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A COMPARISON TEST OF UNITED KINGDOM AND UNITED STATES AMMUNITION FOR LIGHTWEIGHT WEAPONS

NINTH REPORT OF PROJECT TS2-2015

VOLUME I

[redacted]

A COMPARISON TEST OF UNITED KINGDOM AND

UNITED STATES [redacted]LIGHTWEIGHT

WEAPONS

NINTH REPORT ON PROJECT NO. TS2-2015

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A COMPARISON TEST OF UNITED KINGDOM AND UNITED STATES AMMUNITION FOR LIGHTWEIGHT WEAPONS

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DEVELOPMENT AND PROOF SERVI
ABERDEEN PROVING GROUND
MARYLAND

AUTHORITY: ORDTS

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5 June 1950

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A COMPARISON TEST OF UNITED KINGDOM AND UNITED STATES AMMUNITION FOR LIGHTWEIGHT WEAPONS

NINTH REPORT OF PROJECT TS2-2015

DATES OF TEST: 14 February 1950 to 22 May 1950

OBJECT

To evaluate and compare the performance of U. S. Caliber .30, T65, Ball, AP, API, Tracer and Spotting Ammunition with that of U. K. Caliber .280, Ball, AP, API, Tracer and Observing Ammunition.

SUMMARY

The subject ammunition was compared by conducting the test in accordance with the plan as agreed to by representatives of the United States and United Kingdom. Some phases of this test plan were deleted by the Working Committee to avoid duplication of phases covered by the "User" or the "Rifle" tests of this project.

CONCLUSIONS

It is concluded that the caliber .30, T65 ammunition is superior to the caliber .280 ammunition with regards to accuracy, trajectory, and penetration. The caliber .280 ammunition is superior with regards to the ignition characteristics of the API round, and functioning of the tracer and observing round. The caliber .280 ammunition also has superior ballistic coefficients compared with those of the caliber .30, T65 ammunition.

RECOMMENDATIONS

It is recommended that in any future development of weapons and ammunition by the U. K. and the U. S., every effort be made to perfect the ammunition prior to designing the weapon.

Before weapons of any type are considered for joint comparison trials by U. K. and U. S., they should be chambered for a common round of ammunition, which is acceptable to both countries.

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I INTRODUCTION

A. DISCUSSION

In World War II the United States was allied with many allies most notable of which was Great Britain. Throughout this conflict there were few common arms between us. Had British and United States arms been "standardized", much confusion, complication and cost could have been eliminated.

With the ultimate object being standardization, both the United States and Great Britain have been developing versatile lightweight weapons. It is hoped that a satisfactory weapon can be developed, and "standardized" which will replace certain present standard weapons. Development has been guided by requirements set up by the using arms of the United States and Great Britain.

A weapon proposed by the United States is the lightweight rifle, T25 firing a caliber .30, T65 cartridge, while those proposed by Great Britain are the EM-2 or FN auto-rifles, both firing a caliber .280 cartridge.

This test was set up by representatives of the United States and Great Britain to obtain data so that an evaluation could be made of the two types of ammunition used in the above weapons.

B. REFERENCES

1. Authority for Test

a. Letter, file APG (C)474/21 dated 3 February 1950, Subject: Comparative Tests of Light Rifles.

2. Technical References

a. Firing Record S-44377, Development and Proof Services, Aberdeen Proving Ground, Maryland.

b. First Report of TS2-2015 dated 10 January 1949, A Test of Cartridge, Ball, Caliber .30, T65E1 and Rifle Lightweight Caliber .30, T25.

c. Tenth Report of Project No. TS2-2015. A Comparison Test of United Kingdom and United States Lightweight Rifles.

II DESCRIPTION OF MATERIAL

A. The ammunition undergoing test had the following characteristics:

1. Cartridge, caliber .30, ball, T104, Lot No. FAX30-1358
Case, T65E2, 1949 brass, 180.35 grains
Bullet, ball, T104, 136.83 grains
Charge, ball [illegible], Lot [illegible] 44.57 grains.

2. Cartridge, caliber .30, AP, T93, Lot No. FAX30-1357
Case, T65E2, 1949 brass, 180.51 grains
Bullet, AP, T93, 136.08 grains
Charge, ball powder, Lot W2615, 46.55 grains

3. Cartridge, caliber .30, API, T101, Lot No. FAX30-1358
Case, T65E2, 1948 brass, 180.11 grains
Bullet, API, T101, 137.52 grains
Charge, ball powder, Lot W2615, 45.79 grains

4. Cartridge, caliber .30, tracer, T101, Lot No. FAX30-1359
Case, T65E2, 1949 brass, 179.95 grains
Bullet, tracer, T102, 134.12 grains
Charge, IMR 3031, 39.65 grains

5. Cartridge, caliber .30, spotting, T102, Lot No. 2
Case, 180.02 grains
Bullet, 119.66 grains
Charge, 43.71 grains

6. Cartridge, caliber .30, grenade, T116, Lot No. FAX30-1367
Case, FA-T-1-E-1
Charge: Black powder A4 1 grain
IMR 4895 40 grains

7. Cartridge, SA, caliber .280, ball, Lot 19A
Case, 150.72 grains
Bullet, ball, 139.63 grains
Charge, NRN 11, Lot D 16520, 30.57 grains

8. Cartridge, SA, caliber .280, AP, Lot 21A
Case, 150.59 grains
Bullet, AP, 128.45
Charge, NRN 11, Lot D 16520, 29.55 grains

9. Cartridge, SA, caliber .280, API, Lot 23A
Case, 150.84 grains
Bullet, API, 130.24 grains
Charge, NRN 11, Lot D 16520, 29.44 grains

10. Cartridge, SA, caliber .280, tracer, Lot 32A
Case, 151.16 grains
Bullet, 115.17 grains
Charge, IMR, 25.51 grains

11. Cartridge, SA, caliber .280, OBS, Lot 17A
Case, 150.73 grains
Bullet, 127.54 grains
Charge, NRN 11, Lot D 16520, 29.33 grains

12. Cartridge, SA, caliber .280, grenade, Lot No. 20E

Photographs of the above cartridge components are enclosed as Appendix B.

III DETAILS OF TEST

A. PROCEDURES

1. Mann barrel accuracy at 600 yard range.

a. Equipment using caliber .30, T65 ammunition:

Rifle, accuracy, caliber .30, T7692088
Rest, recoil, accuracy, caliber .30, 49-6-408
Frankford Arsenal machine rest

b. Equipment using caliber .280 ammunition:

Mann barrel, fitted to P-17 receiver (Enfield, caliber .30 action)
Vee slide, No. 101, type 18826 (British manufacture)

The above equipment used in the U. K. for caliber .280 accuracy firing was adapted for use in this test by securing the vee slide to a 1-1/2 inch steel plate and in turn fastening this to a Frankford Arsenal machine rest with 4 - 3/8" machine bolts. Appendix C, Photograph A61272, shows the weapon used for firing the caliber .280 ammunition and the method of fastening to the FA rest. Appendix C, Photograph A61273, shows the caliber .30 accuracy rifle, recoil rest, and FA rest. Note that in the caliber .30, T65 equipment the weapon is securely clamped in a rest which recoils whereas the caliber .280 weapon recoils sliding in a vee which is stationary. Recoil of the caliber .280 weapon is restrained by a spring-loaded vee-shaped fixture at the rear of the barrel.

c. Five ten-shot accuracy targets of each type of ammunition were fired and measured. Two series of five ten-shot diagrams were fired with ball and AP ammunition of each caliber. Two weapons, of each caliber, were used in firing the ball and AP ammunition as a check on performance of equipment. All firing was conducted in accordance with ORD-M608-PM, Volume III, 7-14. All firing was conducted when wind velocity was 10 mph or less; however, to eliminate any variable in wind velocity or direction on the different calibers undergoing test, the following procedure was adopted.

[redacted]

Two weapons, one of each caliber, were fired simultaneously down the same range. Therefore, for each accuracy target of one caliber, an accuracy target of the other caliber is recorded that was fired under identical conditions of wind velocity and direction.

In addition to the ammunition undergoing test, [redacted] conducted in both caliber .30, T65 and .280 using lead-core ball ammunition.

2. Velocity Firing

a. Equipment using caliber .30, T65 ammunition: Universal receiver, caliber .30, M2; Velocity barrel, light rifle, chambered in accordance with SK-FSA5212; Rest, recoil, for Universal receiver; Frankford Arsenal machine rest.

b. Equipment using caliber .280 ammunition:

Ordnance Factory Base Pressure Housing. (British manufacture)
Velocity barrel fitted to above housing, No. 449/5.
The above housing was securely bolted to a one-inch steel plate which in turn was bolted to a Frankford Arsenal machine rest.

c. All velocities were recorded on a counter chronograph initiated by lumiline screens placed 53 and 103 feet from the gun muzzle.

All firing was conducted in accordance with ORD-M608-PM, Volume III, 7-13.

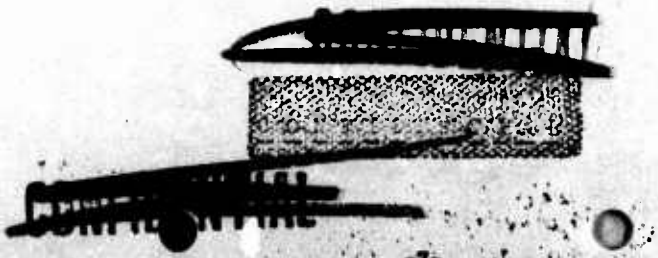
d. All velocity averages were obtained from 20-round strings.

e. Prior to firing, all ammunition was conditioned for at least 2 hours in a controlled constant temperature. Ammunition was fired after conditioning at +70°F, +165°F and -65°F.

f. Appendix C, Photographs A61274 and A61275 show the caliber .30 and caliber .280 velocity and pressure equipment utilized in this test. The only difference in velocity and pressure equipment is in the barrel, therefore, the photographs enclosed are titled, pressure barrels.

3. Pressure Firing

a. Equipment using caliber .30, T65 ammunition: Universal receiver, caliber .30, M2; Pressure barrel, light rifle, No. G30 chambered in accordance with SK-FSA-5212; Rest, recoil, for Universal receiver; Frankford Arsenal machine rest.



[redacted]

b. Equipment using caliber .280 ammunition

Ordnance factory base pressure housing
Pressure barrel fitted to above housing, No. 449/6

The above housing was used in the veloci[redacted] and the method of mounting is described under III, A, 2b. The caliber [redacted] barrels No. 449/5 and No. 449/6 are identical and can be used interchangeably. However, for this test No. 449/6 was designated as a pressure barrel and No. 449/5 as a velocity barrel.

The base pressure gage used in this test consists of a pressure housing, breechblock, firing mechanism and adapters, so pressure recordings can be taken from any type of proof barrel. The breechblock is designed so that a well in the forward part accommodates a copper and a steel pad; the thickness of the steel pad varies with the tonnage of the copper used. The resultant combination permits a definite head space to be obtained when the mouth of the well is in direct contact with the breech end of the barrel. The copper used has a circular hole through the center; the firing pin passes through this hole and through a corresponding hole in the steel pad.

Immediately prior to loading, the cartridge case is dipped to a depth a little below the shoulder in oil. When the round is fired, the cartridge case sets back and acts as a piston against the steel pad which in turn compresses the copper. The amount of compression of the copper (or decrement) is measured and this is converted to pressure by reference to the correct tarage table.

The coppers used with this equipment vary in diameter according to the caliber under test and in length according to the amount of the precompression applied, each type of precompressed copper is further subdivided into five grades to compensate for small variations in hardness in the copper.

Care must, therefore, be taken to select for a particular set of pressure measurements a copper, the pressure decrement of which will lie within the range of .010" to .030". Consequently it was not possible in all cases to utilize the same precompressed tonnage copper either for the various types of rounds at one temperature or for one type of round at various temperatures. Since coppers of different precompressions gave slightly different recorded pressures for the same actual pressures, directly comparative pressure results are not normally obtained.

Appendix C, Photograph A61278 shows a disassembly view of the Ordnance Factory Pressure Housing. The position of a round of ammunition and a base copper, relative to the firing mechanism are also shown.

c. Averages were obtained from twenty-round strings.

d. Prior to firing all ammunition was conditioned for at least two hours in a controlled constant temperature. Ammunition was fired after conditioning at +70°F, +165°F and -65°F.

[redacted]

4. Flash Test Firing

a. Flash characteristics of both calibers of ammunition undergoing test were observed by firing each type of ammunition from weapons having the same barrel length and by firing ball ammunition from weapons designed for the respective ammunition.

b. Firing was conducted in a darkened closed range to better observe flash and make possible the use of a camera to obtain a permanent record. Flash from all firing was photographed by two f2.5, 4 x 5 inch Speed Graphic cameras using Super XX film.

c. Firing was divided into two phases as follows:

(1) A twenty-round burst of each type ammunition in both calibers was fired from M1919A4 machine guns modified for the caliber .30, T65 and caliber .280 respectively.

(2) Twenty rounds of ball ammunition were fired single shot from the caliber .30 rifle, M1; caliber .30 lightweight rifle T25; caliber .280 auto-rifle EM-2; and the caliber .280 auto-rifle, FN. All rifles were fired with and without flash hider except the caliber .280, EM-2 which does not require a flash hider. In the above firing, photographs and visual observations were taken of the cumulative flash of all rounds fired.

d. The two cameras were placed and designated as follows:

(1) Camera A; 4.5' left of gun muzzle

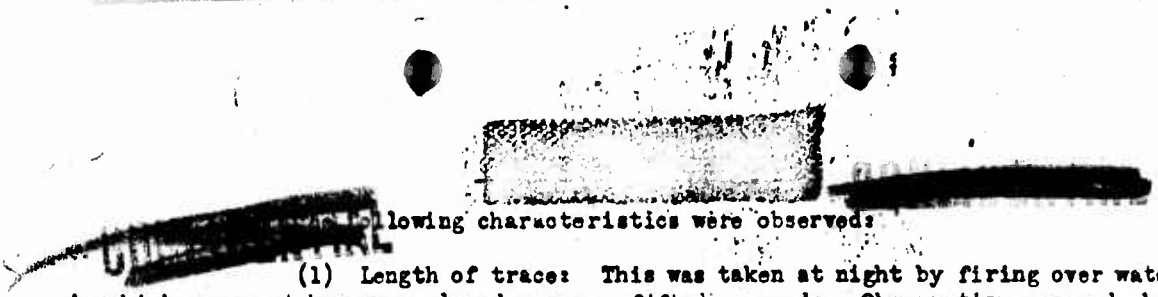
(2) Camera B; 2' left and 3.5' to rear of gun muzzle

5. Smoke Test Firing

Smoke characteristics of the ammunition undergoing test were compared by visually observing the relative obscuration of a 20-foot square target placed 150 feet from the gun muzzle. Observation was made during burst fire from a gunner's position directly behind the gun. Modified M1919A4 machine guns were used in this phase. To record the resultant smoke and obscuration, a 16-mm motion picture camera was operated 9 feet to the rear and 9" above the gun muzzle. The film is on file at this station and is available for further study. Since smoke is a characteristic of the propellant and is little affected by the bullet, only ball and tracer ammunition of each caliber were fired.

6. Tracer Test Firing

a. Comparison of tracer characteristics between the caliber .30, T65, and caliber .280 ammunition undergoing test was conducted by firing from modified M1919A4 machine guns.



llowing characteristics were observed:

(1) Length of trace: This was taken at night by firing over water in which range stakes were placed every fifty yards. Observation was made by qualified observers located in a tower looking down on the bullet path and range stakes. Length of trace can be measured to the closest 25 yards by this method.

(2) Length of igniter: This was measured by observing the point at which the tracer composition reached its normal brilliance. Observation was made at night with reference to lights placed 25, 50, 75, and 100 yards from the gun muzzle.

(3) Brilliance of igniter and trace were observed in conjunction with the above firing.

(4) Percent ignition was calculated from the results of above firing.

(5) Daylight visibility of trace was observed from the gun. This was observed during the firing conducted to obtain smoke characteristics.

7. The caliber .30 grenade ammunition was fired in the lightweight rifle, T25, and the caliber .280 grenade ammunition in both the auto-rifle EM-2 and auto-rifle FN. The rifles were fired at a thirty-degree angle to the horizontal with the butt placed firmly on the ground. Since accuracy of the grenade depends more on the grenade than on the launching ammunition, accuracy was not measured. During this phase, functioning of the launching ammunition and range of the grenades fired were observed. Grenade, AT, practice, M11A2, were utilized for functioning and determining range.

8. Due to the small quantity of ammunition available, very little could be done to determine erosion characteristics. Erosion data were obtained in conjunction with the lightweight rifle test of this same project by measuring instrumental velocity at 78 feet in rifles used in the rifle test. Velocity was measured from 9 rifles at the beginning, during, and at the conclusion of the rifle test. The amount of velocity drop is one measure of barrel erosion.

Erosion characteristics of the ammunition in machine gun barrels were not obtained due to lack of ammunition. A limited number of burst velocities from M1919A4 machine guns were obtained during the function firing of API and observing ammunition. These velocities were recorded on a counter chronograph initiated by lumiline screens placed 53 and 103 feet from the gun muzzle.

The velocity of ball ammunition when fired from those barrels used in the penetration test were also recorded using the above equipment. These velocities were recorded to insure that the velocity level of the penetration barrels had not dropped throughout the penetration test.

[redacted]

[redacted]ition Firing

a. Tank ignition characteristics of the API ammunition were obtained by firing the following programs:

(1) At 100, 300, and 500 yards range.

(a) Above and below fuel level with fuel container exposed, 1/2", 4", 8", and 12" behind a 10-gauge mild steel plate.

b. Seventy-two octane, automotive grade gasoline was used throughout the test.

c. Fuel was contained in standard 5-gallon issue type safety cans.

d. To maintain uniformity in conditions throughout the firing the following procedure was followed.

(1) All recorded hits on the target were true, i.e., hits near the edge of the can or on seams were disregarded and additional firing was conducted.

(2) Firing of the two calibers of ammunition was conducted with weather conditions as nearly alike as possible.

(3) During firing above the fuel level, an attempt was made to maintain the same vapor concentration in the can for each can fired.

(4) All hits on the plate in front of the fuel can were true hits. All doubles etc were disregarded and refired.

(5) A new can was utilized for each shot recorded.

e. All firing was conducted from weapons utilized in the accuracy phase. (Mann barrels)

f. A limited investigation of the functioning characteristics of the API ammunition firing from a machine gun was conducted. This was performed by firing API linked 1 to 4 with ball or AP ammunition in cold and in hot barrels. Occurrence of muzzle bursts were of primary interest.

g. It was agreed by the Working Committee that a sufficient comparison of ignition characteristics could be obtained from the above program and firing with fuel at -65°F and +125°F as requested in the directive was deleted.

[redacted]

10. Penetration Test Firing

a. Penetration characteristics of the Ball, AP and API ammunition going test were obtained by firing the following program:

(1) The following targets were utilized:

(a) One-inch pine boards placed one inch apart. Photograph No. A61221 (Appendix D).

(b) Ten-gauge mild steel plates placed four inches apart.

(c) Helmet, M1.

(d) Vest, armor, M12.

(e) Masonry-bonded, brick wall, 8-1/2 inches thick.

(f) Hard homogeneous armor 1-1/2 inches thick at angles of 0°, 20°, 30° and 40° (Brinell 286).

(2) The above targets were to be fired at from the following ranges: 25, 100, 300, 600, 800, 1000, 1200, 1600 and 2000 yards. Firing on a particular target was discontinued at the range at which penetration was not achieved.

(3) All firing at ranges up to 600 yards was conducted with a rifle, and at 800 yards and over a modified M1919A4 machine gun was used.

The caliber .30 ammunition was fired from lightweight rifle, T25, No. 10. The caliber .280 ammunition was fired from auto-rifle EM-2, No. 3.

(4) Instrumental velocity at 78 feet was recorded for the above weapons prior to and at the completion of the penetration firing.

(5) Instrumental velocity at 78 feet was recorded for the caliber .280 and caliber .30 machine gun barrels at the conclusion of the penetration firing.

(6) It was agreed by the Working Committee that average concrete, common earth, and sand in bags as listed in Test 1, Phase II of the Test Plan be deleted as targets. It was further agreed that depth of penetration in 1-1/2 inch hard homogeneous armor at various angles of obliquity would be acceptable. This armor was substituted due to the supply shortage of various thicknesses of adequate armor plate.

11. Time-of-Flight data were obtained for Ball, AP, API, Tracer and Observing ammunition of each caliber by conducting the following program:

[redacted]

a. Firing was conducted from those Mann barrels, (450/3 and 1528613,) utilized in the 600-yard accuracy firing. These barrels were supported in a steady vee slide and allowed to recoil in this slide.

[redacted] Since two different calibers were fired, it was not practicable [redacted]ternate rounds; however, firing was conducted in such a way to keep all weather variables for each type round as near as possible the same.

c. Velocity was recorded at 78 feet on a counter chronograph initiated by lumiline screens placed 28 and 128 feet from the gun muzzle.

d. Time of flight of the projectile from the first lumiline screen at 28 feet to a wire mesh target placed down range was measured on a second counter chronograph. Twenty rounds of each ammunition type were measured for time of flight to 600 and to 1000 yards.

e. Other data taken consisted of the following:

(1) Azimuth of line of fire.

(2) Time each round was fired.

(3) Velocity and direction of wind, at time of firing each round, were recorded at firing site.

(4) Density of air at time of firing determined from temperature measured at the firing site; and pressure and humidity measured by the Meteorological Section of this station.

f. Prior to firing all rounds were base tapped to obtain more uniform results.

12. Maximum range data for caliber .30 and caliber .280 ball ammunition were obtained by conducting the following program:

a. All firing was conducted from those weapons, (450/3 and 1528613), used in the 600 yard accuracy firing. The weapons were supported in a caliber .30 accuracy recoil rest mounted on a Frankford Arsenal machine rest. The caliber .280 barrel, (450/3), was modified to fit the above rest to facilitate firing.

b. Elevation of fire was set at 28° by use of a clinometer, large, M1917. This angle was measured on the vee slide and correlated with the axis of bore which was the true elevation.

c. The gun was located so that the bullets would fall on a previously measured water impact area. Range of each round was determined by observers placed in a dugout at the impact area.

[redacted]

[redacted]

d. Time of flight was taken by two observers at the impact area timing the gun report and water impact.

[redacted] was conducted when surface and aloft wind velocities were zero.

f. Elevation of the gun muzzle above mean low tide was measured with reference to Bench Marks at the firing points.

g. Weather data necessary in this firing were furnished by the Meteorological Section.

13. Observing Cartridge Functioning

a. A comparison of the functioning characteristics of the caliber .30 and caliber .280 ammunition was made by firing at the following targets from 1000 yard range:

(1) Hard packed cinder road.

(2) Sandy earth.

(3) Scrub brush

(4) Grassy field

(5) Brick wall, 8-1/2" thick.

b. The 7.92 mm German observing round was used as a control in this firing phase.

c. The above program was set up as that closest to duplicating the tactical use of observing ammunition. The complete program as requested in the test directive was not fired in order to conserve ammunition necessary for the user tests and to avoid duplication with the user tests.

14. Test number two as listed in Phase II of the Test Plan requesting a determination of the shock effect of the U. S. caliber .30 and U. K. caliber .280 ammunition was not conducted at this station. At the present time the above phase is being conducted by the Wound Ballistic Section of the Army Chemical Center. A separate report on shock effect will be prepared by that organization.

15. It was agreed by the Working Committee that tests seven, eight and nine as requested in Phase II of the Test Plan could be deleted. In accordance with the above, these tests were not conducted.

[redacted]

B. RESULTS.

[redacted] A summary of Mann barrel accuracy results follows. The Ball and AP ammunition of both calibers were fired from two weapons to obtain a better average. The following abbreviations are utilized in the summary. All measurements are in inches.

MR - Mean Radius
MVD - Mean Vertical Dispersion
MHD - Mean Horizontal Dispersion
EVD - Extreme Vertical Dispersion
EHD - Extreme Horizontal Dispersion
ES - Extreme Spread

Complete accuracy data are enclosed as Appendix E.

Summary of Mann Barrel Accuracy at 600 Yards

WEAPON	MR	MVD	MHD	EVD	EHD	ES
AMMUNITION: Cartridge, Ball, Caliber .30, T104, Lot No. FAX30-1358						
1528385	5.43	3.09	2.97	15.52	16.58	19.87
1528613	5.38	3.45	3.36	13.63	13.77	17.97
Average	5.40	3.27	3.17	14.57	15.18	18.92
AMMUNITION: Cartridge, Ball, Caliber .280, Lot 19A						
450/2	11.24	7.91	5.82	33.29	27.13	37.05
450/3	8.28	5.47	5.00	20.94	22.38	27.85
Average	9.76	6.69	5.41	27.12	24.76	32.45
AMMUNITION: Cartridge, AP, Caliber .30, T93, Lot No. FAX30-1357						
1528385	4.56	2.96	2.79	15.02	10.72	16.04
1528613	6.02	3.81	3.69	16.19	14.45	18.25
Average	5.29	3.39	3.24	15.61	12.59	17.15
AMMUNITION: Cartridge, SA, AP, Caliber .280, Lot 24A						
450/2	9.88	6.31	6.18	24.11	26.20	31.46
450/3	12.75	9.18	6.66	35.81	31.56	43.59
Average	11.32	7.75	6.42	29.26	[illegible]	37.53

[redacted]

WEAPON	MR	MVD	MHD	EVD	EHD	ES
	AMMUNITION: Cartridge, API, Caliber .30, T101, Lot FAX30-1356					
1528385	6.48	3.88	4.51	14.80	17.19	19.84
	AMMUNITION: Cartridge, SA, API, Caliber .280, Lot 23A					
450/2	7.22	4.79	3.96	23.64	15.55	24.40
	AMMUNITION: Cartridge, Tracer, Caliber .30, T102, Lot FAX30-1359					
1528385	11.24	7.40	6.48	30.28	26.30	38.75
	AMMUNITION: Cartridge, SA, Tracer, Caliber .280, Lot 32A					
450/2	10.78	5.86	7.36	26.03	29.92	34.77
	AMMUNITION: Cartridge, Spotting, Caliber .30, T103, Lot No. 2					
1528385	10.29	6.01	13.88	33.38	24.91	34.58
	AMMUNITION: Cartridge, SA, OBS, Caliber .280, Lot 17A					
450/2	9.57	6.92	5.03	27.68	20.12	28.84

A tabulated summary of accuracy results obtained from firing lead core ball ammunition follows. Lot No. FAX30-1290 and Lot No. 21A were fired simultaneously as described in III, A, Method of Test. Lot No. 12A was fired at the request of the U. K. representative as a further control on the caliber .280 accuracy firing. The figures given are the averages obtained from 5 targets of each ammunition. Complete accuracy results are enclosed in Appendix E.

	150 GRAINS (LEAD CORE) CTG, BALL, CALIBER .30 LOT FAX30-1290	130 GRAINS (LEAD CORE) CTG, SA, BALL, CALIBER .280 LOT 12A	140 GRAINS (LEAD CORE) CTG, SA, BALL, CALIBER .280 LOT 21A
MR	3.03	6.31	6.90
MVD	2.30	3.54	4.51
MHD	2.53	3.74	3.99
EVD	9.54	17.27	19.96
EHD	9.59	14.37	16.46
ES	12.04	21.02	21.59

[redacted]

2. A summary velocity results fired from velocity barrels follows. All velocities are the instrumental at 78 feet given in feet per second. Complete velocity results are enclosed [redacted] F.

[redacted]

	AMMUNITION TEMPERATURE		
	-65°F	+70°F	+165°F
AMMUNITION: Cartridge, Ball, Caliber .30, T104, Lot No. FAX30-1358			
Average Velocity	2592	2771	2836
Maximum Velocity	2639	2818	2870
Minimum Velocity	2534	2728	2792
Extreme Variation	105	90	78
Standard Deviation	36.1	21.8	17.2
AMMUNITION: Cartridge, SA, Ball, Caliber .280, Lot No. 19A			
Average Velocity	2164	2273	2361
Maximum Velocity	2218	2344	2399
Minimum Velocity	2103	2224	2313
Extreme Variation	115	120	86
Standard Deviation	26.7	28.6	26.8
AMMUNITION: Cartridge, AP, Caliber .30, T93, Lot FAX30-1357			
Average Velocity	2606	2822	2835
Maximum Velocity	2658	2862	2867
Minimum Velocity	2505	2770	2807
Extreme Variation	153	92	60
Standard Deviation	37.2	22.3	16.6
AMMUNITION: Cartridge, SA, AP, Caliber .280, Lot No. 24A			
Average Velocity	2067	2202	2302
Maximum Velocity	2101	2236	2347
Minimum Velocity	2016	2150	2283
Extreme Variation	85	86	64
Standard Deviation	21	24.6	17.4
AMMUNITION: Cartridge, API, Caliber .30, T101, Lot FAX30-1356			
Average Velocity	2598	2739	2847
Maximum Velocity	2660	2784	2871
Minimum Velocity	2554	2664	2812
Extreme Variation	106	120	65
Standard Deviation	30.3	20.7	14.6

[redacted]

[redacted]

[redacted]

AMMUNITION TEMPERATURE

	-65°F	+70°F	+165°F
AMMUNITION: Cartridge, API, Caliber .280, Lot No. 23A			
Average Velocity	2017	2196	2308
Maximum Velocity	2097	2252	2387
Minimum Velocity	1970	2153	2241
Extreme Variation	127	99	146
Standard Deviation	33.9	30.1	46.3
AMMUNITION: Cartridge, Tracer, Caliber .30, T102, Lot FAX30-1359			
Average Velocity	2554	2629	2732
Maximum Velocity	2629	2678	2758
Minimum Velocity	2511	2573	2703
Extreme Variation	118	105	55
Standard Deviation	31.8	30.3	15.3
AMMUNITION: Cartridge, Tracer, Caliber .280, Lot 32A			
Average Velocity	2114	2248	2370
Maximum Velocity	2218	2319	2399
Minimum Velocity	2070	2170	2326
Extreme Variation	148	149	73
Standard Deviation	36.7	30	15.4
AMMUNITION: Cartridge, Spotter, Caliber .30, T103, Lot No. 2			
Average Velocity	2510	2726	
Maximum Velocity	2568	2762	
Minimum Velocity	2456	2671	
Extreme Variation	112	91	
Standard Deviation	24.4	24.1	
AMMUNITION: Cartridge, OBS, Caliber .280, Lot No. 17A			
Average Velocity	2195	2340	
Maximum Velocity	2253	2379	
Minimum Velocity	2147	2287	
Extreme Variation	106	92	
Standard Deviation	27.4	23.4	

Observing ammunition was not fired at +165°F due to the possible hazard involved.

[redacted]

[redacted]

[redacted]

[redacted]

3. A summary of pressure results follows. Pressure is given in pounds per square inch. Velocity was taken 78 feet from the muzzle and is given in feet per second. Complete pressure results are enclosed as Appendix G.

[redacted]

	AMMUNITION TEMPERATURE		
	-65°F	+70°F	+165°F
AMMUNITION: Cartridge, Ball, Caliber .30, T104, Lot No. FAX30-1358			
Average Pressure	46515	52050	47715
Maximum Pressure	50600	55100	51500
Minimum Pressure	42400	50000	45100
Extreme Variation	8200	5100	6400
Standard Deviation	2213	1380	1730
Average Velocity	2589	2753	2775
Maximum Velocity	2653	2790	2820
Minimum Velocity	2500	2737	2746
Extreme Variation	153	53	74
Standard Deviation	44.2	13.9	21.9
AMMUNITION: Cartridge, SA, Ball, Caliber .280, Lot 19A			
Average Pressure	38750	43100	45000
Maximum Pressure	44100	45900	47300
Minimum Pressure	35800	41900	43900
Extreme Variation	8300	4000	3400
Standard Deviation	2391	1100	794
Average Velocity	2156	2295	2309
Maximum Velocity	2190	2328	2357
Minimum Velocity	2053	2266	2266
Extreme Variation	137	62	91
Standard Deviation	28.4	19.6	23.8
AMMUNITION: Cartridge, AP, Caliber .30, T93, Lot FAX30-1357			
Average Pressure	48275	51270	48445
Maximum Pressure	52400	54900	52000
Minimum Pressure	43700	47000	46600
Extreme Variation	8700	7900	5400
Standard Deviation	2440	2542	1426
Average Velocity	2628	2787	2814
Maximum Velocity	2677	2811	2859
Minimum Velocity	2568	2758	2781
Extreme Variation	109	53	78
Standard Deviation	30.3	17.8	18.8

[redacted]

[redacted]

AMMUNITION TEMPERATURE

	-65°F	+70°F	+165°F
AMMUNITION: Cartridge, SA, AP, Caliber .280, Lot No. 24A			
Average Pressure		39200	40000
Maximum Pressure		41200	42500
Minimum Pressure		37850	38150
Extreme Variation		3350	4350
Standard Deviation		870	886
Average Velocity		2238	2276
Maximum Velocity		2306	2330
Minimum Velocity		2180	2242
Extreme Variation		126	88
Standard Deviation		36.9	25.5

Pressures of caliber .280, AP ammunition could not be recorded at -65°F with available equipment.

AMMUNITION: Cartridge, API, Caliber .30, T101, Lot FAX30-1356			
Average Pressure	46205	50390	48495
Maximum Pressure	50100	52200	51800
Minimum Pressure	41500	46200	45000
Extreme Variation	8600	6000	6800
Standard Deviation	2194	1043	1915
Average Velocity	2560	2695	2783
Maximum Velocity	2607	2743	2811
Minimum Velocity	2500	2671	2744
Extreme Variation	107	72	67
Standard Deviation	30.9	17.4	21.1

AMMUNITION: Cartridge, SA, API, Caliber .280, Lot No. 23A			
Average Pressure		39500	40900
Maximum Pressure		42500	43400
Minimum Pressure		38100	38150
Extreme Variation		4400	5250
Standard Deviation		1249	1385
Average Velocity		2194	2252
Maximum Velocity		2252	2343
Minimum Velocity		2165	2204
Extreme Variation		87	139
Standard Deviation		22.5	37.9

Pressure of caliber .280, API, ammunition could not be recorded at -65°F with available equipment.

[redacted]

[redacted]

[redacted]

[redacted]

	AMMUNITION TEMPERATURE		
	-65°F	+70°F	+165°F

AMMUNITION: Cartridge, Tracer, Caliber .30, T102, Lot FAX30-1359

[redacted]			
Average Pressure	43845	42885	40575
[redacted]	51600	46100	42300
[redacted] Pressure	37500	39800	38600
[redacted] Variation	14100	6300	4200
[redacted] Deviation	3150	1820	1195
Average Velocity	2476	2568	2668
Maximum Velocity	2585	2615	2704
Minimum Velocity	2393	2505	2629
Extreme Variation	192	110	75
Standard Deviation	42.4	29.9	19.5

Caliber .280, tracer ammunition was not fired from a pressure barrel as pressures were too low to record with available equipment.

AMMUNITION: Cartridge, Spotter, Caliber .30, T103, Lot No. 2

Average Pressure	38860	42185
Maximum Pressure	41000	44000
Minimum Pressure	34000	38300
Extreme Variation	7000	5700
Standard Deviation	1609	1223
Average Velocity	2504	2708
Maximum Velocity	2571	2762
Minimum Velocity	2446	2674
Extreme Variation	125	88
Standard Deviation	27.3	22.5

AMMUNITION: Cartridge, SA, OBS, Caliber .280, Lot No. 17A

Average Pressure	36200	38500
Maximum Pressure	37200	39650
Minimum Pressure	35200	37400
Extreme Variation	2000	2250
Standard Deviation	669	729
Average Velocity	2261	2355
Maximum Velocity	2325	2393
Minimum Velocity	2215	2303
Extreme Variation	110	90
Standard Deviation	26.1	27

Observing ammunition was not fired at +165°F due to possible [redacted]

[redacted]

[redacted]

4. The preceding velocity and pressure results on the caliber .280 ammunition were lower than that expected by the U.K. representatives. To confirm the preceding results and check on the equipment used, twenty-round strings of cartridge, SA, caliber .280, ball, Lot 40A were fired in two different weapons recording velocity and the combined pressure/velocity. Lot 40A is used in the United Kingdom as a check lot and serves the same purpose as hand loaded reference rounds. Lot No. 40A was assessed to give an instrumental velocity at 90 feet of 2314 feet/sec and a base pressure of 46,800 pounds per square inch. This ammunition was conditioned at 80°F prior to firing. Assessment firing was conducted at Swynnerton, England, a proof establishment of the British Army.

A summary of velocity and combined pressure/velocity results for Lot 40A follows. Complete firing data are included as Appendix H.

Summary of Velocity Firing Conducted With Cartridge, SA, Caliber .280, Ball, Lot 40A

	VELOCITIES IN fps AT 78 FEET					
WEAPON	AVERAGE	MAXIMUM	MINIMUM	EXTREME VARIATION	STANDARD DEVIATION	DATE
449/5	2238	2306	2203	103	27.2	10 March 1950
449/5	2231	2264	2214	50	13.9	15 March 1950
449/6	2266	2354	2188	166	40.4	10 March 1950
449/6	2222	2246	2198	48	13.6	15 March 1950

Summary of Pressure Firing Conducted With Cartridge, SA, Caliber .280, Ball, Lot 40A

	WEAPON NO.	
	449/5	449/6
Average Pressure	42750	42750
Maximum Pressure	43600	43450
Minimum Pressure	41850	41850
Extreme Variation	1750	1600
Standard Deviation	527	491
Average Velocity	2232	2236
Maximum Velocity	2273	2296
Minimum Velocity	2198	2194
Extreme Variation	75	102
Standard Deviation	16.8	31.3

5. To investigate the drop in pressure common to the caliber .30 ammunition at increased temperature additional firing was conducted at +70°F and +165°F from a different weapon. A caliber .30 pressure barrel fitted to a M1903 receiver was used. A summary of the results follow which verify the previous pressure firing. Pressures are given in pounds per square inch and velocity in feet per second measured 78 feet from the muzzle. Complete firing data are enclosed as Appendix I.

[redacted]

[redacted]

Summary of Pressure Firing Conducted With Rifle, Caliber .30, Pressure, Barrel 17, Receiver No. 4195345.

[redacted]

AMMUNITION: Cartridge, Ball, Caliber .30, T104, Lot FAX30-1358	AMMUNITION TEMPERATURE +70°F	+165°F
Average Pressure	46705	45045
Maximum Pressure	49800	49000
Minimum Pressure	43100	42200
Extreme Variation	6700	6800
Standard Deviation	1986	1905
Average Velocity	2716	2733
Maximum Velocity	2772	2793
Minimum Velocity	2687	2637
Extreme Variation	85	156
Standard Deviation	23.4	30.9

6. Complete data on firing performed to observe flash characteristics of ammunition are enclosed as Appendix J; all photographs taken during the above firing are enclosed as Appendix K.

