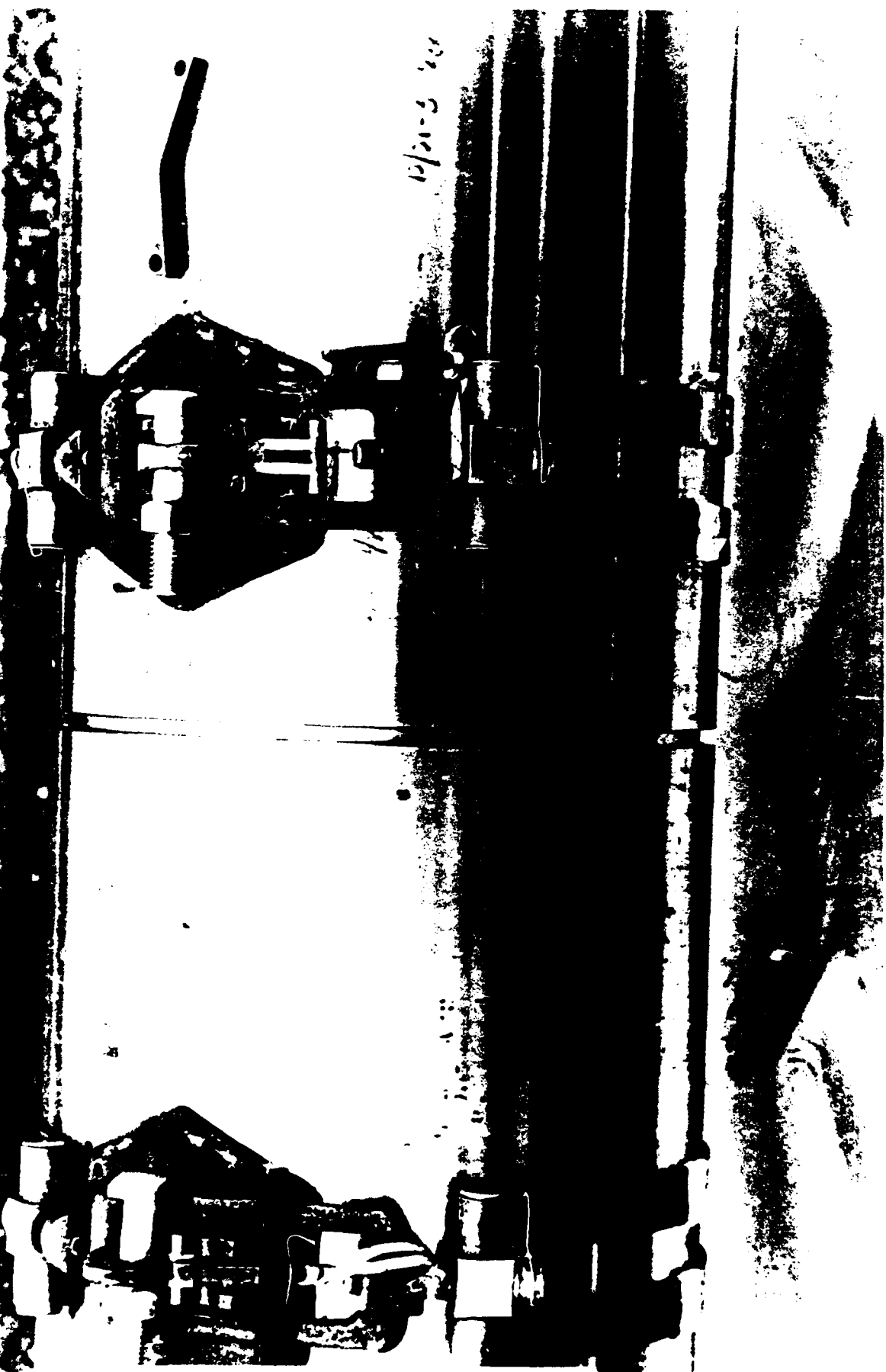
PHOTOGRAPH F



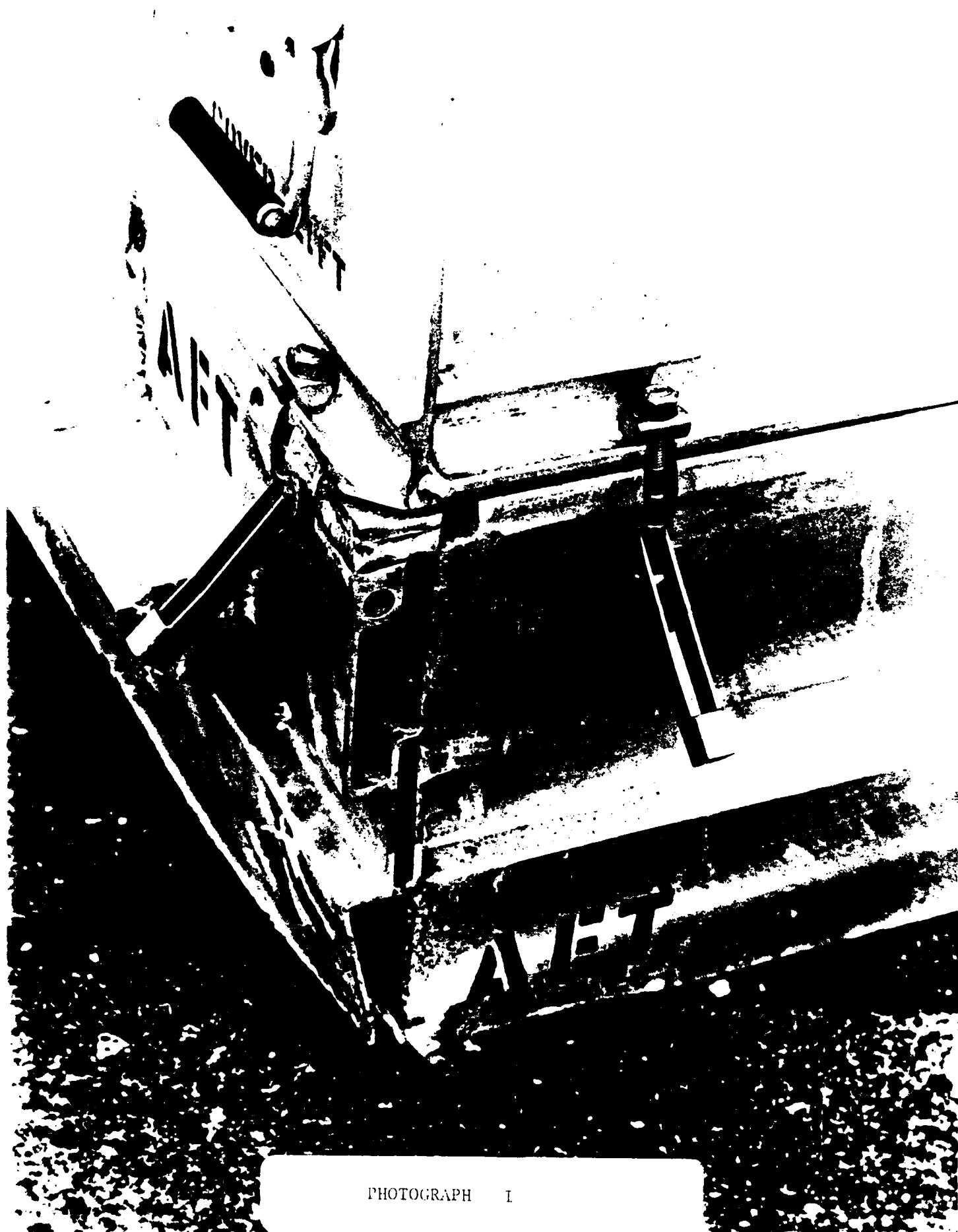


PHOTOGRAPH G

19/00-3 200



