

UNCLASSIFIED

AD NUMBER	
AD013844	
CLASSIFICATION CHANGES	
TO:	unclassified
FROM:	confidential
LIMITATION CHANGES	
TO: Approved for public release; distribution is unlimited.	
FROM: Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; JUN 1953. Other requests shall be referred to Naval Proving Ground, Dahlgren, VA.	
AUTHORITY	
USNSWC ltr, 12 Jul 1976; USNSWC ltr, 12 Jul 1976	

THIS PAGE IS UNCLASSIFIED

CONFIDENTIAL

SECURITY INFORMATION

U INU-1-57-50-1-1
ASTIA 54X 0011

U S NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO 1147

WARHEADS FOR AIR TARGET GUIDED MISSILES
TESTING OF

64th Partial Report

FRAGMENTATION TEST OF
ROD-EXPELLING WARHEAD NO 143

FINAL Report

Copy No 11

Task

Assignment NPG Re3f 607 1-53

Classification CONFIDENTIAL
SECURITY INFORMATION

Fragmentation Test of Rod-expelling Warhead No. 143
-----PART ASYNOPSIS

1. This test was conducted to determine the effect of cork liners on the fragment mass distribution of 4.74 diameter rod-expelling warhead Nos. 143-1 and 143-2, Composition C-3 loaded. These warheads are internally slotted to produce 26 rod-like fragments, each weighing 350 grams and 12" in length.

2. a. Warhead No. 143-2, which employed a full length 1/16" thick cork liner, produced 26 rod-like fragments averaging 320 grams each. Twenty-four were full length, one was 11-3/4", and one was 10". The full length cork liner also reduced the amount of chaff obtained in this model warhead. Warhead No. 143-1, which employed a 3/16" thick cork liner only 8" long, was not as successful.

b. In the warhead model tested, the use of the 1/16" thick full length cork liner did prevent end loss on practically all of the rod-like fragments.

Fragmentation Test of Rod-expelling Warhead No. 143
-----TABLE OF CONTENTS

	<u>Page</u>
SYNOPSIS.	1
TABLE OF CONTENTS	2
AUTHORITY	3
REFERENCES.	3
BACKGROUND.	3
OBJECT OF TEST.	3
PERIOD OF TEST.	3
DESCRIPTION OF ITEM UNDER TEST.	4
PROCEDURE	4
RESULTS AND DISCUSSION.	4
CONCLUSIONS	5
APPENDIX A - WARHEAD NO. 143, PHOTOGRAPHS	FIGURES 1-3 (incl)
APPENDIX B - MASS DISTRIBUTION, PHOTOGRAPHS . . .	FIGURES 4-5 (incl)
APPENDIX C - DISTRIBUTION	1-2 (incl)

Fragmentation Test of Rod-expelling Warhead No. 143
-----PART BINTRODUCTION

1. AUTHORITY:

This test was authorized by reference (a) and conducted under Task Assignment NPG-Ro3f-607-1-53, reference (b).

2. REFERENCES:

- a. NOL Conf Work Request WG/33/53 of 21 January 1953
- b. BUORD Conf ltr NP9-Ro3f-RKJ:gg Serial 42699 of 29 July 1952
- c. NPG Conf Report No. 1001 of 22 July 1952
- d. NPG Conf Report No. 972 of 5 May 1952

3. BACKGROUND:

a. Reference (b) authorized the Naval Ordnance Laboratory to work directly with the Naval Proving Ground in the development and testing of guided missile warheads.

b. In reference (a) the Naval Ordnance Laboratory requested that rod-expelling warhead Nos. 143-1 and 143-2 be tested for mass distribution data. These warheads contained cork liners. Similar warheads without liners, Nos. 134 and 138, were tested and reported in references (c) and (d). Warhead No. 143 was designed to produce 26 rod-like fragments, 12" long.

4. OBJECT OF TEST:

This test was conducted to determine the effect of cork liners on the fragment mass distribution of 4 7/8" diameter rod-expelling warheads Nos. 143-1 and 143-2, Composition C-3 loaded. These warheads are internally slotted to produce 26 rod-like fragments, each weighing 350 grams and 12" in length.