In general, when fired from barrels of the same length (modified M1919A4 machine gun) the caliber .30 ammunition loaded with ball type powder gave considerably more flash than that from the caliber .280 ammunition. The tracer ammunition of each caliber, both loaded with an IMR powder, gave more comparable flashes, that from the caliber .30 being larger.

When fired from weapons with a barrel length designed for the two ammunitions undergoing test, the caliber .30 ammunition gives more flash. The above characteristics are given in more detail in the firing data. The accompanying photographs in Appendix K do not show all flash visible to the eye but merely serve as a means of relative comparison.

7. Complete data of firing performed to compare smoke characteristics are enclosed as Appendix L. A 16-mm motion picture film, APG 1135, taken during burst fire showing obscuration of a twenty-foot square target, 150 feet from the gun muzzle is on file at this station. (Film not available until August 1950.) This film is available for showing on request by any interested and authorized personnel.

In general, the smoke resulting from firing caliber .30, T65 ammunition was considerably denser and was produced in greater volume than that from caliber .280 ammunition. As in the case of visible flash, the tracer ammunition, both calibers of which were loaded with an IMR powder, gave comparable types of smoke.

[redacted]

8. Complete data recorded during the tracer firing are enclosed as Appendix M. A summary of results obtained during the tracer test follows:

Caliber .30, T65

Weapon: Gun, Machine, Caliber .30, M1919A4 (Modified), No. 839252, Barrel No. 4, Previous Rounds 100

Ammunition: Cartridge, Caliber .30, Tracer, T102, Lot No. FAX30-1359

Caliber .280

Weapon: Gun, Machine, Caliber .280, M1919A4 (Modified), No. OW 4966, Barrel No. 4, Previous Rounds 245

Ammunition: Cartridge, SA, Caliber .280, Tracer, Lot No. 32A

Summary of Tracer Test Results

	CALIBER .30 AMMUNITION	CALIBER .280 AMMUNITION
Average Length of Trace, Yards	879	1061
Maximum Length of Trace, Yards	900	1075
Minimum Length of Trace, Yards	850	1000
Average Length of Igniter, Yards	50	64
Maximum Length of Igniter, Yards	75	90
Minimum Length of Igniter, Yards	30	50
Number Rounds Fired	200	200
Number Failing to Trace	0	2
% Trace	100	99
Color of Trace	Dull Red	Rose Red
Brilliance of Trace	Brilliant	More Brilliant
Igniter	Dim	Invisible

9. Complete data taken during the firing of the grenade launching cartridges are enclosed as Appendix N. A summary of results follows:

	RIFLE, LIGHTWEIGHT, CALIBER .30, T25	
	NO. 14	NO. 15
Cartridge, Caliber .30, Grenade, T116, Lot FAX30-1367, Grenade, AT, Practice, M11A2		
Average Range, 10 Rounds, Feet	617.3	589.3
Maximum Range, 10 Rounds, Feet	649.0	625.0
Minimum Range, 10 Rounds, Feet	590.0	472.0

[redacted], LIGHTWEIGHT, CALIBER .30, T25

	NO. 14	NO. 15
Fired With Addition of Cartridge, Grenade, Auxiliary, M7, Lot FA-S-31		
Average Range, 10 Rounds, Feet	955.3	910.8
Maximum Range, 10 Rounds, Feet	1024.0	950.0
Minimum Range, 10 Rounds, Feet	894.0	872.0

	RIFLE, AUTO, CALIBER .280, FM-2		RIFLE, AUTO, CALIBER .280, FN	
	NO. 6	NO. 8	NO. 6	NO. 7
Cartridge, Caliber .280, Grenade, Lot 20E [redacted], Grenade, AT, Practice, M11A2				
Average Range, Feet	731.0	Note 1	723.5	708.25
Maximum Range, Feet	800.0		766.5	742.0
Minimum Range, Feet	711.5		690.0	671.5

Note 1: On caliber .280 auto rifle EM-2, No. 6, four rounds out of ten failed to launch properly. On auto rifle EM-2, No. 8, seven rounds out of ten failed to launch properly. The grenade fin assembly tube split indicating that the combination of ammunition, grenade launcher and grenade as used with the EM-2 is neither safe nor satisfactory.

10. A tabulated summary of the ignition results of the caliber .30 and caliber .280, API ammunition follows. Complete firing results are enclosed as Appendix O.

Summary of Ignitions
Range 100 Yards

PLATE DISTANCE	STRIKE, REFERENCE TO FUEL LEVEL	CALIBER .30, API, LOT FAX30-1356		CALIBER .280, LOT 23A	
		IGNITED	FAILED	IGNITED	FAILED
No Plate	Below	0	5	0	5
No Plate	Above	0	5	0	5
1/2"	Below	0	5	4	1
1/2"	Above	1	4	2	3
4"	Below	2	3	2	3
4"	Above	4	1	4	1
8"	Below	0	5	2	3
8"	Above	2	3	1	4
12"	Below	0	5	5	0
12"	Above	0	5	1	4

[redacted]

[redacted]

Summary of Ignition Firing
Range 300 Yards

PLATE DISTANCE	STRIKE, REFFRENCE TO FUEL LEVEL	CALIBER .30, API, LOT FAX30-1356 IGNITED	FAILED	CALIBER .280, LOT 23A IGNITED	FAILED
No Plate	Below	0	5	0	5
No Plate	Above	1	4	0	5
1/2"	Below	2	3	3	2
1/2"	Above	2	3	0	5
4"	Below	2	3	3	2
4"	Above	1	4	1	4
8"	Below	0	5	2	3
8"	Above	2	3	0	5
12"	Below	0	5	3	2
12"	Above	0	5	1	4

Summary of Tank Ignition Firing
Range 500 Yards

No Plate	Below	1	4	0	5
No Plate	Above	1	4	2	3
1/2"	Below	0	5	3	2
1/2"	Above	0	5	0	5
4"	Below	2	3	3	2
4"	Above	1	4	0	5
8"	Below	1	4	5	0
8"	Above	0	5	0	5
12"	Below	1	4	4	1
12"	Above	0	5	0	5

11. Following are tabulated summaries of penetration results. These results were obtained from firing caliber .30, T65, and caliber .280 ammunition against various materials as listed. All firing at 600 yards or under was conducted with rifles while at 800 yards and over modified M1919A4 machine guns were utilized. The instrumental velocity at 78 feet of the weapons used is as follows:

[redacted]

[redacted] weapons:

Rifle, lightweight, caliber .30, T25, No. 10

Average velocity at beginning of test - 2737 fps
Average velocity at end of test - 2754 fps

Gun, machine, caliber .30, M1919A4 (modified), barrel No. 3

Average velocity at end of test - 2687 fps

Caliber .280 weapons:

Rifle, auto, caliber .280, EM-2, No. 3

Average velocity at beginning of test - 2211 fps
Average velocity at end of test - 2172 fps

Gun, machine, caliber .280, M1919A4 (modified) barrel No. 3

Average velocity at end of test - 2167 fps

The above velocities were recorded using ball type ammunition in each caliber.

Complete round-by-round data of all penetration firing are enclosed as Appendix P.

Penetration Summary

Table I

Target: 1-Inch pine boards placed 1 inch apart.

Result is the average number of boards penetrated in 10 true hits on the target.

RANGE YARDS	CALIBER .30, T65, AMMUNITION			CALIBER .280, AMMUNITION		
	BALL	AP	API	BALL	AP	API
25	47.25	37.00	17.25	39.50	37.50	39.75
100	43.00	42.50	33.25	33.50	31.25	34.75
300	30.75	30.75	34.75	25.50	22.75	22.75
600	16.00	16.00	18.25	14.25	11.75	10.75
800	8.50	8.50	11.25	8.75	7.75	10.00
1000	6.00	6.00	8.50	6.00	5.00	7.25
1200	4.00	4.00	6.50	4.75	3.25	5.00
1600	2.50	3.00	3.75	3.00	[redacted]	[redacted]
2000	1.25	1.25	1.50	1.75		

The above table is illustrated graphically and is enclosed as part of Appendix [redacted]

[redacted]

[redacted]

Table II

[redacted] steel plates, 4 inches apart.

Result is the average number of plates penetrated in 10 true hits on the target.

RANGE YARDS	CALIBER .30, T65 AMMUNITION			CALIBER .280 AMMUNITION		
	BALL	AP	API	BALL	AP	API
25	3.0	3.5	5.5	2.1	3.0	4.1
100	3.2	4.9	4.6	2.0	3.4	4.0
300	2.7	3.1	3.4	1.0	2.2	2.3
600	1.5	1.9	1.9	1.0	1.0	1.0
800	1.0	1.0	1.0	1.0	1.0	0.6
1000	0.1	0.1	1.0	0	0	0
1200	---	---	0	---	---	---

The above data are illustrated graphically and is enclosed as part of Appendix Q.

Table III

Target: 1-1/2-Inch homogeneous hard armor.

Result is the average inches of penetration achieved from 10 rounds.

Range 100 Yards

ANGLE OF OBLIQUITY	CALIBER .30, T65 AMMUNITION			CALIBER .280 AMMUNITION		
	BALL	AP	API	BALL	AP	API
Normal	.237	.590	.550	.039	.375	.393
20°	.165	.556	.543	.025	.387	.384
30°	.056	.556	.171	.020	.178	.168
40°	.057	.134	.109	.016	.153	.166

The above data are graphically illustrated and is enclosed as part of Appendix Q.

[redacted]

Table IV

Following is a summary of results obtained when firing against Helmet, M1 and Vest, Armor, M12.

RANGE YARDS		PERCENT OF ROUNDS FIRED ACHIEVING PENETRATION CALIBER .30, T65 BALL	AP	API	CALIBER .280 BALL	AP	API
600	Helmet	100	Not Fired	100	100	Not Fired	100
	Vest, Armor	100	Not Fired	100	100	Not Fired	100
800	Helmet	100	100	100	100	100	100
	Vest, Armor	100	100	100	70	80	40
1000	Helmet	100	Not Fired	100	100	100	100
	Vest, Armor	60	60	70	70	50	0
1200	Helmet	100	100	100	100	100	0
	Vest, Armor	0	0	20	20	0	0
1400	Helmet	0	40	100	0	0	0
	Vest, Armor	Not Fired	Not Fired	Not Fired	Not Fired	Not Fired	Not Fired
1600	Helmet	0	0	40	0	0	0
	Vest, Armor	Not Fired	Not Fired	Not Fired	Not Fired	Not Fired	Not Fired

Table V

Target: Brick Wall, 8-1/2" Thick.

Result is the average depth of penetration in inches of five true hits on the target.

"Break through" expresses the total number of rounds required to obtain complete penetration of the wall. To obtain "break through", firing was done at a single aiming point.

RANGE YARDS	CALIBER .30, T65 BALL	AP	API	CALIBER .280 BALL	AP	API
25	4.40	4.65	4.90	3.40	2.95	2.88
100	4.10	3.60	4.35	4.15	4.00	2.80
300	2.80	2.75	3.00	2.35	1.40	1.03
			Break Through			
25	5 Rounds	7 Rounds	6 Rounds	8 Rounds	9 Rounds	14 Rounds
100	10 Rounds	14 Rounds	12 Rounds	14 Rounds	32 Rounds	24 Rounds

The caliber .280, AP and API required an excessively large number [redacted] yards for a break through. Because of the inaccuracy of the ammunition, and the course reticule of the sight, the gunner was unable to hold the impact in a small enough area to obtain a break through with [redacted]

12. [redacted] data recorded during the firing of the observing ammunition are enclosed as Appendix R. Following is a summary of the function characteristics of the observing ammunition.

Summary of Function Results for Caliber .30, Caliber .280 and 7.92 mm Observing Ammunition

Range 1000 Yards

AMMUNITION		TARGET TYPE				
		BRICK WALL	SAND PIT	CINDER ROAD	GRASSY FIELD	SCRUB BRUSH
Caliber .30	Rounds Functioned	25	2	6	1	0
	Rounds Failed to Function	2	16	12	19	7
	Total Rounds Fired	27	18	18	20	7
Caliber .280	Rounds Functioned	18	13	7	17	2
	Rounds Failed to Function	0	1	5	6	8
	Total Rounds Fired	18	14	12	23	10
7.92 mm	Rounds Functioned	10	10	13	9	6
	Rounds Failed to Function	0	0	0	0	4
	Total Rounds Fired	10	10	13	9	10

Against a hard target, the observing ammunition functioned with a large flash and a puff of white smoke. Against soft targets, such as sand or grassy fields, the flash was not visible, and the amount of smoke produced was smaller. This smoke was difficult to see from 1000 yards and would be practically impossible to pick up if the observer did not know where to look.

13. There follows a summary of velocity averages obtained from 20-round strings of ball ammunition fired from rifles used in this test and the 10th Report of Project TS2-2015. These data give a basis for evaluating the erosion caused by caliber .30, T65 ammunition and that by caliber .280 ammunition when fired from these respective rifles.

Complete velocity data are enclosed as Appendix S.

Summary

Complete velocity data of all weapons undergoing test. All velocities are given 78 feet from the muzzle in feet per second.

PREVIOUS ROUNDS	AVERAGE	MAXIMUM	MINIMUM	EXTREME VARIATION	STANDARD DEVIATION
Rifle, Lightweight, Caliber .30, T25, No. 14					
7	2686	2762	2643	119	32.0
6415	2675	2703	2627	76	18.1

[redacted]

PREVIOUS ROUNDS	AVERAGE	MAXIMUM	MINIMUM	EXTREME VARIATION	STANDARD DEVIATION
		[redacted]rifle, Lightweight, Caliber .30, T25, No. 10			
117	2737	2775	2695	70	22.4
707	2754	2779	2722	57	17.0
		Rifle, Lightweight, Caliber .30, T25, No. 15			
4	2670	2717	2640	77	17.1
6398	2702	2741	2680	61	22.3
		Auto Rifle, Caliber .280, EM-2, No. 6			
7	2214	2250	2157	93	22.3
6410	2202	2232	2150	82	20.0
		Auto Rifle, Caliber .280, EM-2, No. 8			
10	2221	2342	2176	166	42.0
1278	2208	2268	2178	90	22.3
6399	2176	2247	2014	233	47.5
		Auto Rifle, Caliber .280, EM-2, No. 3			
242	2211	2298	2176	122	27.7
1006	2172	2253	2129	124	26.1
		Auto Rifle, Caliber .280, FN (Long Model) No. 6			
7	2237	2274	2175	99	24.5
6478	2200	2246	2152	94	22.5
		Auto Rifle, Caliber .280, FN (Long Model) No. 7			
7	2245	2273	2220	53	16.4
6430	2200	2250	2160	90	20.8

Complete velocity and firing data recorded during burst fire of caliber .30 and caliber .280, M1919A4 modified machine guns are enclosed as Appendix T. There follows a summary of the above velocities.

[redacted]

Barrels used in penetration phase firing ball ammunition.

[redacted] Caliber .30, Barrel No. 3, Previous Rounds - 6273

	BURST 1	BURST 2
Average Velocity, fps	2683	2691
Maximum Velocity, fps	2728	2738
Minimum Velocity, fps	2644	2654
Extreme Variation, fps	84	84

NOTE: 20-Round Burst

Caliber .280, Barrel No. 3, Previous Rounds - 6748

Average Velocity, fps	2167
Maximum Velocity, fps	2219
Minimum Velocity, fps	2126
Extreme Variation, fps	93

Average Velocities From Burst Fire on M1919A4, Caliber .30, Barrel Number 3

BURST	NUMBER OF ROUNDS	CALIBER .30	AVERAGE VELOCITY fps
1	20	AP	2698
1	5	API	2697
2	20	AP	2709
2	5	API	2689
3	20	AP	2711
3	5	API	2712
4	20	AP	2714
4	5	API	2723
5	20	AP	2723
5	5	OBS	2708
6	20	AP	2734
6	5	OBS	2741
7	20	AP	2754
7	5	OBS	2757
8	20	AP	2754
8	5	OBS	2748
9	120	AP	2750
9	30	API	2754
10	92	AP	2749
10	23	[redacted]	

[redacted]

Average Velocities of Burst Fire on Caliber .280, Barrel Number 3

[redacted]	NUMBER OF ROUNDS	CALIBER .280	AVERAGE VELOCITY fps
1	20	Ball	2177
1	5	API	2235
2	20	Ball	2184
2	5	API	2249
3	20	Ball	2156
3	5	API	2256
4	20	Ball	2243
4	5	API	2251
5	20	Ball	2257
5	5	OBS	1991
6	20	Ball	2245
6	5	OBS	1934
7	20	Ball	2275
7	5	OBS	1922
8	20	Ball	2281
8	5	OBS	1800
9	120	Ball	2312
9	30	API	2296
10	120	Ball	2314
10	30	OBS	1787
11	100	Ball	2263

One 100-round burst of linked, 4 to 1, ball and observing, was fired in a comparatively new barrel to investigate the excessive velocity drop of the observing round when fired from a warm worn barrel as noted above. It was observed that the observing ammunition as fired above was impacting 150 to 500 yards from the gun muzzle.

The caliber .280 barrel, number 4, with 355 previous rounds was utilized to investigate the above condition.

1	80	Ball	2260
1	20	Observing	2345

14. Complete ballistic data, as computed by the Computing Laboratory of the Ballistic Research Laboratory of this station, are enclosed as Appendix U. The data from which the above computations were made are enclosed as Appendix V.

During the above firing the velocity recorded for caliber .280 ammunition was considerably higher than that recorded for the same ammunition fired from a velocity barrel. A limited investigation of this barrel (Accuracy Barrel 450/3) was made by firing 20 rounds of ball ammunition for instrumental velocity at 78 feet. A check of the other available accuracy barrel (450/2) was conducted in the same manner.

[redacted]

The velocity results recorded in the above firing are as follows:

AMMUNITION: Cartridge, SA, Caliber .280, Ball, Lot 19A

AMMUNITION TEMPERATURE: 70°F

	BARREL	
	450/2	450/3
Average Velocity, fps	2369	2336
Maximum Velocity, fps	2413	2391
Minimum Velocity, fps	2333	2307
Extreme Variation, fps	80	84

Complete velocity data are enclosed as Appendix W.

C. OBSERVATIONS

1. The following observations were made on the performance of Cartridge, Caliber .30, Ball, T104, Lot No. FA-X30-1358 as compared with Cartridge, SA, Caliber .280, Ball, Lot 19A.

a. The average velocity of the caliber .30, ball ammunition at 70°F was 2771 feet per second and that of the caliber .280, ball ammunition was 2273 feet per second.

b. The average pressure of the caliber .30, ball ammunition at 70°F was 52,050 pounds per square inch and that of the caliber .280, ball ammunition was 43,100 pounds per square inch.

c. An increase in the average velocity for both ammunition types was noted with an increase in ammunition temperature to +165°F.

d. A smaller standard deviation in velocity existed for the caliber .30, ball ammunition at +70°F and +165°F.

e. A decrease in average velocity was noted for both ammunition types fired at -65°F, the caliber .280 giving the smallest decrease. The standard deviation in velocity was less for the caliber .280, ball ammunition at this decreased temperature.

f. Both ammunition types resulted in lower pressures and an increase in the standard deviation when fired at -65°F. The caliber .30, ball ammunition showed a decrease in average pressure coupled with a slight increase in standard deviation when fired at +165°F. The caliber .280, ball ammunition fired at this temperature resulted in a higher average pressure and decrease in standard deviation.

[redacted]

g. The average mean radius of 10 targets fired at 600 yards from Mann barrels with caliber .30, ball ammunition is 5.40 inches compared with 9.76 inches obtained using caliber .280 ammunition. This does not compare favorably with targets obtained using lead-core ball ammunition in either caliber. The average mean radius of five targets fired with caliber .30, 150-grain lead-core ball ammunition, caliber .280, 130-grain lead-core ball ammunition, and caliber .280, 140-grain lead-core ball ammunition are 3.83 inches, 6.31 inches and 6.90 inches respectively.

h. With respect to penetration of 1-inch pine boards placed 1 inch apart, the caliber .30, ball ammunition is superior to the caliber .280 ball ammunition from a 25-yard range to about 800 yards. From 800 yards to 2000 yards the penetration curves are very similar.

i. With respect to penetration of 10-gauge mild steel plates placed 4 inches apart, the caliber .30, ball ammunition is superior to the caliber .280, ball ammunition at all ranges from 25 yards to 1000 yards. The caliber .30, ball ammunition compares with the caliber .280, AP against the above target.

j. With respect to penetration of 1-1/2-inch hard homogeneous armor at different angles of obliquity, from normal to 40 degrees, the caliber .30, ball ammunition is superior to the caliber .280, ball ammunition.

k. The caliber .30 and caliber .280, ball ammunition will defeat the Helmet, M1, from a range of 1200 yards and the M12 Armor Vest from about 1000 yards.

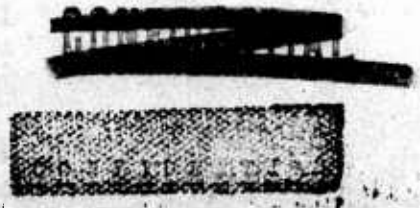
2. The following observations were made concerning the performance of Cartridge, Caliber .30, AP, T93, Lot No. FA-X30-1357 as compared with Cartridge, SA, Caliber .280, AP, Lot No. 24A.

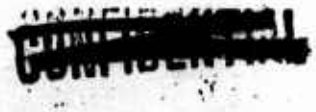
a. The average velocity of the caliber .30, AP ammunition at 70°F was 2822 feet per second and that of the caliber .280, AP ammunition was 2202 feet per second.

b. The average pressure of the caliber .30, AP ammunition at +70°F was 51,270 lb per square inch and that of the caliber .280, AP ammunition was 39,200 lb per square inch.

c. When fired at +165°F both calibers of ammunition showed an increase in average velocity and a decrease in the standard deviation, that of the caliber .30, AP being smaller than that of the caliber .280, AP.

d. At -65°F both the caliber .30 and caliber .280, AP ammunition reacted similarly to the ball ammunition of each caliber fired at this temperature.





[redacted]

e. At +165°F the pressure from the caliber .30, AP ammunition was lower than at +70°F while the pressure of the caliber .280 ammunition increased with increase in temperature. At -65°F the caliber .30 ammunition resulted in a decrease in pressure about equal to that encountered at +165°F. The pressure from the caliber .280, AP ammunition was not measured at -65°F.

f. The average mean radius of ten targets fired at 600 yards from Mann barrels with caliber .30, AP ammunition is 5.92 inches compared with 11.32 inches obtained with caliber .280, AP ammunition.

g. The caliber .30 and caliber .280, AP ammunition will defeat the Helmet, M1 from a range of 1200 yards. The above ammunition defeated the M12 Armor Vest from a range of 800 yards.

h. With respect to penetration of one-inch pine boards placed one inch apart, the caliber .30, AP ammunition is slightly superior to the caliber .280, AP ammunition at all ranges from 100 to 1200 yards. This superiority decreases with increase in range to 1600 yards where penetrations at that point and above are substantially the same. At 25 yards range the penetrations achieved by the caliber .30, AP ammunition were less than those achieved at 100 yards. This was apparently caused by the instability of the projectile at 25 yards.

i. With respect to penetration of 10-gauge mild steel plates placed 4 inches apart, the caliber .30, AP ammunition exhibits slightly better penetration characteristics than the caliber .280, AP up to 600 yard ranges. At 800 yards to 1000 yards, penetration characteristics of the two calibers are the same. As in firing against the duplex wood target, the penetration achieved at 25 yards with the caliber .30, AP was inferior to that at 100 yards.

j. With respect to penetration of 1-1/2-inch hard homogeneous armor at different angles of obliquity, the caliber .30, AP ammunition was superior to the caliber .280, AP ammunition at normal, 20 and 30 degrees. At 40° angle, little difference existed in the penetration achieved, the caliber .280 showing up slightly better.

3. The following observations were made concerning the performance of Cartridge, Caliber .30, API, T101, Lot No. FAX30-1356 as compared with Cartridge, SA, Caliber .280, API, Lot No. 23A.

a. The average velocity of the caliber .30, API ammunition at +70°F was 2739 feet per second and that of the caliber .280, API ammunition was 2196 feet per second.

b. The average pressure at 70°F of the caliber .30, API ammunition was 50, 390 pounds per square inch and that of the caliber .280, API ammunition was 39,500 pounds per square inch.

[redacted]

[redacted] velocity of both caliber .30, API and caliber .280, [redacted] nition increased with increase in temperature and decreased with decrease on temperature. The standard deviation was smaller at each temperature for the caliber .30 ammunition.

d. The relation of pressure to temperature was similar to that encountered for ball and AP ammunition in each caliber.

e. The average mean radius of five targets fired from Mann barrels at 600 yards range is 6.48 inches for the caliber .30, API ammunition and 7.22 inches for the caliber .280, API ammunition. This figure of 7.22 inches for the caliber .280, API ammunition is better than that for the caliber .280, ball or AP ammunition which was 9.76 inches and 11.32 inches respectively.

f. With respect to penetration of one-inch pine boards placed one inch apart, the caliber .30, API ammunition is superior to the caliber .280, API ammunition at ranges greater than 100 yards. This superiority, greatest at 300 yards, decreases with increase in range up to 2000 yards, where penetration performance is about the same. At ranges less than 300 yards some caliber .30, API rounds function after penetrating about 12 boards and their penetration characteristics are lost. The caliber .280 ammunition did not function on this type target at any ranges fired. As a result the caliber .280 penetration performance is superior to that of the caliber .30 ammunition at ranges of 25 and 100 yards.

g. With respect to penetration of 10-gauge mild steel plates placed 4 inches apart, the caliber .30, API ammunition is superior to the caliber .280, API ammunition at all ranges from 25 to 1000 yards.

h. With respect to penetration of hard homogeneous armor at angles of obliquity from 0 to 40 degrees, the caliber .30 ammunition is superior to the caliber .280 ammunition at all angles except 40 degrees. At 40 degrees the penetration achieved by the caliber .280 is .166 inches and that by the caliber .30 is .109 inches.

i. The caliber .30, API projectile will defeat Helmet, M1 at 1400 yards and the M12 Armor Vest at 1000 yards. (7 out of 10) The caliber .280, API projectile will defeat Helmet, M1 at 1000 yards and the M12 Armor Vest at 600 yards.

j. During the tank ignition firing, the following general observations were made:

(1) Sensitivity

At 100 yards, functioning of the caliber .280 projectile generally occurred at the plate with flash being visible both on the face of the plate and between the plate and can. Functioning of the caliber .30 projectile appeared to be somewhat slower, the flash usually occurring behind the can. At ranges of 300 yards and 500 yards, this difference was less pronounced; however, the caliber .280 projectile still tended to give greater flash on the face of the plate than did the caliber .30 projectile.

[redacted]

(2) Size and color of flash

In general, flash obtained from caliber .30 projectiles was [redacted] that from caliber .280 projectiles at all ranges. A difference in color from each of the two types of projectiles was noticeable. The flash from the caliber .30 type was slightly red in color whereas a white flash was obtained from the caliber .280.

(3) Size and color of flash smudge on the can

At all ranges the flash smudge around the bullet-entrance hole in the can was larger with the caliber .30 ammunition than with the caliber .280 ammunition. Flash smudge from the caliber .30 round was generally black in color whereas that from the caliber .280 round was usually gray or light gray.

k. With respect to actual fuel ignition, the caliber .280, API ammunition had a higher percentage of ignitions below fuel level at all ranges than did the caliber .30, API ammunition. Above fuel level the ignition performance of both ammunition is about the same.

4. The following observations were made with respect to Cartridge, Caliber .30, Tracer, T102, Lot No. FAX30-1359 and Cartridge, SA, Caliber .280, Tracer, Lot No. 32A.

a. The caliber .30, T65 traced an average length of 879 yards while the caliber .280 traced an average length of 1061 yards.

b. The caliber .30 tracer reached its maximum brilliance after travelling an average distance of 50 yards. The caliber .280 tracer reached its maximum brilliance after travelling an average distance of 64 yards.

c. The caliber .30 trace is dull red in color while the caliber .280 trace is rose red. The caliber .280 trace is more brilliant than that from the caliber .30 and remains at a more uniform brilliance until it burns out.

d. The igniter of the caliber .280 tracer burns invisibly while that from the caliber .30 ammunition burns leaving a dim trace. Ignition of the caliber .280 tracer mixture also appears to occur with greater rapidity than that of the caliber .30 ammunition. This was especially noticeable in that the caliber .280 tracer mixture burned with maximum brilliance almost immediately on igniting while the caliber .30 projectile traveled some distance before maximum brilliance of the tracer mixture was reached. This difference was accentuated by the 400-feet per second velocity difference in the two projectiles.

e. The percent of rounds tracing was 100 in the case of the caliber .30 ammunition and 99 in the case of the caliber .280 ammunition.

[redacted]

f. The average mean radius of five targets fired from Mann barrels was 11.24 inches for caliber .30, tracer ammunition and 10.78 inches caliber .280, tracer ammunition.

g. The average velocity at 70°F of the caliber .30, tracer ammunition was 2629 feet per second as compared with 2248 feet per second obtained with the caliber .280, tracer ammunition.

h. The average pressure of the caliber .30, tracer ammunition fired at +70°F was 42,885 pounds per square inch. The pressure resulting from firing the caliber .280, tracer ammunition was not obtainable with available facilities, therefore, it was not possible to fire this phase. From observations based on correlation with the velocity data, the pressure would probably be on the order of 36,000 pounds per square inch.

i. The velocity of both types of ammunition increased with increase in temperature and decreased with a decrease in temperature. The standard deviations for both types of ammunition were substantially the same, the caliber .30 being slightly better at -65°F.

5. The following observations were made with respect to Cartridge, Caliber .30, Spotting, T103, Lot No. 2, Cartridge, SA, Caliber .280, Observing, Lot No. 17A and the 7.92 mm German observing cartridge.

a. The average velocity of the caliber .30, spotting ammunition at +70°F was 2726 feet per second and that of the caliber .280, observing ammunition was 2340 feet per second.

b. The average pressure at 70°F of the caliber .30, spotting ammunition was 42,185 pounds per square inch and that of the caliber .280, observing ammunition was 38,500 pounds per square inch.

c. With decrease in temperature, both calibers of ammunition resulted in decreased velocity. The standard deviation of both calibers of ammunition was substantially the same at -65°F and +70°F. (NOTE: Observing ammunition was not fired at +165°F.)

d. Pressures of both calibers of ammunition decreased with decrease in temperature with little change in the standard deviation.

e. The 7.92 mm was most sensitive to initiation, the caliber .280 next and the caliber .30 least sensitive to initiation.

f. Against hard targets, such as a brick wall or cinder road, the flash and resultant smoke from all three observing rounds are sufficient to permit observation from 1000 yards.

[redacted] Against soft targets, such as sand or scrub brush, the resultant [redacted] rounds is difficult to see from 1000 yards.

h. The smoke producing agent from caliber .30 and caliber .280 observing ammunition scatters more on functioning than that from the 7.92 mm ammunition. This results in a thin smoke from the caliber .30 and caliber .280 ammunition as compared with the 7.92 mm ammunition.

The following general observations were made:

a. When fired from barrels of the same length, (modified M1919A4 barrels) the muzzle flash from the caliber .30 ammunition is greater than that from the caliber .280 ammunition. This includes the tracer ammunition of both calibers which are both loaded with an IMR type powder.

b. When the ball ammunition is fired from rifles, with a barrel length designed for the respective caliber of ammunition, the caliber .30 ammunition results in more muzzle flash.

c. The muzzle smoke resulting from a 75-round burst of caliber .30, AP ammunition fired from an M1919A4 machine gun is darker and greater in volume than that resulting from a 75-round burst of caliber .280, AP ammunition.

d. The muzzle smoke, resulting from a 75-round burst of caliber .30, tracer ammunition fired from a M1919A4 machine gun, is substantially the same as that from a 75-round burst of caliber .280, tracer ammunition.

e. When firing the caliber .30 ammunition, loaded with ball powder, from a machine gun located in a firing house, the resultant smoke was extremely irritating to the gun crew. If fired from an enclosed position, such as a tank turret, the smoke would possibly prohibit any large volume of fire.

f. Throughout the test program, differences in the color code marking of the U. S. caliber .30 and U. K. caliber .280 ammunition resulted in unnecessary delays in properly identifying different type rounds.

g. All penetration results obtained from firing at an 8-1/2 inch brick wall were quite erratic. It is felt that the erratic behavior was not caused by the ammunition undergoing test but by the type of target utilized. Sections of the particular wall used were built from different quality bricks. All bricks in the wall looked the same; however, they were of different densities and hardnesses. Since each recorded shot hit a different brick the conditions encountered by each bullet were different.

h. With respect to the grenade launching cartridges tested the caliber .280 cartridge in the EM-2 rifle was not satisfactory. The same cartridge in the FN rifle was satisfactory and gave longer ranges than the caliber .30, T65 grenade launching cartridge used in the T25 rifle.

[redacted]

[redacted]

D. OBSERVERS

	NAME	REPRESENTING
3 February 1950	Capt. J. W. Moore	British Army
13 February 1950	Mr. F. K. Wolfe	Springfield Armory
14 February 1950	Brig. J. A. Barlow	British Army
14 February 1950	Major J. F. May	British Army
14 February 1950	Mr. H. W. Duneclift	British Army
14 February 1950	Mr. K. Januszenski	British Army
14 February 1950	Mr. R. W. Frost	British Army
14 February 1950	ESM A. J. Martin	British Army
14 February 1950	EQMS F. A. Herbert	British Army
14 February 1950	QMSI J. H. Thwaites	British Army
14 February 1950	QMSI D. T. Maber	British Army
14 February 1950	Major F. R. Milive	Canadian Army
14 February 1950	Capt. R. M. MagGibbon	Canadian Army
14 February 1950	Lt. Col. A. Feldman	Springfield Armory
14 February 1950	Col. R. Studler	OCO, ORDTS
14 February 1950	Col. J. W. Hammond	OCO, ORDTS
14 February 1950	Brig. G. Morrison	Canadian Army
14 February 1950	Lt. Col. Maddox	Canadian Army
14 February 1950	Major J. T. Woolsey	Canadian Army
28 February 1950	Mr. E. W. Kent-Lemon	Great Britain
2 March 1950	Mr. E. W. Harvey	Springfield Armory
3 March 1950	Brig. R. C. M. King	British Army
3 March 1950	Brig. F. W. Gordon Hall	British Army
3 March 1950	Lt. Col. G. Kellett	British Army
8 March 1950	Mr. A. C. Bonkemeyer	OCO, ORDTS
24 March 1950	Gen. Shoos Smith	British Army
24 March 1950	Sir Alwyn Crowe	British Army
24 March 1950	Col. M. A. H. Butler	British Army
24 March 1950	Major F. M. Beal	British Army
24 March 1950	Major Hope	British Army
28 March 1950	Major Miller	U. S. Air Forces
3 April 1950	M/Sgt. R. Hawkins	Frankford Arsenal
3 April 1950	Mr. A. Benson	Frankford Arsenal
17 April 1950	Mr. J. Kirk	Frankford Arsenal

IV CONCLUSIONS

A. It is concluded that:

1. All ammunition undergoing test is reasonably stable at -65°F, +70°F and +165°F.

[redacted]

2. No accurate comparison can be made between the pressure developed by caliber .30, T65 and caliber .280 ammunition due to differences in test equipment.

3. The accuracy of all types of caliber .30, T65 ammunition undergoing test fired from Mann barrels is *satisfactory.

4. The accuracy of caliber .280 ball and AP ammunition undergoing test is not *satisfactory, however, it probably can be improved by further development and refinements in manufacture. The accuracy of other types of caliber .280 ammunition, (API, tracer, and observing) undergoing test is satisfactory.

5. The caliber .30, T65 ammunition produces more muzzle smoke and flash than the caliber .280 ammunition.

6. The smoke resulting from caliber .30 ammunition loaded with ball type powder is irritating to the throat and possibly has a serious toxic effect.

7. The ballistic coefficients of all types of caliber .280 ammunition undergoing test are superior to those comparable types of caliber .30, T65 ammunition tested.

8. Because of this difference in ballistic coefficients, the remaining velocity of the caliber .30, T65, ball, AP, and API ammunition decreases at a more rapid rate than do the caliber .280 bullets. At about 1000 yards, the remaining velocities of comparable types in the two calibers are about equal in spite of the higher muzzle velocity of the caliber .30, T65 Ammunition.

9. The above facts are further illustrated by reference to the penetration performance obtained at ranges above 1000 yards.

10. The caliber .30, T65, ball, AP and API ammunition develop from 45 to 73 percent more muzzle energy than do comparative types of caliber .280 ammunition.

11. The maximum range of the caliber .30, T65 and caliber .280, ball ammunition is about 3000 yards.

12. The trajectory of the caliber .30, T65 ammunition is considerably flatter than that of the caliber .280 ammunition at ranges considered practical for rifle fire.

13. The caliber .280, API ammunition exhibits superior fuel ignition characteristics compared with the caliber .30, T65, API ammunition.

* Satisfactory as used in this instance is defined as being within the present accuracy specifications for caliber .30 ammunition.

[redacted]

[redacted]

14. The performance of both caliber .30, T65 and caliber .280, tracer ammunition is satisfactory; however, the .280 gave the best performance.

15. The caliber .30, T65 spotting ammunition is not satisfactory. The functioning characteristics of the caliber .280 observing ammunition compare favorably with the German 7.92 mm observing ammunition as regards functioning and visibility; however, the caliber .280, observing is susceptible to premature functioning.

16. Those caliber .280 barrels, 450/2 and 450/3, used in the accuracy, maximum range and time of flight firing gave a higher velocity level than the pressure and velocity barrels. This difference is possibly due to some difference in the bore dimensions of the subject barrels.

V RECOMMENDATIONS

A. If any tests of this nature are conducted in the future it is recommended that:

1. Ammunition to undergo test be identified with the standard U. S. color code marking for ammunition.

2. Pressure, velocity, and accuracy equipment be of the same type to eliminate any variable caused by different test procedures.

3. A member of the testing organization be allowed to attend any future meetings involving preparation of technical test plans.

4. In any future development of weapons and ammunition by the U. K. and U. S., every effort be made to perfect the ammunition prior to designing the weapon.

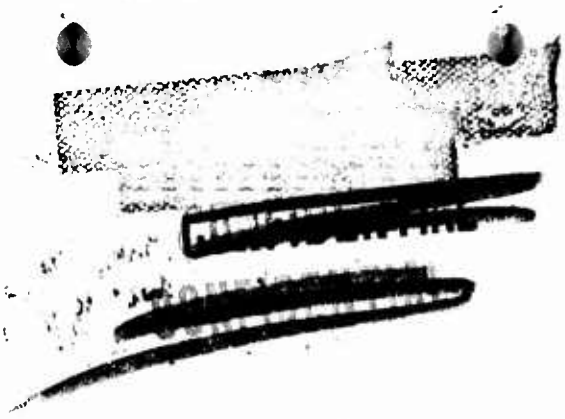
5. Before weapons of any type are considered for joint comparison trials by U. K. and U. S., they should be chambered for a common round of ammunition, which is acceptable to both countries.