PHOTOGRAPH II



PHOTOGRAPH I



PHOTOGRAPH J

FWD

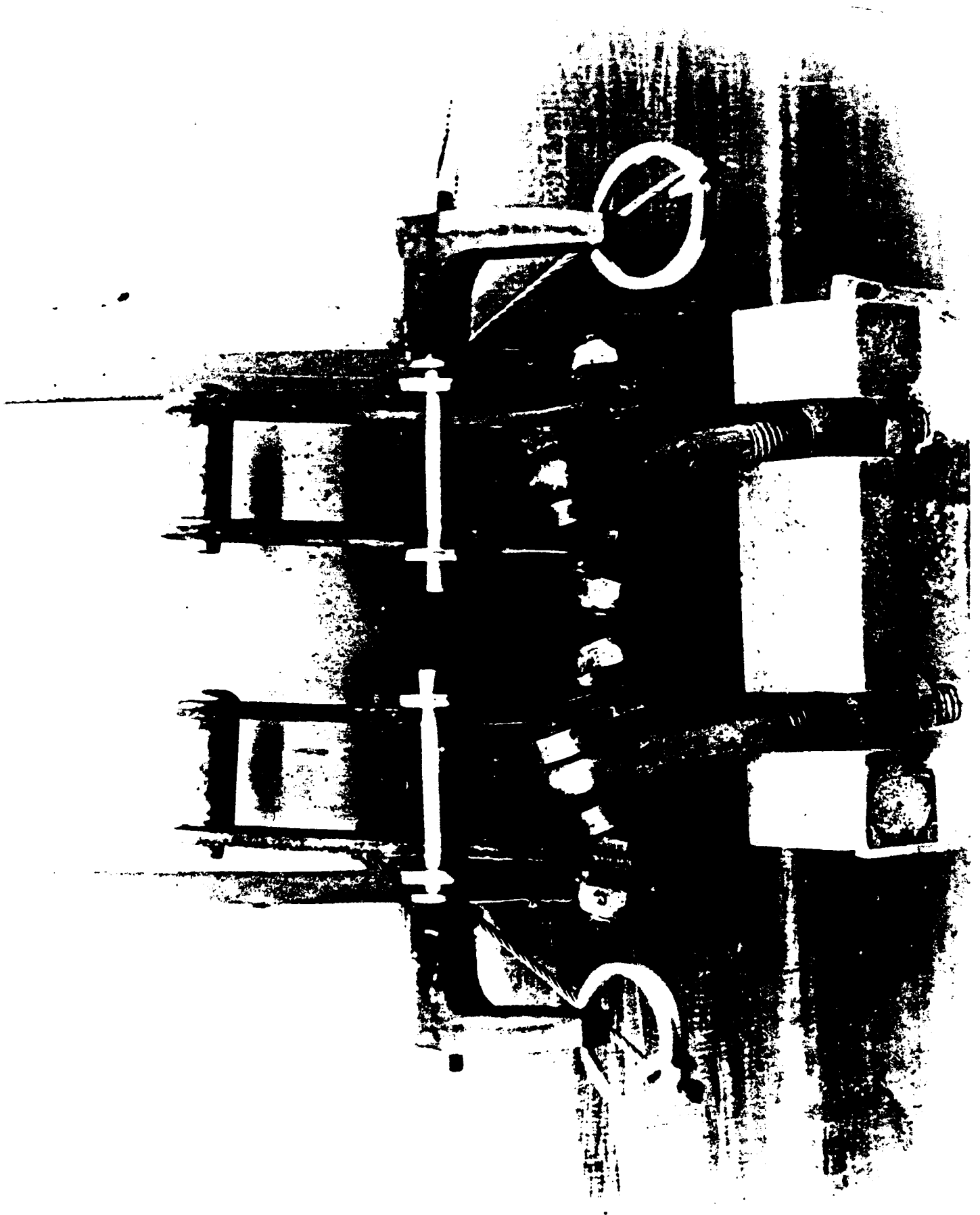
REUSABLE CONTAINER

EX 714 CONT.
QUALIFICATION