5. PERIOD OF TEST:

- | | |
|-------------------------------------|-----------------|
| a. Date Project letter | 21 January 1953 |
| b. Date Necessary Material Received | 27 January 1953 |
| c. Date Commenced Test | 31 March 1953 |
| d. Date Completed Test | 16 April 1953 |

Fragmentation Test of Rod-expelling Warhead No. 143

PART C

DETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

a. Warheads Nos. 143-1 and 143-2, Figures 1 and 2, were 4.74 in diameter and 12.0 long with a uniform wall thickness of 0.50. Each warhead had 26 full length internal slots cut to a depth of 0.40. One end of each warhead had a 1/8" thick steel end plate, Figure 3, held in place by four (4) screws.

b. Warhead 143-1 had a cork liner 3/16" thick and 8.00 long covering the middle inner surface of the case, leaving 2.00 of inner case surface on either end uncovered.

c. Warhead 143-2 had a cork liner 1/16" thick and 12.00 long covering the entire inner surface of the case.

7. PROCEDURE:

Each warhead was detonated in a cane fiberboard box surrounded by sawdust in the Fragmentation Chamber. The fragments were collected in the sawdust and separated using a 1/4" mesh screen and a magnetic separator.

8. RESULTS AND DISCUSSION:

a. Detailed mass distribution data, shown in Figures 4 and 5, are summarized as follows:

Warhead No.	Average wt. of rods greater than 10" in length (grams)	No. of rods in length groups		
		12"	10"-12"	7"-10"
143-1	309	17	9	0
143-2	320	24	2	0
*134	331	24	0	0
*138	292	10	11	3

*References (c) and (d).

Warheads 134 and 138 were 4-3/8" in diameter and designed to produce 24 rods, each 12" long. No. 134 had a tapered case whose thickness decreased toward both ends, while No. 138 had a uniform case thickness.

Fragmentation Test of Rod-expelling Warhead No. 143

b. The 1/16" full length cork liner appeared to be superior to the 3/16" thick 8" long cork liner in: (1) preventing end losses up to 2", and (2) reducing the amount of chaff in Warhead No. 143. Only two of the 26 rods produced by No. 143-2 lost end pieces.

c. Both the tapered case, No. 134, and the uniform case with full length cork liner, No. 143-2, were satisfactory. They produced full length rod-like fragments. The cork liner would appear to be preferable in manufacture to the tapered case.

PART DCONCLUSIONS

9. a. Warhead No. 143-2, which employed a full length 1/16" thick cork liner, produced 26 rod-like fragments averaging 320 grams each. Twenty-four were full length, and the other two 11-3/4" and 10" in length respectively. The full length cork liner also reduced the amount of chaff obtained in this model warhead. Warhead No. 143-1, which employed a 3/16" thick cork liner only 8" long, was not as successful.

b. In the warhead model tested, the use of the 1/16" thick full length cork liner did prevent end loss on practically all of the rod-like fragments.

CONFIDENTIAL

NPG REPORT NO. 1147

Fragmentation Test of Rod-expelling Warhead No. 143

The tests upon which this report is based were conducted by:

W. WRIGHT, ENS USNR-R, Fragmentation Firing Officer
Fragmentation Division
Terminal Ballistics Department

This report was prepared by:

J. GORMAN, ENS USNR-R, Fragmentation Firing Officer
Fragmentation Division
Terminal Ballistics Department

This report was reviewed by:

V. PHILIPCHUK, Fragmentation Battery Officer
Fragmentation Division
Terminal Ballistics Department

R. H. LYDDANE, Director of Research
Terminal Ballistics Department

W. B. ROBERTSON, Lieutenant Commander, USN
Terminal Ballistics Officer
Terminal Ballistics Department

C. C. BRAMBLE, Director of Research, Ordnance Group

APPROVED: J. A. EDWARDS, Acting
Captain, USN
Commander, Naval Proving Ground



E. A. RUCKNER
Captain, USN
Ordnance Officer
By direction

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1147

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Sixty-fourth Partial Report

on

Warheads for Air Target Guided Missiles,
Testing of

- - - - -

Final Report

on

Fragmentation Test of
Rod-expelling Warhead No. 143

Project No.: NPG-Rc3f-607-1-53
Copy No.: 11
No. of Pages: 6

Date:

JUN 26 1953

CONFIDENTIAL
SECURITY INFORMATION

Technical drawing of a circular part with slots. The drawing includes a top view showing 26 slots evenly spaced at 13.5 degrees apart. Dimensions include a diameter of 4.740 (+.010, -.000), a wall thickness of .500 (+.002, -.000), and a slot width of .100 (+.007, -.000). A detail view shows a cross-section of a slot with a depth of .163 (+.007, -.000).

THIS DOCUMENT CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U. S. CODE, SECTIONS 793 AND 794. THE TRANSMISSION OF THE REVELATION OF ITS CONTENTS IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

TRIAL WARHEAD
143

U.S.
 NAVAL ORDANCE LABORATORY
 1700 S. YUMA ST.
 PUEBLO, CO. 81001
 (303) 763-1000

60812117809

1177340.

CONFIDENTIAL
SECURITY INFORMATION

Approved 1953

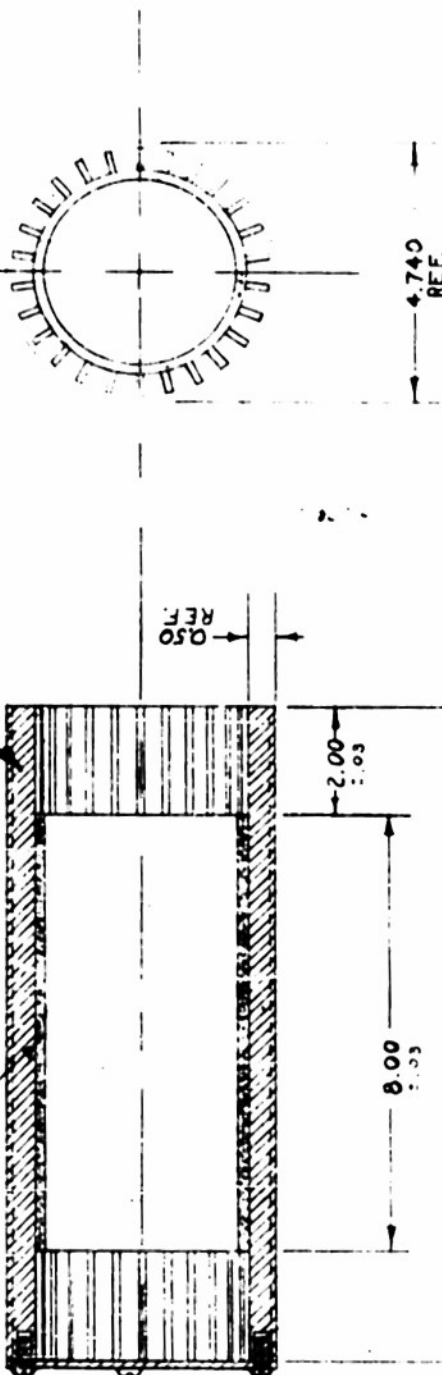
303D Drawing 1183626 Not Exceeding Warhead No. 143-1

Figure 2

1183626

REVISIONS		
SYM	DESCRIPTION	DATE

CORK LINER 3/16 THICK DR. 1177209



THIS DOCUMENT CONTAINS INFORMATION UPDATING THE
NAVY'S OFFICIAL RECORDS OF THE DEPARTMENT OF THE NAVY
SECTION 791 AND 794 THE TRANSMISSION OF THE
REVELATION OF ITS CONTENTS IN ANY MANNER TO AN
UNAUTHORIZED PERSON IS PROHIBITED BY LAW