APPROVED:

[redacted]

P. F. COLLERAN	H. F. BIGELOW	WALTER DUGGAN
Director, Dev. &	Lt. Col., Ord. Dept.,	1st Lt., Ord. Dept.,
Proof Services	Chief, Arms & Am. Div.	Proof Officer

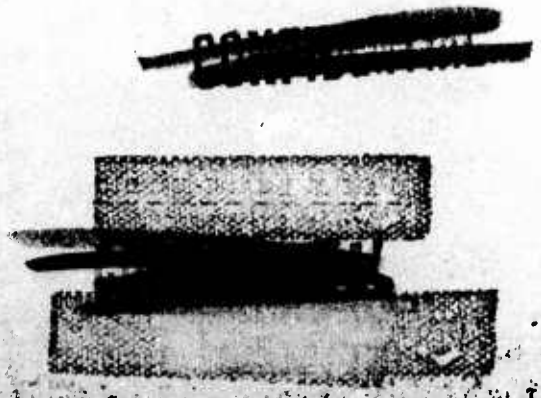
[redacted]



APPENDIX A

Directive Letter

OO FILE 474/2 (c), APG FILE (c) 474/21



WAR DEPARTMENT
OFFICE OF THE CHIEF OF ORDNANCE
WASHINGTON 25, D. C.

RECORD
ACBonkemeyer/bhy/3085

OO FILE 474/2
ATTN: ORDTS
APG FILE (c) 474/21

3 February 1950

SUBJECT: Comparative Tests of Light Rifles
(Project TS2-2015, Priority 1-C)

TO: Commanding Officer
Aberdeen Proving Ground, Md.

1. Reference is made to file APG (c) 474/14 (O.O. 474/317 - C), basic dated 2 Nov 1949, and file APG 474.1/144 (O.O. 474/1388), regarding comparative tests of United States and United Kingdon lightweight rifles and ammunition. It is requested that necessary action be taken by the Proving Ground to conduct these tests.

2. It is understood that the Technical Test and the Phase II Ammunition Test will be conducted concurrently, and that an estimated time of one hundred sixty-eight (168) working days will be required for completion of the tests. It has been agreed by representatives of the United States and the United Kingdom that the tests will begin on 14 February 1950, and that the test materiel will be delivered to the Proving Ground prior to that date.

3. Copies of the agreement covering these tests and the detailed plans of tests are attached herewith for retention by the Proving Ground.

BY COMMAND OF MAJOR GENERAL FORD:

3 Incls
1. Cy of Agreement
2. Cy Phase II Ammunition Test
3. Cy Technical Test

RENE' R. STUDIER
Colonel, Ord Dept
Assistant

45

[redacted]

29 Sep 49

PLAN OF TEST OF NEW US AND UK RIFLE AMMUNITION

PHASE II

[redacted]

INDEX OF TESTS

Test No.	Abbreviated Title of Test
1.	Penetration
2.	Wounding or stopping power
3.	Accuracy, Mann barrel
4.	Grenade ammunition, functioning of
5.	Range tables
6.	Pressure data
7.	Erosion
8.	Accuracy, worn barrel, -65°F
9.	Storage, effect on functioning
10.	Maximum range
11.	Flash and smoke
12.	Tracer, API, observing bullet, functioning

[redacted]

Incl 2

[redacted] 14 Oct 49

PLAN OF TEST OF [redacted]

NEW US AND UK RIFLE AMMUNITION

PHASE II
(To be conducted at Aberdeen, Maryland)

PRIORITY - A

Test No. 1

Purpose: To determine the penetrating power of comparable types of AP, API and Ball (Mild steel core) at ranges of 25, 100, 300, 600, 800, 1000, 1200, 1600 and 2000 yards against 10 gage mild steel plates 4" apart, 1" deal boards spaced 1" apart, burned brick masonry, body armor and helmets. Each type of subject ammunition will be fired against armor plate at a range of 100 yards to determine the maximum penetration at angles of attack of normal, 20, 30, and 40 degrees. The maximum penetration will be considered to have been obtained when 7 rounds out of a series of 10 rounds have defeated the thickest homogenous hard armor. Tests of penetration will be discontinued when limits of penetration have been obtained.

Test No. 2

Purpose: To determine the shock effect (wounding or stopping power) of the several types of combat ammunition.

Test No. 3

Purpose: To determine the accuracy of all test ammunition when fired from a Mann barrel at 600 yards.

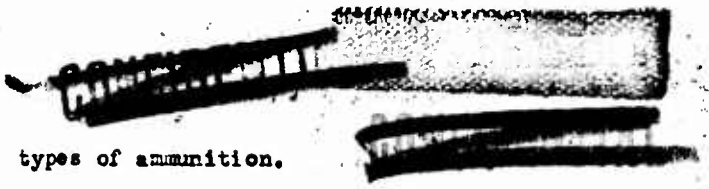
Test No. 4

Purpose: To determine the range, accuracy [redacted] teristics of grenade ammunition.

PRIORITY - B

Test No. 5

Purpose: To provide data for preparation of range tables for all [redacted]



types of ammunition.

Range tables will be provided for AP, API, ball, tracer and observing rounds.

Test No. 6

Purpose: To determine the pressure curve of test ammunition in rifle barrels at different stages of wear and at temperature of 70°F., -65°F. and 125°F.

Method: One each reasonably new, 1/2 worn, and last 1/4 of life barrels will be used.

Test No. 7

Purpose: To determine the comparative erosions of barrels in different stages of firing conducted in above tests by recording velocity drop or accuracy change.

Test No. 10

Purpose: To determine the maximum flight of all types of combat ammunition.

Test No. 11

Purpose: To determine the comparative flash and smoke of the tested ammunition.

PRIORITY - D

Test No. 12

Purpose: To determine the functioning characteristics of tracer, observing and API ammunition.

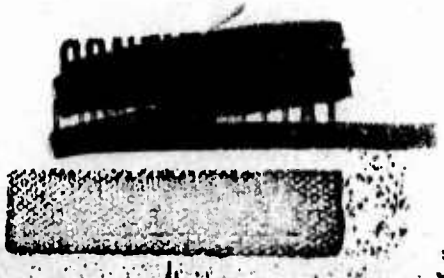
Observing ammunition will be tested against targets and at ranges

as in Test No. 1 above, as well as against plough land, downland or prairie and rocky soil or shingle, at ranges of 1000, 1200, 1600 and 2000 yards. The German spotting round will be used as test control item. This control ammunition to be furnished by UK. API ammunition will be fired against fuel at various temperatures. Ammunition will be fired at temperatures of -65, +70 and +125 F. Ammunition will be tested both in new and worn barrels.

NO PRIORITY

Test No. 13

Purpose: To record all malfunctions of ammunition and weapons and the causes therefor.



[redacted]

29 Sep 49

TECHNICAL TEST PLAN

INDEX OF TESTS

Test No.	Abbreviated Title of Test
Par. 1	Materiel to be submitted for test
Par. 2	Standard Light Automatic Rifle Test (See below for detailed index)
Par. 3a	Penetration, normal conditioning
Par. 3b	Penetration, worn barrel, -65°F.
Par. 3c	API, tracer and observing cartridge efficiency
Par. 3d	Remaining velocity
Par. 4	Demonstration of converted weapons

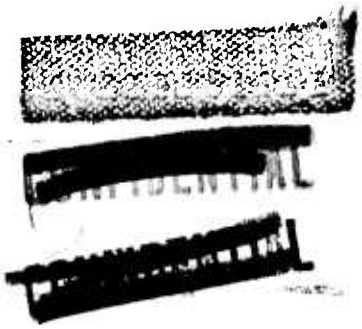
(In below, SLART refers to appropriate test in Inclosure 1, STANDARD LIGHT AUTOMATIC RIFLE TEST)

SLART I	Physical characteristics
SLART II	Assembly and disassembly
SLART III	Preliminary function fire
SLART IV	Cook-off
SLART V	Dust test
SLART VI	Mud test
SLART VII	Rain test
SLART VIII	Grenade launching
SLART IX	Functioning and cyclic rate, at angles and various temperatures
SLART X	Accuracy
SLART XI	Endurance
SLART XII	Omitted
SLART XIII	Flash
SLART XIV	Function in cold
SLART XV	Immersion in sea water
SLART XVI	Salt spray
SLART XVIII	Function without lubrication
SLART XIX	Determine the recoil energy of test rifles and ammunition
SLART XX	Determine the recoil energy of test rifles when firing grenades

[redacted]

Incl 3

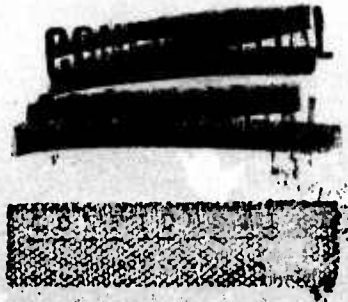
50

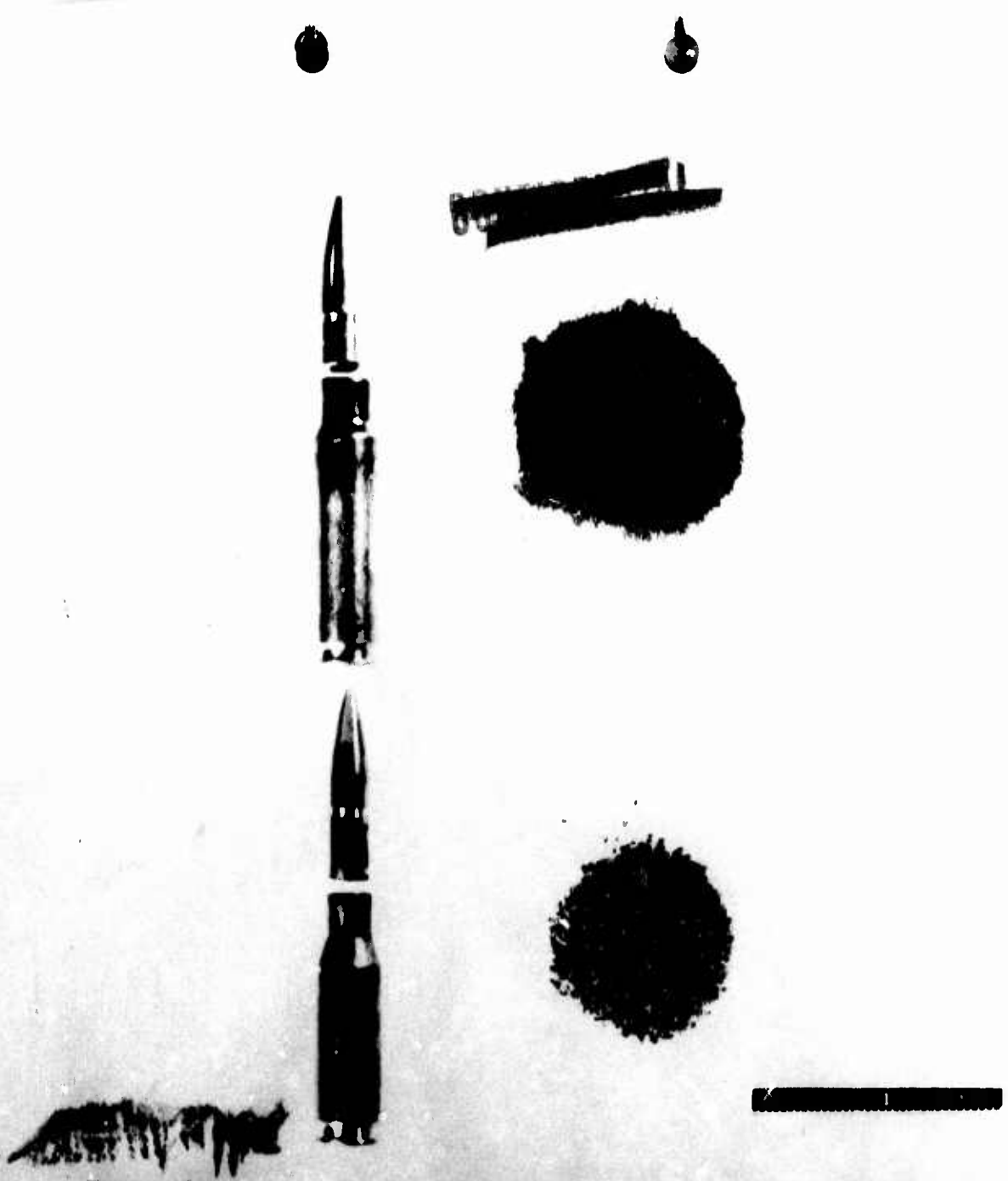


APPENDIX B

Cartridge Components

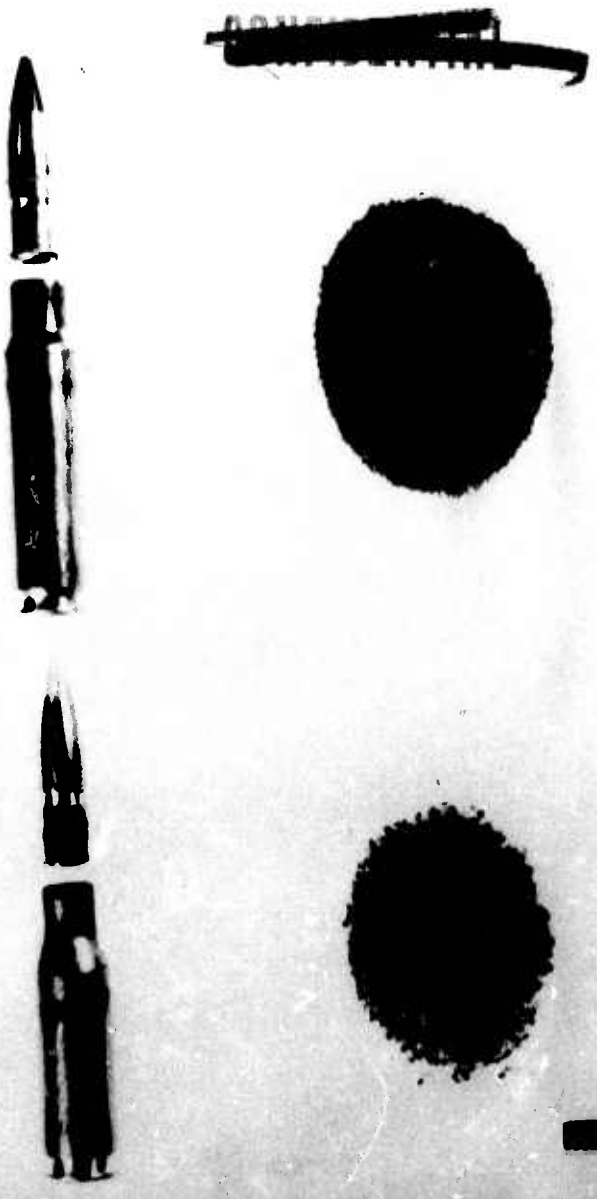
Photographs - A61236
A61237
A61238
A61239
A61240





A61236 [redacted] ABERDEEN PROVING GROUND 12 April 1950

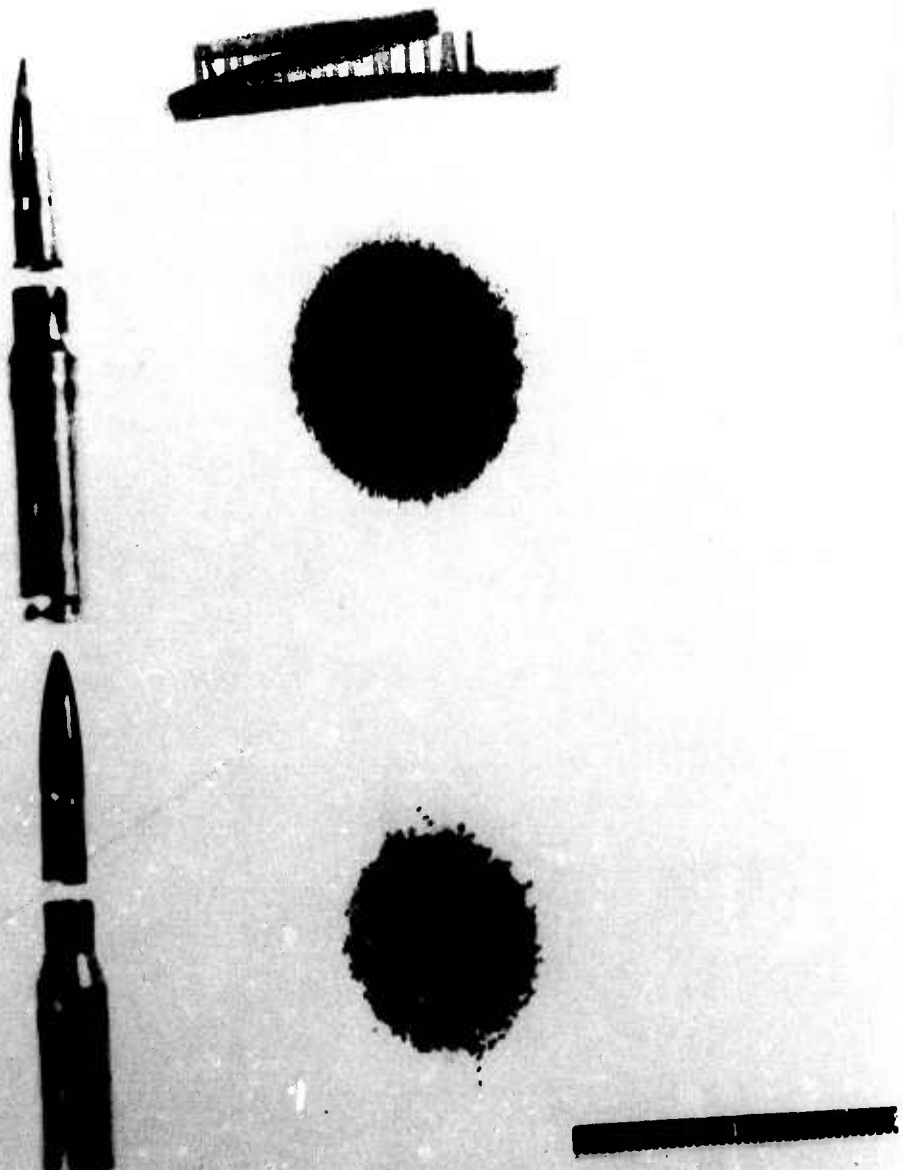
Project No. TS2-2015. 9th Report. Cartridge Components: (TOP) Cartridge, Ball, Caliber .30, T104, Lot No. FA-X30-1358. (BOTTOM) Cartridge, SA, Ball, Caliber .280, Lot No. 19[redacted]



A61237 [redacted] ABERDEEN PROVING GROUND 12 April 1950

Project No. TS2-2015. 9th Report. Cartridge Components: (TOP) Cartridge, AP, Caliber .30, T93, Lot No. FA-X30-1357. (BOTTOM) Cartridge SA, AP, Caliber .280, Lot No. 24A.

[redacted]



ABERDEEN PROVING GROUND

12 April 1950

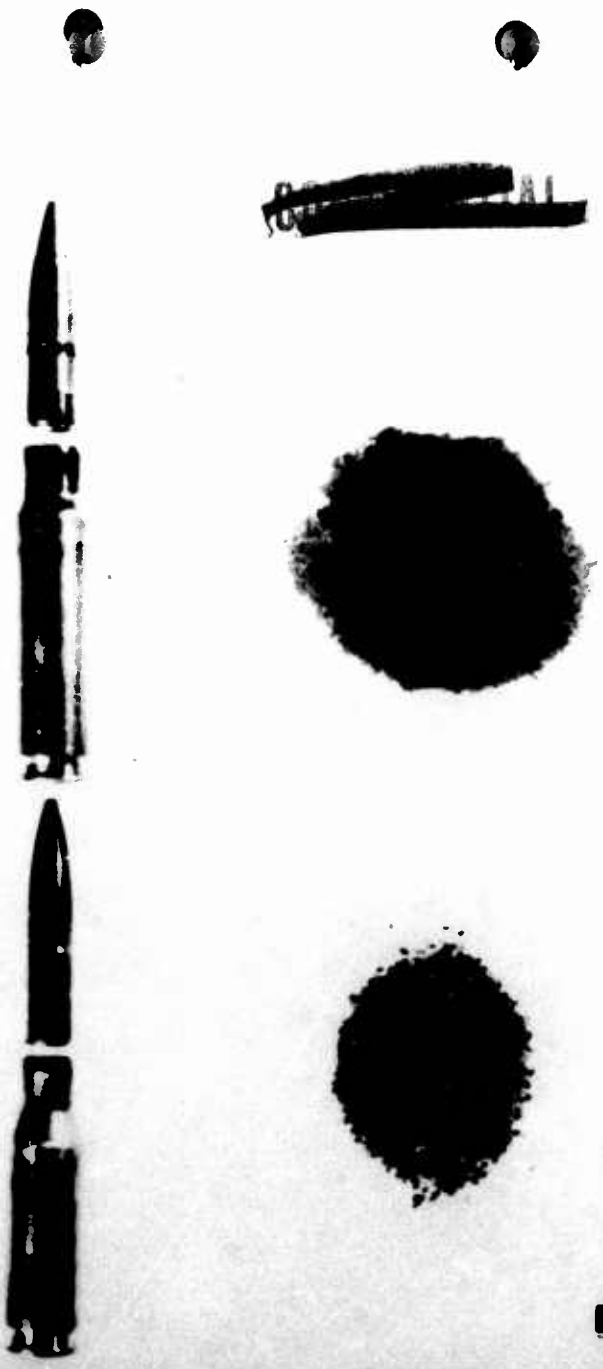
A61238 [redacted]

Project No. TS2-2015. 9th Report. Cartridge Components: (TOP) Cartridge, API, Caliber .30, T101, Lot No. FA-X30-1356. (BOTTOM) Cartridge, SA, API, Caliber .280, Lot No. 23A.

[redacted]

A61239 [redacted] ABERDEEN PROVING GROUND 12 April 1950

Project No. TS2-2015. 9th Report. Cartridge Components: (TOP) Cartridge, Tracer, Caliber .30, T102, Lot No. FA-X30-1359. (BOTTOM) Cartridge, SA, Tracer, Caliber .280, Lot No. 32A. [redacted]



A61240 [redacted] ABERDEEN PROVING GROUND 12 April 1950

Project No. TS2-2015. 9th Report. Cartridge Components: (TOP) Cartridge, Spotting Caliber .30, T103, Lot No. 2. (BOTTOM) Cartridge, SA, OBS, Caliber .280, Lot No. 17A.

[redacted]

[redacted]

[redacted]

[redacted]

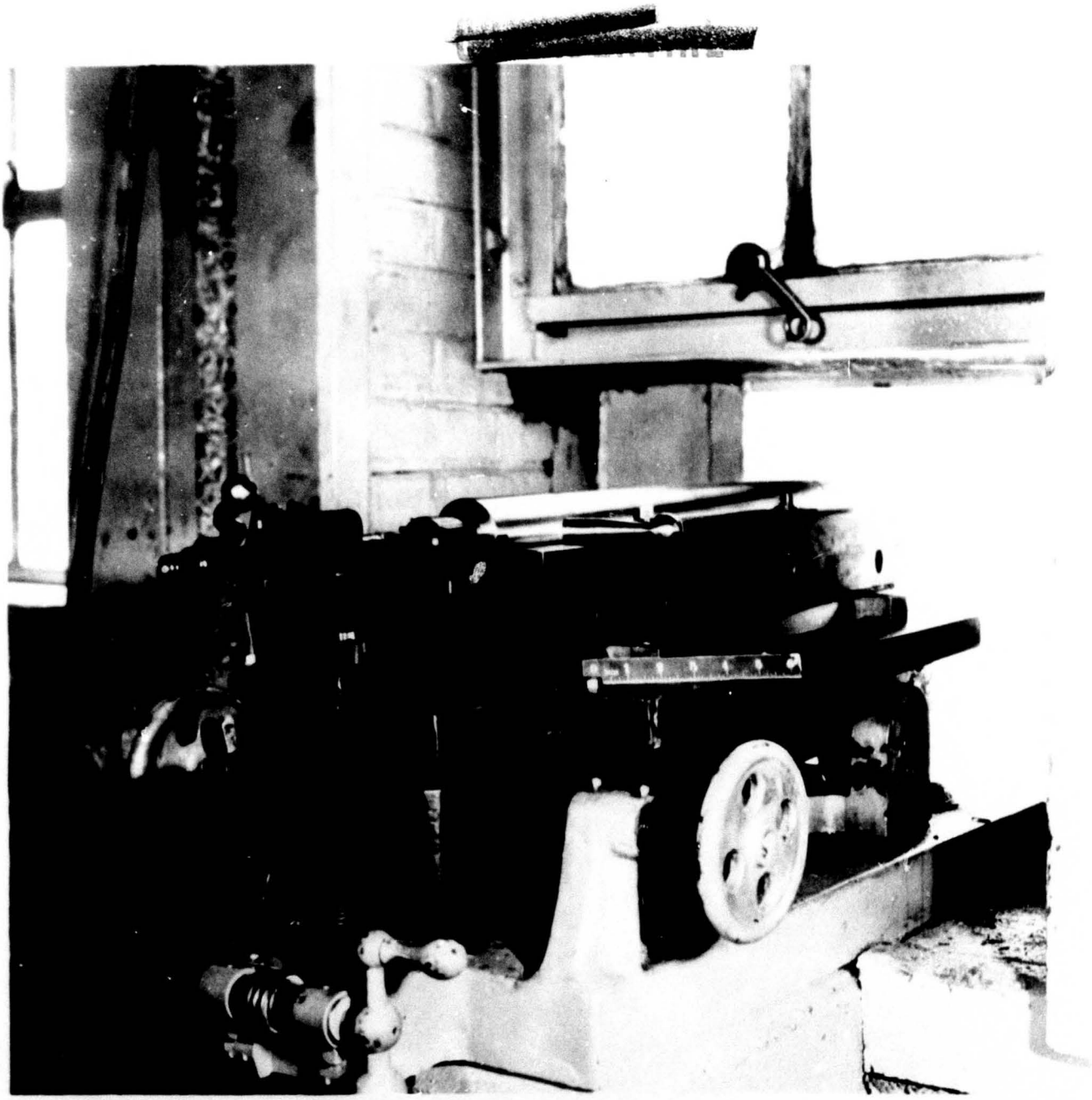
APPENDIX C

Pressure, Velocity and Accuracy Weapons

Photographs - A61272
A61273
A61274
A61275
A61278

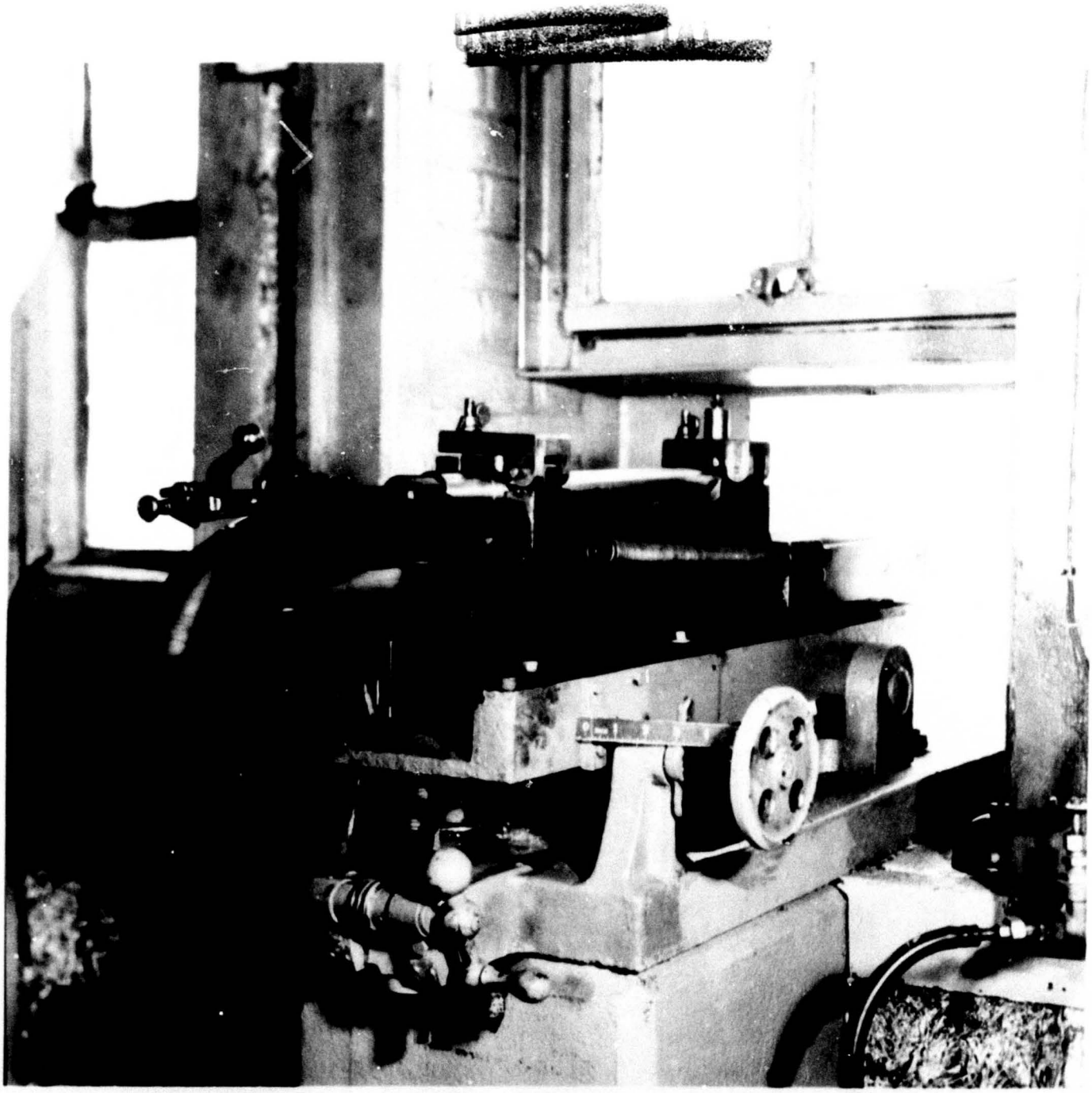
[redacted]

[redacted]



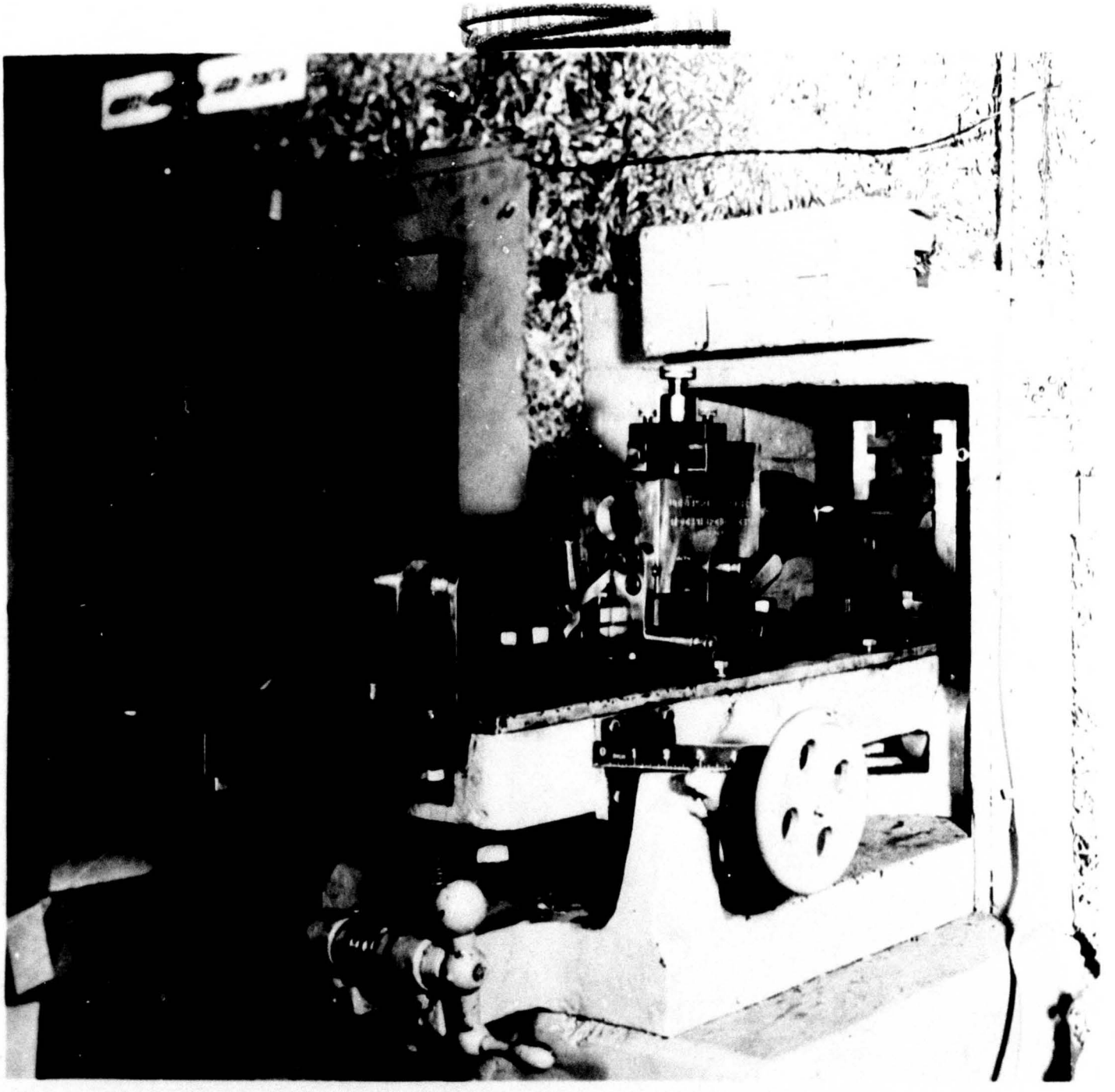
A61272 [redacted] ABERDEEN PROVING GROUND 15 April 1950

Project No. TS2-2015. 9th Report. Accuracy Rifle: Caliber .280, Mann Barrel Fitted to P-17 (Enfield) Action Resting in a Vee Slide. Note method of adapting slide to FA Rest.



A61273 [redacted] ABERDEEN PROVING GROUND 15 April 1950

Project No. TS2-2015. 9th Report. Accuracy [illegible]: Caliber .30, Modified M1919A4 Barrel Chambered for T65E1 Cartridge, Fitted to Springfield Action Mounted in Recoil Rest Supported on [illegible] Rest.



A61274 [redacted] ABERDEEN PROVING GROUND 15 April 1950

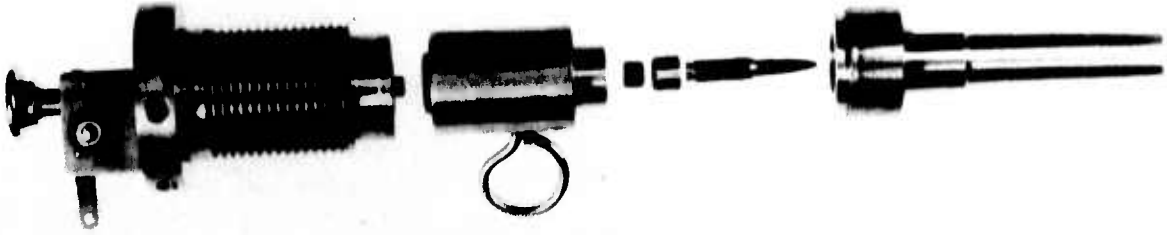
Project No. TS2-2015. 9th Report. Pressure Weapon: Caliber .30 Pressure Barrel Fitted to M-2 Universal Receiver. Weapon mounted in a recoil rest supported by a FA Rest.

[redacted]

A61275 [redacted] ABERDEEN PROVING GROUND 15 April 1950

Project No. TS2-2015. 9th Report. Ordnance Factory Pressure Housing: Caliber .280 Barrel Fitted to Housing. Note adaption of housing to FA Rest.

[redacted]



[redacted]

CONFIDENTIAL

A61275 [redacted] ABERDEEN PROVING GROUND 12 April 1950

Project No. TS2-2015. 9th Report. Ordnance Factory Pressure Housing: Disassembly of (less housing). Caliber .50 Barrel shown.

[redacted]

[redacted]

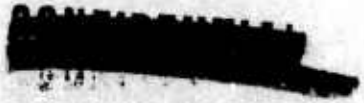
[redacted]

APPENDIX D

Penetration Target

AFG Photograph No. A61221

[redacted]



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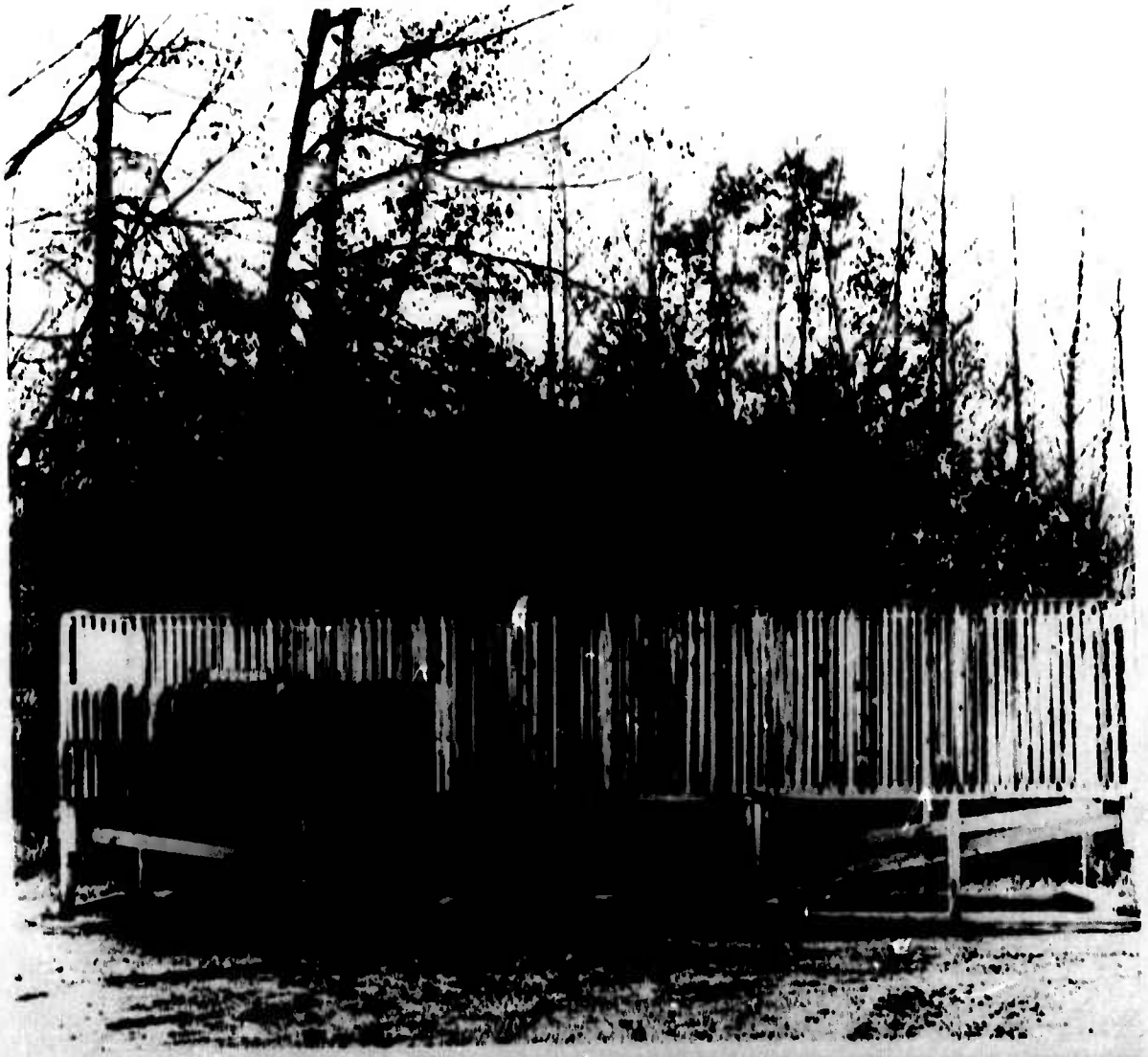


A61221 [redacted] ABERDEEN PROVING GROUND 11 April 1950

Project No. TS2-2015. 9th Report. Penetration Target (Side View), One Inch Pine Boards Spaced One Inch Apart.

