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AAP Rod Warhead and Slotted Rocket Motor Assembly No. 366

- -

PART A

SYNOPSIS

1. This test was conducted to determine the ability of 24 internal grooves 1/16" wide and 1/8" deep in the AAP rocket motor to produce rod-like fragments. The inert motor was assembled to a Composition C-3 loaded and fuzed AAP rod-producing warhead and the assembly was designated No. 366.

2. a. The internal grooves of the AAP motor were of no significance in controlling fragment size.

b. The AAP warhead with external grooves did not produce rod-like fragments of design lengths. The poor performance is attributed to the fuze booster location.

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APPENDIX A - AAP ASSEMBLY NO. 366 . . . . . FIGURE 1

APPENDIX B - FRAGMENT MASS DISTRIBUTION . . . . FIGURES 2-3 (Incl)

APPENDIX C - DISTRIBUTION . . . . . 1-2 (Incl)

PART B

INTRODUCTION

1. AUTHORITY:

This test was authorized by references (a) and (b).

2. REFERENCES:

a. NOL Conf Work Request WG/19/53 of 26 September 1952
b. BUORD Conf ltr NP9-Rexb:JBC:teb Ser 29835 of 29 November 1951
c. NPG Conf Report No. 948 of 27 March 1952
d. NPG Conf Report No. 858 of 13 October 1951

3. BACKGROUND:

a. Reference (b) authorized the Naval Ordnance Laboratory to work directly with the Naval Proving Ground in the development and testing of the Angled Arrow Projectile (AAP).

b. References (c) and (d) reported the fragment mass distribution data of AAP assemblies having rod-producing warheads and unslotted motors. In an attempt to produce rod-like fragments from the motor, the Naval Ordnance Laboratory slotted the motor in AAP assembly No. 366 and forwarded it to the Naval Proving Ground for test.

4. OBJECT OF TEST:

This test was conducted to determine the ability of 24 internal grooves 1/16" wide and 1/8" deep in the AAP rocket motor to produce rod-like fragments. The inert motor was assembled to a Composition C-3 loaded and fuzed AAP rod-producing warhead and the assembly was designated No. 366.

5. PERIOD OF TEST:

a.	Date Project Letter	26 September 1952
b.	Date Necessary Material Received	19 January 1953
c.	Date Commenced Test	6 March 1953
d.	Test Completed	23 March 1953

PART C

DETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

AAP Assembly No. 366 is shown in Figure 1. The warhead, 4".450 in diameter and 11".815 long, has 24 longitudinal grooves with depths of approximately half the wall thickness. The wall thickness tapers from 0".348 at the fuzed end to 0".260 at the motor joint end. The warhead was loaded with Composition C-3 and fuzed with an AAP fuze modified for static detonation. The warhead wall is thinner than those reported in references (c) and (d). The AAP rocket motor has 24 internal grooves 1/16" wide and 1/8" deep along its 10".12 length and a 0".375 thick wall. The weights of the assembly in pounds are as follows:

* Empty Warhead	Warhead Filler	Fuze	Inert Motor	Total
16.57	4.61	3.00	22.66	46.84

* This warhead contained 6 fins. Those reported in references (c) and (d) did not have fins.

7. PROCEDURE:

The assembled AAP was detonated in the center of a sawdust filled chamber. After the detonation, the sawdust was sifted and the fragments recovered by the use of sieves and a magnetic separator. The warhead, fuze fin, and motor fragments were then separated and classified in weight groups.