WARHEAD 143-1 ASSEMBLY		BUREAU OF ORDNANCE DEPARTMENT OF THE NAVY	
		NAVAL ORDNANCE LABORATORY NAVY'S AND NAVY'S AND	
APPROVED		10	
BY DIRECTOR OF THE CHIEF OF BUREAU			
DO NOT SCALE THIS DRAWING			
MATERIAL			
SPECIFICATIONS OF LATEST REVISION APPLY			
NEXT ASSY	USED ON	SCALE	UNIT WT.
APPLICATION		JOB ORDER	
		1183626	

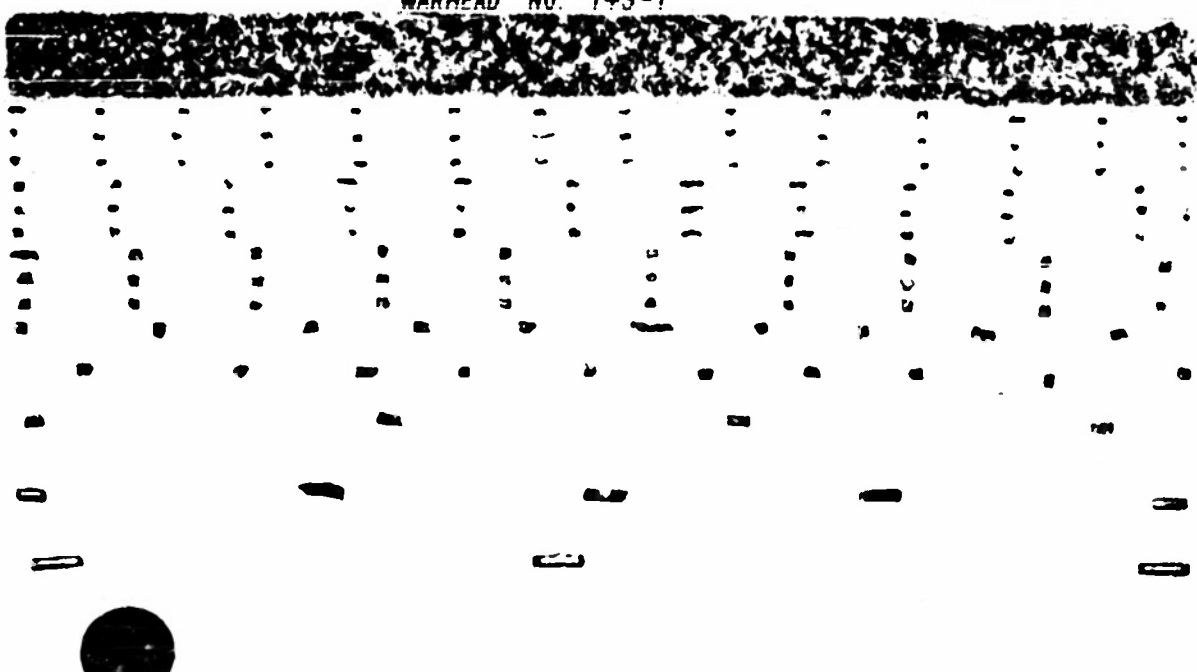
1183626

FRAG NO. 1730

WARHEAD NO. 143-1

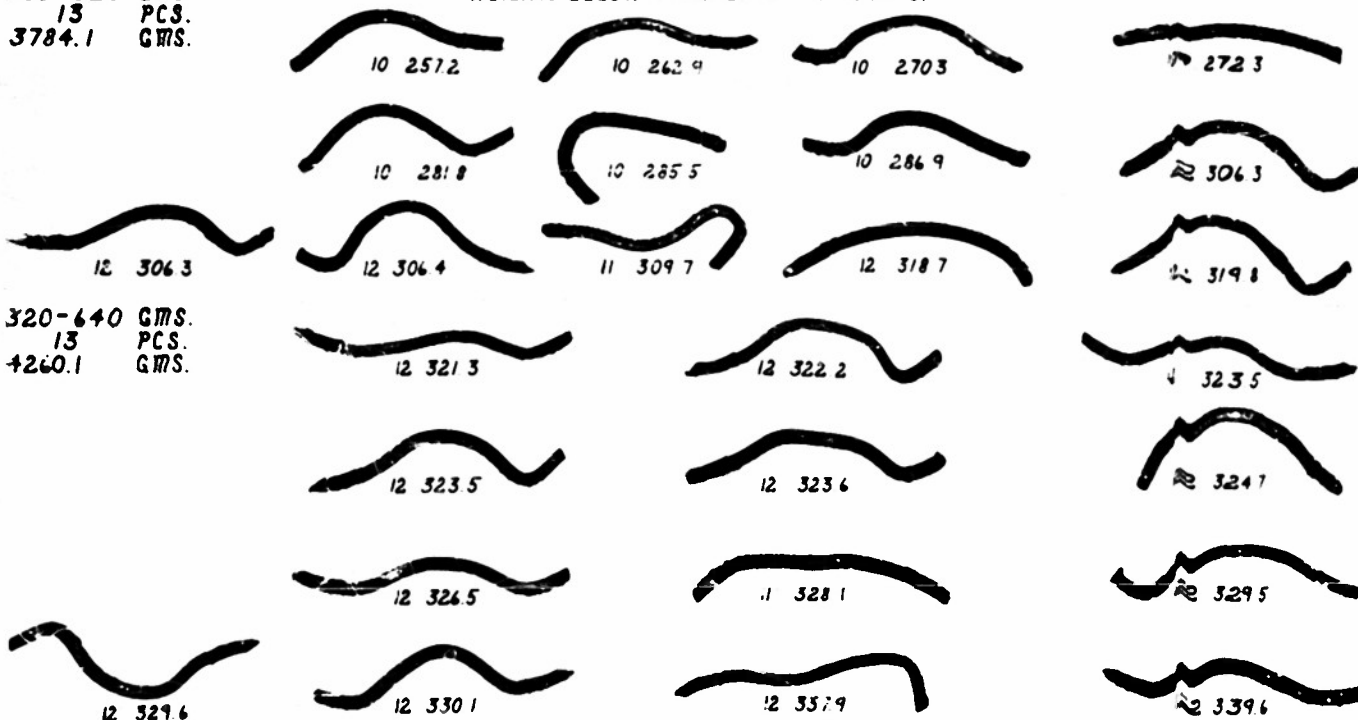
N.P.9 NO. 63026

0 - 1/4 GMS.
 392 PLS.
 GMS.
 1/4 - 1/2 GMS.
 42 PCS.
 37 GMS.
 1/2 - 3/4 GMS.
 34 PCS.
 53 GMS.
 2 1/2 - 5 GMS.
 29 PCS.
 107 GMS.
 5 - 10 GMS.
 20 PCS.
 125 GMS.
 10 - 20 GMS.
 4 PCS.
 44 GMS.
 20 - 40 GMS.
 5 PCS.
 162 GMS.
 40 - 80 GMS.
 3 PCS.
 150 GMS.
 80 - 160 GMS.
 1 PCS.
 151 GMS.



160-320 GMS.
 13 PCS.
 3784.1 GMS.

WEIGHTS BELOW FRAGMENTS IN GRAMS.



SCALE 1"

AP9-63026

Mass distribution for Warhead No. 143-1.
 Figure 4

FRAG NO. 1731

WARHEAD NO. 143-2

N.P.9 NO. 63040

0 - 5/8 GMS.
PCS.
203 GMS.

5/8 - 1 1/4 GMS.
14 PCS.
12 GMS.

1 1/4 - 2 1/2 GMS.
26 PCS.
50 GMS.

2 1/2 - 5 GMS.
32 PCS.
108 GMS.

5 - 10 GMS.
22 PCS.
151 GMS.