[redacted]

[redacted]

APPENDIX E

[redacted]

(19 Sheets)

MANN BARREL ACCURACY FIRING DATA

The following abbreviations are utilized:

M.R. - Mean Radius in inches
M.V.D. - Mean Vertical Dispersion in inches
M.H.D. - Mean Horizontal Dispersion in inches
E.V.D. - Extreme Vertical Dispersion in inches
E.H.D. - Extreme Horizontal Dispersion in inches
E.S. - Extreme Spread

[redacted]

[redacted]

APPENDIX E

[redacted]

FIRING AND ACCURACY DATA FOR 600 YARD MANN BARREL FIRING

RIFLE, ACCURACY, CAL. .30, No. 1528385 MOUNTED IN REST, RECOIL, ACCURACY, CAL. .30

AND

CAL. .280 MANN BARREL NO. 450/2 FITTED TO A P-17 RECEIVER (ENFIELD, CAL. .30 ACTION).

WEAPON SUPPORTED BY VEE SLIDE NO. 101

DATE: 21 February 1950 TEMP: 38°F

WIND VELOCITY: 6 to 8 mph DENSITY: 1.093

PREVIOUS ROUNDS: Cal. .30 Weapon - 42
Cal. .280 Weapon - 23 [redacted]

TARGET NO. 1 - 1450 HOURS

	CAL. .30 BALL, T104 LOT FAX 30-1358	CAL. .280 BALL LOT 19A
M.R.	5.65	10.03
M.V.D.	2.81	7.88
M.H.D.	2.44	5.44
E.V.D.	18.71	30.77
E.H.D.	18.20	24.00
E.S.	20.63	35.39

TARGET NO. 2 - 1502 HOURS

M.R.	6.41	14.06
M.V.D.	3.76	8.58
M.H.D.	4.40	7.66
E.V.D	17.40	35.27
E.H.D.	28.80	42.78
E.S.	32.10	47.60

[redacted]

[redacted]

[redacted]

APPENDIX E

TARGET NO. 3 - 1512 HOURS

	CAL. .30 BALL, T104 LOT FAX 30-1358	CAL. .280 BALL LOT 19A
M.R.	5.77	8.42
M.V.D.	2.38	6.29
M.H.D.	2.48	3.82
E.V.D.	11.18	32.95
E.H.D.	11.03	20.31
E.S.	12.60	33.00

TARGET NO. 4 - 1522 HOURS

M.R.	4.41	9.99
M.V.D.	3.00	6.54
M.H.D.	2.61	6.70
E.V.D.	14.15	21.31
E.H.D.	10.87	21.15
E.S.	15.98	23.15

TARGET NO. 5

M.R.	4.92	13.68
M.V.D.	3.52	10.25
M.H.D.	2.94	5.46
E.V.D.	16.18	46.10
E.H.D.	13.99	27.42
E.S.	18.05	46.10

[redacted]

[redacted]

[redacted]

APPENDIX E

[redacted]

DATE: 17 April 1950
TEMP: 66°F
DENSITY: 1.035
WIND: 6 mph
DIRECTION: SW

DIRECTION FIRE: SSE

PREVIOUS ROUNDS: Cal. .30 Weapon - 92
Cal. .280 Weapon - 117

TARGET NO. 1 - 0935 HOURS

	CAL. .30, AP, T93 LOT FAX 30-1357	CAL. .280, AP LOT 24A
M.R.	4.17	8.46
M.V.D.	3.31	6.86
M.H.D.	1.81	3.74
E.V.D.	16.90	23.25
E.H.D.	7.40	18.50
E.S.	17.00	25.00

TARGET NO. 2 - 0945 HOURS

M.R.	4.32	10.80
M.V.D.	3.13	4.92
M.H.D.	2.45	8.66
E.V.D.	15.48	18.94
E.H.D.	12.50	42.30
E.S.	15.47	44.00

TARGET NO. 3 - 0950 HOURS

M.R.	4.88	9.48
M.V.D.	3.40	7.14
M.H.D.	2.72	5.14
E.V.D.	17.47	28.91
E.H.D.	13.72	17.02
E.S.	18.95	28.91

[redacted]

[redacted]

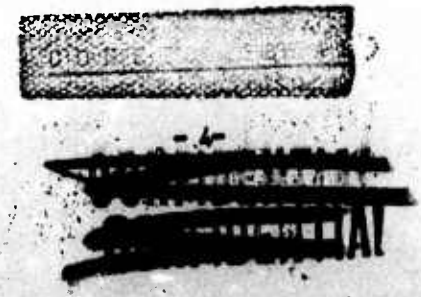
APPENDIX E

TARGET NO. 4 - 1000 HOURS

	CAL. .30 AP, T93 LOT FAX 30-1357	CAL. .280 AP LOT 24A
M.R.	3.70	9.25
M.V.D.	1.87	6.47
M.H.D.	2.89	5.42
E.V.D.	9.13	26.87
E.H.D.	8.69	20.70
E.S.	10.60	26.87

TARGET NO. 5 - 1005 HOURS

M.R.	5.73	11.41
M.V.D.	3.09	6.17
M.H.D.	4.10	7.96
E.V.D.	16.12	22.70
E.H.D.	11.30	32.48
E.S.	18.20	32.52



[redacted]

APPENDIX E

DATE: 17 April 195[redacted]
TEMP: 69°F
DENSITY: 1.026
WIND: 8 mph
DIRECTION: SW

DIRECTION FIRE: SSE

PREVIOUS ROUNDS: Cal. .30 Weapon - 142
Cal. .280 Weapon - 166

TARGET NO. 1 - 1010 HOURS

	CAL. .30, API, T101 LOT FAX 30-1356	CAL. .280, API LOT 23A
M.R.	6.42	7.12
M.V.D.	4.72	4.68
M.H.D.	3.99	3.84
E.V.D.	15.58	26.64
E.H.D.	15.85	19.40
E.S.	21.10	27.03

TARGET NO. 2 - 1015 HOURS

M.R.	7.70	8.44
M.V.D.	5.42	6.36
M.H.D.	4.50	4.48
E.V.D.	19.53	23.62
E.H.D.	15.20	18.92
E.S.	20.37	24.10

TARGET NO. 3 - 1025 HOURS

M.R.	7.27	7.78
M.V.D.	2.78	2.63
M.H.D.	6.64	6.21
E.V.D.	12.28	17.58
E.H.D.	22.15	16.65
E.S.	22.15	19.48

[redacted]

[redacted]

APPENDIX E

[redacted]

TARGET NO. 4 - 1030 HOURS

	CAL. .30, API, T101 LOT FAX 30-1356	CAL. .280, API LOT 23A
M.R.	4.89	6.00
M.V.D.	2.98	5.23
M.H.D.	3.24	1.87
E.V.D.	12.77	32.37
E.H.D.	14.00	7.35
E.S.	15.30	32.55

TARGET NO. 5 - 1037 HOURS

M.R.	6.14	6.76
M.V.D.	3.50	5.05
M.H.D.	4.17	3.40
E.V.D.	13.85	18.00
E.H.D.	18.75	15.45
E.S.	20.30	18.82

[redacted]

[redacted]

[redacted]

APPENDIX [redacted]

[redacted]

DATE: 17 April 1950
TEMP: 68°F
DENSITY: 1.012
WIND: 8 mph
DIRECTION: SW

DIRECTION FIRE: SSE

PREVIOUS ROUNDS: Cal. .30 Weapon - 193
Cal. .280 Weapon - 220

TARGET NO. 1 -1050 HOURS

	CAL. .30, TRACER, T102 LOT FAX 30-1359	CAL. .280, TRACER LOT 32A
M.R.	13.23	10.02
M.V.D.	10.24	7.23
M.H.D.	7.27	5.78
E.V.D.	35.13	30.38
E.H.D.	24.35	25.33
E.S.	39.20	36.23

TARGET NO. 2 - 1105 HOURS

M.R.	7.30	9.93
M.V.D.	3.86	4.50
M.H.D.	5.32	8.08
E.V.D.	25.10	20.69
E.H.D.	21.88	24.00
E.S.	28.80	28.00

TARGET NO. 3 - 1110 HOURS

M.R.	13.69	12.60
M.V.D.	9.83	7.70
M.H.D.	4.96	8.55
E.V.D.	35.85	24.87
E.H.D.	26.53	32.57
E.S.	57.23	33.85

[redacted]

[redacted]

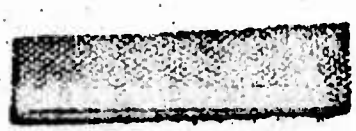
APPENDIX E

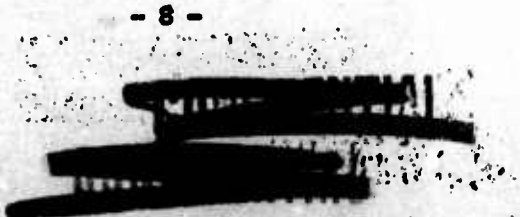
TARGET NO. 4 - 1115 HOURS

	CAL. .30, TRACER, T102 LOT FAX 30-1359	CAL. .280 TRACER LOT 32A
M.R.	12.13	10.03
M.V.D.	5.98	2.68
M.H.D.	9.16	7.32
E.V.D.	27.41	20.28
E.H.D.	34.00	38.07
E.S.	34.80	39.75

TARGET NO. 5 - 1122 HOURS

M.R.	9.85	11.33
M.V.D.	7.10	7.20
M.H.D.	5.68	7.08
E.V.D.	27.90	33.93
E.H.D.	24.75	29.62
E.S.	33.70	36.00





[redacted]

APPENDIX E

[redacted]

DATE: 18 April 1950
TEMP: 70°F
DENSITY: 1.008
WIND: 6 mph
DIRECTION: S

DIRECTION FIRE: SSE

PREVIOUS ROUNDS: Cal. .30 Weapon 298
Cal. .280 Weapon -328

TARGET NO. 1 - 0930 HOURS

	CAL. .30, SPOTTING, T103 LOT NO. 2	CAL. .280 OBS. LOT 17A
M.R.	7.20	8.36
M.V.D.	5.68	5.56
M.H.D.	2.87	4.89
E.V.D.	20.25	21.98
E.H.D.	14.34	18.71
E.S.	20.30	23.65

TARGET NO. 2 - 0935 HOURS

M.R.	9.37	8.86
M.V.D.	8.03	6.32
M.H.D.	4.10	4.54
E.V.D.	37.32	26.78
E.H.D.	22.54	18.97
E.S.	40.04	28.70

TARGET NO. 3 - 0940 HOURS

M.R.	8.38	10.72
M.V.D.	3.96	9.07
M.H.D.	4.91	4.06
E.V.D.	34.74	38.80
E.H.D.	20.91	21.44
E.S.	36.80	40.00

[redacted]

[redacted]

APPENDIX E

[redacted]

TARGET NO. 4 - 0945 HOURS

	CAL. .30, SPOTTING, T103 LOT NO. 2	CAL. .280, OBS. LOT 17A
M.R.	14.46	10.87
M.V.D.	4.82	6.92
M.H.D.	8.18	6.42
E.V.D.	36.68	25.93
E.H.D.	37.43	23.04
E.S.	37.60	26.90

TARGET NO. 5 - 1000 HOURS

M.R.	12.02	9.05
M.V.D.	7.56	6.74
M.H.D.	7.71	5.25
E.V.D.	37.93	24.90
E.H.D.	29.34	18.48
E.S.	38.15	24.95

[redacted]

[redacted]

[redacted]

APPENDIX E

DATE: 18 April 1950
TEMP: 70°F
DENSITY: 1.008
WIND VELOCITY: 5 mph
WIND DIRECTION: S

DIRECTION FIRE: SSE

PREVIOUS ROUNDS: Cal. .30 Weapon - 243
Cal. .280 Weapon - 270

TARGET NO. 1 - 0845 HOURS

	CTG, BALL, CAL. .30 LOT FA-X30-1290	CTG, S.A. BALL, CAL. .280 LOT NO. 12A
M.R.	4.05	4.93
M.V.D.	2.88	3.56
M.H.D.	2.26	3.31
E.V.D.	12.73	12.97
E.H.D.	9.63	10.03
E.S.	13.40	13.03

TARGET NO. 2 - 0850 HOURS

M.R.	3.87	8.68
M.V.D.	2.82	3.82
M.H.D.	2.33	2.98
E.V.D.	9.19	25.52
E.H.D.	9.93	10.64
E.S.	13.04	25.73

TARGET NO. 3 - 0855 HOURS

M.R.	3.69	3.83
M.V.D.	1.66	2.14
M.H.D.	2.79	2.75
E.V.D.	9.20	7.14
E.H.D.	8.93	14.50
E.S.	9.93	15.40

[redacted]

[redacted]

[redacted]

APPENDIX E

TARGET NO. 4 - 0900 HOURS

	CTG, BALL, CAL. .30 LOT FA-X30-1290	CTG, S.A. BALL, CAL. .28 LOT NO. 12A
M.R.	4.41	6.89
M.V.D.	2.49	3.58
M.H.D.	2.82	5.03
E.V.D.	8.77	18.78
E.H.D.	10.52	19.04
E.S.	12.48	26.80

TARGET NO. 5 - 0905 HOURS

M.R.	3.14	7.24
M.V.D.	1.67	4.64
M.H.D.	2.47	4.65
E.V.D.	7.85	21.94
E.H.D.	8.97	17.68
E.S.	11.37	24.18

[redacted]

[redacted]

66

[redacted]

APPENDIX E

[redacted]

DATE: 18 April 1950

TEMP: 72°F

DENSITY: 1.008

WIND VELOCITY: 7 mph

WIND DIRECTION: S DIRECTION FIRE: SSE

PREVIOUS ROUNDS - 383

WEAPON NO. 450/2

AMMUNITION: CARTRIDGE, S.A., BALL, CAL. .280

LOT NO. 21A (140-GRAIN LEAD CORE BALL)

	TARGET 1	TARGET 2	TARGET 3	TARGET 4	TARGET 5	AVERAGE
M.R.	8.01	7.02	6.61	7.23	5.65	6.90
M.V.D.	5.80	4.30	4.72	3.89	3.85	4.51
M.H.D.	3.32	4.19	3.77	5.15	3.53	3.99
E.V.D.	27.15	18.70	22.03	18.46	13.48	19.96
E.H.D.	16.12	17.90	12.20	21.12	14.98	16.46
E.S.	29.20	19.00	22.03	21.25	16.45	21.59

[redacted]

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APPENDIX E

[redacted] CONFIDENTIAL

RIFLE, ACCURACY, CAL. .30, NO. 1528613 MOUNTED IN REST, RECOIL, ACCURACY, CAL. .30

AND

CALIBER .280 MANN BARREL NO. 450/3 FITTED TO A P-17 RECEIVER (ENFIELD MK1 ACTION NO.894347

WEAPON SUPPORTED BY VEE SLIDE NO. 101

DATE: 24 February 1950 TEMP: 44°F

WIND VELOCITY: 8 mph DENSITY: 1.049

PREVIOUS ROUNDS: Cal. .30 Weapon - 23
Cal. .280 Weapon - 44

TARGET NO. 1 -1006 HOURS

	CAL. .30, BALL, T104 LOT FA-X30-1358	CAL. .280, BALL, LOT 19A
M.R.	4.58	7.41
M.V.D.	4.20	5.43
M.H.D.	2.43	3.67
E.V.D.	14.41	29.00
E.H.D.	10.12	14.72
E.S.	15.95	29.25

TARGET NO. 2 -1015 HOURS

M.R.	6.02	8.26
M.V.D.	3.96	7.07
M.H.D.	4.20	3.26
E.V.D.	12.20	19.27
E.H.D.	13.56	18.48
E.S.	18.20	21.50

TARGET NO. 3 - 1020 HOURS

M.R.	4.59	8.07
M.V.D.	2.76	4.45
M.H.D.	3.03	5.90
E.V.D.	8.88	19.74
E.H.D.	13.43	24.25
E.S.	14.40	30.55

[redacted] [redacted] CONFIDENTIAL 68

[redacted]

APPENDIX E

TARGET NO. 4 - 1029 HOURS

	CAL. .30 BALL, T104 LOT FA-X30-1358	CAL. .280 BALL, LOT 19A
M.R.	4.67	6.98
M.V.D.	3.55	3.54
M.H.D.	2.60	4.88
E.V.D.	17.35	16.55
E.H.D.	9.72	26.60
E.S.	18.50	26.65

TARGET NO. 5 - 1038 HOURS

M.R.	7.05	10.68
M.V.D.	3.71	6.85
M.H.D.	4.56	7.31
E.V.D.	15.33	20.13
E.H.D.	22.00	27.85
E.S.	22.80	31.30

[redacted]

[redacted]

APPENDIX E

DATE: 27 February 1959 TEMP: 23°F

WIND VELOCITY: 8 mph DENSITY: 1.105

PREVIOUS ROUNDS: Cal. .30 Weapon - 75
Cal. .280 Weapon - 128

TARGET NO. 1 - 0933 HOURS

	CAL. .30 AP, T93 LOT FA-X30-1357	CAL. .280 AP LOT 24A
M.R.	7.67	13.64
M.V.D.	4.18	9.95
M.H.D.	5.53	3.74
E.V.D.	18.45	41.07
E.H.D.	19.47	37.25
E.S.	21.40	44.15

TARGET NO. 2 - 0941

TARGETS LOST DUE TO CHANGE IN WIND

[redacted]

[redacted]

APPENDIX E

TARGET NO. 3 - 1000 HOURS

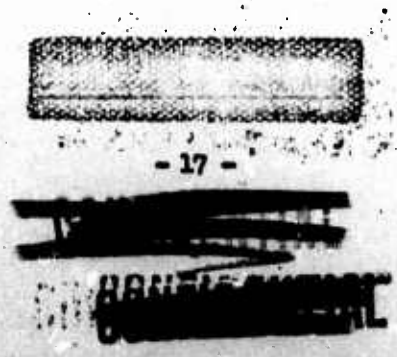
	CAL. 30, AP, T93 LOT FA-X30-1357	CAL. .280, AP, LOT 24A
M.R.	7.26	15.75
M.V.D.	3.77	12.18
M.H.D.	5.14	8.80
E.V.D.	18.52	38.20
E.H.D.	22.90	34.58
E.S.	24.97	46.75

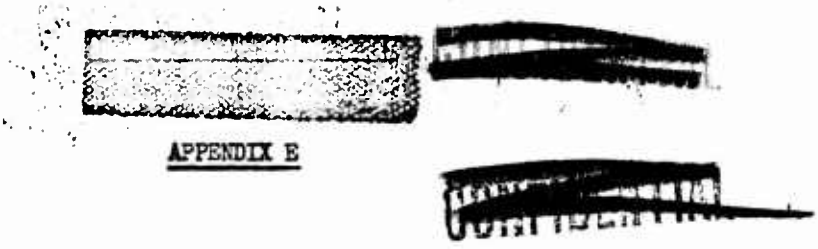
TARGET NO. 4 - 1006 HOURS

M.R.	7.36	10.73
M.V.D.	5.41	6.69
M.H.D.	4.06	7.81
E.V.D.	21.31	33.35
E.H.D.	16.71	36.58
E.S.	22.50	49.55

TARGET NO. 5 - 1012 HOURS

M.R.	4.70	16.28
M.V.D.	2.98	14.01
M.H.D.	2.92	5.65
E.V.D.	14.09	57.34
E.H.D.	9.27	29.24
E.S.	14.72	60.50





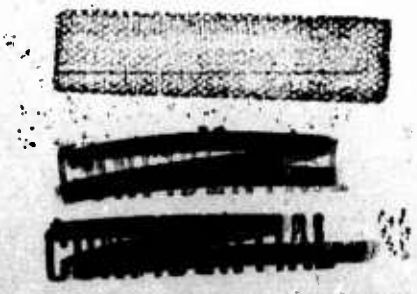
APPENDIX E

TARGET NO. 6 - 1026 HOURS

	CAL. .30, AP, T93 LOT FA-X30-1357	CAL. .280, AP LOT 24A
M.R.	3.51	10.21
M.V.D.	2.75	6.94
M.H.D.	1.62	6.31
E.V.D.	11.11	24.90
E.H.D.	6.89	24.32
E.S.	11.40	29.34

TARGET NO. 7 - 1047 HOURS

M.R.	5.63	9.86
M.V.D.	3.79	5.33
M.H.D.	2.88	6.77
E.V.D.	13.63	19.99
E.H.D.	11.48	27.38
E.S.	14.51	31.25



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APPENDIX E

The following two targets were fired directly after the above Cal. .280 AP accuracy firing. These targets were fired to investigate the possibility of a fault in the mount, vee slide, or barrel used in the Cal. .280 accuracy firing. A 130-grain lead core ball round was fired.

DATE: 27 February 1950 TEMP: 26° F

WIND VELOCITY - 8 mph DENSITY: 1.097

PREVIOUS ROUNDS: Barrel 450/3 - 223

AMMUNITION: Cartridge, S.A., Ball, Cal. .280, Lot No. 12A

	TARGET NO. 1 - 1100 HOURS	TARGET NO. 2 - 1106 HOURS
M.R.	5.43	6.97
M.V.D.	3.81	5.29
M.H.D.	3.42	4.14
E.V.D.	17.50	20.33
E.H.D.	16.00	16.82
E.S.	22.80	24.75

[redacted]

[redacted]

[redacted]

[redacted]

APPENDIX F

Complete Velocity Data for Caliber .30 and Caliber .280
Ammunition at +70°F, -65°F and +165°F

(28 sheets)

[redacted]

[redacted]

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 23 February 1950 Time Started: 1125 Time Finished: 1200

Universal Receiver No.: 197 Barrel No.: R-12 Previous Rounds: 20

Ammunition Temperature: 70°F Range Temperature: 39°F. Density: 1.038

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .30, T104, Lot FA40-1358

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2625	
2	2765	
3	2793	
4	2789	
5	Lost	
6	2803	
7	2761	
8	2755	
9	2759	
10	2737	
11	2792	
12	2796	
13	Lost	
14	Lost	
15	2818	
16	2756	
17	Lost	
18	2759	
19	2776	
20	2753	
21	2758	
22	2770	
23	2728	
24	Lost	
25	2786	
26	Lost	
27	2772	
28	2755	
29	2767	

Rounds 1-3 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX F

[redacted]

VELOCITY TEST

Date: 23 February 1950 Time Started: 12[redacted]:

Universal Receiver No.: 197 Barrel No.: R-12 Previous Rounds: 49

Ammunition Temperature: +70°F Range Temperature: +40°F Density: 1.038

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, AP, Caliber .30, T93, Lot No. FA[illegible]30-1357

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2839	
2	2838	
3	2839	
4	2851	
5	2812	
6	2862	
7	2851	
8	2836	
9	2825	
10	2782	
11	2801	
12	2822	
13	2836	
14	Lost	
15	2814	
16	2833	
17	2830	
18	Lost	
19	2804	
20	2795	
21	Lost	
22	2770	
23	Lost	
24	Lost	
25	Lost	
26	Lost	
27	2828	

[redacted]

[redacted]

[redacted]

APPENDIX F

[redacted]

VELOCITY TEST

Date: 2 March 1950 Time Started: 1517 [redacted] ed: 1545

Universal Receiver No.: 197 Barrel No.: [redacted] Previous Rounds: 105

Ammunition Temperature: 70°F Range Temperature: 28°F Density: 1.101

Chronograph Type: Ocuntor Initiator Type: Lumiline

Test Ammunition: Cartridge, API, Caliber .30, T101, Lot No. FAX30-1356.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Warmer	
2	Warmer	
3	Warmer	
4	Warmer	
5	Warmer	
6	2747	
7	2716	
8	2764	
9	2729	
10	2769	
11	2743	
12	2751	
13	2717	
14	2725	
15	2779	
16	2720	
17	2737	
18	2755	
19	2755	
20	2664	
21	Lost	
22	2753	
23	2725	
24	2737	
25	2719	
26	2775	

[redacted]

[redacted]

APPENDIX F

[redacted]

VELOCITY TEST

Date: 2 March 1950 Time Started: 1450 Time Finished: 1515

Universal Receiver No.: 197 Barrel No.: R-12 Previous Rounds: 79

Ammunition Temperature: 70°F Gauge Temperature: 29°F Density: 1.101

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Tracer, Caliber .30, T102, Lot No. FAX30-1559

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Warmer	
2	Warmer	
3	Warmer	
4	Warmer	
5	Warmer	
6	2672	
7	2678	
8	2646	
9	2662	
10	2653	
11	2614	
12	2573	
13	2604	
14	2657	
15	2671	
16	2627	
17	2623	
18	2600	
19	2608	
20	2588	
21	2671	
22	Lost	
23	2595	
24	2627	
25	2615	
26	2625	

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 9 March 1950 Time Started: 1005 [illegible]nished: 1047

Universal Receiver No.: 197 Barrel No.: [illegible] Previous Rounds: 253

Ammunition Temperature: 70°F Range Temperature: 32°F Density:

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Spotting, Caliber .30, T103, Lot No. 2.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2700	
2	2759	
3	2723	
4	2694	
5	2716	
6	2728	
7	2693	
8	2755	
9	2722	
10	2726	
11	2711	
12	2671	
13	2741	
14	2719	
15	2714	
16	2759	
17	2759	
18	2697	
19	2732	
20	2762	
21	2746	
22	2735	
23	2726	
24	2734	
25	2698	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

APPENDIX F

[redacted]

VELOCITY TEST

Date: 7 March 1950 Time Started: 12[redacted] Finished: 1300

Universal Receiver No.: 197 Barrel No.: [redacted]-12 Previous Rounds: 153

Ammunition Temperature: -65°F Range Temperature: 39°F Density: 1.068

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .30, T104, Lot FA330-1358.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2528	
2	2621	
3	2587	
4	2525	
5	2623	
6	2610	
7	2632	
8	2573	
9	2568	
10	2548	
11	2623	
12	2623	
13	2584	
14	2563	
15	2616	
16	2542	
17	2534	
18	2630	
19	2632	
20	2639	
21	2623	
22	2545	
23	2608	
24	2619	
25	2541	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 7 March 1950 Time Started: 1307 [redacted] 1320

Universal Receiver No.: 197 Barrel No.: [redacted] Previous Rounds: 178

Ammunition Temperature: -65°F Range Temperature: 39°F Density: 1.068

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, AP, Caliber .30, Lot FAX30-1357.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2508	
2	2636	
3	2623	
4	2611	
5	2580	
6	2651	
7	2612	
8	2625	
9	2655	
10	2601	
11	2580	
12	2647	
13	2632	
14	2538	
15	2593	
16	2597	
17	2576	
18	2616	
19	2607	
20	2621	
21	2622	
22	2593	
23	2587	
24	2658	
25	2505	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 8 March 1950 Time Started: 1245 Time Finished: 1305

Universal Receiver No.: 197 Barrel No.: R-12 Previous Rounds: 228

Ammunition Temperature: -65°F Range Temperature: 54°F Density: 1.010

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, API, Caliber .30, T101, Lot FAX30-1356.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2580	
2	2614	
3	2630	
4	2587	
5	2618	
6	2612	
7	2568	
8	2616	
9	2650	
10	2596	
11	2569	
12	2625	
13	2567	
14	2601	
15	2569	
16	2637	
17	2660	
18	2596	
19	2575	
20	2568	
21	2563	
22	2584	
23	2626	
24	2554	
25	2623	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 5 March 1950 Time Started: 1115 Time Finished: 1135

Universal Receiver No.: 197 Barrel No.: F-12 Previous Rounds: 203

Ammunition Temperature: -65°F Range Temperature: 53°F Density: 1.032

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Tracer, Caliber .30, M1C2, Lot FA30-1559

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2618	
2	2642	
3	2616	
4	Lost	
5	2560	
6	2548	
7	2556	
8	2548	
9	2629	
10	2520	
11	2560	
12	2520	
13	2554	
14	2507	
15	2623	
16	2530	
17	2585	
18	2545	
19	2530	
20	2551	
21	2535	
22	2511	
23	2548	
24	2535	
25	2564	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX F [redacted]

VELOCITY TEST

Date: [redacted] Time Started: 1455 Time Finished: 1510

Universal Receiver No.: 197 Barrel No.: R-12 Previous Rounds: 2/8

Ammunition Temperature: -65°F Range Temperature: 55°F Density: 1.083

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Spotter, Caliber .30, Lot No. 2

ROUND NO.	EXPERIMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Lost	
2	Lost	
3	Lost	
4	2454	
5	2465	
6	2456	
7	[illegible]	
8	[illegible]	
9	2479	
10	2528	
11	2506	
12	2506	
13	2506	
14	2541	
15	2504	
16	2496	
17	2519	
18	2495	
19	2493	
20	2534	
21	2504	
22	2486	
23	2547	
24	2494	
25	2568	

Rounds 1-5 - Warmers.

[redacted]

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APPENDIX F [redacted]

VELOCITY TEST

Date: 15 March 1950 Time Started: 1255 Time Finished: 1307

Universal Receiver No. [redacted] Barrel No.: [illegible]-12 Previous Rounds: 321

Ammunition [redacted] +165°F Range Temperature: [illegible]2°F Density: 1.0[illegible]8

Chronograph Type: Counter Initiator Type: [illegible]

Test Ammunition: Cartridge, Ball, Caliber .30, T104, Lot FA[illegible]0-1558.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2846	
2	2858	
3	2865	
4	2847	
5	2867	
6	2858	
7	2854	
8	28[illegible]4	
9	2849	
10	2852	
11	2857	
12	2870	
13	2852	
14	2851	
15	2859	
16	2831	
17	2822	
18	2822	
19	2838	
20	2823	
21	2823	
22	2850	
23	2792	
24	2822	
25	2823	

Rounds 1-5 - Warmers. [redacted]

[redacted]

APPENDIX B

VELOCITY TEST

Date: 15 March 1950 Time Started: 1320 Time Finished: 1335

Universal Receiver No.: 197 Barrel No.: B-12 Previous Rounds: 316

Ammunition: [redacted] Temperature: 42°F Density: 1.218

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, AP, Caliber .30, M2, Lot [redacted]0-1557.

ROUND NO.	INSTANTANEOUS VELOCITY AT 78', f/s	PRESSURE, psi
1	2852	
2	2856	
3	2865	
4	2867	
5	2862	
6	[illegible]	
7	2841	
8	[illegible]	
9	2857	
10	2867	
11	2841	
12	2850	
13	2814	
14	2865	
15	2850	
16	2853	
17	2836	
18	2814	
19	2847	
20	2849	
21	2834	
22	2823	
23	2814	
24	[illegible]	
25	2807	

Rounds 1-5 - Warmers.

[redacted]

CONFIDENTIAL

[redacted]

APPENDIX F

VELOCITY TEST

Date: [redacted] Time Started: 1155 Time Finished: 1155

Universal Receiver [illegible] Barrel No.: 1-12 Previous Rounds: 396

[redacted] Air & Powder Temperatures: 40°F Density: 1.079

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, AFI, Caliber .30, M101, Lot FAX30-1556.

ROUND NO.	INSTRUMENTAL VELOCITY AT 72', fps	PRESSURE, psi
1	2833	
2	2843	
3	2851	
4	2857	
5	2852	
6	2877	
[illegible]	[illegible]	
9	2012	
10	2828	
11	2875	
12	2862	
13	2851	
14	2846	
15	2847	
16	2859	
17	2846	
18	2869	
19	2860	
20	2850	
21	2854	
22	2839	
23	2852	
24	2841	
25	2844	

Rounds 1-5 - Warmers.

[redacted]

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[redacted]

APPENDIX F

VELOCITY TEST

[redacted]

Date: 14 March 1939 Time Started: 1112 Time Finished: 1130

Universal Receiver No.: [redacted] Barrel No.: R-12 Previous Rounds: 371

Ammunition Temperature: +109°F Range Temperature: 40°F Density: 1.079

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Tracer, Caliber .30, T102, Lot FA-30-1359.

ROUND NO.	INSTANTANEOUS VELOCITY AT 78', fps	PRESSURE, psi
1	2697	
2	2719	
3	2772	
4	2750	
5	2728	
6	2735	
7	2713	
8	2726	
9	2740	
10	2749	
11	2723	
12	2750	
13	2731	
14	2756	
15	2740	
16	2743	
17	2758	
18	2719	
19	2703	
20	2731	
21	2710	
22	2714	
23	2743	
24	2740	
25	2723	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 23 February 1950 Time Started: 0931 Time Finished: 1000

Universal [redacted] Barrel No.: 449-5 Previous Rounds: 48

Ammunition Temperature: +70°F Range Temperature: 39°F Density: 1.033

Chronograph Type: Oehler Initiator Type: Lumiline

Test Ammunition: Cartridge, SA, Ball, Caliber .220, Lot No. 194.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2281	
2	2314	
3	2310	
4	2295	
5	Lost	
6	2314	
7	2316	
8	2317	
9	2301	
10	2293	
11	Lost	
12	2274	
13	2253	
14	Lost	
15	2255	
16	Lost	
17	2201	
18	2247	
19	2253	
20	2247	
21	Lost	
22	2284	
23	2252	
24	2236	
25	2250	
26	Lost	
27	Lost	
28	2265	
29	[redacted]	
30		

Rounds 1-3 - Warmers.

[redacted]

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[redacted]

APPENDIX F

VELOCITY TEST

Date: 25 February 1950 Time Started: 1030 — Time Finished: 1055

Universal Receiver No.: Barrel No.: 449-5 Previous Rounds: 85

Ammunition Temperature: 70°F Room Temperature: 40°F Density: 1.030

Chronograph Type: [illegible] Initiator Type: Luniline

Test Ammunition: Cartridge, SA, AP, Caliber .220, Lot No. 2bA.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', f/s	PRESSURE, psi
1	2195	
2	2193	
3	2204	
4	2217	
5	2227	
6	2232	
7	2212	
8	2159	
9	2174	
10	2170	
11	2217	
12	2236	
13	2235	
14	2219	
15	2227	
16	2192	
17	2170	
18	2186	
19	2179	
20	2222	

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 8 March 1950 Time Started: 1038 Time Finished: 1100

Universal Receiver No.: [redacted] Gun No.: 449-5 Previous Rounds: 108

Ammunition Temperature: 70°F Range Temperature: 59°F Density: 1.012

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, MFI, Caliber .50, Lot 23A.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Lost	
2	2250	
3	2261	
4	2277	
5	2255	
6	2251	
7	2250	
8	2232	
9	2239	
10	2195	
11	2203	
12	2211	
13	2180	
14	2190	
15	2185	
16	2178	
17	2177	
18	2189	
19	2159	
20	2158	
21	2185	
22	2208	
23	2179	
24	2153	
25	2171	

Rounds 1-5 - Warmers.

[redacted]

41

APPENDIX F [redacted]

VELOCITY TEST

Date: 27 March 1950 Time Started: 0918 Time Finished: 0938

Universal Receiver No.: Barrel No.: 419-5 Previous Rounds: 411

[illegible] Temperature: [illegible] Range Temperature: +44°F Density: 1,047

Chronograph Type: [redacted] Initiator Type: Lumiline

Test Ammunition: Cartridge, SA, Tracer, Caliber .280, Lot 52A.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2185	
2	22[illegible]	
3	2256	
4	[illegible]271	
5	2255	
6	2254	
7	2251	
8	[illegible]	
9	2215	
10	2247	
11	2254	
12	2255	
13	2319	
14	2257	
15	2250	
16	2293	
17	2170	
18	2230	
19	2225	
20	2232	
21	2266	
22	2228	
23	2244	
24	2233	
25	2261	

Rounds 1-5 - Warmers.

[redacted]

C O N F [illegible]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 1[redacted] 1950 Time Started: 0909 Time Finished: 0925

[redacted] Barrel No.: 449-5 Previous Rounds: 203

[redacted] Temperature: 71°F Density: 1.[redacted]

[redacted] Chamber Inhibitor Type: Lanolin

[redacted] Cartridge, Ball, Caliber .30, Lot 17[redacted]

[redacted] No.	EXPERIMENTAL VELOCITY at 78', fps	PRESSURE, psi
1	2317	
2	2370	
3	2366	
4	2391	
5	2357	
6	2370	
7	2[redacted]	
8	[redacted]	
9	2362	
10	2344	
11	2374	
12	2361	
13	2363	
14	2333	
15	2344	
16	2322	
17	2333	
18	2343	
19	2319	
20	2350	
21	2317	
22	2290	
23	2355	
24	2336	
25	2287	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 9 March 1950 Time Started: 1047 Time Finished: 1115

[redacted] Barrel No.: 449-5 Previous Rounds: 133

[redacted] Range Temperature: 32°F Density: 1.013

[redacted] Initiator Type: Inline

Test Ammunition: Cartridge, Ball, Caliber .30, Lot 194.

ROUND NO.	EXPERIMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2178	
2	2238	
3	2200	
4	2253	
5	2206	
6	2218	
7	2197	
8	2178	
9	2198	
10	2167	
11	2181	
12	2200	
13	2140	
14	2158	
15	2147	
16	2175	
17	2157	
18	2183	
19	2146	
20	2103	
21	2142	
22	2156	
23	2167	
24	2165	
25	2146	

Rounds 1-5 - warmers.