8. RESULTS AND DISCUSSION:

a. The slotted warhead exhibited poor control of fragment size. Instead of the intended 24 rods, each 11".815 in length (totalling 283-1/2"), the warhead produced 37 rod-like fragments greater than 3" in length (totalling 190"), the longest one (1) being 8-1/2". The remaining 93-1/2" of fragment length consisted of fragments 3" and less in length. The warhead, head proper, fin, and fuze, fragments are shown in Figure 2. The break up of the design length is probably due to the fuze booster location. If the booster could be located closer to either end of the warhead, fragments of the approximate design length could be produced, reference (c).

b. The AAP rocket motor fragmented fairly well considering the fact that the motor was inert. The internal grooves of the motor were of no significance in controlling fragment size. It is felt that an ungrooved motor would have performed similarly. The heavier ungrooved motor of AAP assembly 505-1, reference (c), fragmented into strips and clumps as did the motor in this test.

PART D

CONCLUSIONS

9. a. The internal grooves of the AAP motor were of no significance in controlling fragment size.

b. The AAP warhead with external grooves did not produce rod-like fragments of design lengths. The poor performance is attributed to the fuze booster location.

AAP Rod Warhead and Slotted Rocket Motor Assembly No. 366

The tests upon which this report is based were conducted by:
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NPG REPORT NO. 1129

