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AUTHORITY

2 Feb 1963, Group 4, DoDD 5200.10, ST-A USNSWC LTR, 1 APR 1975

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NPG REPORT NO. 727

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U S NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO. 727

FC

TEST AND DEVELOPMENT OF
3"/70 AA PROBERT PROJECTILES

32nd Partial Report

TEST OF 3"/70 AA PROJECTILES
TYPE EX 24 MOD. 3 IN GUN TYPE B MOD. 5

FINAL Report

Task
Assignment NPG-14-Re3b-210-1

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NPG REPORT NO. 727

Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

PART A

SYNOPSIS

1. Four (4) 3"/70 AA Projectiles Type Ex 24-3 were fired for spin determination in the 3"/70 Gun Type B Mod. 5 No. 24480, with 546 ESR.
2. The rate of spin was 82.4% of the nominal value for this projectile gun combination.

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Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

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Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

PART B

INTRODUCTION

1. AUTHORITY:

- a. This program was authorized by references (a) and (b).

2. REFERENCES:

- a. TelCon BUORD Re3b (Mr. M. A. Sheppa) and NAVPROV, Armament Dept. (Mr. D. C. Sloan) of 30 August 1950.
b. BUORD ltr S78-1(56-3")Re3b-MAS Ser. 11196 to NAVPROV of 22 August 1950.
c. BUORD ltr S78-1(56-3")(Re3b-210) Ser. 5324 to NAVPROV of 23 Jan 1950.
d. BUORD Sketch No. 239090, 3"/70 AA Projectile Type Ex 24 Mod. 3.

3. BACKGROUND:

The Bureau of Ordnance requested, by reference (a), recovery firing of 3"/70 AA Projectiles Type Ex 24 Mod. 3 in gun Type B Mod. 5, in order to determine the rate of spin.

Reference (c) outlined a program of range firing in the 1-20 twist gun type B Mod. 5 which was to be continued until the range performance became erratic. Reference (b) outlined a range program to determine whether inert VT fuzes, assembled in Ex 24-3 projectiles, remain intact when fired from this gun.

4. OBJECT OF TEST:

The object of this test was to determine the rate of spin of 3"/70 AA Projectiles Type Ex 24 Mod. 3 in Type B Mod. 5 gun in approximately the same state of wear as when the program outlined in reference (b) was fired.

5. PERIOD OF TEST:

- | | |
|------------------------|-------------|
| a. Dates of Directives | 30 Aug 1950 |
| | 22 Aug 1950 |
| b. Date Commenced Test | 23 Jan 1950 |
| c. Date Test Completed | 6 Sep 1950 |
| | 11 Sep 1950 |

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PART C

DETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

a. 3"/70 AA Projectiles Ex 24 Mod. 3 in accordance with reference (d).

b. The gun used in this test was Type B Mod. 5 Ser No. 24480 which has a small chamber and rifling of uniform twist, 1 in 20 calibers, and zero depth in the muzzle section. The gun had 546 ESR at the beginning of the test.

7. PROCEDURE:

Four (4) 3"/70 AA Projectiles Ex 24-3 were prepared for recovery firing at service charge. The projectiles were loaded with Epsom salt and fitted with flat dummy nose plugs to a weight of 15 lbs. Naval Proving Ground numbers were stamped on for identification. (Appendix (B), Figure 1).

The spin of all projectiles was measured by the wire impression method (described in Appendix (C)).

8. RESULTS AND DISCUSSION:

Complete before and after firing data are given in Table I Appendix (A) and photographs of the recovered projectiles are included as Figures 2 to 5, inclusive (Appendix (B)).

The results shown in Table I indicate that the pressure and velocity were normal but the nominal spin was low, although no yaw was apparent for the projectiles fired. It should be noted that the round fired in an oily bore was lowest in percentage spin (75.7%) and the remaining three were approximately the same (82%).

PART D

CONCLUSIONS

9. It is concluded that:

a. The rate of spin was 82.4% of the nominal value for this projectile gun combination.