[redacted]

[redacted]

APPENDIX F

VELOCITY TEST

Date: 9 March 1950 Time Started: 1127 Time Finished: 1150

Universal Receiver No.: Barrel No.: 449-5 Previous Rounds: 158

Ammunition Temperature: -65°F Ambient Temperature: 32°F Density: 1.038

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, AP, Caliber .30, Lot 2HA.

Round No.	Instrumental Velocity at 78', f/s	Pressure, psi
1	2020	
2	2071	
3	2109	
4	2061	
5	2047	
6	2060	
7	2063	
8	2077	
9	2076	
10	2074	
11	2045	
12	2063	
13	2101	
14	2057	
15	2064	
16	2016	
17	2070	
18	2070	
19	2101	
20	2072	
21	2059	
22	2079	
23	2081	
24	2054	
25	2048	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

25

[redacted]

APPENDIX F

VELOCITY TEST

Date: 9 March 1950 Time Started: 1251 Time Finished: 1301

Universal Receiver No.: Barrel No.: 449-5 Previous Rounds: 183

Ammunition Temperature: -35°F Range Temperature: 32°F Density: 1.[illegible]93

Chronograph Type: Caliber Initiator Type: Lumiline

Test Ammunition: Cartridge, AFI, Caliber .50, Lot 23[illegible].

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2029	
2	2087	
3	2105	
4	2111	
5	2085	
6	2097	
7	2089	
8	2093	
9	2047	
10	2034	
11	2033	
12	2017	
13	1991	
14	2037	
15	2006	
16	2000	
17	1990	
18	1976	
19	2036	
20	1970	
21	1994	
22	2006	
23	200[illegible]	
24	1990	
25	2008	

Rounds 1-5 - Warmers.

[redacted]

[redacted] **APPENDIX F** [redacted]

VELOCITY TEST

Date: [illegible] 1972 Time Started: 1112 Time Finished: 1132

[illegible] Barrel No.: [illegible]9-5 Previous Rounds: [illegible]

[illegible] Temp.: -65°F Range Temperature: +65°F Density: .[illegible]97

[illegible] Type: [illegible] Initiator Type: [illegible]

[illegible] Ammunition: Cartridge, [illegible], Caliber .[illegible], Lot No. 32[illegible].

ROUND NO.	INSTRUMENTAL VELOCITY AT [illegible]	PRESSURE, psi
1	2235	
2	2240	
3	2275	
4	2317	
5	2350	
6	2105	
7	2209	
8	2210	
9	2135	
10	2109	
11	2130	
12	2106	
13	2098	
14	2070	
15	2094	
16	2090	
17	2098	
18	2120	
19	2109	
20	2080	
21	2082	
22	2106	
23	2088	
24	2117	
25	2122	

Rounds 1-5 - Warmers.

[redacted]

APPENDIX F [redacted]

VELOCITY TEST

[redacted]

Date: [redacted] 1950 Time Started: 1110 Time Finished: 1200

Universal Receiver No.: Barrel No.: 119-5 Previous Rounds: 401

Ammunition Temperature: +55°F Range Temperature: +55°F Density: .997

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, [illegible], [illegible], Caliber .30, Lot [illegible].

ROUND NO.	INSTRUMENTAL VELOCITY AT [illegible], fps	PRESSURE, psi
1	2168	
2	2165	
3	2217	
4	2255	
5	2173	
6	2235	
7	2200	
8	[illegible]	
9	2190	
10	2169	
11	2162	
12	2171	
13	2197	
14	2179	
15	2185	
16	2208	
17	2147	
18	2213	
19	2205	
20	2195	

[redacted]

APPENDIX F [redacted]

VELOCITY TEST

Date: 15 March 1950 Time Started: 1112 Time Finished: 1125

Universal Receiver No.: Barrel No.: 449-5 Previous Rounds: 291

Ammunition Temperature: +155°F Range Temperature: 40°F Density: 1.055

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, M2, Ball, Caliber .30, Lot 19A.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	[illegible]	
2	[illegible]	
3	[illegible]	
4	[illegible]	
5	[illegible]	
6	[illegible]	
7	[illegible]	
8	[illegible]	
9	[illegible]	
10	[illegible]	
11	[illegible]	
12	[illegible]	
13	[illegible]	
14	[illegible]	
15	2359	
16	2375	
17	2345	
18	2374	
19	2375	
20	2374	
21	2376	
22	2329	
23	2350	
24	2342	
25	2315	

Rounds 1-5 - Warmers.

[redacted]

APPENDIX F [redacted]

[redacted]

VELOCITY TEST

Date: [illegible] March 195[illegible]   Time Started: 1140   Time Finished: 1155

Universal Receiver No.:   Barrel No.: [illegible]9-5   Previous Rounds: [illegible]21

Ammunition Temperature: +1[illegible]°F   Range Temperature: 40°F   Density: 1.055

Chronograph Type: Counter [illegible]   Initiator Type: Lumiline

Test Ammunition: [illegible], [illegible], AP, Caliber .280, Lot No. 24[illegible].

ROUND NO.	INSTRUMENTAL VELOCITY AT [illegible] FT., fps	PRESSURE, psi
1	23[illegible]	
2	23[illegible]	
3	23[illegible]	
4	23[illegible]	
5	2305	
6	23[illegible]	
7	2347	
8	23[illegible]	
9	22[illegible]8	
10	2288	
11	2307	
12	2285	
13	2285	
14	22[illegible]	
15	2289	
16	2291	
17	2300	
18	2307	
19	2311	
20	2293	
21	2295	
22	2338	
23	2295	
24	2307	
25	2291	

Rounds 1-5 - warmers.

[redacted]

100

[redacted]

APPENDIX F

[redacted]

VELOCITY TEST

Date: 16 March 1950 Time Started: 1312 Time Finished: 1340

Universal Receiver No.: [redacted] Barrel No.: 449-5 Previous Rounds: 381

Ammunition Temperature: [redacted] Range Temperature: 56°F Density: 1.079

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, .50, API, Caliber .50, Lot No. 23A.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', f/s	PRESSURE, psi
1	2271	
2	2256	
3	2299	
4	2273	
5	2295	
6	2311	
7	Lost	
8	2247	
9	2290	
10	2255	
11	2249	
12	2287	
13	2323	
14	2285	
15	2316	
16	2256	
17	2270	
18	2269	
19	2254	
20	2289	
21	2296	
22	2295	
23	2240	
24	2263	
25	2251	
26	2272	

Rounds 1-5 - Warmers.

[redacted]

APPENDIX F

TEST

Date: 27 March 1950 Time Started: 1100 Time Finished: 1120

Universal Receiver No.: Barrel No.: 449-5 Previous Rounds: 441

Ammunition Temperature: +16[illegible]° Range Temperature: +46° Density: 1.047

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Barbridge, SA, Tracer, Caliber .280, Lot 32A.

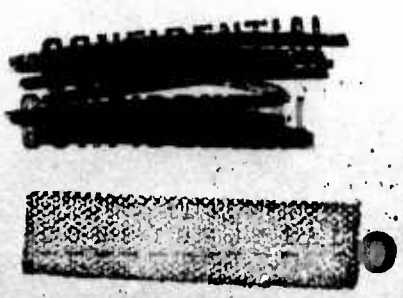
ROUND NO.	INSTRUMENTAL VELOCITY AT 78', f/s	RESIDUAL, f/s
1	Lost	
2	2365	
3	2373	
4	2375	
5	2369	
6	2371	
7	2363	
8	2371	
9	2383	
10	2382	
11	2375	
12	2379	
13	2372	
14	2378	
15	2373	
16	2326	
17	2373	
18	2370	
19	2370	
20	2380	
21	2344	
22	2361	
23	2350	
24	2360	
25	Lost	
26	2380	

Rounds 1-5 - Warmers.

APPENDIX G

Complete Pressure Data for Caliber .30 and
Caliber .280 Ammunition at +70°F, -65°F and +165°F

(23 sheets)



APPENDIX G [redacted]

PRESSURE TEST

Date: | Time Started: 1330 | Time Finished: 1420

Universal Receiver No.: 197 | Barrel No.: G-30 | Previous Rounds: 0

Ammunition Temperature: 70°F | Range Temperature: 32°F | Density: 1.004

Chronograph Type: Counter | Initiator Type: Inline

Test Ammunition: Cartridge, Ball, Caliber .30, T104, Lot FA30-1358

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2717	51100
2	2732	51700
3	2747	52000
4	2746	51500
5	2741	53800
6	2761	51500
7	2743	52500
8	2752	53000
9	2770	55700
10	2740	51700
11	2740	51200
12	2790	55100
13	2741	51500
14	2744	51800
15	2761	50000
16	2741	50000
17	2761	51100
18	2757	51700
19	2769	51600
20	2743	51100
21	2769	52100
22	2765	53400
23	2750	51600

Rounds 1-3 - Warmers.

[redacted]

104

[redacted]

APPENDIX G

PRESSURE/VELOCITY FIRING

Cartridge, AP, Caliber .30, T93, Lot F[redacted]
Universal Receiver No. 197
Barrel No. G-30
Previous Rounds: 28
Ammunition Temperature: 70°F Range Temperature: 32°F Density: 1.084

TIME	RD	VELOCITY	PRESSURE	TIME	RD	VELOCITY	PRESSURE
1500	1	2747	47900		13	2784	52400
	2	2822	56100		14	2759	50400
	3	2773	51700		15	2801	52200
	4	2781	54000		16	2770	48200
	5	2786	51200		17	2758	51400
	6	2762	47600		18	2803	54900
	7	2765	47000		19	2795	53300
	8	2784	53100		20	2765	48400
	9	2809	53200		21	2800	49200
	10	2806	53800		22	2793	50400
	11	2806	53000	1550	23	2804	48400
	12	2811	53300				

Average	2787.1	Average	51270
Maximum	2811	Maximum	54900
Minimum	2758	Minimum	47000
Extreme Variation	53	Extreme Variation	7900

Rounds 1-3 - Warmers.

[redacted]

[redacted]

APPENDIX G

PRESSURE TEST

Date: 2 March 1950 Time Started: 1257 Time Finished: 1405

Universal Receiver No.: 197 Previous Pounds: 76

[illegible] Temperature: 70°F [illegible] °F Density: 1.101

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, API, Caliber .50, M1C1, Lot No. PA50-1356

Shot No.	Instrumental Velocity, F.P.S., fps	Pressure, psi
1	Jammed	
2	Jammed	
3	Jammed	
4	Jammed	
5	Jammed	
6	2688	50600
7	2671	46200
8	2705	50100
9	2707	51800
10	2684	49600
11	2687	48200
12	2672	50200
13	2693	51500
14	2697	51600
15	2743	51800
16	2678	49800
17	2711	52200
18	2677	50400
19	2698	49000
20	2716	50800
21	2707	51500
22	2685	51400
23	2682	48600
24	2704	51400
25	2713	51100

[redacted]

APPENDIX C

PRESSURE TEST [redacted]

Date: 2 March 1950 [redacted] ted: 0920 Time Finished: 1000

Universal Receiver [redacted] Barrel No.: 050 Previous Rounds: 51

Ammunition Temperature: 70°F Range Temperature: 25°F Density: 1.101

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Tracer, Caliber .30, T102, Lot No. FA30-1359

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Warmer	
2	Warmer	
3	Warmer	
4	Warmer	
5	Warmer	
6	2551	40900
7	2575	40400
8	2615	46100
9	2552	41400
10	2556	41200
11	2584	43700
12	2601	45600
13	2528	41800
14	2599	42800
15	2591	43200
16	2505	40200
17	2573	42400
18	2589	44600
19	2533	39800
20	2543	42700
21	2577	44600
22	2583	43700
23	2584	44800
24	2529	42000
25	2600	45600

[redacted]

[redacted]

APPENDIX G [redacted]

PRESSURE TEST

Date: 9 March 1950 Time Started: 0830 Time Finished: 0930

Universal Receiver No.: [redacted] Barrel No.: C-30 Previous Rounds: 203

Ammunition Temperature: [redacted] Air Temperature: 30°F Density: 1.038

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Spotter, Caliber .30, T103, Lot No. 2

ROUND NO.	ESTIMATED MUZZLE VELOCITY AT 78', fps	PRESSURE, psi
1	2734	42200
2	Lost	39900
3	2714	41500
4	2702	41200
5	2691	41900
6	2725	41600
7	2764	42700
8	2732	42200
9	2711	41800
10	2706	41800
11	2704	42200
12	2704	43000
13	2706	42200
14	2738	43600
15	2691	43000
16	2684	41600
17	2737	44000
18	2681	40500
19	2762	43700
20	2704	42800
21	2734	42700
22	2674	38300
23	2722	41400
24	2709	41800
25	2688	42600

Rounds 1-5 - Warmers.

[redacted]

[redacted]

APPENDIX G [redacted]

[redacted]SSURE TEST

Date: 7 March 19[redacted] Time Started: 1330 Time Finished: 1430

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 101

Ammunition Temperature: [illegible]°F Range Temperature: 55°F Density: 1.068

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .50, T104, Lot [illegible]-1558

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2693	48800
2	2660	48600
3	2752	50300
4	2703	51400
5	2636	47600
6	2667	50600
7	2669	45600
8	2665	49000
9	2653	47500
10	2636	48200
11	2643	47300
12	2614	48000
13	2539	44200
14	2575	46000
15	2529	45100
16	2597	49400
17	2554	43100
18	2513	42400
19	2558	43400
20	2500	48500
21	2604	47500
22	2600	46200
23	2573	47500
24	2548	44400
25	2633	46400

Rounds 1-5 - Warmers. [redacted]

[redacted]

[redacted]

APPENDIX G

PRESSURE TEST

Date: 7 March 1950 Time Started: 1500 Time Finished: 1605

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 126

Ammunition Temperature: -65°F Range Temperature: 55°F Density: 1.063

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, AP, Caliber .30, Lot [illegible]-1357

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2660	51000
2	2587	44000
3	2626	50400
4	2651	51500
5	2618	50100
6	2665	48300
7	[illegible]	[illegible]
8	2616	48800
9	2637	49000
10	2677	50000
11	2625	46400
12	2644	49100
13	2654	51800
14	2643	49400
15	2591	45400
16	2577	43900
17	2627	48800
18	2648	49400
19	2664	52400
20	2568	43700
21	2589	47000
22	2610	49400
23	2655	49300
24	2595	45600
25	2636	44600
26	2643	50400

Rounds 1-5 - Warmers

[redacted]

[redacted]

APPENDIX C

PRESSURE TEST

Date: 8 March 1950 Time Started: 1355 Time Finished: 1440

Universal Receiver No.: 197 Barrel No.: C-30 Previous Rounds: 152

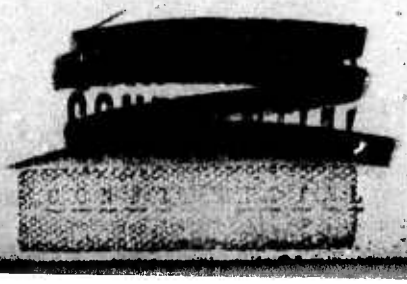
Ammunition Temperature: -65°F Range Temperature: 54°F Density: 1.010

Chronograph Type: Computer Initiator Type: Lumiline

Test Ammunition: Cartridge, Tracer, Caliber .30, T102, Lot PA30-1359

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2529	43000
2	2506	40400
3	2481	44000
4	2521	45600
5	2509	46700
6	2476	39200
7	2485	43400
8	2423	40400
9	2464	43400
10	2494	45200
11	2504	47400
12	2395	37500
13	2585	51600
14	2459	42300
15	2464	44000
16	2484	47600
17	2485	47600
18	2481	44400
19	2543	44800
20	2525	45200
21	2450	43200
22	2500	43300
23	2481	44000
24	2452	44200
25	2413	39800

Rounds 1-5 - Warmers.



[redacted]

APPENDIX G

PRESSURE TEST

[redacted]

Date: 8 March 1950 Time Started: 1500 Time Finished: 1555

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 177

Ammunition Temperature: -65°F Range Temperature: 54°F Density: 1.010

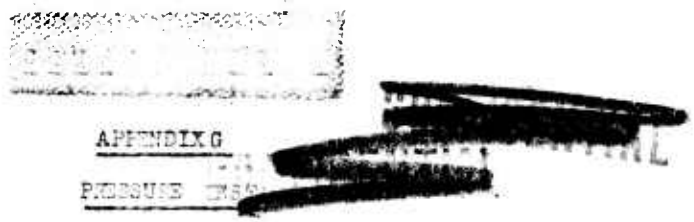
Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, API, Caliber .30, T101, Lot [illegible]

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2701	49600
2	2701	51000
3	2514	44200
4	[illegible]	47000
5	2572	45600
6	2577	49000
7	Lost	Lost
8	[illegible]	45600
9	2607	46200
10	2539	46300
11	2592	48200
12	2572	47000
13	2576	50100
14	2500	44300
15	2558	44800
16	2519	44300
17	2524	46700
18	2601	48400
19	2585	50000
20	2527	43000
21	2569	46800
22	2523	46000
23	2572	47400
24	2538	43700
25	2510	41500
26	2545	44800

[redacted]

Rounds 1-5 - Warmers.



APPENDIX G

PRESSURE [illegible]

Date: 9 March 1950 Time Started: 1330 Time Finished: 1420

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 228

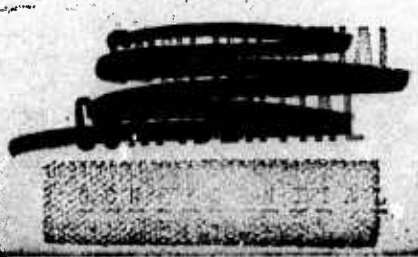
Ammunition Temperature: -65°F Range Temperature: 35°F Density: 1.035

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Spotter, Caliber .30, Lot No. 2

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2513	38200
2	2470	38700
3	2504	37800
4	2535	39600
5	2504	39800
6	2523	40500
7	2515	39500
8	2472	38300
9	2446	38400
10	2571	39000
11	2500	39900
12	2501	40000
13	2537	39200
14	2491	37200
15	2515	40300
16	2525	38800
17	2467	38600
18	2496	38000
19	2509	41000
20	2521	40200
21	2495	39200
22	2485	37400
23	2541	40200
24	2461	34000
25	2490	39300

Rounds 1-5 - Warmers.



[redacted]

APPENDIX G

[redacted] TUBE TEST

Date: 15 March 1950 Time Started: 1402 Time Finished: 1445

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 253

Ammunition Temperature: +165°F Range Temperature: 42°F Density: 1.048

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .30, T10[illegible], Lot FA[illegible]30-1558

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2823	51400
2	Lost	49400
3	2830	48400
4	Lost	50600
5	2785	47000
6	2773	49400
7	2775	[illegible]
8	2773	[illegible]
9	2790	48500
10	2798	48600
11	2789	49600
12	2787	49000
13	2749	45100
14	2782	48500
15	2747	46000
16	2769	48000
17	2795	48700
18	2752	47000
19	2750	45200
20	2772	47700
21	2746	44800
22	2820	51500
23	2776	45100
24	2807	49800
25	2755	48400

Rounds 1-5 - Warmers.

[redacted]

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[redacted]

APPENDIX G

PRESSURE TEST

Date: 13 March 1950 Time Started: 1500 Time Finished: 1550

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 278

Ammunition Temperature: +165°F Range Temperature: 44°F Density: 1.0[illegible]

Chronograph Type: Counter Initiator Type: Lucalite

Test Ammunition: Cartridge, AP, Caliber .30, T[illegible], Lot FA[illegible]30-1957

ROUND NO.	INSTRUMENTAL VELOCITY AT 71', fps	PRESSURE, psi
1	2790	45600
2	2756	47000
3	2806	48100
4	2773	5[illegible]400
5	2815	48700
6	2843	49800
7	2859	49600
8	2[illegible]	49000
9	2806	48100
10	2825	48100
11	2843	50000
12	2806	46600
13	2811	48100
14	2853	51100
15	2812	47600
16	2811	47400
17	2807	48100
18	2811	48600
19	2784	46600
20	2801	47600
21	2781	47300
22	2804	47000
23	2820	52000
24	2804	47400
25	2803	49000

Rounds 1-5 - Warmers.

[redacted]

[redacted]

[redacted]

APPENDIX G

[redacted] PRESSURE TEST

Date: 14 March 1950 Time Started: 1310 Time Finished: 1350

Universal Receiver No.: 197 Barrel No.: G-30 Previous Rounds: 303

Ammunition Temperature: +165°F Range Temperature: 42°F Density: 1.034

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, API, Caliber .30, T101, Lot [redacted]-1550

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2769	47500
2	2779	47600
3	2775	50600
4	2773	47000
5	2717	48900
6	2801	49400
7	2801	50000
8	2761	45900
9	2776	48100
10	2772	45000
11	2809	50600
12	2809	50600
13	2796	47600
14	2782	48000
15	2811	51800
16	2804	47300
17	2744	45100
18	2795	49800
19	2811	51600
20	2764	48200
21	2767	49400
22	2765	48100
23	2765	48700
24	2756	47800
25	2762	47500

Rounds 1-5 - Warmers.

[redacted]

[redacted]

APPENDIX G

PRESSURE TEST

[redacted]

Date: 14 March 1950 Time Started: 1455 Time Finished: 1535

Universal Receiver No.: 179 Barrel No.: C-30 Previous Rounds: 328

Ammunition Temperature: [illegible]°F Range Temperature: 42°F Density: 1.068

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Tracer, Caliber .30, T102, Lot F[illegible]50-1559

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Lost	38700
2	Lost	40800
3	Lost	44300
4	Lost	39800
5	Lost	39000
6	2687	42800
7	[illegible]	39200
8	[illegible]	39200
9	2681	40200
10	2654	39800
11	2674	40400
12	2690	42000
13	2677	38700
14	2657	41200
15	2665	40400
16	2670	41100
17	2675	42500
18	2690	41700
19	2694	40000
20	2691	41800
21	2657	38600
22	2678	39600
23	2658	40400
24	2662	41600
25	2629	40300

[redacted]

Rounds 1-5 - Warmers.

[redacted]

APPENDIX C

PRESSURE TEST

Date: 24 February 1950 Time Started: 1440 [redacted] Time Finished: 1525

Universal Receiver No.: Barrel No.: 4496 Previous Rounds: 41

Ammunition Temperature: +70°F Range Temperature: 38°F Density: 1.049

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, SA, Caliber .280, Ball, Lot 19A

ROUND NO.	INSTANT MUZZLE VELOCITY AT 78', fps	PRESSURE, psi
1	2329	Warmer
2	2354	Warmer
3	2353	Warmer
4	2296	44200
5	2328	43750
6	2322	42600
7	[illegible]	[illegible]
8	2328	42600
9	2294	42400
10	2304	42600
11	2328	42600.
12	2266	42400
13	2297	43450
14	2294	41900
15	2281	42600
16	2282	42600
17	2294	43700
18	2285	43900
19	2270	42100
20	2276	42000
21	2286	42800
22	2273	43450
23	2284	42100

[redacted]

[redacted]

[redacted]

APPENDIX G

PRESSURE TEST

Date: [redacted] Feb. 1950 Time Started: 1000 Time Finished: 1040

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds: 250

Air Station Temperature: +70°F Gauge Temperature: +49°F Density: 1.065

Chronograph Type: Oehler Initiator Type: Lumiline

Type Ammunition: Cartridge, SA, AP, Caliber .250, Lot ZAA

ROUND NO.	EXPERIMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2257	36500
2	2285	38300
3	2286	38300
4	2263	36100
5	2306	39200
6	2283	39400
7	2282	39200
8	2207	37850
9	2220	38100
10	2280	39200
11	2203	39400
12	2201	39400
13	2213	40400
14	2268	40100
15	2235	38500
16	2241	41200
17	2214	40400
18	2232	39600
19	2180	39600
20	2223	39400

[redacted]

[redacted]

APPENDIX G

PRESSURE TEST

Date: [redacted] March 1950 Time Started: 1250 Time Finished: 1330

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds: 275

Ammunition Temperature: +70°F Range Temperature: 40°F Density: 1,055

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Ct, AII, Caliber .280, Lot 23..

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2227	38100
2	2252	38100
3	2231	39000
4	2195	39850
5	2132	41000
6	[illegible]	[illegible]
7	2169	39200
8	2182	41600
9	2184	39600
10	2219	38300
11	2190	38100
12	2190	38500
13	2212	39600
14	2179	39400
15	2206	39600
16	2173	40400
17	2179	39200
18	2177	39000
19	2183	41600
20	2199	42500

[redacted]

[redacted]

APPENDIX G

PRESSURE TEST

Date: 2[illegible] March 1950 Time Started: 1100 Time Finished: 1440

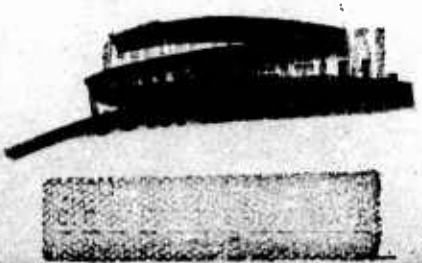
Unit recoil booster No.: Barrel No.: 449-6 Previous Rounds: 300

Ammunition Temperature: [illegible]°F Barrel Temperature: +49°F Density: 1.024

Chronograph Type: Potter Initiator Type: Lumiline

Test Ammunition: Cartridge, Cl, 600, Caliber .50, Lot 17A

ROUND NO.	MUZZLE VELOCITY AT 78', fps	PRESSURE, psi
1	2374	39200
2	2363	39400
3	2361	39200
4	2359	39200
5	2367	39650
6	2357	38500
7	2364	39650
8	2354	38500
9	2362	37400
10	2367	39200
11	2357	38750
12	2367	37850
13	2393	38100
14	2363	37850
15	2373	38750
16	2365	38750
17	2372	38500
18	2350	37600
19	2365	37400
20	2320	37600



[redacted] APPENDIX G [redacted]

PRESSURE TEST

Date: 9 March 1950 Time Started: 1515 Time Finished: 1540

Universal Receiver No.: Barrel No.: 449/6 Previous Rounds: 74

Ammunition Temperature: -65°F Range Temperature: 35°F Density: 1.083

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .280, Lot 19A.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	Warmer	
2	Warmer	
3	Warmer	
4	Warmer	
5	Warmer	
6	2174	38350
7	2165	36700
8	2162	39200
9	2190	44100
10	2155	41200
11	2162	42100
12	2167	42550
13	2158	40300
14	2147	40750
15	2158	40100
16	2153	38550
17	2149	37200
18	2149	36050
19	2159	35800
20	2127	36750
21	2130	38100
22	2145	38550
23	2157	36500
24	2155	36500
25	2053	35800

[redacted]

APPENDIX G

PRESSURE TEST

Date: 29 March 1950 Time Started: 1300 Time Finished: 1415

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds: 175

Atmospheric Temperature: +65°F Range Temperature: +47°F Density: 1.023

Chronograph Type: Counter Initiator Type: Lumiline

Type of Ammunition: Cartridge, Ea, Pa.1, Caliber .260, Lot No. 19A

ROUND NO.	MUZZLE VELOCITY AT 78', fps	PRESSURE, psi
1	2367	
2	2374	
3	2319	
4	2331	
5	2325	
6	2305	
7	2254	43900
8	2333	45000
9	2357	45000
10	2347	45000
11	2342	47300
12	2286	44400
13	2320	46000
14	2318	44600
15	2296	43900
16	2325	44600
17	2309	46000
18	2285	44400
19	2309	45000
20	2305	44800
21	2305	45500
22	2318	44400
23	2326	45300
24	2299	45700
25	2268	45000

Rounds 1-6 - Warmers.

[redacted]

APPENDIX G

PRESSURE TEST

Date: 15 March 1950 Time Started: 1422 Time Finished: 1440

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds: 200

Ammunition Temperature: +165°F Range Temperature: +47°F Density: 1.028

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Eldridge, SA, AP, Caliber .220, Lot No. 2A4

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2276	
2	2272	
3	2271	
4	2270	
5	2270	
6	2254	40950
7	2263	38150
8	2242	39700
9	2280	39700
10	2265	38800
11	2245	40550
12	2252	40550
13	2264	39450
14	2254	39700
15	2250	41600
16	2246	42500
17	2305	39700
18	2330	40000
19	2314	40000
20	2275	39700
21	2283	39700
22	2271	39700
23	2285	40000
24	2305	39700
25	2312	39700

Rounds 1-5 - Warmers.

[redacted]

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[redacted]

APPENDIX G

PRESSURE TEST

Date: 16 March 1950 Time Started: 1355 Time Finished: 1435

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds: 225

Ammunition Temperature: +165°F Range Temperature: +38°F Density: 1.079

Chronograph Type: Counter Initiator Type: Lumiline

Test Ammunition: Cartridge, SA, API, Caliber .280, Lot No. 23A

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2296	
2	2325	
3	2331	
4	2345	
5	2320	
6	2343	41200
7	2332	39700
8	2301	42600
9	2295	41600
10	2267	41200
11	2247	41600
12	2252	43400
13	2240	40550
14	2230	42500
15	2214	42100
16	2238	39700
17	2219	42100
18	2256	38150
19	2219	40800
20	2218	39600
21	2251	38150
22	Lost	Lost
23	2242	41400
24	2222	39600
25	2250	41400
26	2204	40000

Rounds 1-5 - Warmers.

[redacted]

[redacted]

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[redacted] L

APPENDIX C

PRESSURE TEST

Date: 28 March 1950 Time Started: 1315 Time Finished: 1355

Universal Receiver No.: Barrel No.: 49-6 Previous Rounds: 324

Ammunition Temperature: -65°F Range Temperature: +70°F Density: .979

Chronograph Type: Counter Initiator Type: Lumiline

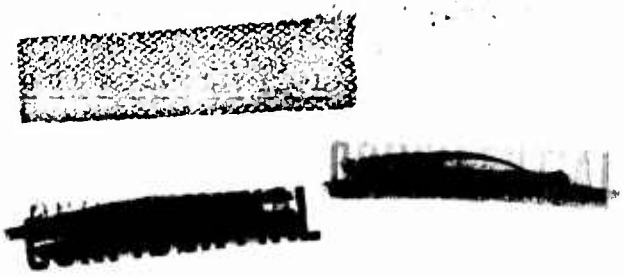
Test Ammunition: Cartridge, SA, CES, Caliber .220, Lot 17A

ROUND NO.	EXPERIMENTAL VELOCITY AT 53', fps	PRESSURE, psi
1		
2		
3		
4		
5		
6	2250	36100
7	2279	36500
8	2259	35700
9	2273	35200
10	2300	37200
11	2277	36500
12	2241	35900
13	2215	35200
14	2216	35400
15	2229	36700
16	2295	36700
17	2269	35200
18	2242	35600
19	2239	35200
20	2296	37000
21	2283	36700
22	2259	36700
23	2260	36100
24	2260	36500
25	2325	37200

Rounds 1-5 - Warmers.

[redacted]

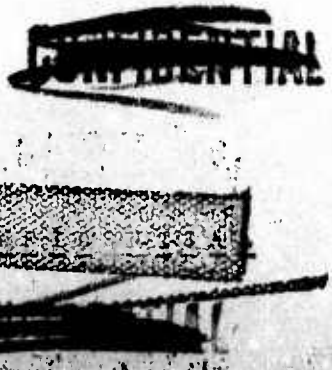
CONFIDENTIAL



APPENDIX H

Firing Data for Cartridge, SA, Caliber .280, Ball, Lot 40A

(6 sheets)



[redacted] APPENDIX H [redacted]

VELOCITY TEST

Date: 15 March 1970 — Time Started: 1514 — Time Finished: 1527

Universal Receiver No.: — Barrel No.: [illegible]-5 — Previous Rounds: 321

Ammunition Temperature: +70°F — Bore Temperature: +47°F — Density: 1.223

Chronograph Type: Counter — Initiator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .30, Check, Lot No. [illegible].

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2222	
2	2266	
3	Lost	
4	2274	
5	2246	
6	2244	
7	2246	
8	2222	
9	2239	
10	2253	
11	2258	
12	2220	
13	2222	
14	2224	
15	2223	
16	2231	
17	2232	
18	2227	
19	2236	
20	2225	
21	2217	
22	2219	
23	2218	
24	2214	
25	2220	

Rounds 1-5 - Warmers.

[redacted]

CONFIDENTIAL L

12E

APPENDIX H

VELOCITY TEST

Date: 15 March 1930 Time Started: 1455 Time Finished: 1510

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds:

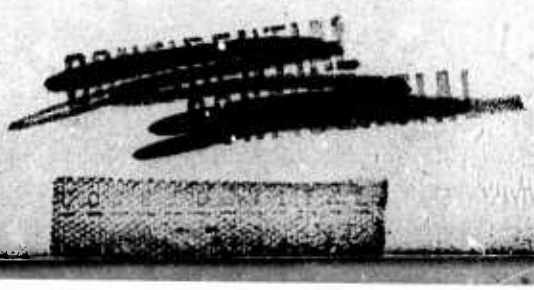
Ammunition Temperature: +70°F Range Temperature: +47°F Density: 1.028

Chronograph Type: Counter Velocimeter Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .30, Check, Lot No. 1,0A.

ROUND NO.	INSTRUMENTAL VELOCITY AT 78 ft., f/s	REMARKS
1	Lost	
2	2252	
3	2235	
4	2245	
5	Lost	
6	2218	
7	2213	
8	2253	
9	2246	
10	2211	
11	2198	
12	2232	
13	2243	
14	2238	
15	2204	
16	2217	
17	2256	
18	2205	
19	2218	
20	2207	
21	2208	
22	2220	
23	2222	
24	2244	
25	2215	

Rounds 1-5 - warmers.



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ATTACHMENT

VELOCITY TEST

Date: 10 [illegible] 50 Time Started: 0941 Time Finished: 0955

Material and Lot No.: Barrel No.: 49-5 Previous Rounds: 231

Ammunition Temperature: 70°F Temp Temperature: 32°F Density: 1.000

Chronograph Type: Oehler 35 Initiator Type: Lumiline

Type Ammunition: Cartridge, Ball, Caliber .30, Lot 40A.

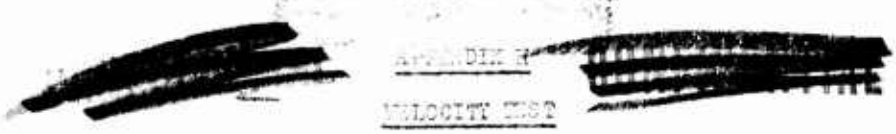
SHOT NO.	PROJECTILE VELOCITY AT 78', fps	PRESSURE, psi
1	2243	
2	2263	
3	2282	
4	2285	
5	2286	
6	2306	
7	2252	
8	2246	
9	2227	
10	2251	
11	2231	
12	2248	
13	2275	
14	2265	
15	2251	
16	2208	
17	2234	
18	2244	
19	2252	
20	2264	
21	2236	
22	2205	
23	2240	
24	2208	
25	2203	

Rounds 1-5 - Warmers.

[redacted]

[redacted]

130



APPENDIX H

VELOCITY TEST

Date: 10 March 1950 Time Started: 1131 Time Finished: 1150

[illegible] Barrel No.: 419-6 Previous Rounds: 110

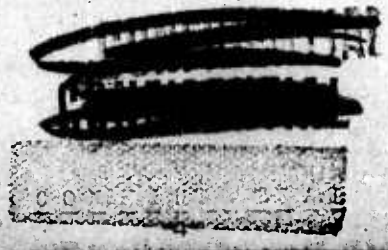
[illegible] Temperature: 70°F Range Temperature: 55°F Density: 1.[illegible]

[illegible] Type: Counter Initiator Type: Luminate

[illegible]: Speedwriter, Ball, Caliber .30, Lot 40A.

Round No.	Instrumental Velocity at 7'. fps	Pressure, psi
1	2249	
2	2315	
3	2315	
4	2318	
5	2312	
6	2354	
7	2314	
8	2330	
9	2307	
10	2250	
11	2282	
12	2284	
13	2257	
14	2278	
15	2269	
16	2252	
17	2245	
18	2232	
19	2270	
20	2219	
21	2231	
22	2259	
23	2188	
24	2252	
25	2244	

Rounds 1-5 - Warmers.



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APPENDIX H

PRESSURE TEST

Date: 10 March 1960 Time Started: 1255 Time Finished: 1320

Universal Receiver No.: Barrel No.: 449-6 Previous Rounds: 110

Ammunition Temperature: 70°F Range Temperature: 36°F Density: 1.050

Chronograph Type: Oehler Indicator Type: Lumiline

Test Ammunition: Cartridge, Ball, Caliber .223, Lot [redacted]

ROUND NO.	MUZZLE BALL VELOCITY AT 78', f/s	PRESSURE, psi
1	2175	
2	2276	
3	2316	
4	2337	
5	2338	
6	2296	41850
7	2327	42750
8	2370	43000
9	2219	43000
10	2284	43200
11	2272	42550
12	2271	43000
13	2271	43200
14	2234	43450
15	2194	43450
16	2230	43450
17	2282	43000
18	2197	43000
19	2221	43000
20	2205	42550
21	2244	42550
22	2216	42550
23	2197	41850
24	2202	43450
25	2210	42200

Rounds 1-5 - Warmers.

[redacted]

[redacted]

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[redacted]

APPENDIX [redacted]

PRESSURE TEST

Date: 10 March 1950 Time Started: 1027 Time Finished: 1100

Universal Receiver No.: Barrel No.: 119-5 Previous Rounds: 238

Ammunition Temperature: +70°F Range Temperature: +52°F Density: 1.090

Chronograph Type: Counter Initiator Type: Luminline

Test Ammunition: Cartridge, Ball, Substandard, Caliber .220, Lot No. 401

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2224	
2	2208	
3	2255	
4	2233	
5	2276	
6	2273	43000
7	2255	41650
8	2246	43450
9	2231	42200
10	2243	42550
11	2219	42750
12	2220	43450
13	2241	42750
14	2229	42750
15	2234	43600
16	2230	43000
17	2189	43600
18	2252	43450
19	2237	43450
20	2217	43450
21	2231	43000
22	2217	42550
23	2223	42550
24	2242	43200
25	[redacted]	42550

Rounds 1-5 - Warmers.

[redacted]

[redacted]

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[redacted]

[redacted]

[redacted]

APPENDIX I

Firing Data for Cartridge, Caliber .30, Ball, T104,
Lot No. FAX30-1358 Fired from Pressure Rifle

(2 sheets)

[redacted]

[redacted]

[redacted] APPENDIX I [redacted]

PRESSURE TEST

Date: 16 March 1950   Time Started: 1028   Time Finished: 1125

[illegible] Receiver No.: 1195245   Barrel No.: 17   Previous Rounds: 211

Ammunition Temperature: +70°F   Range Temperature: +56°F   Density: 1.0[illegible]5

Chronograph Type: Counter   Initiator Type: [illegible]

Test Ammunition: Cartridge, Ball, Caliber .30, Lot FA[illegible].