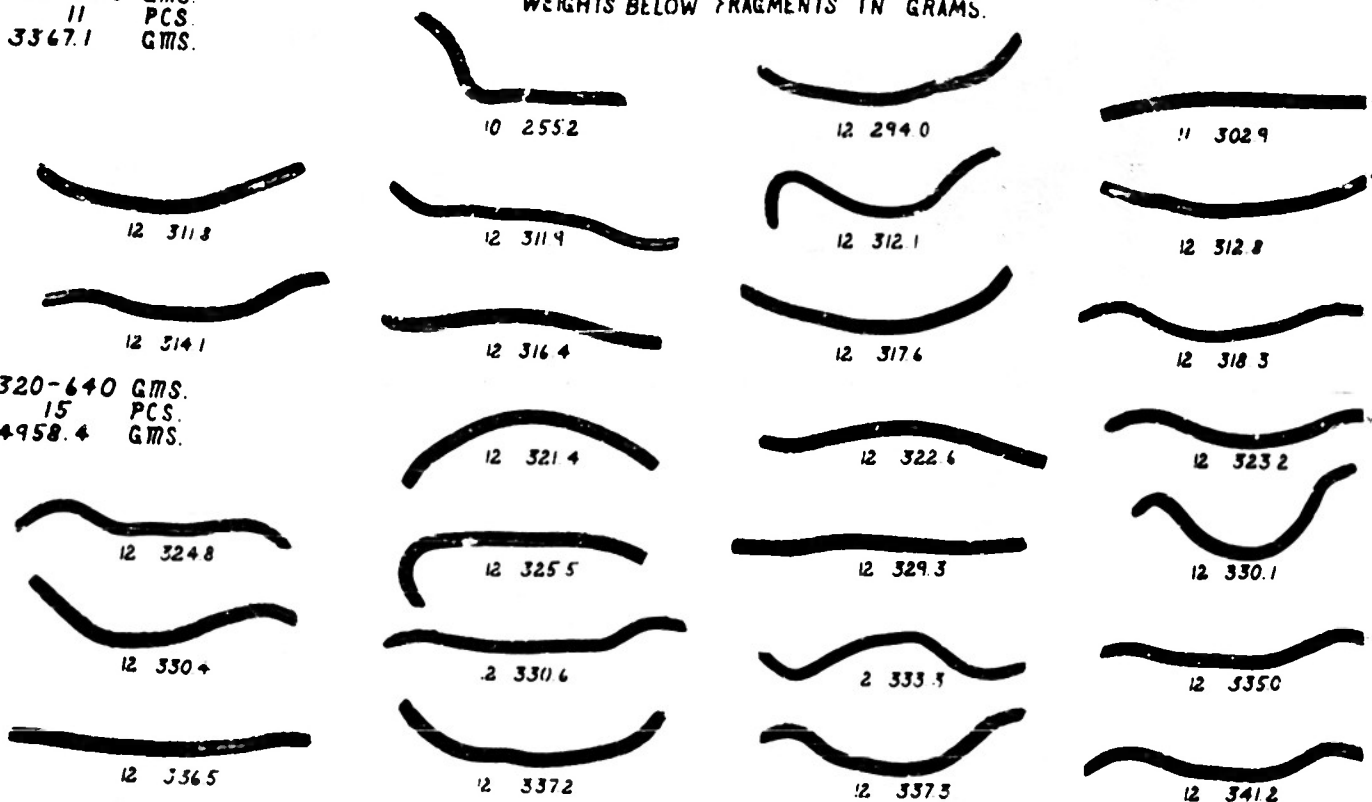
10 - 20 GMS.
5 PCS.
61 GMS.

40 - 80 GMS.
1 PCS.
42 GMS.

80 - 160 GMS.
1 PCS.
132 GMS.

160 - 320 GMS.
11 PCS.
3367.1 GMS.

WEIGHTS BELOW FRAGMENTS IN GRAMS.



SCALE 1"

NP9-63040

4 April 1953
Mass distribution for Warhead No. 143-2.
Figure

CONFIDENTIAL
SECURITY INFORMATION