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Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

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U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Thirty-Second Partial Report
on
Test and Development of
3"/70 AA Probert Projectiles



Final Report
on
Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

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Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

TABLE I

COMPLETE BEFORE AND AFTER FIRING DATA

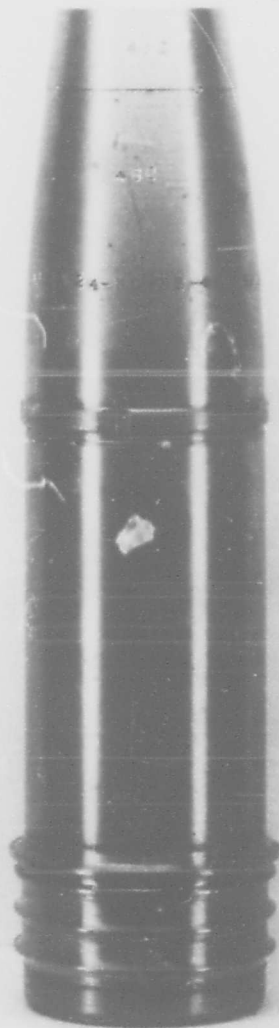
3"/70 AA Projectiles Ex 24 Mod. 3 in Gun B Mod. 5,
Test for Spin Determination of

<u>Proj. No.</u>	<u>Pdr. Charge (lbs.)</u> SPDN 3531	<u>Avg. Pressure & Gauges (t.s.i.)</u>	<u>Muzzle Velocity (ft/sec)</u>	<u>% Nominal Spin</u>	<u>Remarks</u>	<u>Wt. Total</u>
459	8.90	20.4	3420	75.7	No yaw	15.00
460	8.90	20.4	3384	82.0	No yaw	15.00
461	8.90	20.2	3370	82.4	No yaw	14.97
462	8.90	20.6	3375	82.4	No yaw	15.01

- a. Gun Type B Mod. 5 Ser No. 24480 with ESR 546 before this test.
- b. All projectiles were Epsom salt loaded, fitted with flat nose dummy nose plugs and cases were crimped on.
- c. Projectile No. 459, round No. 1, was fired in oily bore (light oil).