ROUND NO.	INSTRUMENTAL VELOCITY AT 78', fps	PRESSURE, psi
1	2726	49000
2	Lost	52400
3	Lost	50600
4	2750	49400
5	2741	45700
6	2728	49800
7	2752	49000
8	2772	49000
9	2709	46500
10	2716	46600
11	2738	49000
12	2703	45100
13	2729	45600
14	2694	44700
15	2722	44000
16	2695	47000
17	2687	45800
18	2703	43100
19	2674	43600
20	2698	47400
21	2740	49700
22	2734	45800
23	2707	46800
24	2691	47200
25	2722	47800

Rounds 1-5 - Warmers.

[redacted]

APPENDIX I [redacted]

PRESSURE TEST

Date: 16 Mar [redacted] Time Started: 1445 Time Finished: 1535

[illegible] No.: [illegible] Barrel No.: 17 Previous Rounds: [illegible]

[illegible] Temperature: [illegible] Range Temperature: [illegible] Density: 1.0[illegible]9

[illegible] Initiator Type: [illegible]

Test Ammunition: Cartridge, Ball, Caliber .50, [illegible], Lot [illegible].

Round No.	Instrumental Velocity at 78', fps	Pressure, psi
1	2773	44400
2	2747	[illegible]
3	2654	47700
4	2772	44300
5	[illegible]	45700
6	2699	43800
7	[illegible]	42700
8	[illegible]	[illegible]
9	2757	42700
10	Lost	[illegible]
11	2729	42200
12	2744	43100
13	2752	[illegible]
14	2751	43400
15	2746	45200
16	2758	45300
17	2706	46100
18	2747	47400
19	2752	49000
20	2746	47300
21	2722	43300
22	2758	44600
23	2726	45400
24	2732	44000
25	2793	44400
26	2746	48400

Rounds 1-5 - Warmers.

[redacted]

[redacted]

APPENDIX J

FLASH FIRING DATA

MACHINE GUN AND RIFLE

(5 Sheets)

[redacted]

137

[redacted]

APPENDIX J

FLASH FIRING DATA 22 March 1950

Rifle, Lightweight, Caliber .30, T-25 No. 10
Previous Rounds - 349
Ammunition: Cartridge, Ball, Caliber .30, T104 Lot No. FAX30-1358

Without Flash Hider

TIME	ROUNDS	REMARKS
1000	349-354	Function firing OK
1010	355-359	FF. 3 Short Recoil
1012	360-365	FF 4 Short Recoil
1020	366-385	Function OK, Flash about 5" x 5", white in middle with red tinge to outer edges. Few sparklers going forward. No flash on one round. No breech flash.

With Flash Hider

1030	386-405	Function OK, Flash about 4" long, very dull smokish pink in color. Two rounds gave breech flash.

Rifle, Caliber .30M1, No. 3830498
Previous Rounds - 405
Ammunition: Cartridge, Ball, Caliber .30M-2 Lot No. FA-4059

Without Flash Hider

1035	405-408	Function Firing, OK.
1035	409-428	Function OK. Red flash with small white core. Flash about 8" long and 4" in diameter. No breech flash however muzzle sparks 6 to 8 feet long.

With Flash Hider

1040	429-448	Function OK. Dull flash. Sparklers on every round, 8" long. All sparklers in forward direction. No breech flash, muzzle flash appears slightly larger than that from T-25.

[redacted]

-2-

[redacted]

APPENDIX

Rifle, Auto, Caliber .280 EM2, No. 3
Previous Rounds - 602
Ammunition: Cartridge, Ball, Caliber .280 Lot 19A [redacted]

TIME	ROUNDS	REMARKS
1050	603-606	Function only, OK
1050	607-626	Function OK, Dull red to orange flash. Several sparklers on every round.

Rifle, Auto, Caliber .280, FN No. 4
Previous Rounds - Approx. 1000
Ammunition: Cartridge, Ball, Caliber 280, Lot 19A

Without Flash Hider

1100	1001-1004	Function, OK
1100	1005-1014	Function, OK, orange flash with white fringe. 6 to 8 in. long x 6 in. in diameter. Many sparklers going forward. One white flash in front of muzzle on about 12th round.
1105	1015-1034	Function OK, No appreciable flash; However, a shower of sparklers forward on every round.

[redacted]

[redacted]

APPENDIX J

[redacted] FLASH FIRING DATA 21 March 1950

Gun, Machine, Caliber .30, M1919A4 No. 839252, (converted); Barrel No. T65E2-4. (New)

TIME	RBL ROUNDS	AMMUNITION	REMARKS
1100	0-20	Caliber .30, Ball, T104 Lot No. FAX30-1358	Pinkish yellow flash 10 to 12 inches long. Red tinge on edges. No definite core. Sparklers in front of main flash going forward.
1105	21-40	Caliber .30, AP, T-93 Lot No. FAX30-1357	Yellow flash about 10" long, red fringe. Main flash forms about two inches from muzzle. Sparklers travel 3 to 4 feet forward.
1115	41-60	Caliber .30, API, T-101 Lot FAX30-1356.	Yellowish Flash with red fringe, 10 to 12" long. Main flash 2" in front of muzzle. Sparklers 3 to 4' long.
1135	61-80	Caliber .30, Tracer, T-102 Lot FAX30-1359	Cone shaped flash 5 to 6 inches long starting 2" ahead of muzzle. Rose pink in color. More sparklers than previous ammunition.
1135	81-100	Caliber .30, Spotting T- Lot No. 2 103	Pinkish yellow flash 5 to 6" long with red fringe. Sparklers about 3 to 4 ft long going forward. Smallest of all flashes from caliber .30 ammunition. Main flash about 2" from muzzle.

Gun, Machine, Caliber .30 M1919A4 (Converted) No. OW 4966

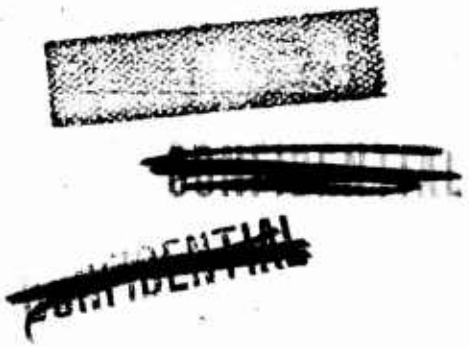
1320	0-20	Ca[redacted] Lot [redacted]	range colored flash 5 to 6 inches long, 2 to 3" in diameter. Sparklers 3 to 4' long.

[redacted]

APPENDIX J

TIME	BEL[illegible]	[illegible]LTION	REMARKS
1325	21-30	Cartridge, API Caliber .280 Lot 23A	Failure to feed. About the middle of the burst a large incandescent white flash occurred in front of muzzle. This was probably due to the ignition of accumulated powder gases.
1335	31-50	Cartridge, API Caliber .280 Lot 23A	Orange flash 5 to 6 inches long 2 to 3 inches in diameter. Sparklers going forward about 4 ft. Flash has a fringe on edges.
1400	51-70	Cartridge AP Caliber .280 Lot No. 24A	Large flash on 1st round. Burst flash was orange in color similar to that of Ball Ammunition. Few Sparklers.
1410	71-90	Cartridge, OBS Caliber .280, Lot 17A	Observation difficult due to muzzle burst of one round near middle of burst. Flash appears similar to that of AP and Ball.
1445	91-110	Cartridge, OBS Caliber .280, Lot 17A	Muzzle burst occurred about 1st round, 1 to 3 ft from muzzle. Flash similar to that from Ball Ammunition.
1510	111-130	Cartridge, Tracer Caliber .280 Lot No. 32A	Feather shaped flash 4 to 5 in. long, 2" in diameter. Dull red color. Sparklers going forward.

[illegible]



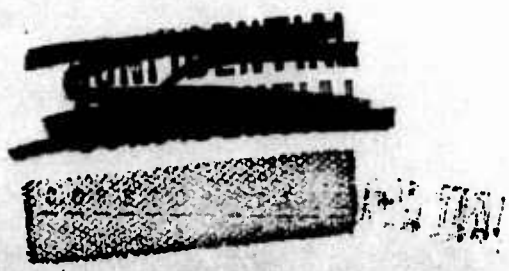
APPENDIX K

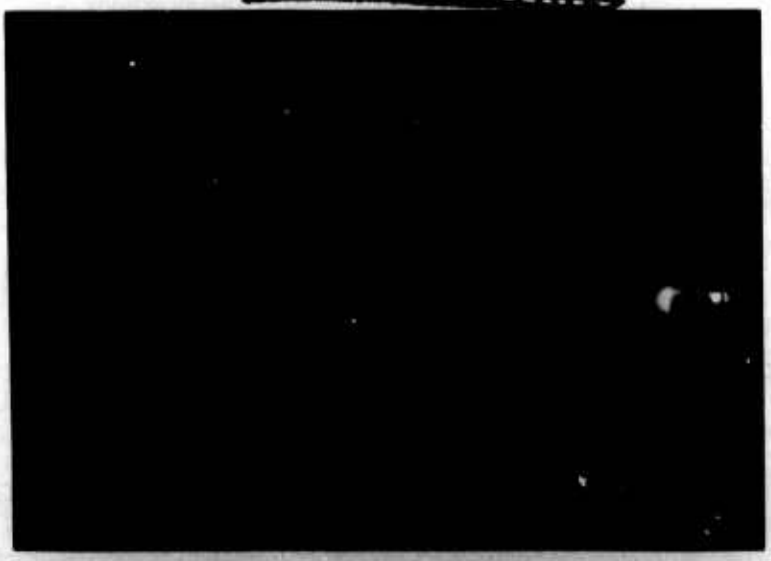
Photographs of Flash Characteristics

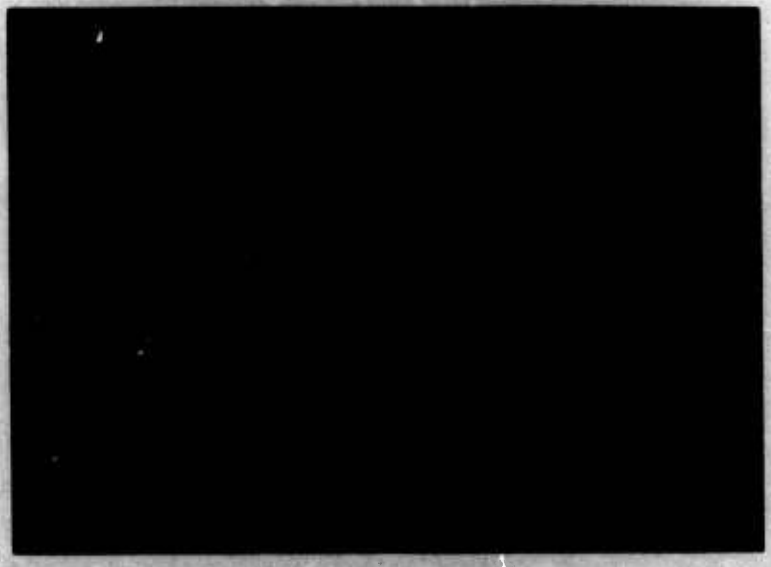
Camera Position A - 4.5' Left of Gun Muzzle

Camera Position B - 2' Left and 3.5' to Rear of Gun Muzzle

APG Photographs	A61142	A61145	A61155
	A61143	A61150	A61149
	A61146	A61151	A61156
	A61147	A61152	A61157
	A61148	A61153	A61158
	A61144	A61154	A61159







A61142 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Cumulative Flash from 20 Rounds of Ball Ammunition Fired Semi-Automatic from [redacted] Lightweight, Cal. .30, T25. (TOP) w/o Flash Hider. (BOTTOM) with [redacted] Camera position A.

[redacted]

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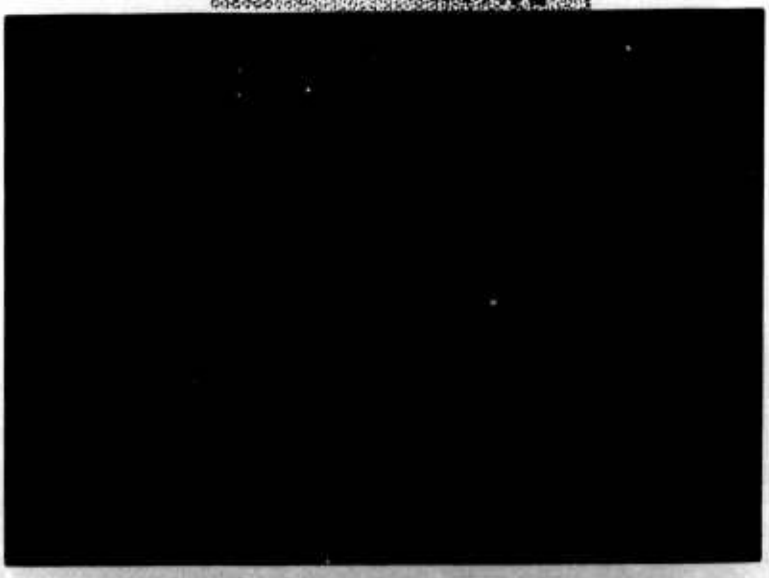
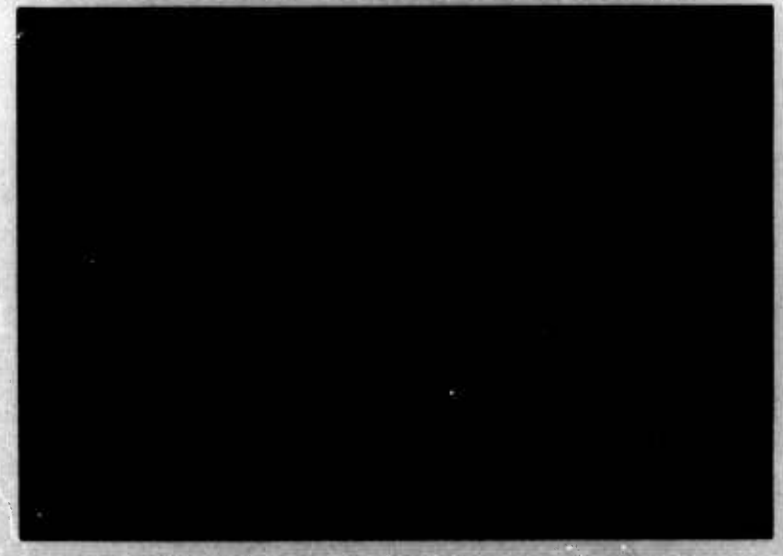
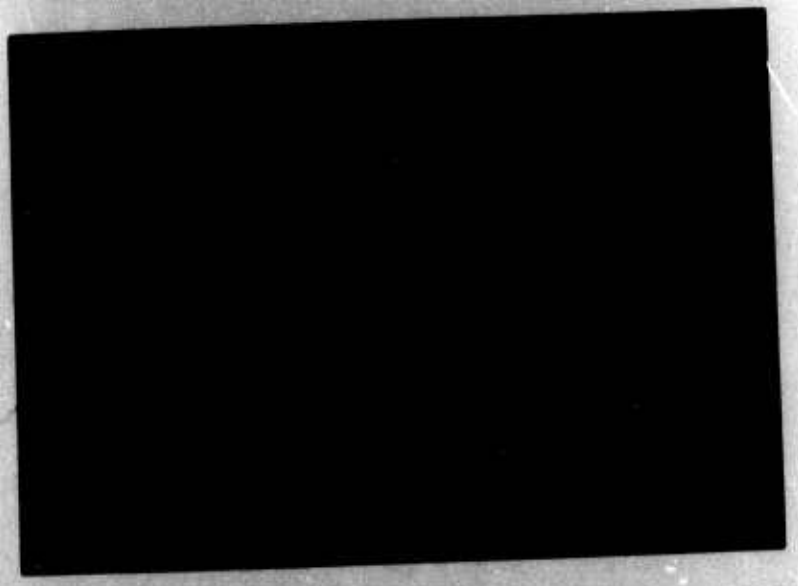




A61143 [redacted] L ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Qualitative Flash from 20 Rounds of Ball Ammunition Fired Semi-Automatic from Rifle, Lightweight, Cal. .30, T25. (TOP) w/o Flash Hider. (BOTTOM) with Flash Hider. Camera position B.

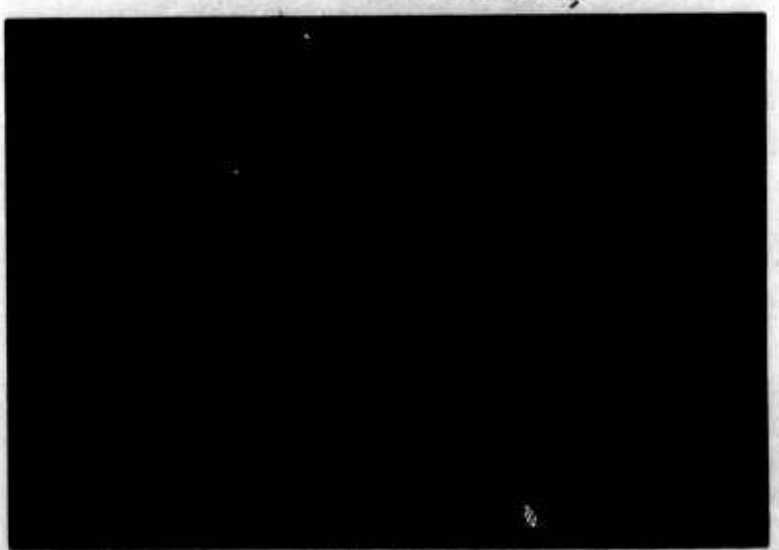
[redacted]

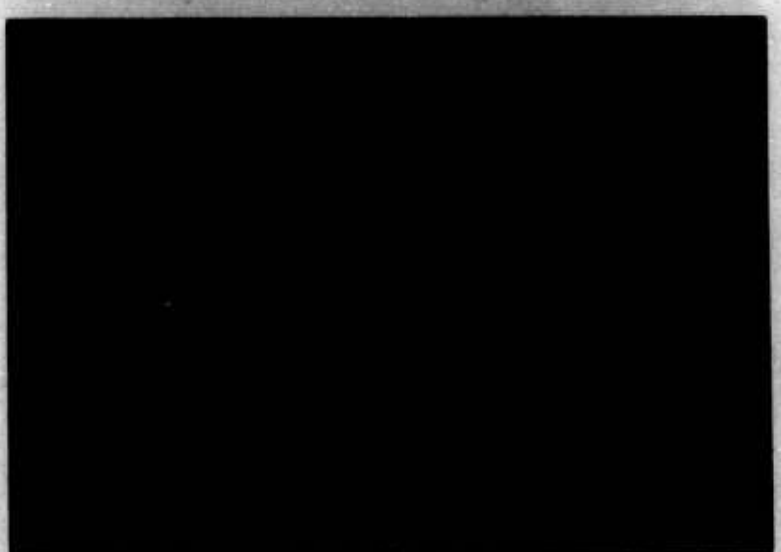


AG 1144 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Cu[redacted] Flash from 20 Rounds of Ball Ammunition Fired [redacted] Cal. .280, F.N. (TOP) w/o Flash Hider. [redacted] ra position A.

CONFIDENTIAL



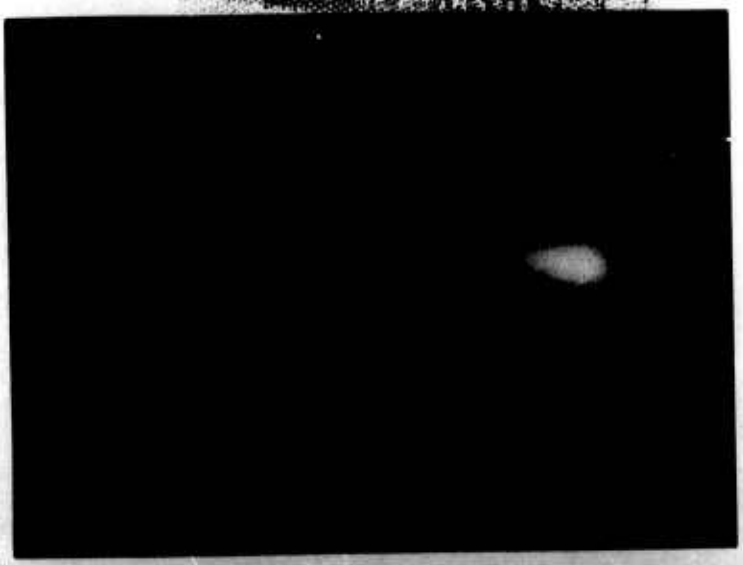


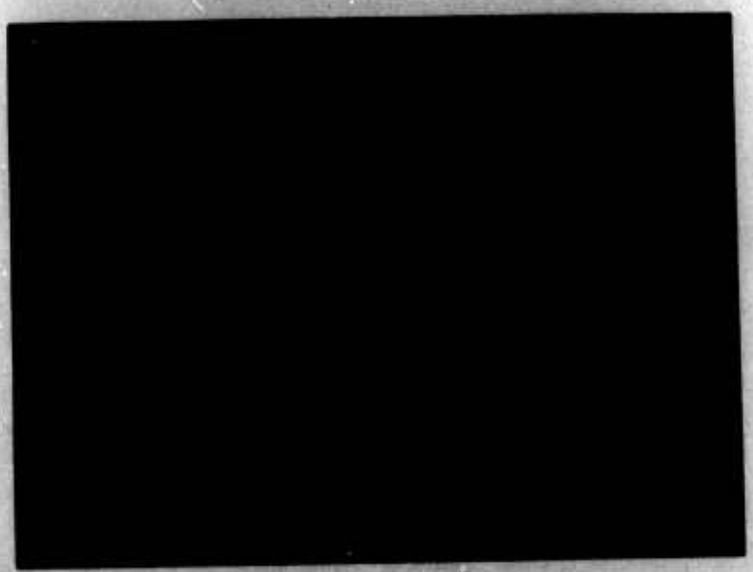
A61145 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Cumulative Flash from 20 Rounds of Ball Ammunition Fired Semi-Automatic from M1 [redacted] Cal. .280, F.N. (TOP) w/o Flash Hider. [redacted] Camera position B.

[redacted]

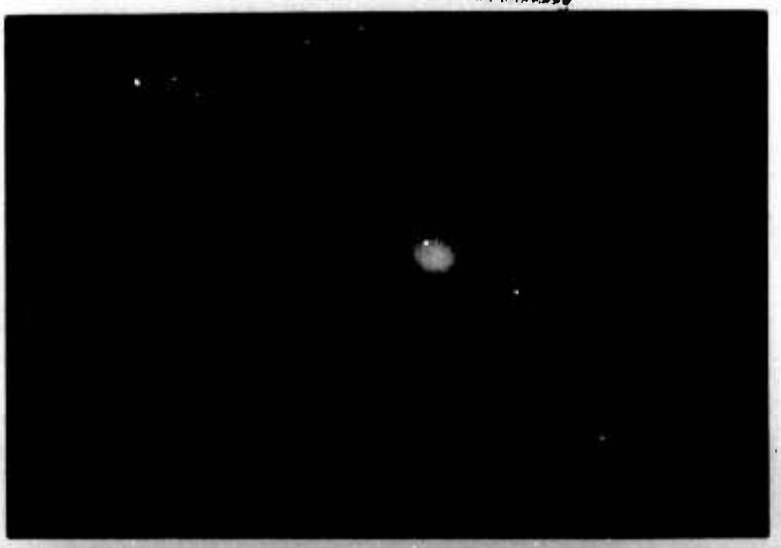
[redacted]





AG 1146 [redacted] ABERDEEN PROVING GROUND 28 March 1950

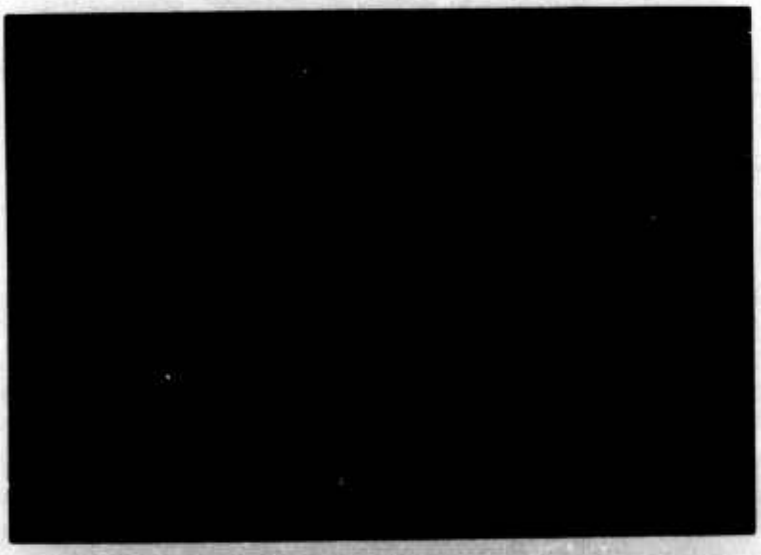
Project No. T32-2015. 9th Report [redacted] Flash from 20 Rounds of Ball Ammunition Fired from Rifle, [redacted] (TOP) w/o Flash Hider. (BOTTOM) with Flash Hider [redacted]



AG 1147 C[redacted] & ABERDEEN PROVING GROUND & 28 March 1950

Project No. TS2-2015. 9th Report. [redacted] Flash from 20 Rounds of Ball Ammunition Fired fr[redacted]) w/o Flash Hider. (BOTTOM) with Flash Hide[redacted]

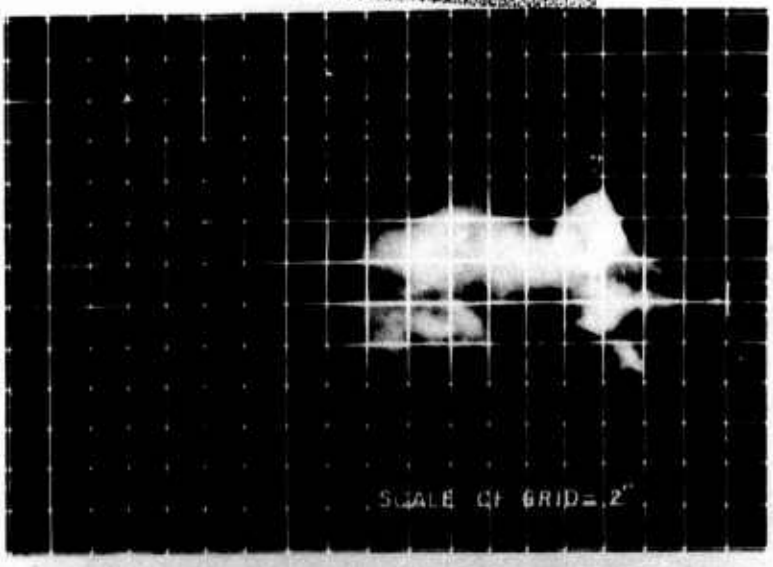
[redacted]



A61148 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. T52-2015. 9th Report. Cumulative Flash from 20 Rounds of Ball Ammunition Fired Semi-Automatic from Rifle, Auto. Cal. .280 M42. (TOP) Camera position A; [redacted] Camera position B. No provision for Flash Hider.

[redacted]



A61149 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Fla[redacted]10 Round Burst of Cartridge S.A., API. Cal. .2[redacted] Lot No. [redacted] tion of Gases in Front of Muzzle Caused Flash [redacted] (TOP) Camera [redacted] (BOTTOM) Camera Position B.

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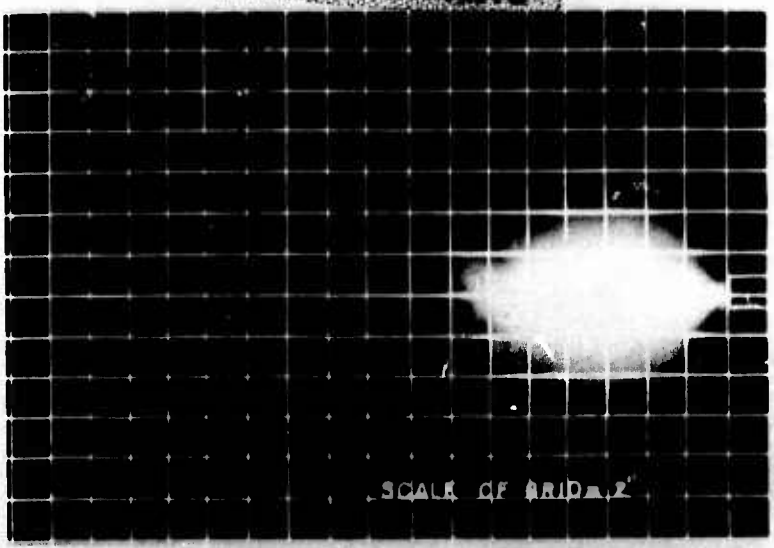
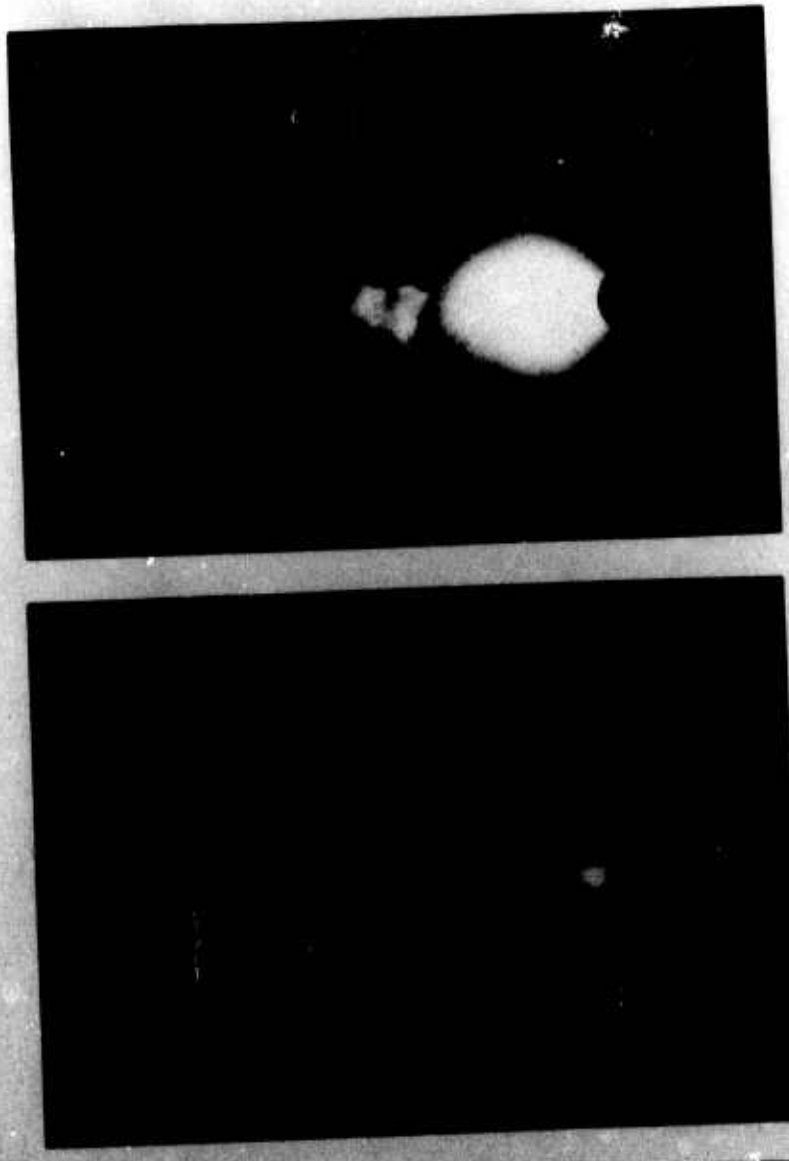


A61150 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. T32-2015. 9th Report. Flash T[redacted] Round Burst of: TOP: Cartridge, Ball, Cal. .30, T104, [redacted] BOTTOM: Cartridge, Ball, Cal. .300, Lot No. 19A, F[redacted] Machine Gun. Camera Position 4½' left of muzzl[redacted]

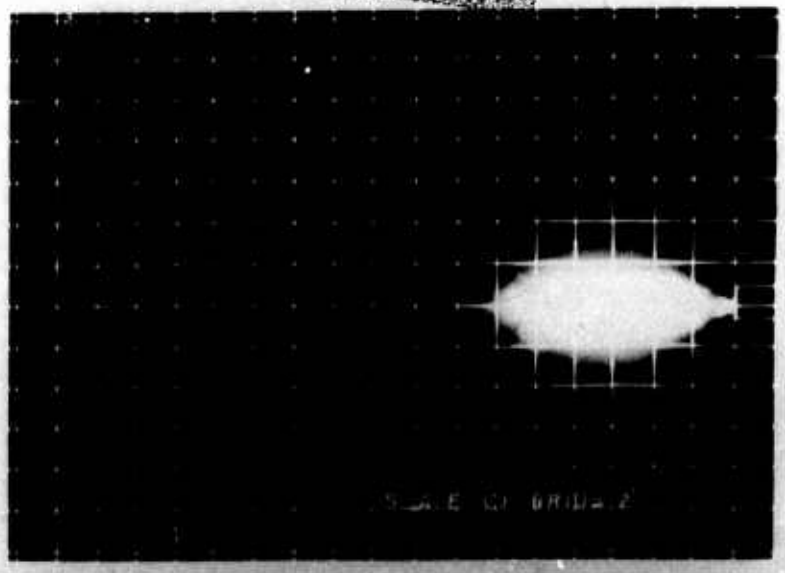
CONFIDENTIAL

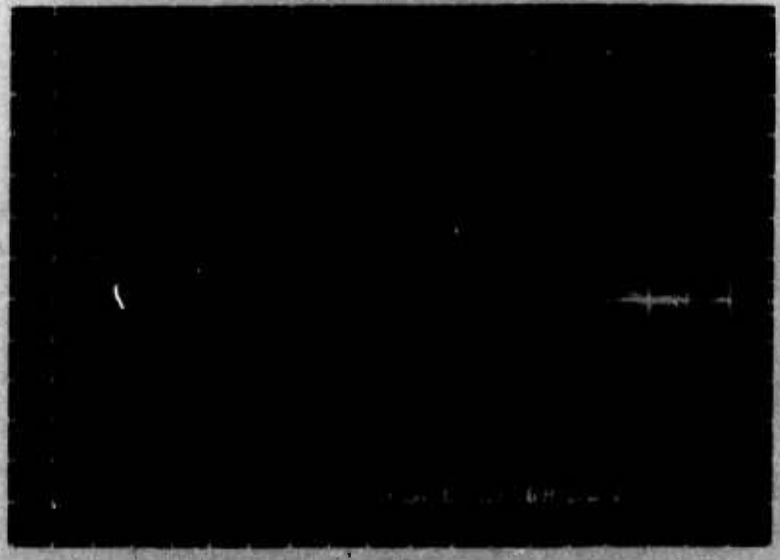


A61151 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Flash from .30 Round Burst of: TOP: Cartridge, Ball, Cal. .30, T104, Lot FAX30-13[redacted] Cartridge, Ball, Cal. .280, Lot No. 19A. Camera Position [redacted]

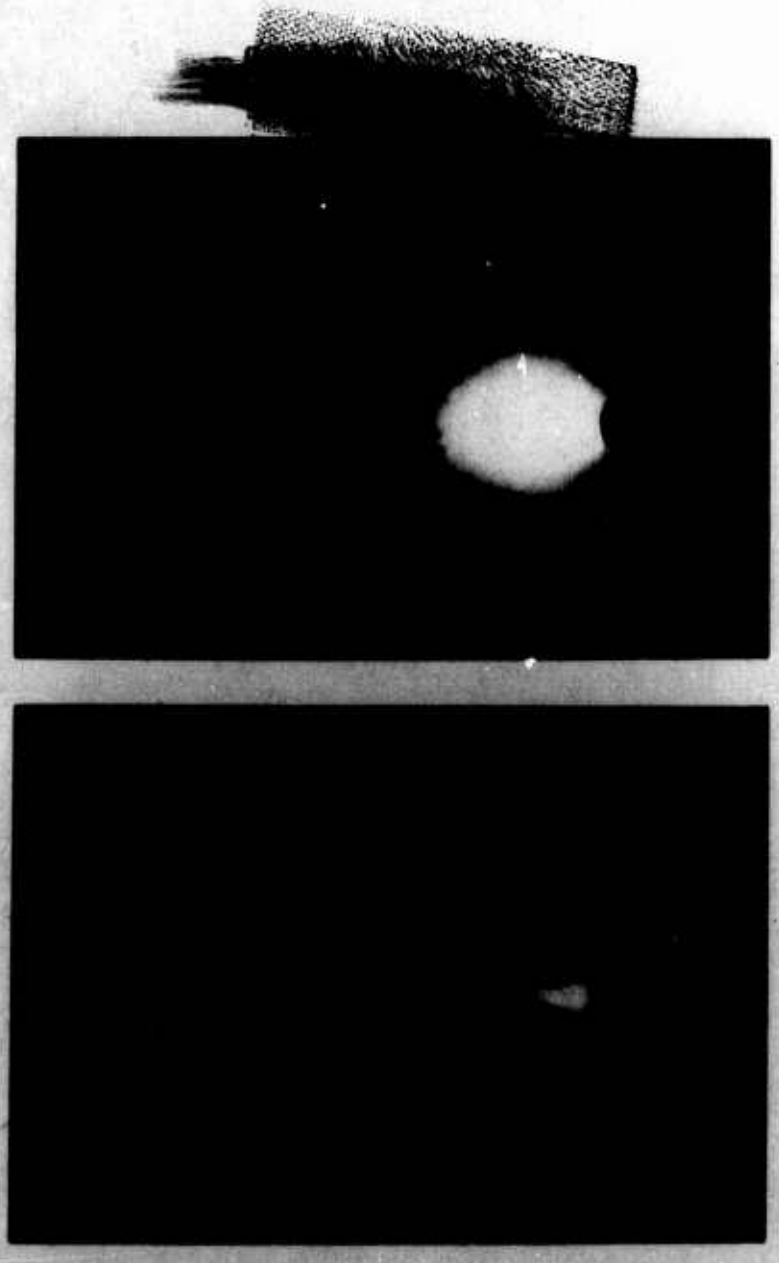
CONFIDENTIAL





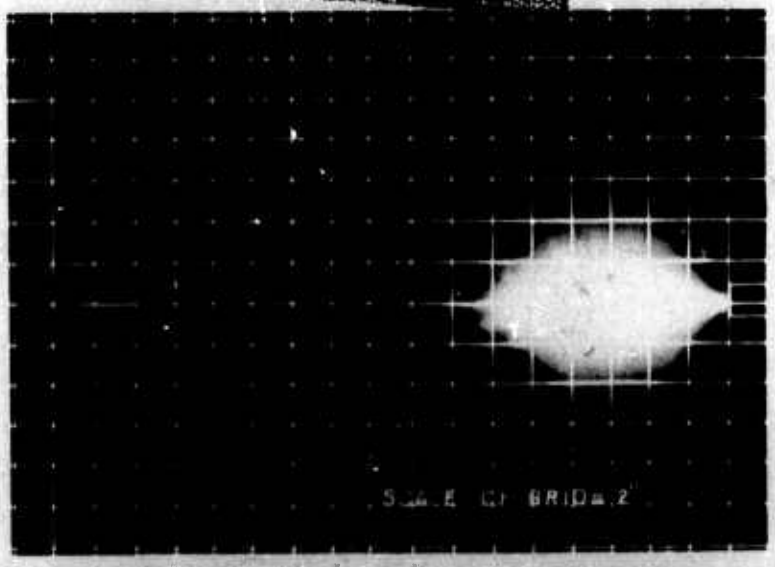
A61152 [redacted] ABERDEEN PROVING [redacted] 28 March 195