4 FOOT

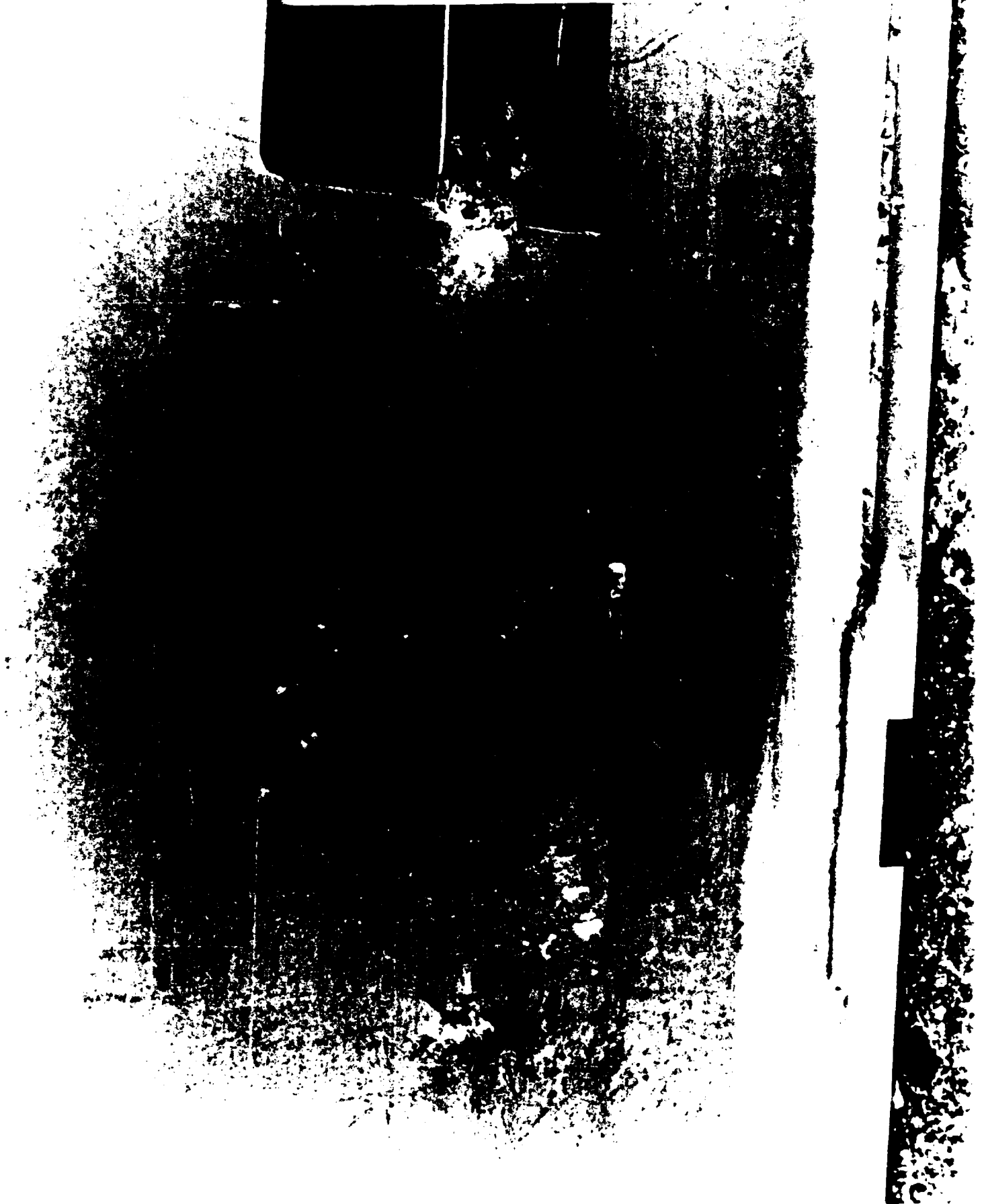
CORNER
DROP TEST
MANUFACTURER
NUWES

JAN 7 1991
NUWES KEYPORT



PHOTOGRAPH 1