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APPENDIX A



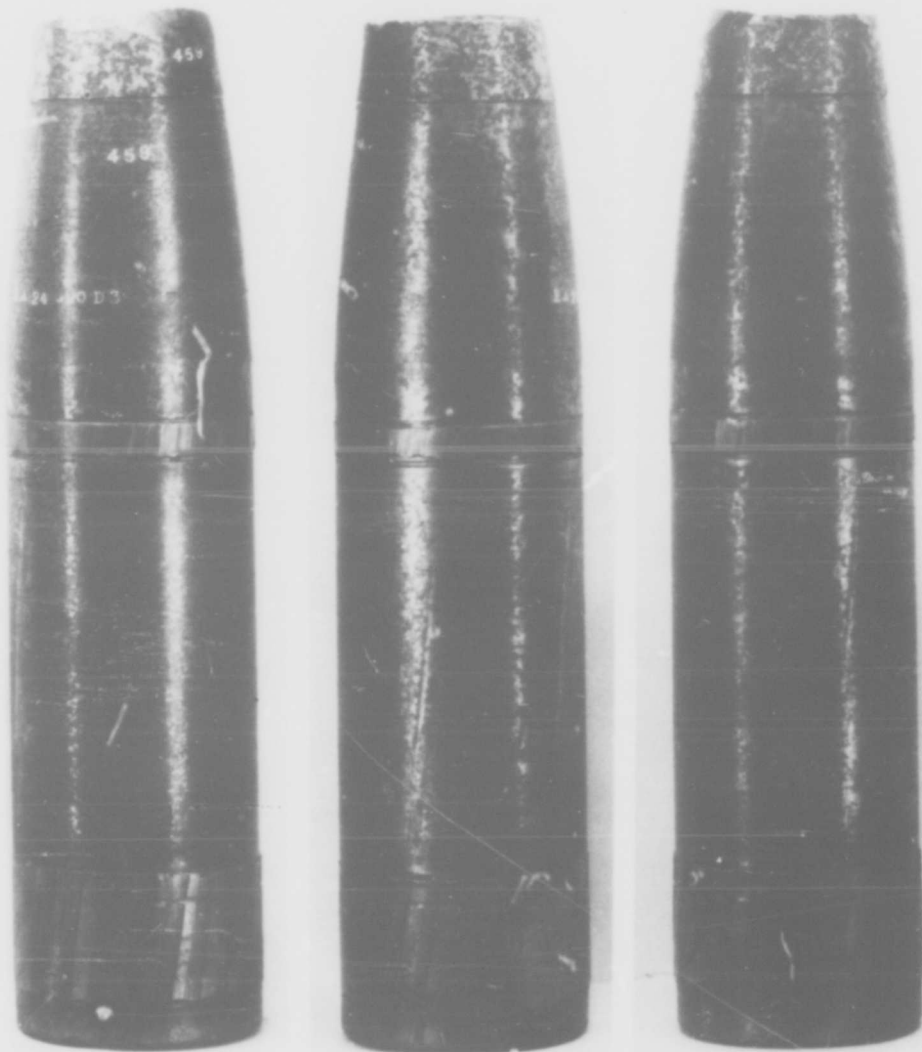
NP9-42996

25 August 1950

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Photograph of 3"/70 A.A. Projectile, Ex 24-3 before firing.

Figure 1



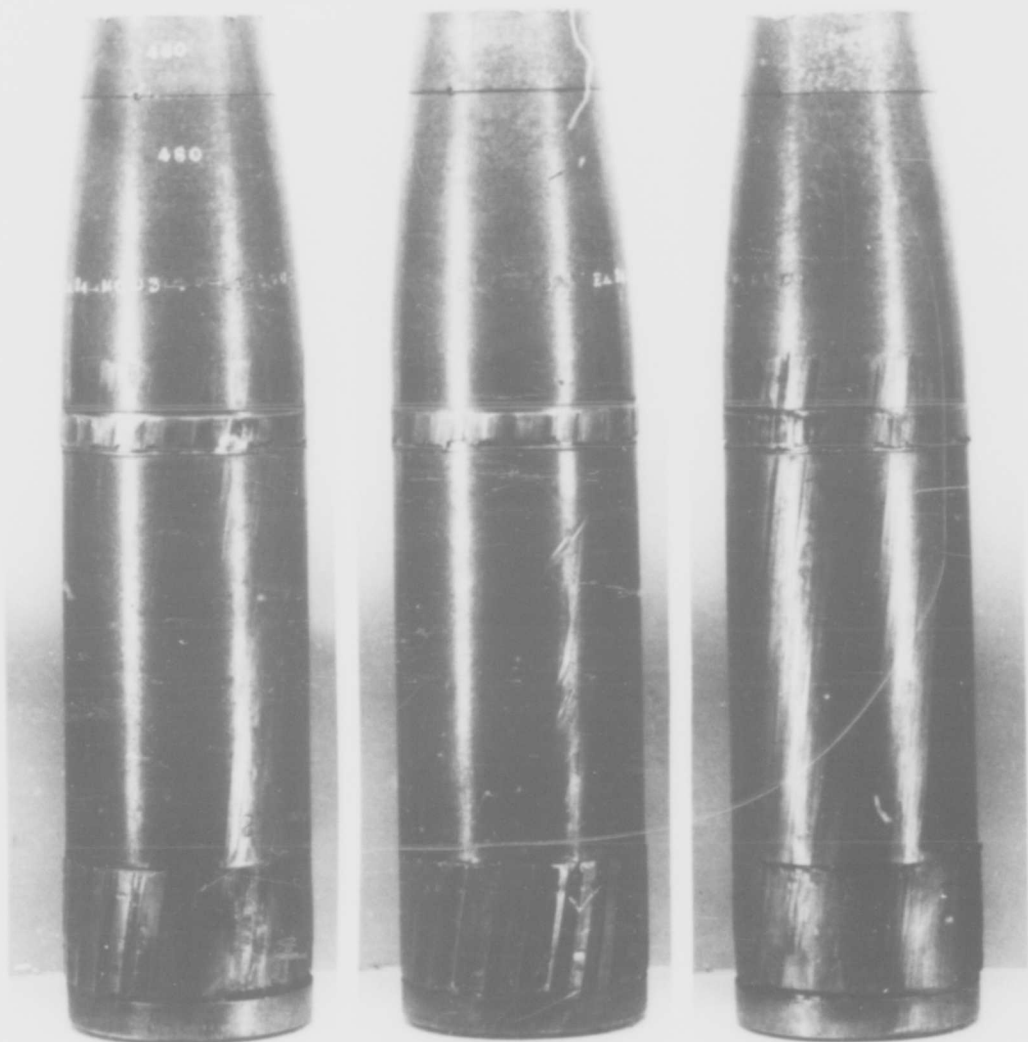
NP9-42997

11 September 1950

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Three views (120° apart) of recovered 3"/70 A.A. Projectile
Type Ex 24 Mod. 3. Projectile No. 459.