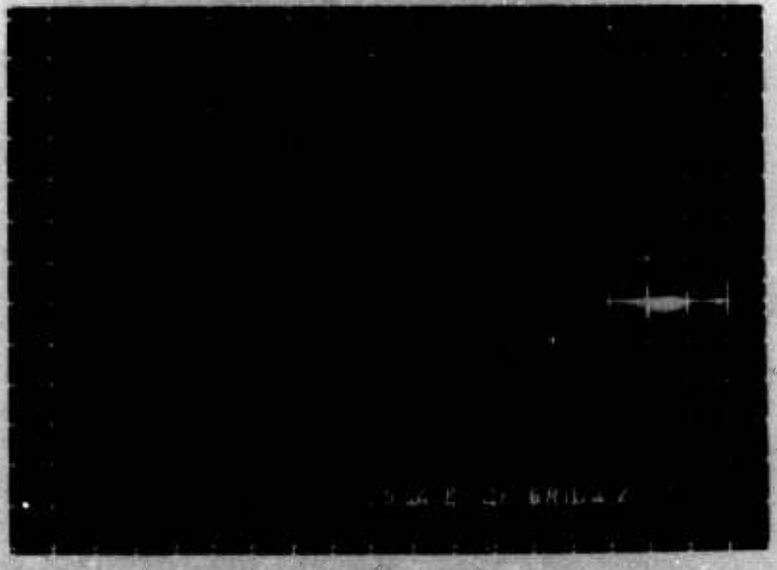
Project No. TS2-2015. 9th Report. Flash [redacted] Burst of: TOP: Cartridge, A.P. Cal. .30, T92, Lot FAXSO-13[redacted] Cartridge, A.P. Cal. .280, Lot No. 24A. Camera Position A. [redacted]



A61153 [redacted] ABERDEEN PROVING GROUND 28 March 1950

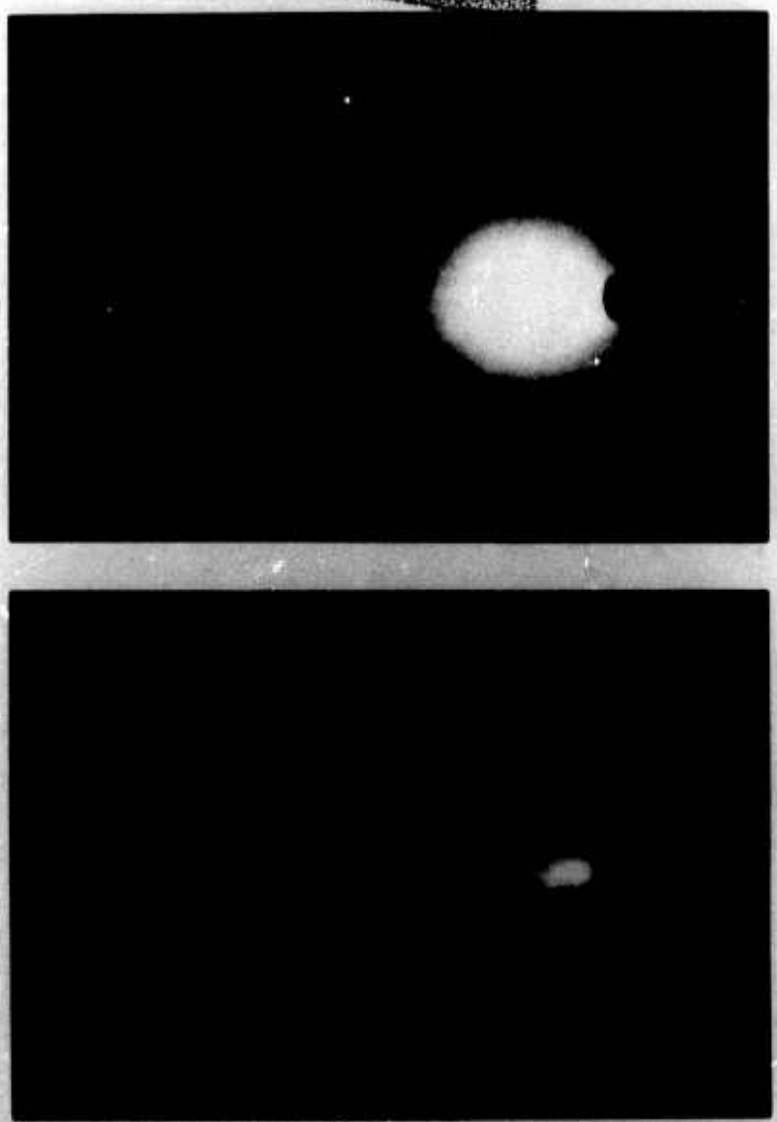
Project No. TS2-2015. 9th Report. Flash [illegible] 20 Round Burst of: TOP: Cartridge, A.P. Cal. .30, T93, Lot FAX30-1[illegible]. BOTTOM: Cartridge, A.P. Cal. .280, Lot No. 24A. [redacted]





A61154 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Flash from 30 Round Burst of: TOP: Cartridge, A.P.I. Cal. .30, T101, Lot PAX30-13[redacted]; A.P.I. Cal. .280, Lot No. 23A. Camera Position A[redacted]



A61155 [redacted] ABERDEEN PROVING GROUND 28 March 1950

Project No. TS2-2015. 9th Report. Flash From 20 Round Burst of: TOP: Cartridge, A.P.I. Cal. .30, T101 Lot PAX30-135 [redacted] BOTTOM: Cartridge, A.P.I. Cal. .280, Lot No. 23A.

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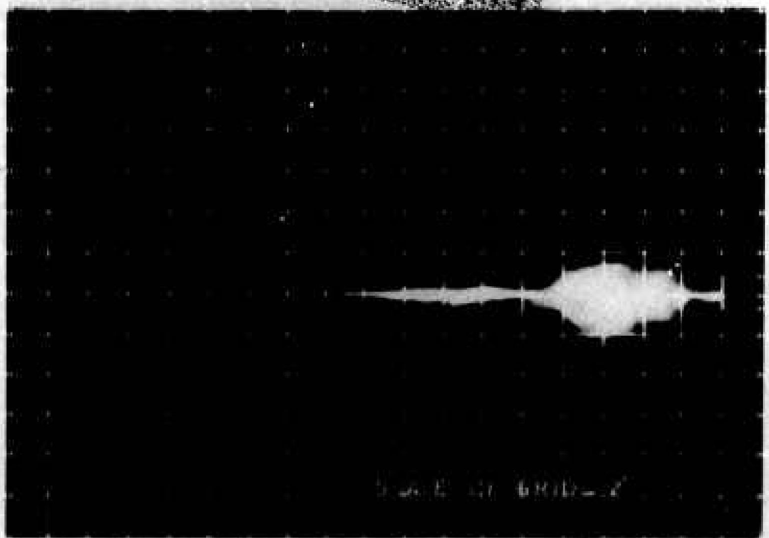
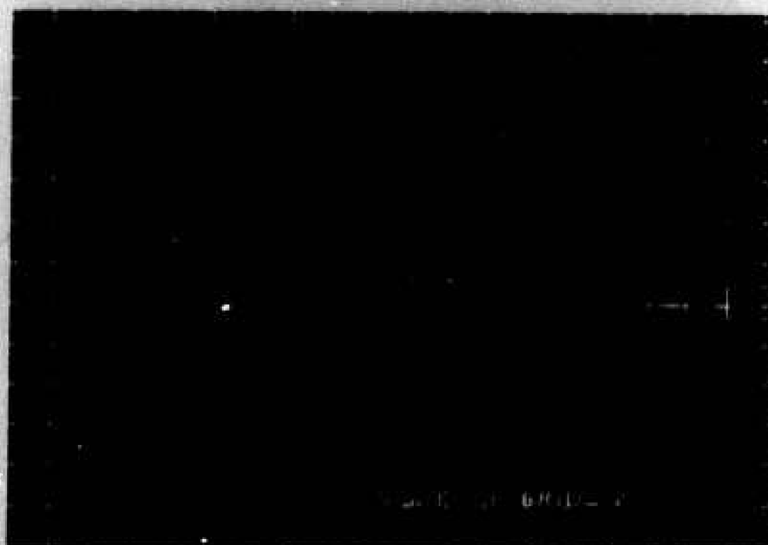
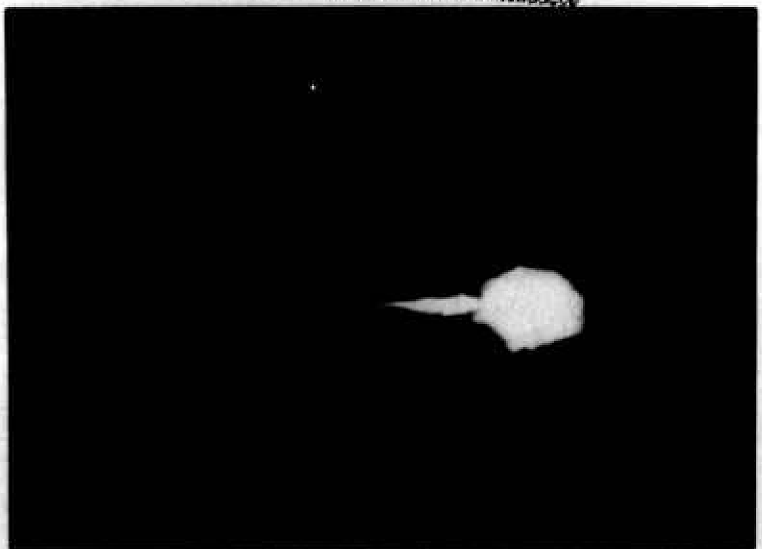
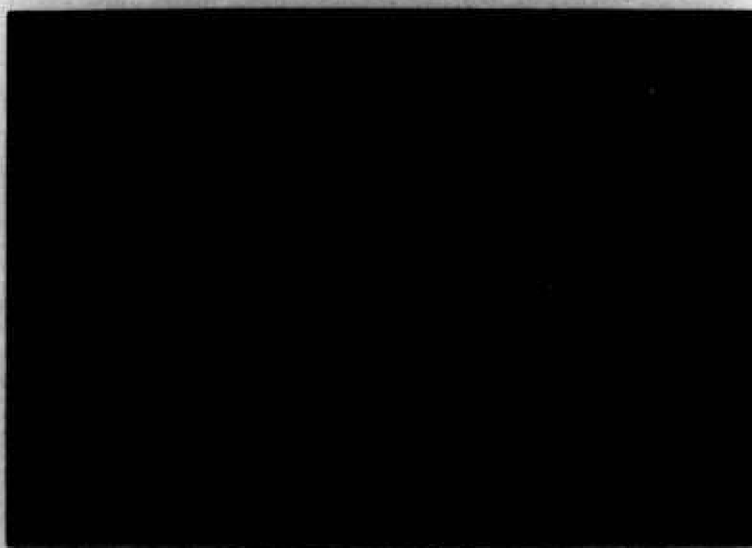




A61156 [redacted] ABERDEEN PROVING GROUND 28 March 1950

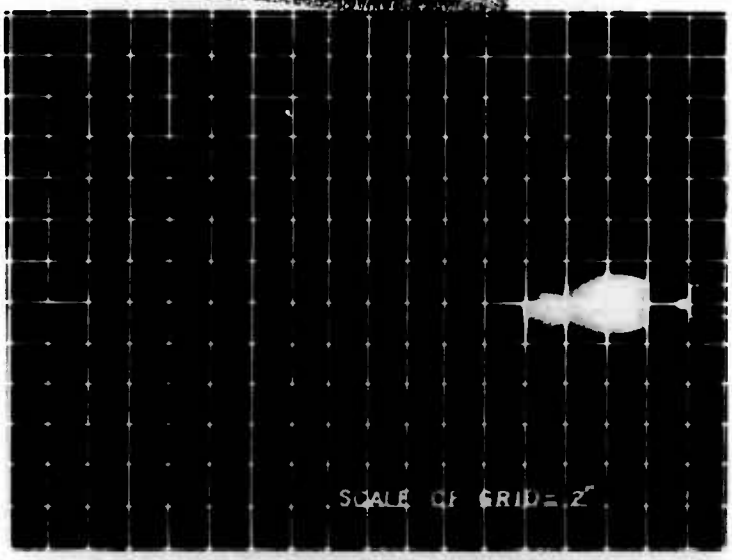
Project No. TS2-2014. 9th Report. Flash [illegible]
Cartridge, Tracer, Cal. .30, T102, Lot FAX30-13[redacted]
Tracer, Cal. .280, Lot No. 32A. Camera Position[redacted]

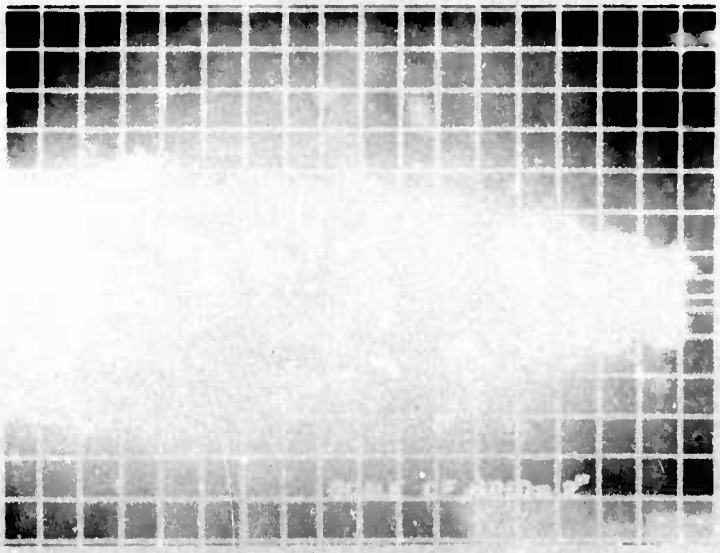




[redacted] ABERDEEN PROVING GROUND 28 March 1950

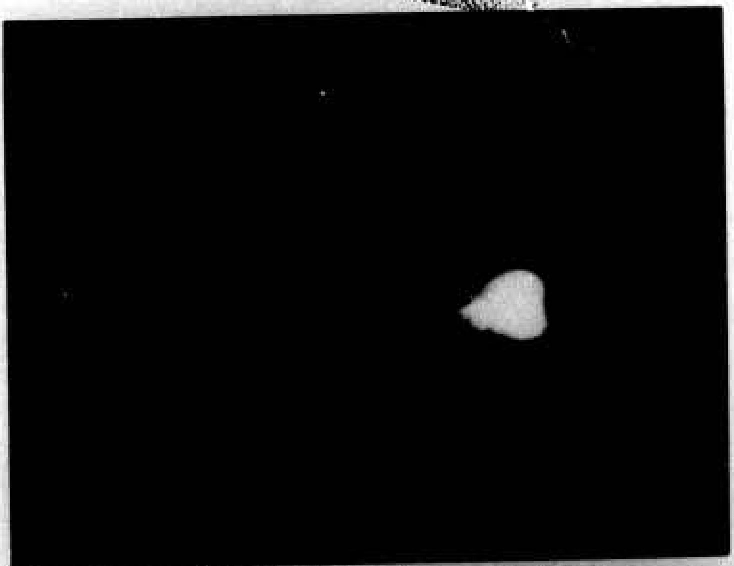
[illegible] No. TS2-2015. 9th Report. Flash from [illegible]-Round Burst of: TOP: [illegible], Tracer, Cal. .30, T102, Lot FAX30-[illegible]. BOTTOM: Cartridge, [illegible], Cal. .280, Lot No. 3[illegible] Position

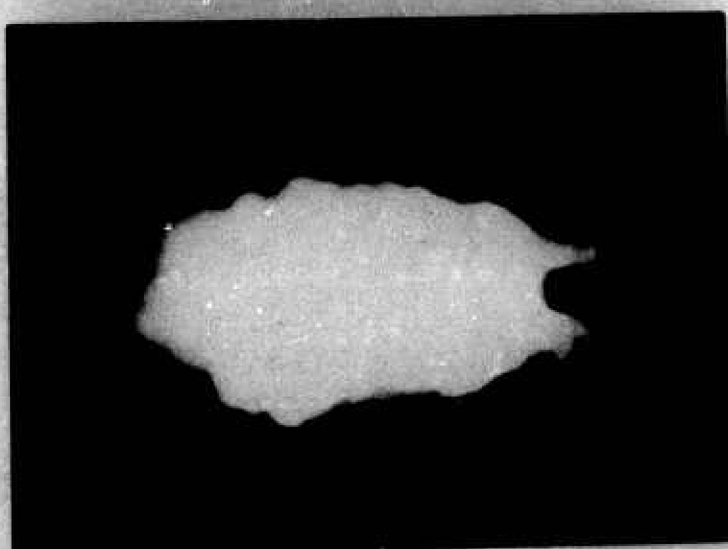




AD 11[illegible] [redacted] ABERDEEN PROVING GROUND 28 March 1950

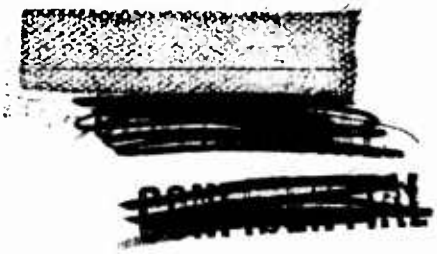
Project No. TS2-2015. 9th Report. Flash from [illegible] Round Burst of: TOP: Cartridge, Spotting, Cal. .[illegible] Lot No. 2[illegible] BOTTOM: Cartridge, OBS, Cal. .280, Lot No. 17A. (M[illegible] [redacted] [illegible]en A.





A61159 [redacted] ABERDEEN PROVING GROUND 28 March 1960

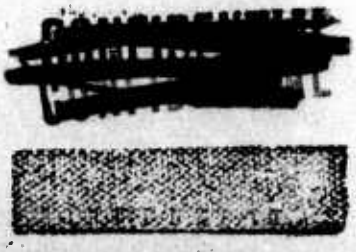
Project No. T32-2015. 9th Report. Flash [illegible] Round Burst of: TOP: Cartridge, Spotting, Cal [illegible], T103, Lot No. [illegible]: Cartridge, OBS, Cal. .250, Lot No. 17A. [illegible] Position B.

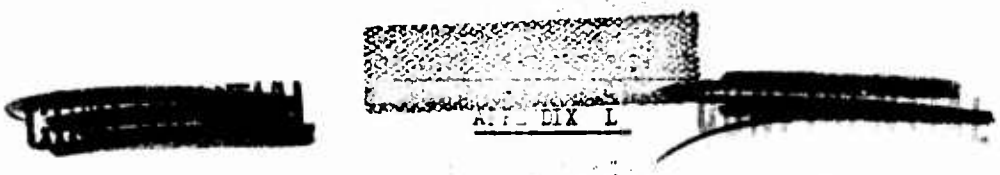


APPENDIX L

FIRING DATA - SMOKE CHARACTERISTICS

(2 Sheets)





APPENDIX L

SMOKE CHARACTERISTICS - 20 April 1950
TEMP: 46°F
DENSITY: 1.040
Cloudy

WEAPON: Gun, Machine, Modified, Caliber .280, M1919A4 No. CM4966, Barrel No. 4, Previous Rounds: 445

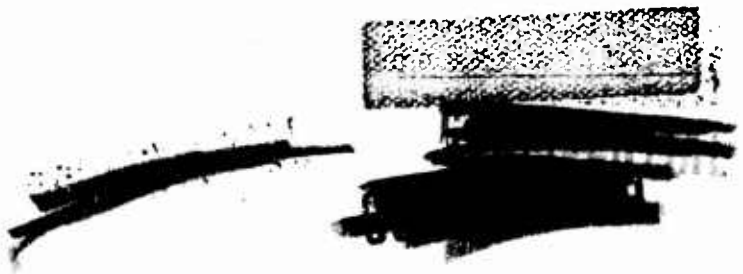
TIME	ROUNDS	AMMUNITION	REMARKS
0915	446-470	Caliber .280, AP, Lot 24A	Function OK. Smoke grey-white in color and quite thin. Target not obscured.
0920	471-545	Caliber .280, AP, Lot 24A	1 FF. Grey-white smoke, thin density. Target not obscured.
0930	546-620	Caliber .280, Tracer Lot 32A	Function OK, Smoke darker grey-white than above and slightly thicker. Daylight visibility of trace, excellent.

WEAPON: Gun, Machine, Modified, Caliber .30, M1919A4, No. 839252 Barrel No. 4, Previous Rounds - 315

0935	316-390	Caliber .30, AP, T93, FAX30-1357	Smoke grey-black in color and very thick as compared with that from caliber .280, AP ammunition. Target not obscured; However, more difficult to see than when firing caliber .280 AP. Smoke also noticed to have a more irritating effect on observers' throats.
0940	391/465	Caliber .30, Tracer FAX30-1359	Smoke grey-white in color and not as thick as above. Compares with that from Caliber .280 tracer, possibly slightly thicker. Daylight visibility of trace, excellent. Not as bright as Caliber .280 trace.

WEAPON: Gun, Machine, Caliber .30, M1919A4, No. 523242 Barrel No. A4-9, Previous Rounds: 410

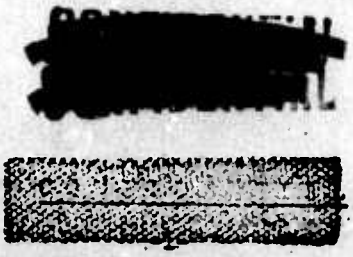
0945	411-485	Caliber .30, Ball, M-2, Lot FA-4059	Dark grey-white smoke, very thick. Of the ammunitions fired this gave the greatest amount of smoke; however, not the darkest.



APPENDIX M

TRACE TEST FIRING DATA

(5 Sheets)



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APPENDIX V

28 March 1950

TRACER FIRING - (LENGTH OF TRACE)

Gun, Machine, Caliber .30, M1919A4, No. 839252
Ammunition: Cartridge, Caliber .30, Tracer, T102, Lot No. FAX30-1359
Barrel No. T65E2, No. 4
Previous Rounds: 100

ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUND	YARDS
1-20	Locators						
21	900	41	875	61	875	81	900
22	900	42	875	62	900	82	875
23	875	43	875	63	900	83	900
24	875	44	875	64	875	84	875
25	875	45	875	65	875	85	875
26	900	46	875	66	850	86	900
27	875	47	900	67	875	87	875
28	875	48	875	68	900	88	900
29	875	49	900	69	900	89	875
30	875	50	875	70	875	90	875
31	875	51	875	71	875	91	900
32	875	52	875	72	875	92	900
33	875	53	875	73	875	93	900
34	875	54	875	74	900	94	875
35	900	55	875	75	875	95	875
36	900	56	850+	76	875	96	850
37	850	57	850	77	875	97	850
38	875	58	875	78	875	98	875
39	900	59	875	79	875	99	875
40	875	60	850	80	875	100	900

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APPENDIX M

TRACER FIRING

Gun, Machine, Caliber .30, M1919A4 (Mod) No. [redacted] 4966
Ammunition: Cartridge, SA Caliber .30, Tracer, Lot 32A
Barrel No. 4 Previous Rounds: 245

ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS
1-3	Locators			(Length of Trace - Yards)					
4	1075	26	1075	48	1050	70	1075	92	1075
5	1075	27	1000	49	1075	71	1075	93	1075
6	1075	28	1075	50	1075	72	Lost	94	1075
7	1075	29	1075	51	1025	73	1075	95	1075
8	1050	30	1075	52	1050	74	1050	96	1075
9	1075	31	1075	53	1075	75	1025	97	1075
10	1075	32	1075	54	1050	76	1025	98	1025
11	1050	33	1075	55	1075	77	1025	99	1050
12	1025	34	1075	56	1075	78	1075	100	1050
13	1025	35	1075	57	1075	79	1050		
14	1075	36	1050	58	1050	80	1075		
15	1050	37	1075	59	1050	81	1075		
16	1075	38	1075	60	1075	82	1050		
17	TB*	39	1025	61	1075	83	1050		
18	1075	40	1075	62	Lost	84	1025		
19	1075	41	1050	63	1075	85	1025		
20	1075	42	1075	64	1075	86	1050		
21	1075	43	1050	65	1075	87	1050		
22	1075	44	1075	66	1075	88	1050		
23	1050	45	1050	67	1075	89	1075		
24	1050	46	1025	68	1075	90	1025		
25	1075	47	1050	69	1050	91	1075		

* Total Blind

[redacted]

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APPENDIX M

4 April 1950

TRACER FIRING (Length of Igniter)

Gun, Machine, Caliber .30, M1919A4 (Mod), No. 839252
Barrel No. 4 Previous Rounds: 200
Ammunition: Cartridge, Caliber .30, Tracer, T-102, Lot No. FAX30-1359.

Length of Igniter in Yards

ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS
1	40	21	40	41	40	61	70	81	60
2	40	22	50	42	40	62	60	82	45
3	40	23	40	43	45	63	60	83	60
4	40	24	45	44	45	64	70	84	70
5	40	25	40	45	50	65	60	85	60
6	30	26	40	46	40	66	60	86	40
7	30	27	45	47	40	67	55	87	40
8	35	28	40	48	45	68	45	88	65
9	55	29	45	49	50	69	70	89	60
10	55	30	40	50	50	70	55	90	70
11	50	31	40	51	45	71	50	91	40
12	40	32	35	52	60	72	55	92	60
13	35	33	45	53	55	73	50	93	65
14	40	34	40	54	45	74	65	94	50
15	45	35	40	55	70	75	50	95	50
16	40	36	45	56	70	76	45	96	65
17	40	37	40	57	55	77	50	97	65
18	40	38	40	58	60	78	40	98	50
19	40	39	40	59	70	79	70	99	60
20	35	40	40	60	75	80	70	100	50

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APPENDIX M

TRACER FIRING

Gun, Machine, Caliber .280, M1919A4 (Mod), No. OW 4966
Barrel No. 4 Previous Rounds: 255
Observation for Length of Igniter (Yards)

ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS	ROUNDS	YARDS
1	75	21	60	41	60	61	60	81	60
2	75	22	60	42	65	62	55	82	60
3	60	23	65	43	60	63	50	83	80
4	60	24	75	44	60	64	50	84	65
5	50	25	70	45	60	65	50	85	65
6	70	26	65	46	70	66	50	86	65
7	65	27	55	47	65	67	65	87	65
8	75	28	80	48	70	68	65	88	65
9	65	29	75	49	90	69	65	89	70
10	65	30	75	50	70	70	50	90	60
11	60	31	75	51	70	71	60	91	55
12	60	32	90	52	70	72	60	92	85
13	50	33	70	53	75	73	60	43	90
14	55	34	65	54	70	74	60	94	65
15	60	35	60	55	65	75	60	95	60
16	55	36	70	56	65	76	85	96	55
17	TB*	37	70	57	65	77	70	97	50
18	70	38	65	58	60	78	60	98	50
19	65	39	60	59	50	79	65	99	50
20	60	40	60	60	50	80	75	100	50

*TB - Total Blind

[redacted]

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APPENDIX N

GRENDADE FIRING DATA

(7 Sheets)

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DATE: 3 April 1950

Direction Fire: SW
Wind: Calm

WEAPON: Rifle, Lightweight, Caliber .30, T-25, No. 14
AMMUNITION: Cartridge, Caliber .30, Grenade, T-116, Lot No. FAX30-1367
Rifle Fired at 30° Angle to Horizontal.
Grenade, Practice, M11A2, Lot E-19

ROUND	RANGE, FT
1	649.0
2	590.0
3	605.0
4	595.5
5	No record, round struck guide brace.
6	609.0
7	633.0
8	616.5
9	609.0
10	625.0
11	641.0
Average	617.3
Maximum	649.0
Minimum	590.0

Same Rifle, Ammunition, and Grenade as above but fired with Grenade Booster Cartridge. Cartridge, Auxiliary, Grenade, M7, Lot FA-5-31.

ROUND	RANGE, FT
1	963
2	1024
3	960.5
4	894
5	936
6	Lost
7	906
8	967
9	977
10	971
Average	955.3
Maximum	1024.0
Minimum	894.0

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Rifle, Auto, Caliber .280, EM2, No. 6
Ammunition, Cartridge, Grenade, SA Caliber .280 Lot No. 20E
Grenade, Practice, M11A2, Lot E-19
Thirty Degree Angle to Horizontal
Direction Fire: SW Wind: Calm

ROUND	RANGE, FT	
1	711.5	
2	800.0	
3	708.0	
4	Fin Tube Ruptured.	Head on grenade went about 150'.
5	477.0	Fin came off grenade in flight.
6	747.0	
7	Fin Tube split, Head of grenade went less than 150'.	
8	Same as Round No. 7.	
9	719.5	
10	700.0	

Average of six rounds - 731.0 ft
Maximum 800.0 ft
Minimum 708.0 ft

Rifle, Auto, Caliber .280 FN No. 6
Ammunition, Cartridge, SA Caliber .280 Grenade Lot No. 20E
Grenade, Practice, M11A2, Lot E-19
Direction Fire: SW Wind: Calm

ROUND	RANGE, FT	
1	479	Tail came off grenade
2	730.5	
3	730.5	
4	733.0	
5	766.5	
6	730.0	
7	731.0	
8	697.0	
9	703.0	
10	690.0	

Average, Nine Rounds 723.5 ft
Maximum 766.5 ft
Minimum 690.0 ft

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APPENDIX I

DATE: 4 April 1950
WEAPON: Rifle, Lightweight, Caliber .30, T25, No. 15
AMMUNITION: Cartridge, Caliber .30, Grenade, T-116 Lot FAX30-1367
GRENADE: Practice, M11A2, Lot E-19
DIRECTION FIRE: SW WIND: SSW, 21 to 28 mph

ROUND	RANGE
1	472.0
2	576.5
3	583.0
4	616.0
5	621.5
6	625.0
7	582.0
8	586.0
9	619.0
10	612.0
Average	589.3 ft
Maximum	625.0 ft
Minimum	472.0 ft

Same Rifle, Ammunition, and Grenade as above but fired with Grenade Booster Cartridge. Cartridge, Auxiliary, Grenade, M-7, Lot FA-5-31

ROUND	RANGE, FT	
1	901.0	
2	462.0	Fin assembly came off in flight.
3	896.0	
4	901.0	
5	891.0	
6	934.0	
7	872.0	
8	950.0	
9	923.0	
10	930.0	
Average	910.8 ft, 9 grenades	
Maximum	950.0 ft	
Minimum	872.0 ft	

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Date: 4 April 1950
Rifle, Auto, Caliber .280, EM-2, No. 8
Ammunition: Cartridge, SA, Caliber .280 Grenade, Lot 20E
Grenade: Practice, Rifle, M11A2, Lot E-19

ROUND	RANGE, FT	
1	Fin assembly tube failed to leave launcher	
2	Fin assembly tube ruptured	
3	Fin assembly tube ruptured.	
4	Fin assembly tube ruptured.	
5	Fin assembly tube ruptured.	
6	Fin assembly tube ruptured.	
	Choke Removed From Launcher	
7	628	
8	701	
9	675	
10	115	Fin assembly tube ruptured.

Average of 3 rounds - 668

Rifle, Auto, Caliber .280 FN No. 7
Ammunition: Cartridge, SA, Caliber .280, Grenade, Lot No. 20E
Grenade, Practice, Rifle, M11A2, Lot E-19

ROUND	RANGE, FT
1	671.5
2	698.0
3	698.0
4	699.0
5	742.0
6	720.0
7	707.0
8	742.0
9	707.0
10	698.0
Average	708.25 ft
Maximum	742.0 ft
Minimum	671.5 ft

[redacted]

APPENDIX N

[redacted]

DATE: 17 April 1950
WEAPON: Rifle, Lightweight, Caliber .30, T-25, No. 15
GRENADE: Practice, M11A2, Lot E-19
AMMUNITION, Cartridge, Grenade, Caliber .30, T116
ANGLE OF FIRE: 45° DIRECTION FIRE: SW
WIND S to SW, 12 mph

GRENADE NO.	RANGE, FT
1	695
4	687
6	646
18	614
31	669
Average	662

Powder Charge
41 grs - IMR 4895
1 gr Black Powder - A -4

17 April 1950
Rifle, Lightweight, Caliber .30, T25, No. 15
Grenade, Practice, M11A2, Lot E-19
Fired at a 30° angle with butt of rifle resting on ground.
Direction of fire: SW Wind: S to SW, 10 mph.
Ammunition: Cartridge, grenade, caliber .30, T116.

Powder Charge
41 grs IMR 4895
1 gr Black Powder, A4

ROUND	RANGE, YARDS
1	590
2	610
3	553
4	621
5	603
6	345, Lost Fin
7	650
8	615
9	617
10	580
Average	604

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APPENDIX N[redacted]

17 April 1950
Rifle, Lightweight, Caliber .30, T-25, No. 14
Grenade, practice, M11A-2, Lot E-19
Fired from 30° angle with butt of rifle on firm ground.
Direction fire: SW Wind: S to SW 10 to 12 mph
Ammunition: Cartridge, grenade, Caliber .30, T116

Powder Charge
41 grs IMR 4895
1 gr Black Powder A4

GRENADE	RANGE, FT
1	589
2	592
3	599
4	621
5	616
6	618
7	592
8	625
9	602
10	588
Average	604

Powder Charge
41 grs IMR 4895
1 gr 60 mm Mortar
Ignition Powder

GRENADE	RANGE, FT
1	575
2	593
3	596
4	560
5	591
6	607
7	576
8	621
9	607
10	595
Average	590

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APPENDIX O

Firing Data, Ignition Characteristics

51 Pages

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Appendix O

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Incendiary Test

Guns

Mann Barrel (UK) No. 450/3 Prev. fired 243 rounds
Mann Barrel (US) No. 1528613 with Bbl 5 Prev. fired 145 rounds

Ammunition

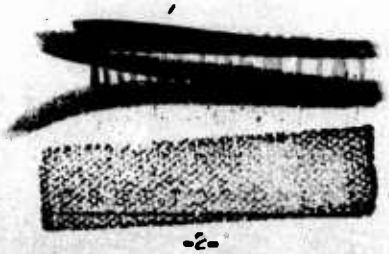
UK Ctg. API, Cal..280, Lot No. 23A
US Ctg. API, Cal..30, T101, Lot No. FA X30-1356

Fuel

Gasoline, Automotive, 72 octane

Ranges

100, 300 and 500 yards



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Weather Data

Date	Temp. °F	Pressure Inches Hg	Relative Density	Relative Humidity	Weather
2 Mar 1950	37.5	30.36	1.076	52%	Overcast
8 Mar 1950	56.2	29.67	1.010	100%	"
9 Mar 1950	29.7	30.06	1.083	43%	Broken Clouds
10 Mar 1950	36.5	30.46	1.083	41%	Clear
13 Mar 1950	40.0	29.73	1.048	100%	L. Rain, Overcast
14 Mar 1950	40.0	30.19	1.065	43%	Clear
15 Mar 1950	50.0	30.10	1.040	44%	Broken Clouds
16 Mar 1950	31.7	30.10	1.080	55%	Overcast
17 Mar 1950	40.5	30.01	1.057	55%	Scattered Clouds
20 Mar 1950	42.8	30.44	1.067	54%	Overcast
21 Mar 1950	41.8	29.93	1.052	89%	Overcast

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Appendix O

Date: 7 Mar. 1950 100 Yards

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1317	US	1						Locator
1330	UK	2						Locator
			W/O Plate - Below Fuel Level					
1332	US	3	2-1/2" Below	.30	.30	1x16	No	Flash visible behind can only.
1338	UK	4	7" Below	.280	1/2"	None	No	
1344	US	5	6" Below	.30	1/2"	6"	No	Flash was approx. 8 ft. behind can.
1350	UK	6	10" Below	.280	.280	2"	No	Flash visible at rear of can
1357	US	7	7" Below	.30	.30	6"	No	Flash not visible until approx. 7 ft. behind can.
1402	UK	8	8" Below	.280	1/2"	None	No	
1410	US	9	9" Below	.30	1/2"	None	No	
1415	UK	10	5" Below	.280	.280	None	No	
1422	US	11	10" Below	.30	.30	5"	No	Flash not visible until approx. 30 ft. behind target.
1430	UK	12	6" Below	.280	.280	None	No	
			W/O Plate - Above Fuel Level					
1450	US	13	1/2" Above	.30	.30	5"	No	Flash approx. 8 ft. behind can.
1452	UK	14	On Fuel Level	.280	.280	None	No	Unfair Hit.
1455	US	15	7" Above	.30	.30	10"	No	Flash 4 ft. behind can.
1459	UK	16	8" Above	.280	1/2"	12"	No	Strike was on top seam of can. Flash showed on face of can.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1500	US	17	6" Above	.30	.30	6"	No	Flash 3 ft. behind can.
1502	UK	18						Disregard.
1504	US	19	6" Above	.30	.30	8"	No	Flash 4 ft. behind can.
1506	UK	20	5" Above	.280	.280	None	No	
1507	US	21	6" Above	.30	.30	8"	No	Flash 2 ft. behind can.
1509	UK	22	5" Above	.280	.280	None	No	
			(Following two rounds fired to replace rounds 14 and 18)					
1511	UK	23	5" Above	.280	.280	5"	Yes	Disregard strike was on edge of can.
1515	UK	24	4" Above	.280	.280	None	No	
1517	UK	25	4" Above	.280	.280	None	No	
			Date: 8 Mar. 1950					
1015	US	1						Locator
1016	UK	2						Locator
			1/2" between plate and can					
			W/Plate - Below Fuel Level					
1020	US	3	4" Below	3/4"	3/4"	10"	No	Flash visible on both sides of can.
1030	UK	4	4" Below	1/2"	3/4"	Lost	Yes	Flash visible in front of can only. Flash smudge on face of plate.
1032	US	5	6" Below	1/2"	1"	2"	No	Flash visible in rear of can only, Approx. 2" from surface of can.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1040	UK	6	3" Below	3/4"	3/4"	18"	Yes	Flash visible on both sides of can.
1042	US	7	7" Below	1/2"	1-1/4"	1/2"	No	Flash visible only between plate and can very small.
1046	UK	8	3" Below	1/2"	1/2"	4"	Yes	Flash visible on face of plate and between plate and can.
1050	US	9	5" Below	1/2"	3/4"	8"	No	Flash visible about 4" behind can.
1055	UK	10	4" Below	1/2"	1/2"	7"	Yes	Flash visible in front of plate.
1105	US	11	6" Below	1/2"	3/4"	10"	No	Small flash visible on face of plate. Ten-inch flash visible 18" in rear of can.
1110	Uk	12	3" Below	1/2"	1/2"	4"	No	Flash visible on face of plate and between plate and can.