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Fifth Partial Report

on

Angled Arrow Projectile Program

- -

Final Report

on

AAP Rod Warhead and Slotted

Rocket Motor Assembly No. 366

X

Project No.: NOL-Re3f-614-1-53

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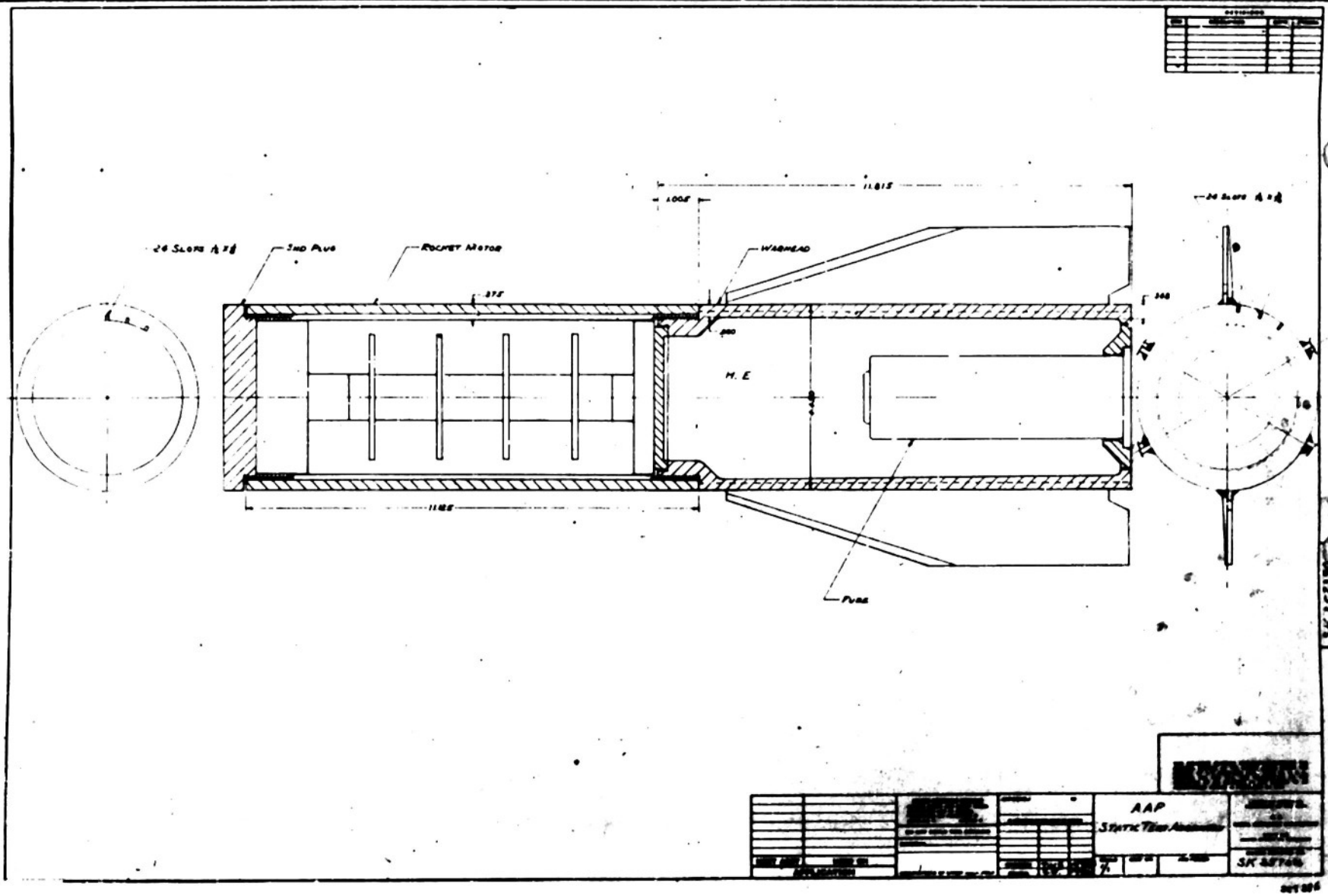
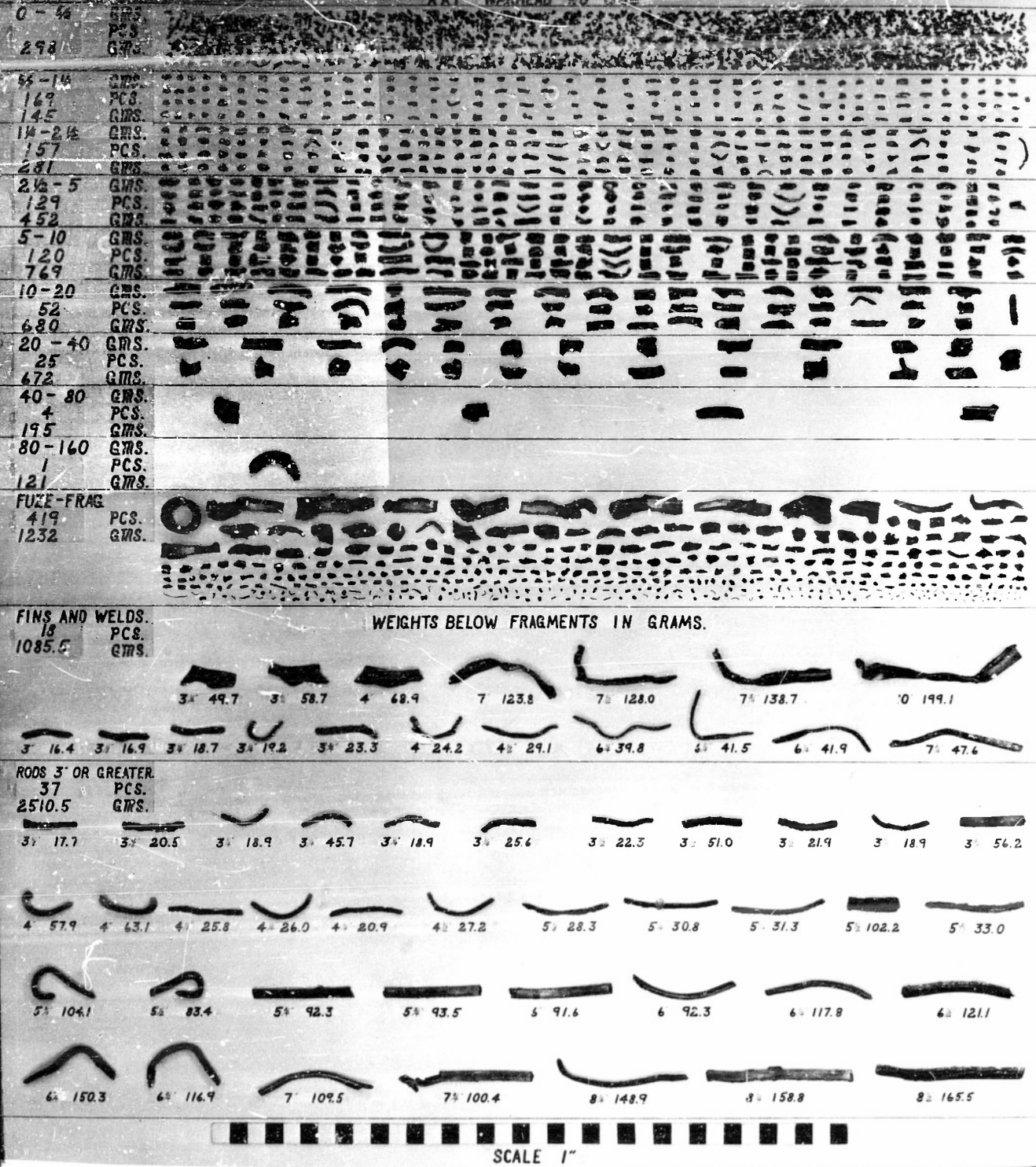