Figure 2



NP9-43373 11 September 1950 CONFIDENTIAL
Three views (120° apart) of recovered 3"/70 A.A. Projectile
Type Ex 24 Mod. 3. Projectile No. 460.
Figure 3



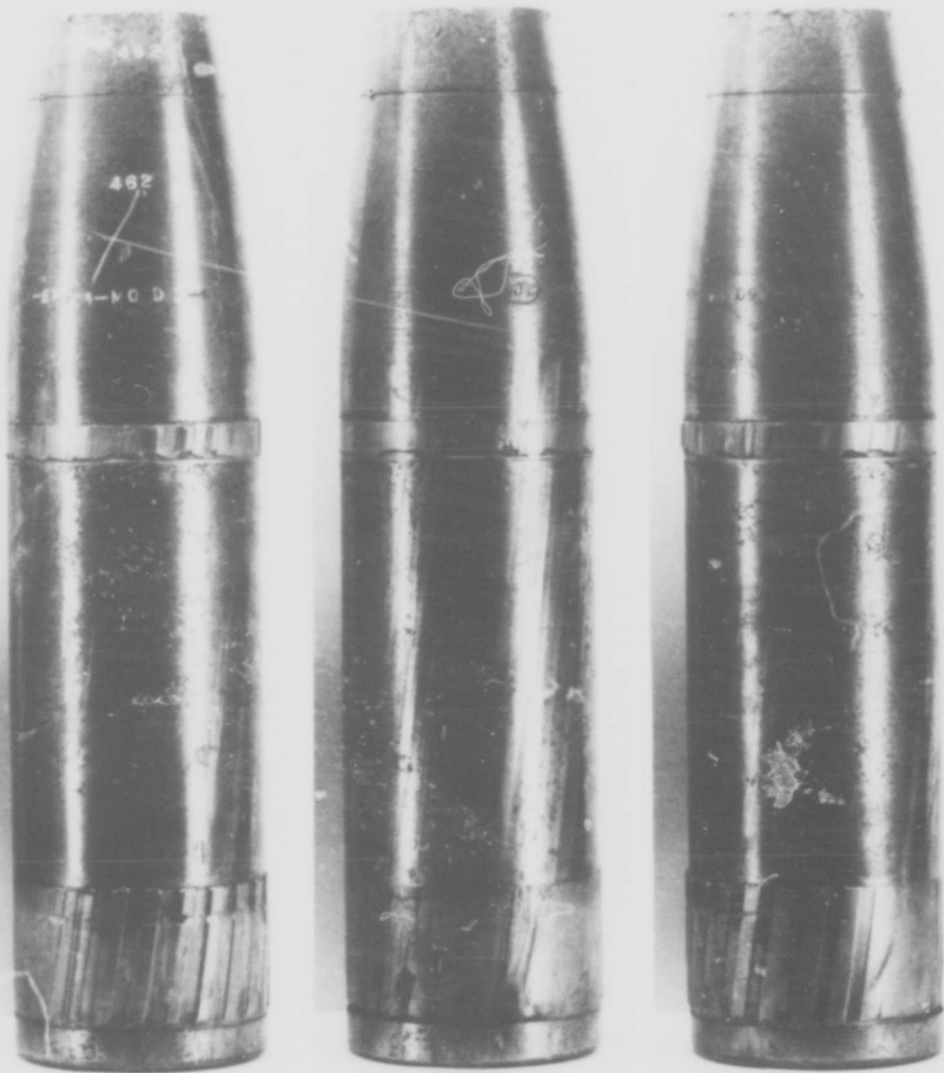
NP9-43374

11 September 1950

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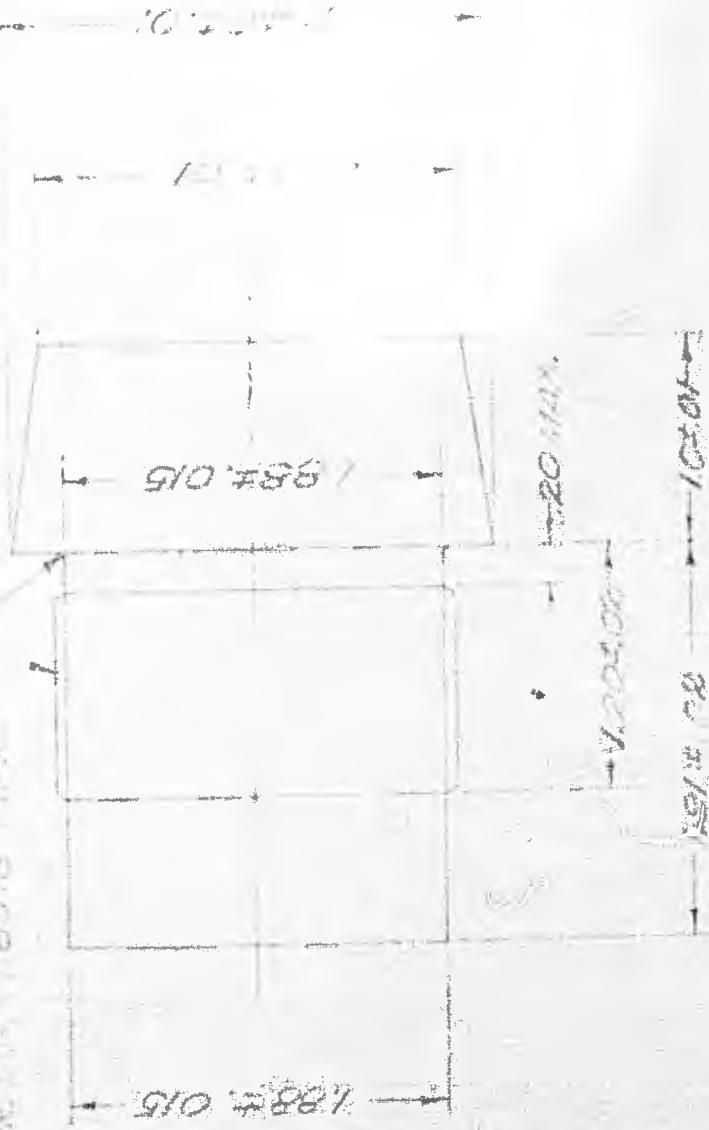
Three views (120° apart) of recovered 3"/70 A.A. Projectile
Type Ex 24 Mod 3. Projectile No. 461.

Figure 4



NP9-43375 11 September 1950 CONFIDENTIAL
Three views (120° apart) of recovered 3"/70 A. A. Projectile
Type 24 Mod. 3. Projectile No. 462.
Figure 5

2.00
 MADE IN U.S.A.
 DIMENSIONS IN INCHES
 MAKE DIMENSIONS MAX



DUMMY NOSE PLUG

(FLAT NOSE)

MATERIAL: STEEL, FORGED
 OR ROLLED STOCK

WEIGHT: 2.68 ± 0.05 LBS.

NOTE: BREAK SHARP EDGES

REF: SEE BUDED SK 239269

APL-107
 9/27/49

FIGURE 106

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Test of 3"/70 AA Projectiles
Type Ex 24 Mod. 3 in Gun Type B Mod. 5

Wire Impression Method of Determining Spin

Two screens are set up 41.5 apart, each screen consisting of a metal frame with wood inserts, holding an array of parallel equidistant vertical copper wires. The spacing of the wires is 1/2" for the first screen and 3/4" for the second. The projectile is fitted with a flat-nosed dummy nose plug or the equivalent, so that after passing through the screens it bears two sets of impressions of the wires. The angle between the two sets of impressions is measured and from this measurement the rifling of the gun, the muzzle velocity, and the velocity at the spin screens, is computed the percentage of nominal spin. It is assumed that over the short distances involved the spin retardation is negligible.

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APPENDIX C

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