PHOTOGRAPH M



EX 714 CONT.
QUALIFICATION

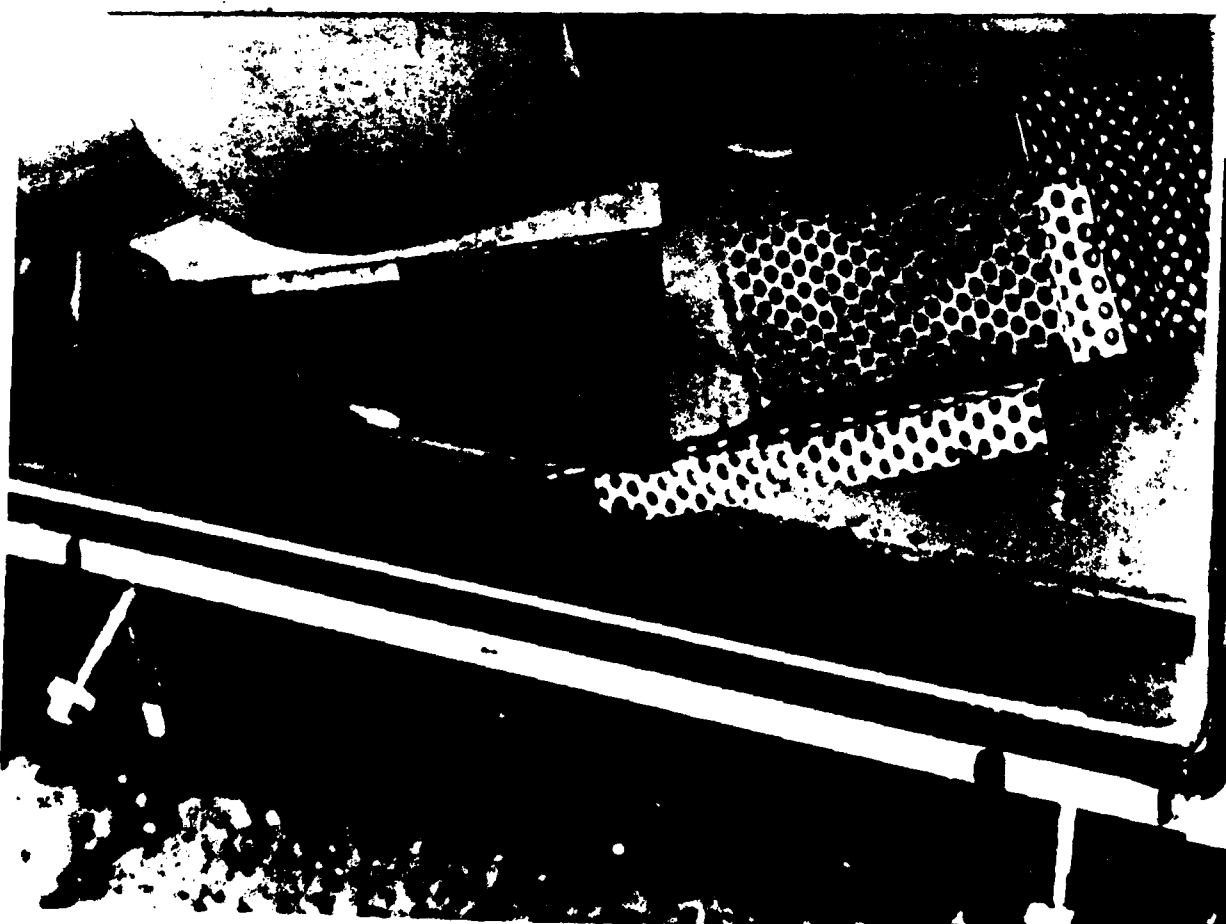
4 FOOT

TOP

DROP TEST
MANUFACTURER
NUWES

JAN 7 1991
NUWES KEYPORT

PHOTOGRAPH N



EX 714 CONT.

EX 714 CONT.

MK 714 SHIPPING AND STORAGE CONTAINER
POP MARKING

IJN 4B1/Y544/S/91/USA/DOD/NAI