

UNCLASSIFIED

AD NUMBER	
ADA800075	
CLASSIFICATION CHANGES	
TO:	unclassified
FROM:	confidential
LIMITATION CHANGES	
TO: Approved for public release; distribution is unlimited.	
FROM: Distribution authorized to DoD only; Administrative/Operational Use; 22 JUL 1952. Other requests shall be referred to Naval Proving Ground, Dahlgren, VA. Pre-dates formal DoD distribution statements. Treat as DoD only.	
AUTHORITY	
NSWC notice dtd 15 Sep 1975; NSWC notice dtd 15 Sep 1975	

THIS PAGE IS UNCLASSIFIED

THIS REPORT HAS BEEN DELIMITED
AND CLEARED FOR PUBLIC RELEASE
UNDER DOD DIRECTIVE 5200.20 AND
NO RESTRICTIONS ARE IMPOSED UPON
ITS USE AND DISCLOSURE.

DISTRIBUTION STATEMENT A

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

UNCLASSIFIED

ATI 208333-

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION, ALEXANDRIA, VIRGINIA

Naval Surface Weapons Center

— 29 SEPT 75 —



UNCLASSIFIED

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

SECURITY INFORMATION

NP6 REPORT NO. 1001

08111

208333

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REGISTERED MAIL

REPORT NO. 1001

3359313

WARHEADS FOR AIR TARGET GUIDED MISSILES;
TESTING OF

47th Partial Report

ROD-EXPPELLING WARHEAD NO. 138;
FRAGMENTATION TEST OF

FINAL Report

Task

Assignment NP6-Re3f-607-1-62

Copy No. 1

Classification CONFIDENTIAL
SECURITY INFORMATION

12 JUL 23 14 05

BUONO
RECEIVED

RETURN TO:
ASTIA-REFERENCE CENTER
LIBRARY OF CONGRESS
WASHINGTON 25, D.C.

LIBRARY OF CONGRESS
REFERENCE DEPARTMENT
ECONOMICAL INQUIRY DIVISION
FORMERLY
NAVY RESEARCH SECTION

JUL 28 1952

JUL 28 1952

CONFIDENTIAL

SECURITY INFORMATION

54 AF-65677

Rod-expelling Warhead No. 138; Fragmentation Test of
-----PART ASYNOPSIS

1. This test was conducted to obtain the fragment mass distribution of Rod-expelling Warhead No. 138. This warhead has a 4-3/8" diameter, 12" length, 0.0500 wall thickness, and is designed to produce 24 rods.

2. a. Warhead No. 138 produced 21 rod-like fragments which were 10"-12" in length and averaged 292 grams in weight. Only 10 of the 21 were of design length, 12". Three other rods were 7"-10" in length.

b. Of the three warheads with similar external dimensions and variable wall thickness tested to date, only Warhead No. 134, which had a wall thickness uniform over the center 4" of length and tapered to each end, produced 24 design length (12") rods. These rods averaged 331 grams each.

Rod-expelling Warhead No. 138; Fragmentation Test of

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. 138, PHOTOGRAPH . . .	FIGURE 1
APPENDIX B - MASS DISTRIBUTION, PHOTOGRAPH . .	FIGURE 2
APPENDIX C - MASS DISTRIBUTION DATA.	TABLE I 1 (Only)
APPENDIX D - DISTRIBUTION.	1-2 (Incl)

Rod-expelling Warhead No. 138; Fragmentation Test of

PART BINTRODUCTION

1. AUTHORITY:

This test was authorized by reference (a) and conducted under Task Assignment NPG-Re3f-607-1-52, reference (b).