24 SLOTS
3RD PLUG
ROCKET MOTOR
WARHEAD
H. E
FUSE
11.815
1.005
.375
11.125
AAP
STATIC TEST ASSEMBLY

FRAG NO. 1777 [redacted] N.P.G. NO. 62769

AAP WARHEAD NO. 366



March 1953

Photographs Distribution of AAP Warhead No. 366

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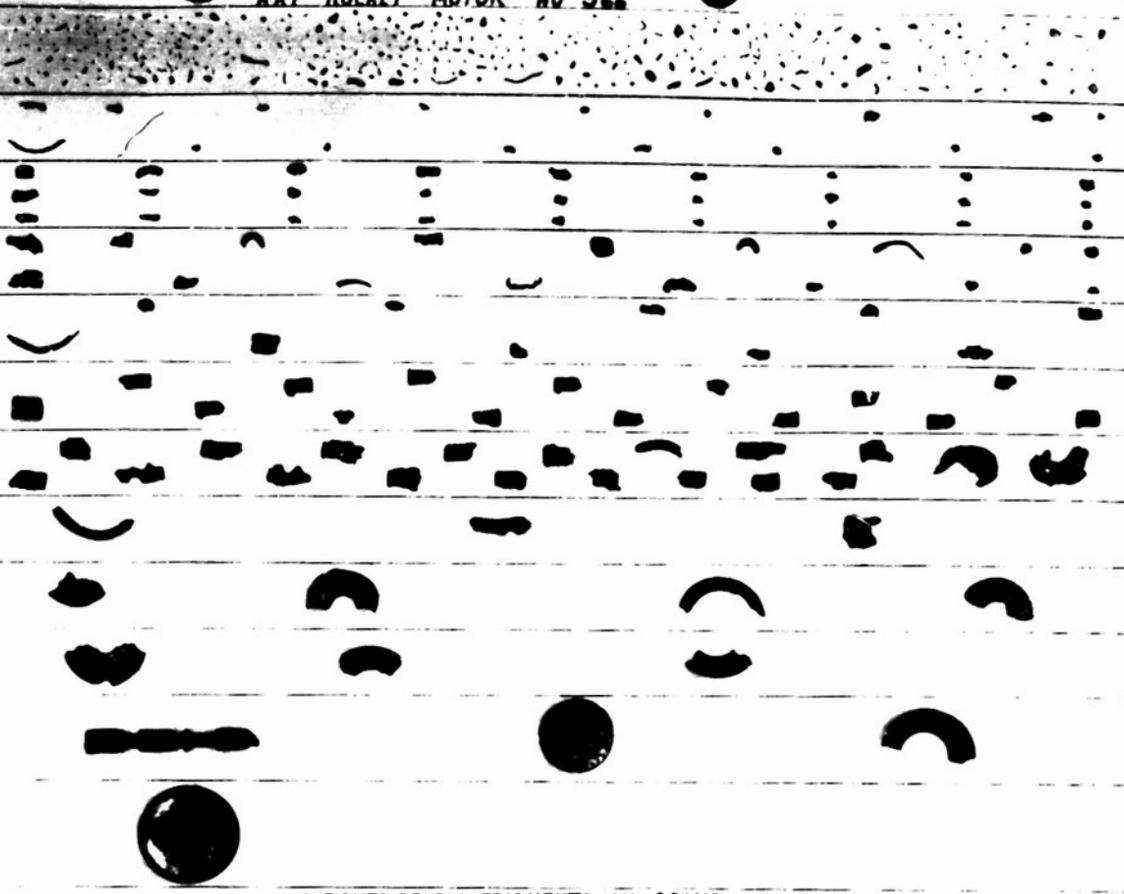
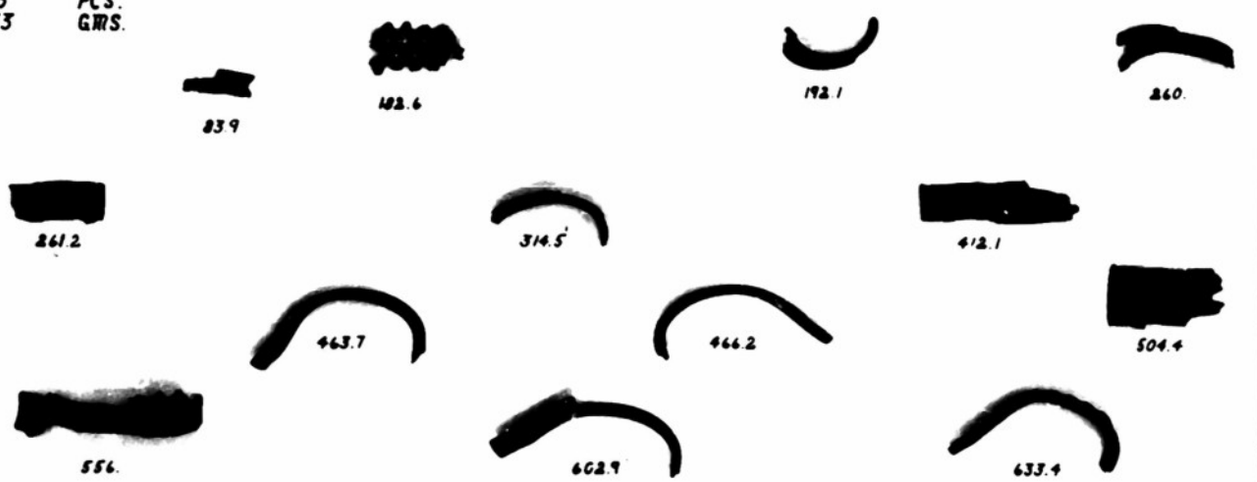
FRAG NO. 1717 [redacted] N.P.9 NO. 62790

AAP ROCKET MOTOR NO 366

0 - 56	GMS.
	PCS.
32	GMS.
56 - 1¼	GMS.
17	PCS.
14	GMS.
1¼ - 2½	GMS.
27	PCS.
46	GMS.
2½ - 5	GMS.
17	PCS.
57	GMS.
5 - 10	GMS.
10	PCS.
69	GMS.
10 - 20	GMS.
15	PCS.
248	GMS.
20 - 40	GMS.
19	PCS.
528	GMS.
40 - 80	GMS.
3	PCS.
190	GMS.
80 - 160	GMS.
4	PCS.
418	GMS.
160 - 320	GMS.
3	PCS.
560	GMS.
320 - 640	GMS.
3	PCS.
1388	GMS.
640 +	GMS.
1	PCS.
1784	GMS.
3" OR GREATER	
13	PCS.
4933	GMS.



WEIGHTS BELOW FRAGMENTS IN GRAMS.



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