2. REFERENCES:

- a. NOL Conf Work Request WG/15/52 of 5 March 1952
- b. BUORD Conf ltr NP9 Re3f-EJHL:edb Ser 25777 of 18 September 1951
- c. NPG Conf Report No. 847 of 1 September 1951
- d. NPG Conf Report No. 972 of 5 May 1952

3. BACKGROUND:

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

b. References (c) and (d) reported the fragment mass distribution tests of rod-expelling warheads No. 120 and No. 134 respectively. These warheads were 4-3/8" diameter, 12" long, and of wall thicknesses which were less at the ends than at the center. Warhead No. 138, which is the subject of this test, has the same external dimensions and the same internal grooving as warheads Nos. 120 and 134 but has a uniform wall thickness of 0.500, which gives essentially the same total charge-to-metal weight ratio as calculated for warhead No. 120.

4. OBJECT OF TEST:

This test was conducted to obtain the fragment mass distribution of Rod-expelling Warhead No. 138. This warhead has a 4-3/8" diameter, 12" length, 0.500 wall thickness, and is designed to produce 24 rods.

5. PERIOD OF TEST:

- | | |
|-------------------------------------|---------------|
| a. Date Project Letter | 5 March 1952 |
| b. Date Necessary Material Received | 11 March 1952 |
| c. Date Commenced Test | 31 March 1952 |
| d. Test Completed | 31 March 1952 |

Rod-expelling Warhead No. 138; Fragmentation Test of

PART CDETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

Warhead No. 138, rod-expelling, cylindrical, mild steel tubing, 4.375 diameter, 12.00 long uniform, 0.500 wall thickness, contains 24 internal longitudinal grooves 0.063 wide and 0.400 deep, empty weight 19.18 lbs., Composition 6-3 weight 6.31 lbs., total weight 25.49 lbs. The warhead was initiated by a 26 gram tetryl booster and a special engineers blasting cap at one end.

7. PROCEDURE:

The warhead was supported on its side in a cane fiberboard box which was 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 are shown in Figure 2 and listed in Table I and are summarized as follows:

<u>Warhead No.</u>	<u>No. of Rod in Length Groups</u>		
	<u>12"</u> <u>(Design Size)</u>	<u>10"-12"</u>	<u>7"-10"</u>
138	10	11	3
*134	24	0	0
*120	20	0	4

* References (c) and (d).

The 21 rod-like fragments which were 10" to 12" in length averaged approximately 292 grams in weight. Only 10 rods were of design length, 12".

b. Of the three similar warheads, Nos. 120, 134, and 138, Warhead No. 134 which had a uniform thickness at its center 4" of length and uniform tapering to both ends, was the most satisfactory in that it produced all rods of design length with an average weight of 331 grams, reference (d).

CONFIDENTIAL

NPG REPORT NO. 1001

Rod-expelling Warhead No. 138; Fragmentation Test of

PART D

CONCLUSIONS

9. a. Warhead No. 138 produced 21 rod-like fragments which were 10"-12" in length and averaged 292 grams in weight. Only 10 of the 21 were of design length, 12". Three other rods were 7"-10" in length.

b. Of the three warheads with similar external dimensions and variable wall thickness tested to date, only Warhead No. 134, which had a wall thickness uniform over the center 4" of length and tapered to each end, produced 24 design length (12") rods. These rods averaged 331 grams each. Detailed data are reported in reference (d).

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1001

Rod-expelling Warhead No. 138; Fragmentation Test of

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

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

This report was prepared by:

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

This report was reviewed by:

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

E. I. LEVSTIK, Lieutenant Commander, USNR
Terminal Ballistics Batteries Officer
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. F. BYRNE
Captain, USN
Commander, Naval Proving Ground


C. T. MAURO
Captain, USN
Ordnance Officer
By direction

CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1001

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Forty-Seventh Partial Report

on

Warheads for Air Target Guided Missiles;

Testing of

Final Report

on

Rod-expelling Warhead No. 138;

Fragmentation Test of

Project No.: NPG-Re3f-607-1-52
Copy No.: 1
No. of Pages: 6

Date:

JUL 22 1952

CONFIDENTIAL
SECURITY INFORMATION

FRAG NO. 1650

NOL WARHEAD NO 138

N.P. 48909

0-1/2	Gms.	
472	PCS.	
1/2-1 1/4	Gms.	
74	PCS.	
64	Gms.	
1 1/4-2 1/4	Gms.	
44	PCS.	
76	Gms.	
2 1/4-5	Gms.	
43	PCS.	
143	Gms.	
5-10	Gms.	
7	PCS.	
40	Gms.	
10-20	Gms.	
1	PCS.	
14	Gms.	
20-40	Gms.	
9	PCS.	
301	Gms.	
40-80	Gms.	
4	PCS.	
212	Gms.	
80-160	Gms.	
2	PCS.	
272	Gms.	
160-320	Gms.	
22	PCS.	
6080	Gms.	

320-640 Gms.
2 Pcs.
666 Gms.

SCALE 1"

CONFIDENTIAL
SECURITY INFORMATION
Fragment of Warhead No. 138.
Page 2

TABLE I

MASS DISTRIBUTION DATA

FRAGMENTATION OF ROD-EXPPELLING WARHEAD NO. 138, COMP. C-3 LOADED																										
NUMBER AND WEIGHT OF RECOVERED FRAGMENTS																										
Rd. No.	Comp. Wt. lb.	Faller Wt. lbs.	0-0.625		0.625-1.25		1.25-2.5		2.5-5		5-10		10-20		20-40		40-80		80-160		160-320		320-640		Total Wt. Gms.	Photo No. NP2
			grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.	grams	Wt.		
1	25.49	6.131	472	64	74	76	44	143	43	40	7	14	1	301	9	212	4	272	2	6080	22	666	2	8340	208	48909

CONFIDENTIAL

NPG REPORT NO. 1001

Rod-expelling Warhead No. 138; Fragmentation Test of

DISTRIBUTION

Bureau of Ordnance

Ad3	1
Re2	1
Re3	2
Re3f	5

Chief of Ordnance, Department of the Army Attn: ORDTX-AR	2
---	---

Navy Research Section Library of Congress Washington 25, D. C. (Via BUORD Re3)	2
---	---

Commanding General Aberdeen Proving Ground Aberdeen, Maryland Attn: Technical Information Section Development and Proof Services	2
--	---

Commander, Operational Development Force U. S. Atlantic Fleet, U. S. Naval Base Norfolk 11, Virginia	1
--	---

Naval Ordnance Laboratory	1
---------------------------	---

Naval Ordnance Laboratory Attn: Explosives Division Attn: Mr. H. W. Semon	1 1
---	--------

Picatinny Arsenal, Dover, N. J. Attn: Technical Division	1
---	---

Reports Office APL/JHU, Silver Spring, Maryland	1
--	---

APL/JHU, Silver Spring, Md. Attn: Mr. H. S. Morton (Via INSORD, Silver Spring, Md.)	1
---	---

CONFIDENTIAL

SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1001

Rod-expelling Warhead, No. 138; Fragmentation Test of

DISTRIBUTION (Continued)

Bureau of Ordnance Technical Liaison Office
Bell Telephone Laboratories
Whippany, New Jersey

1

USNOTS, Inyokern, China Lake, Calif.

1

Inst. for Cooperative Research
JHU/1315 St. Paul St.
Via: (District Chief, Phila. Ord District
1500 Chestnut St., Phila. 2, Pa.
Attn: Mr. Edward R. C. Niles)

1

Director, Research and Development Division
New Mexico Institute of Mining and Technology
Socorro, New Mexico
Via: Development Contract Officer
New Mexico Institute of Mining and Technology
Socorro, New Mexico

1

Boeing Airplane Company
Seattle Division
Seattle, Washington

1

Commanding Officer
Frankford Arsenal
Philadelphia 37, Pa.

1

Locals: OT
OTZ
OT-1
File

1

1

1

1

CONFIDENTIAL
SECURITY INFORMATION

INTER—

ON AGENCY

LO—

REEL-C

736

A.T.I

208333

"NOTICE: When Government or other drawings, specifications or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the U.S. Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formula furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may in any way be related thereto.