Note: Generally UK ammunition appeared to flash mostly on face of plate and between plate and can; US ammunition appeared to flash behind can mostly. One round of US gave visible flash between plate and can.

1/2" between plate and can
W/Plate - Above Fuel Level

1120	US	13	6" Above	1/2"	1"	6"	No	Flash visible at rear of can only.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1025	UK	14	10" Above	1/2"	3/4"	4"	No	Flash appeared to be only on face of plate
1130	US	15	2" Above	3/4"	1"	10"	No	Flash behind can only, approx. 1 ft. from can.
1132	UK	16	4" Above	1/2"	1/2"	6"	Yes	Can ignited but blaze burned only momentarily. Flash was visible on face of plate and in rear of can. Large smudge on face of can.
1135	US	17	7" Above	3/4"	1"	12"	No	Small flash visible on face of can. Main flash was approx. 1 ft. from can.
1140	UK	18	5" Above	1/2"	3/4"	12"	No	Main part of flash on face of plate. Small pencil of flash in rear of can.
1145	US	19	5" Above	1"	1"	12"	No	Small flash visible on face of can. Main part of flash was approx. 1 ft. from rear of can.

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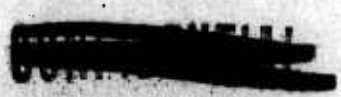
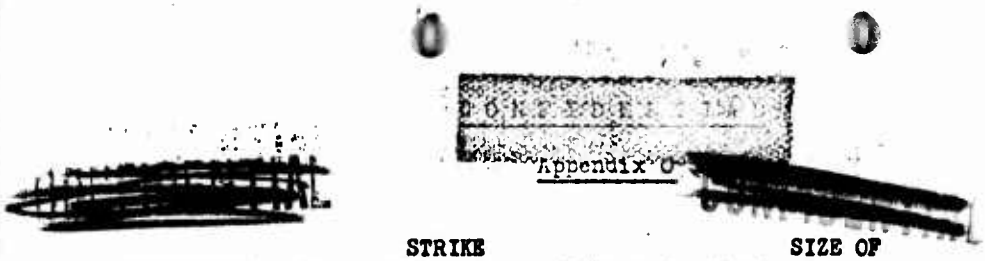
Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1146	UK	20	5" Above	1/2"	1/2"	10"	Yes	Large flash on front of plate and in rear of can. Bullet appeared to break up inside can making two exit holes.
1245	US	21	6" Above	3/4"	3/4"	8"	Yes	Flash visible about 4" behind can.
1250	UK	22	5" Above	1/2"	1/2"	12"	No	Large flash smudge on face of can. Flash was visible on both sides of can and on face of plate.
			4" between plate and can W/Plate - Below Fuel Level					
1255	US	23	4" Below	1"	3"	-	Yes	Flash was visible between plate and can. Fire prevented estimate of size (flash).
1300	UK	24	3" Below	1"	1/2"	-	Yes	Disregard - double hit. Flash visible between plate and can and on face of plate. Bullet struck previous hole in plate.
1305	US	25	2" Below	3/4"	1-1/4"	5"	No	Flash visible between plate and can, appeared to be 5" in diameter.





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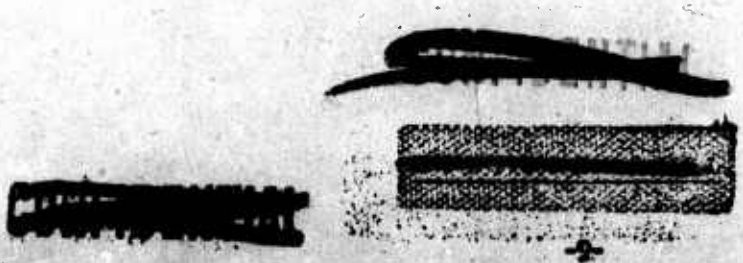
TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1310	UK	26	3" Below	3/4"	1/2"	-	Yes	Flash occurred on face of plate and between plate and can.
1315	US	27	2" Below	1/2"	1"	-	No	Flash between plate and can. Large flash smudge on face of can.
1320	US	28	3" Below	1/2"	1/2"	-	No	Flash visible on face of plate and between plate and can. Large flash smudge on face of can.
1326	US	29	1" Below	1/2"	1-1/4"	3"	No	Flash visible between plate and can.
1350	UK	30	3" Below	1/2"	1/2"	-	No	Flash on face of plate and between plate and can. Flash on face of plate 3"; behind plate 3".
1355	US	31	2" Below	1/2"	2"	-	Yes	Flash between plate and can, none in rear.
1400	UK	32	3" Below	3/4"	1/2"	-	No	Flash mostly between plate and can, appeared to be about 4" in diameter. Flash smudge around entrance hole in can.
1405	UK	33	3" Below	3/4"	1/2"	-	Yes	Flash between plate and can.



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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			4" between plate and can W/Plate - Above Fuel Level					
1415	US	34						Disregard, hit seam of can.
1420	UK	35	3" Above	1/2"	1/2"		Yes	Flash between plate and can. Flash smudge on face of can. Two small exit holes in can.
1421	US	36	4" Above	1/2"	3/4"		Yes	Flash between plate and can, none in rear of can. Flash smudge on face of can. Ignition occurred very slowly.
1423	UK	37	4" Above	1/2"	1/2"		Yes	Flash on face of plate and face of can. Smudge on face of can. Projectile appeared to break up in can making two exit holes.
1425	US	38	5" Above	3/4"	1"		Yes	Flash between plate and can. Smudge on face of can.
1427	UK	39	4" Above	1/2"			No	Flash between plate and can. Large smudge on can. Two small exit holes in can.

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Appendix O

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1438	[redacted]	40	4" Above	1/2"	1"		Yes	Flash smudge on face of can. Flash between plate and can, none in rear.
1439	UK	41	4" Above	1/2"	1/2"		Yes	Flash between plate and can. Large smudge on face of can. Two small exit holes in can.
1441	US	42	4" Above	1/2"	1"		No	Flash between plate and can with small streak visible behind can.
1445	UK	43	4" Above	1/2"	1/2"		Yes	Flash smudge on face of can. Large flash smudge on face of can. Flash between plate and can.
			Following round fired to replace round 34					
1447	US	44	4" Above	1/2"	3/4"		Yes	Flash between plate and can, none in rear.
			8" between plate and can W/Plate - Below Fuel Level					
1506	US	45	2" Below	3/4"	1-1/2"	4"	No	Flash smudge on face of can, no flash in rear of can.
1510	UK	46	3" Below	1/2"	1"	6"	No	Flash between plate and can. Smudge on face of can.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1520	US	47	2" Below	1/2"	1-1/2"	6"	No	Small flash on face of plate. Large flash smudge on face of can.
1525	UK	48	4" Below	0	1/2"		No	Flash filled space between plate and can with respect to length. Flash also visible on face of plate. Two entrance holes in can.
			Date: 9 March 1950					
1010	US	1	7" Below	1/2"	1-1/2"	7"	No	Flash visible between plate and can, none in rear of can.
1015	UK	2	11" Below	-	1/2"	-	Yes	Flash visible on face of plate and between plate and can. Two entrance holes in can.
1020	US	3	7" Below	1/2"	2"	6"	No	Flash visible between plate and can. Large flash smudge on face of can.
1029	UK	4	10" Below	1/2"	3/4"	6"	No	Flash between plate and can. Large flash smudge on face of can.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1039	US	5	6" Below	3/4"	1-1/2"	4"	No	No flash on face of plate. Large flash smudge on face of can. Flash visible between plate and can.
1045	UK	6	8" Below	1/2"	1"	-	Yes	No flash on front of plate. Flash visible between plate and can.
			8" between plate and can W/Plate - Above Fuel Level					
1102	US	7	3" Above	1/2"	1-1/4"	4"	No	Flash only between plate and can. Smudge on can.
1104	UK	8	4" Above	1/2"	1/2"	-	Yes	Small flash on face of plate. Approx. 3" flash between plate and can.
1107	US	9	3" Above	3/4"	1-1/4"	-	Yes	Flash between plate and can only.
1109	UK	10	3" Above	1/2"	3/4"	3"	No	Flash on face of plate and between plate and can. Small flash smudge on face of can.
1111	US	11	3" Above	1/2"	1-1/2"	6"	No	Flash between plate and can only. Large flash smudge on face of can.
1112	UK	12	4" Above	1/2"	3/4"	5"	No	Flash between plate and can. Large flash smudge on face of can.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1115	US	13	4" Above	1/2"	1-1/4"	7"	No	Flash visible between plate and can only.
1119	UK	14	3" Above	1/2"	1/2"	7"	No	Approx. 3" flash on face of plate, 7" flash between plate and can.
1121	US	15	5" Above	1"	2"	8"	Yes	Flash between plate and can only.
1129	UK	16	5" Above	1/2"	1/2"	8"	No	Small flash on face of plate, 8" flash between plate and can. Large flash smudge on face of can.
			12" between plate and can W/Plate - Below Fuel Level					
1129	US	17	4" Below	1"	2"	6"	No	Flash between plate and can only. Medium sized flash smudge on face of can.
1138	UK	18	3" Below	1/2"	1"	-	Yes	Small flash on face of plate.
1255	US	19	4" Below	3/4"	-	10"	No	Flash between plate and can only. Large flash smudge on face of can. Two 1" exit holes.
1304	UK	20	3" Below	-	1"	-	Yes	Two small entrance holes. Main part of flash between plate and can.
1309	US	21	3" Below	3/4"	[redacted]	10"	No	Two exit holes. Flash only between plate and can. Large flash smudge on face of plate.

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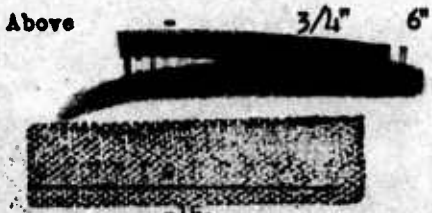
Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1315	UK	22	2" Below	1/2"	3/4"	10"	Yes	Small flash on face of plate. Main part of flash between plate and can.
1320	US	23	3" Below	3/4"	-	10"	No	Three exit holes in can. Large flash smudge on can. Flash only between plate and can.
1327	UK	24	3" Below	1/2"	1"	0	Yes	No flash on face of plate.
1335	US	25	3" Below	-	1-1/2"	8"	No	Two entrance holes. Flash between plate and can only. Large flash smudge on front of can.
1340	UK	26	4" Below	-	1"	-	Yes	Two small entrance holes. Small flash on face of plate.
			12" between plate and can W/Plate - Above Fuel Level					
1350	US	27	3" Above	3/4"	1"	6"	No	Flash visible between plate and can. Large flash smudge on face of can. One small fragment made additional exit hole.
1354	UK	28	4" Above	-	3/4"	6"	Yes	Two entrance holes. Flash visible on face of plate.



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Appendix C

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1358	US	29	3" Above	3/4"	1-1/4"	10"	No	Flash between plate and can. Large smudge on face of can.
1400	UK	30	4" Above	-	-	10"	No	3" flash on face of plate. Slight smudge on face of can.
1402	US	31	5" Above	3/4"	1-1/2"	10"	No	Flash between plate and can. Large smudge on face of can.
1405	UK	32	4" Above	1/2"	1"	-	No	3" flash on face of plate, 7" flash between plate and can. Very slight smudge on face of can.
1410	US	33	4" Above	3/4"	1-1/4"	10"	No	Flash between plate and can. Large smudge on face of can.
1455	UK	34	3" Above	.280	.280	6"	No	3" flash on face of plate. Slight flash smudge on face of can.
1500	US	35	3" Above	3/4"	1-1/2"	10"	No	Flash visible between plate and can only. Large flash smudge on face of can.
1503	UK	36	4" Above	1/2"	1/2"	6"	No	Flash on face of plate. Flash appeared to be on rear of plate barely reaching can. Very slight smudge on face of can.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			300 Yard - W/O Plate - Below Fuel Level					
			DATE: 10 March 1950					
1110	US	1-10						Locators.
1115	UK	1-13						Locators.
1146	US	1	2" Below	.30	.30	None	No	
1155	UK	2	2" Below	.280	.280	None	No	
1340	US	3	4" Below	.30	.30	None	No	
1345	UK	4	-	-	-	-	No	Unfair hit.
1346	US	5	2" Below	.30	1/2"	None	No	
1356	UK	6	-	-	-	-	-	Unfair hit.
1400	US	7	-	-	-	-	No	Unfair hit.
1406	UK	8	-	-	-	-		Missed can.
1410	US	9	2" Below	.30	.30	8"	No	Flash visible in rear of can.
1421	UK	10	2" Below	.280	1/2"	None	No	
			Following rounds were fired to replace rounds 4, 6, 7 and 8					
1425	US	11	5" Below	.30	1/2"	8"	No	8" flash visible 6" to 8" behind can.
1436	UK	12	5" Below	.280	.280	None	No	
1450	UK	13	6" Below	.280	.280	None	No	
1500	UK	14	-	-	-	-	No	Missed can.
1502	UK	15	-	-	-	-	No	Unfair hit.
1505	UK	16	3" Below	.280	.280	None	No	
			W/O Plate - Above Fuel Level - Date: 13 Mar. 50					
1115	US	1-3						Locators.
1130	UK	4-7						Locators.
1323	US	8	-	-	-	-		Hit top of can.
1325	US	9	9" Above	.30	.30	None	No	
1330	UK	10	5" Above	.280	.280	None	No	
1332	US	11	5" Above	.30	.30	11"	No	Flash visible in rear of can only, appeared to start from rear side of can
1335	UK	12	-	[redacted]				Missed can.

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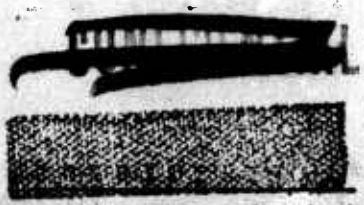
TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1336	UK	13	2" Above	.260	.280	-	No	Very small streak of flash visible in rear of can.
1338	US	14	7" Above	.30	.30	-	Yes	Can ignited at exit hole. Streak of flash visible at rear of can.
1340	UK	15	3" Above	.280	.280	None	No	
1342	US	16	-	-	-	-		Missed can.
1343	US	17	-	-	-	-		Missed can.
1418	US	18	9" Above	.30	.30	None	No	
1421	UK	19	4" Above	.280	.280	None	No	
1423	US	20	-	-	-	-		Unfair hit.
1424	US	21						Missed can.
1426	US	22	7" Above	.30	.30	14"	No	Flash visible approx. 2' behind can.
1428	UK	23	-	-	-	-	-	Unfair hit.
1430	UK	24	5" Above	.280	.280	None	No	
			1/2" between plate and can W/Plate - Below Fuel Level					
1448	US	25	-	-	-	-		Missed can.
1450	US	26	-	-	-	-		Unfair hit, top of can.
1455	US	27	-	-	-	-		Unfair hit, top of can.
1500	US	28	3" Below	1/2"	3/4"	-	No	Flash visible on face of plate. Large flash smudge on face of can.
1510	UK	29	-	-	-	-		Missed can.
1511	UK	30	5" Below	.280	Lost	-	Yes	Flash visible on face of plate. Base of bullet jacket remained stuck in plate.



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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1516	US	31	4" Below	1/2"	3/4"	-	No	3" flash visible on face of plate. Flash smudge on rear of plate and on face of can. Pieces of bullet jacket stuck in plate.
1520	UK	32	4" Below	.280	.280	5"	No	Flash visible only on face of plate. Flash smudge on face of can. Base of bullet jacket stuck in plate.

Date: 14 March 1950

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1010	US	1-8						
1025	UK	9-10						
1035	US	11	1" Below	1/2"	3/4"	-	No	Two inch flash visible on front of plate, none in rear of can. Flash smudge around entrance hole in can.
1042	UK	12	-	-	-	-		Missed can.
1045	UK	13	-	-	-	-		Missed can.
1048	UK	14	-	-	-	-		Missed can.
1051	UK	15	-	-	-	-		Missed can.
1053	UK	16	Above Fuel	-	-	-		Unfair hit.
1059	UK	17	2" Below	.280	1/2"	-	No	4" flash visible on face of plate. Flash smudge on face of can. Base of bullet jacket stuck in plate.
1106	US	18	3" Below	.30	1/2"	-	Yes	Two inch flash on face of plate

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TIME	TYPE	RD. NO.	STRIKE (REF.TO. FULL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1114	UK	19	3" Below	.280	1/2"	-	Yes	Four inch flash on face of plate. Base of bullet jacket stuck in plate.
1120	US	20	4" Below	1/2"	3/4"	-	Yes	Small flash on face of plate. Piece of bullet jacket stuck in hole in plate.
1126	UK	21	4" Above	.280	1/2"	-	Yes	Four inch flash visible on face of plate. Base of bullet jacket remained stuck in plate.
			1/2" between plate and can W/Plate - Above Fuel Level					
1141	US	22	8" Above	1/2"	1/2"	-	No	Small flash on face of plate, none in rear of can. Flash smudge on face of can.
1144	UK	23	8" Above	.280	.280	-	No	Six inch flash on face of plate. Large flash smudge on face of can. Base of bullet jacket stuck in plate. No flash visible in rear of can.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1247	US	24	7" Above	.30	.30	-	No	Three inch flash on face of plate. Large smudge on face of can. Base of bullet jacket stuck in plate.
1255	UK	25	-	-	-	-		Unfair hit on top of can.
1258	UK	26	-	-	-	-		Missed can.
1300	UK	27	-	-	-	-		Unfair hit on top of can.
1302	UK	28	7" Above	.280	.280	-	No	Four inch flash on face of plate Large flash smudge on face of can.
1305	US	29	-	-	-	-		Unfair hit on top of can.
1307	US	30	3" Above	.30	1/2"	-	No	Two inch flash on face of plate. Large flash smudge on face of can.
1310	UK	31	-	-	-	-	-	Unfair hit, top of can.
1312	UK	32	1" Above	.280	.280	-	No	Four inch flash on face of plate. Large smudge on can. Base of bullet jacket stuck in plate.
1315	US	33	3" Above	1/2"	3/4"	-	Yes	Ignited at entrance hole, but burned only momentarily. Two inch flash on face of plate. Large flash smudge on face of can.

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Appendix 6 [redacted]

TIME	A[redacted]	[redacted] NO.	STRIKE [redacted] TO [redacted] LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1325	UK	34	-	-	-	-	-	Missed can.
1326	UK	35	4" Above	.280	.280		No	Three inch flash on face of plate. Large smudge on can. Base of bullet jacket stuck in plate.
1328	US	36	3" Above	1/2"	1/2"		Yes	Flash on face of plate. Large flash smudge on face of can.
1332	UK	37	1" Above	.280	1/2"	-	No	Five inch flash on face of plate. Large flash smudge on can.

4" between plate and can
W/Plate - Below Fuel Level

TIME		NO.	STRIKE	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1352	US	38	2" Below	1/2"	1"	-	No	(New plate) Three inch flash on face of plate. Large flash smudge on face of can.
1400	UK	39	6" Below	1/2"	1/2"	-	Yes	Three inch flash on face of plate.
1410	US	40	2" Below	1/2"	-	-	No	Two inch flash on face of plate. Large flash smudge on face of can. Two small exit holes in can.
1417	UK	41	7" Below	1/2"	3/4"	-	Yes	Four inch flash on face of plate.

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Appendix O

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TIME	AMMUNITION [redacted]	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1422	US	42	9" Below	1/2"	3/4"	-	Yes	Four inch flash on face of plate.
1430	UK	43	9" Below	1/2"	1/2"	-	Yes	Four inch flash on face of plate. Flash also visible between plate and can. Base of bullet jacket stuck in plate.
1437	US	44	6" Below	1/2"	-	-	Yes	Two inch flash on face of plate. Two exit holes in can, piece of bullet jacket stuck in plate.
1445	UK	45	5" Below	.200	.280	-	No	Four inch flash on both sides of plate. Flash smudge on can. Base of bullet jacket remained stuck in plate.
1452	US	46	5" Below	.30	1-1/4"	-	No	One inch flash on face of plate. Flash smudge on face of can. Flash also visible between plate and can.
1502	UK	47	7" Below	.280	1/2"	-	No	Three inch flash on face of plate. Large flash smudge on face of can. Base of bullet jacket stuck in plate. Flash also visible between plate and can.

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TIME	[redacted] RD.	(REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
		4" between plate and can W/Plate - Above Fuel Level					
1512	US	48	1" Above	1/2"	3/4"	No	One inch flash visible on face of plate; four inch flash between plate and can. Large flash smudge on face of can.
1516	UK	49	4" Above	.280	.280	No	Four inch flash on face of plate; four inch flash between plate and can. Large smudge on face of can.
1520	US	50	4" Above	.30	1/2"	No	Fumes at entrance hole in can appeared to burn for about 2 secs., but not sufficiently to be called ignition. Two inch flash on face of plate. Large flash smudge on face of can.
1525	UK	51	5" Above	.280	.280	No	Four inch flash on face of plate; three inch flash between plate and can. Large smudge on can.

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Appendix O

[redacted] Date: 15 March 1950

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
0955	US	1-4						Locators.
1002	UK	5-9						
1010	US	10	6" Above	1/2"	1/2"	-	No	Flash visible on both sides of plate. Large flash smudge on can.
1012	UK	11	4" Above	.280	1/2"	-	No	Four inch flash on face of plate; flash also visible between plate and can. Large flash smudge on can. Base of jacket stuck in plate.
1015	US	12	-	-	-	-		Missed can.
1017	US	13	6" Above	.30	1/2"	-	Yes	Two inch flash on face of plate, large flash between plate and can. (Can top was loosened before second rd.)
1020	UK	14	4" Above	.280	1/2"		No	Five inch flash on face of plate. Flash also visible between plate and can. Large smudge on can.
1023	US	15	-	-	-	-		Unfair hit on top of can.
1025	US	16	3" Above	.30	1/2"		No	Flash visible on face of plate and between plate and can.

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TIME	AMMUNITION	RD.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1029	UK	17	7" above	.280	1/2"	-	Yes	Flash visible on face of plate and between plate and can. Flash smudge around entrance hole in can.
			8" between plate and can W/Plate - Below Fuel Level					
1035	US	18	-	-	-	-		Missed can.
1036	US	19	4" Below	1/2"	-	-	No	Two small exit holes. Flash visible on face of plate and between plate and can. Flash smudge on face of can.
1044	UK	20	3" Below	.280	1/2"	-	Yes	Can ignited very slowly. Flash visible on both sides of plate.
1049	US	21	3" Below	1/2"	3/4"	-	No	Two inch flash on face of plate, large flash between plate and can. Large flash smudge on face of can.
1056	UK	22	-	-	-	-		Unfair hit on top of can.
1104	UK	23	7" below	1/2"	1/2"	-	Yes	Flash could not be observed because of ignition.

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TYPE	TYPE	NO.	STRIKE (F. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1108	US	24	4" Below	1/2"	1"	-	No	Two inch flash on face of plate. Large flash between plate and can. Flash smudge on can.
1115	UK	25	8" Below	.280	1/2"	-	No	Large flash on face of plate and between plate and can. Very slight flash smudge on can. Base of bullet jacket stuck in plate.
1121	US	26	3" Below	1/2"	3/4"	-	No	Two inch flash on face of plate. Large flash between plate and can. Large flash smudge on can.
1129	UK	27	8" Below	.280	1/2"		No	Four inch flash on face of plate. Good flash visible between plate and can. No flash smudge on face of can.
1136	US	28	-	-	-	-		Unfair hit on side of can.
1142	US	29	4" Below	1/2"	3/4"	-	No	Two inch flash on face of plate. Good flash between plate and can. Flash smudge on face of can.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1146	UK	30	5" Below	1/2"	1"		No	Four inch flash on face of plate. Good flash smudge on face of can.
			8" between plate and can W/Plate - Above Fuel Level					
1255	US	31	2" Above	-	3/4"		Yes	Ignition, but burned only about 5 secs. Flash visible on both sides of plate. Smudge on can.
1258	UK	32	-	-	-	-		Missed can.
1302	UK	33	-	-	-	-		Unfair hit, below fuel level.
1310	UK	34	1" Above	1/2"	3/4"		No	Flash on both sides of plate. Slight flash smudge on face of can.
1313	US	35	3" Above	1"	1/2"	-	No	Flash visible on both sides of plate. Large flash smudge on face of can.
1317	UK	36	-	-	-	-		Unfair hit, below fuel level.
1320	UK	37	5" Above	1/2"	3/4"	-	No	Small flash on face of plate, good flash between plate and can. Small flash smudge on can.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1325	US	38	3" Above	1/2"	-		No	Fumes appeared to ignite at entrance hole giving a flash of flame, which expired instantly. Not considered as ignition. Good flash and large smudge on can.
1330	UK	39	4" Above	.280	1/2"	-	No	Flash on both sides of plate. Small flash smudge on face of can.
1332	US	40	2" Above	.30	1/2"	-	No	Flash on both sides of plate. Very large flash smudge on face of can.
1335	UK	41	4" Above	.280	.280		No	Five inch flash on face of plate. Good flash between plate and can. Slight flash smudge on face of can.
1338	US	42	3" Above	-	-	-	Yes	Two 1/2" entrance and exit holes. Small flash on face of plate. Flash smudge on can.
1341	UK	43	3" Above	.280	1/2"	-	No	Four inch flash on face of plate. Small flash smudge on face of can.

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APPENDIX 2

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			12" between plate and can W/Plate - Below Fuel Level					
1350	US	44	7" Below	1/2"	1-1/4"		No	(New plate). Flash on both sides of plate. Slight flash smudge on face of can.
1355	UK	45	5" Below	1/2"	3/4"	-	Yes	Good ignition could not determine flash and smudge characteristics
1403	US	46	-	-	-	-		Missed can.
1404	US	47	9" Below	3/4"	1-1/4"	-	No	Flash on both sides of plate. Very slight flash smudge on face of can.
1411	UK	48	9" Below	1/2"	3/4"	-	Yes	Ignition occurred slowly. Good flash visible on both sides of plate. Base of jacket stuck in plate.
1417	US	49	9" Below	3/4"	1"	-	No	Good flash on both sides of plate. Small flash smudge on face of can.
1426	UK	50	5" Below	.280	1/2"	-	No	Four inch flash on face of plate, large flash between plate and can. Slight smudge on can. Base of jacket stuck in plate.

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APPENDIX C

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TIME	TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1505	US	51	8" Below	1".	1"		No	Two inch flash on face of plate. Good flash between can and plate. Small flash smudge on face of can.
1515	UK	52	8" Below	1/2"	3/4"		Yes	Good ignition. Could not determine flash and smudge characteristics
1517	US	53	8" Below	1"	3/4"		No	Three inch flash on face of plate. Flash between plate and can did not appear to reach can, although can did have slight flash smudge on face.
1525	UK	54	7" Below	3/4"	1"		No	Five inch flash on face of plate. Short flash between plate and can. No flash smudge around entrance hole in can.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			Date: 16 March 1950					
1027	US	1-5						
1035	UK	6-9						
1041	US	10	-	-	-	-		Unfair hit on top of can.
1043	US	11	6" Above	-	1"	-	No	Flash on both sides of plate. Small flash smudge on face of can. Two 1/2" entrance holes in can.
1045	UK	12	-	-	-	-		Double hit on plate.
1047	UK	13	7" Above	1/2"	3/4"		Yes	Flash on both sides of plate. Base of jacket stuck in plate.
1049	US	14	7" Above	3/4"	-	-	No	Flash on both sides of plate. Small flash smudge on face of can. Three small exit holes in can.
1052	UK	15	-	-	-	-		Missed can.
1053	UK	16	7" Above	1/2"	1"	-	No	Flash on both sides of plate. Very faint flas smudge on face of can.
1056	US	17	7" Above	1/2"	1-1/4"	-	No	Small flash on face of plate, good flash between plate and can. Good flash smudge on face of can.
1058	UK	18	6" Above	.280	1/2"	-	No	Two inch flash on face of plat Slight flash smudge on can. Base of jacket stuck in plate.

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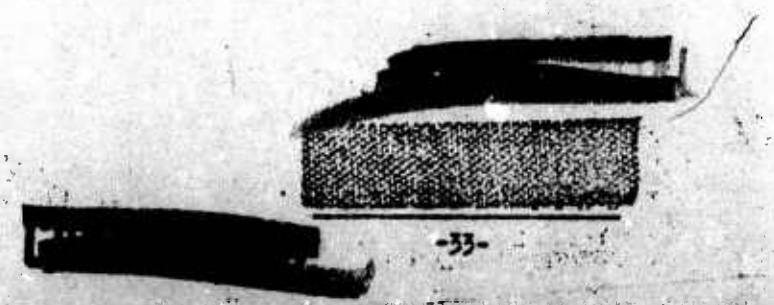
TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1101	US	19	6" Above	1/2"	1"		No	One inch flash on face of plate. Small flash smudge on face of can.
1103	UK	20	6" Above	1/2"	3/4"		No	Large flash on both sides of plate. Small flash smudge on can. Base of jacket stuck in plate.
1105	US	21	4" Above	1"	1"		No	One inch flash on face of plate. Large flash smudge on face of can.
1107	UK	22	-	-	-	-		Missed can.
1109	UK	23	5" Above	.280	.280		No	Flash visible on both sides of plate. Slight flash smudge on face of can. Base of jacket stuck in plate.
			500 Yards Range 1/2" between plate and can W/Plate - Below Fuel Level					
1322	US	24-32	(Good flash on all rds.)					Locators.
1335	UK	33-36	(Good flash on all rds.)					Locators.
1343	US	37	3" Below	.30	3/4"	None	No	(New plate) No visible flash on face of plate or on outside of can. Large section of jacket remained stuck in plate. No flash smudge on can.



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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1350	UK	38	-	-	-	-		Missed can.
1351	UK	39	5" Below	.280	.280	-	No	Four inch flash on face of can. Small flash smudge on face of can
1400	US	40	4" Below-	.30	3/4"	None	No	No visible flash. No smudge on plate or can, section of jacket stuck in plate.
1408	UK	41	10" Below	.280	.280	-	No	Six inch flash on face of plate. Small flash smudge on can.
1415	US	42	8" Below	.30	3/4"	None	No	No visible flash. No smudge on plate or can. Section of jacket stuck in plate.
1422	UK	43	7" Below	.280	.280	-	Yes	Three inch flash on face of plate.
1437	US	44	-	-	-	-		Unfair hit.
1443	US	45	5" Below	.30	1-1/4"	None	No	No visible flash. No flash smudge on can. Section of jacket stuck in plate.

A check disclosed that gunner had inadvertently fired wrong type of ammunition (US type) at cans for 500 yard range. One carton of AP, Lot FAX30-1357, had been put in box containing US, API ammunition, Lot FAX 30-1356. Carton containing wrong type of ammunition was not opened until after locating at 500 yards.

Following US rounds were fired to even up No. of cans for both types of ammunition:

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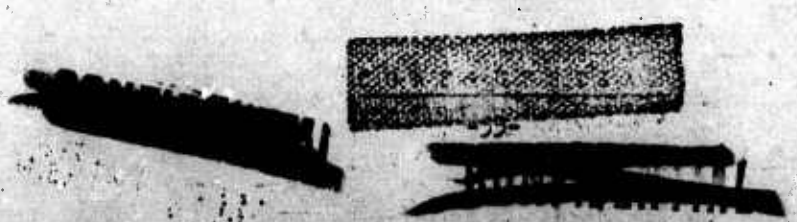
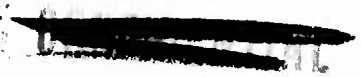
Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1500	US	45	-	-	-	-		Missed can.
1503	US	46	5" Below	1/2"	3/4"		No	5" flash on face of plate. Large smudge on can.
1510	US	47	2" Below	.30	1/2"	-	No	Four inch flash on front of plate. Slight flash smudge on face of can.
1516	US	48	9" Below	1/2"	3/4"		No	Three inch flash on face of plate. Small flash smudge on face of can.
	Above three cans fired to even up No. of cans fired with each type of ammunition.							
1521	US	49	5" Below	1/2"	1"	-	No	Five inch flash on face of plate. Large flash smudge on face of can.
1526	UK	50	-	-	-	-		Missed can.
1529	UK	51	5" Below	.280	1/2"		Yes	Four inch flash on face of plate.
1532	US	52	-	-	-	-		Missed can.
1533	US	53	-	-	-	-		Missed can.
1534	US	54	-	-	-	-		Missed can.
1536	US	55	9" Below	.30	3/4"	-	No	Five inch flash on face of plate. Large flash smudge on can.
1541	UK	56	9" Below	.280	.280	-	Yes	Four inch flash on face of plate







TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
Note:	Jacket of UK round appears to be breaking up on face of plate, only core seems to go through. Entire bullet appears to go through plate on US round. Flash smudge on face of plate is large with UK round, but is very faint with US round.							
	Date: 17 March 1950							
			1/2" between plate and can W/Plate - Above Fuel Level					
0945	US	1-3						Locators.
0950	UK	4-13						
1002	US	14	-	-	-	-		Missed can.
1003	US	15	-	-	-	-		Missed can.
1004	US	16	8" Above	.30	.30		No	Three inch flash on face of plate. Small smudge on can.
1006	UK	17	-	-	-	-	-	Missed can.
1007	UK	18	9" Above	.280	.280	-	No	Five inch flash on face of plate. Small smudge on can.
1009	US	19	7" Above	.30	.30		NO	Three inch flash on face of plate. Large flash smudge on can.
1012	UK	20	-	-	-	-	-	Missed can.
1013	UK	21	4" above	.280	.280		No	Four inch flash on face of plate. Large flash smudge on can.
	US	22	5" Above	.30	1/2"		No	Three inch flash on face of plate. Large flash smudge on can.
1017	UK	23	-	-	-	-	-	Unfair hit.
1020	UK	24	-	-	-	-	-	Missed can.
1022	UK	25	-	-	-	-	-	Unfair hit, below fuel



TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1027	UK	26	4" Above	.280	.280	-	No	Four inch flash on face of plate. Small flash smudge on can.
1030	US	27	-	-	-	-	-	Missed can.
1031	US	28	-	-	-	-	-	Missed can.
1032	US	29	-	-	-	-	-	Missed can.
1033	US	30	-	-	-	-	-	Missed can.
1034	US	31	5" Above	.30	3/4"	-	No	Three inch flash on face of plate. Large smudge on can.
1036	UK	32	2" Above	.280	.280	-	No	Five inch flash on face of plate. Small smudge on can.
1038	US	33	7" Above	.30	1"		No	One inch flash on face of plate. Large smudge on can.
1040	UK	34	-	-	-	-	-	Missed can.
1041	UK	35	9" Above	.280	.280		No	Five inch flash on face of plate. Small smudge on can.
			4" between plate and can W/Plate - Below Fuel Level					
1047	US	36	8" Below	1/2"	3/4"	-	Yes	(New plate) Five inch flash on face of plate Base and piece of jacket crushed into hole in plate.
1052	UK	37	-	-	-	-	-	Unfair hit on top of can.
1057	UK	38	-			-	-	Missed can.

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1058	UK	39	7" Below	.280	1/2"		Yes	Three inch flash on face of plate. Base of jacket stuck in plate.
1103	US	40	3" Below	1/2"	3/4"	-	No	Four inch flash on face of plate. Large smudge on can. No pieces of jacket in plate
1114	UK	41	-	-	-	-	-	Missed can.
1115	UK	42	5" Below	.280	1/2"	-	No	Five inch flash on face of plate. Small smudge on can, jacket apparently shattered on face of plate.
1119	US	43	-	-	-	-	-	Missed can.
1120	US	44	4" Below	.30	3/4"	-	No	Four inch flash on face of plate. Large smudge on can. No pieces of jacket in plate
1125	UK	45	7" Below	.280	.280	-	Yes	Five inch flash on front of plate. Jacket apparently shattered on face of plate.
1130	US	46	5" Below	.30	3/4"		No	Two inch flash on face of plate. Large smudge on can. No pieces of jacket in plate.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRNACE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1135	UK	47	-	-	-	-	-	Missed can.
1136	UK	48	-	-	-	-	-	Missed can.
1137	UK	49	-	-	-	-	-	Missed can.
1138	UK	50	-	-	-	-	-	Missed can.
1139	UK	51	10" Below	.280	1"	-	No	Four inch flash on face of plate. Slight flash smudge on can jacket apparently shattered on plate.
1250	US	52	-	-	-	-	-	Missed can.
1251	US	53	8" Below	.30	3/4"		Yes	Four inch flash on face of plate. No pieces of jacket stuck in plate.
1256	UK	54	-	-	-	-	-	Missed can.
1258	UK	55	10" Below	.280	1/2"	-	Yes	Five inch flash on face of plate, jacket apparently shattered on face of plate.
			4" between plate and can W/Plate - Above Fuel Level					
1305	US	56	-	-	-	-	-	Missed can.
1307	US	57	-	-	-	-	-	Missed can.
1308	US	58	-	-	-	-	-	Missed can.
1309	US	59	3" above	.30	1/2	-	No	Two inch flash on face of plate. Large flash smudge on can. No jacket in plate.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1311	UK	60	-	-	-	-	-	Missed can.
1312	UK	61	-	-	-	-	-	Missed can.
1314	UK	62	5" Above	.280	.280	-	No	Three inch flash on face of plate, small smudge on can. Jacket apparently shattered on face of plate.
1316	US	63	-	-	-	-	-	Missed can.
1317	US	64	4" Above	.30	1/2"		No	Three inch flash on face of plate. Large flash smudge on can. No jacket pieces in plate.
1320	UK	65	3" Above	.280	1/2"	-	No	Five inch flash on face of plate. Small flash smudge on can. Jacket apparently shattered on face of plate.
1323	US	66	3" Above	.30	3/4"	-	Yes	Can ignited at entrance hole, fire burned for about 5 secs. and expired. Three-inch flash on face of plate. Large smudge on face of can.
1328	UK	67	-	-	-	-	-	Missed can.
1330	UK	68	4" Above	.280	1/2"	-	No	Four inch flash on face of plate. Large smudge on can.

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Appendix O

TYPE	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1332	US	69	-	-	-	-	-	Missed can.
1334	US	70	4" Above	1/2"	-	-	No	Two 1/2" exit holes. Three inch flash on face of plate. Large smudge on can. No jacket pieces in plate.
1336	UK	71	-	-	-	-	-	Unfair hit, below fuel.
1342	UK	72	-	-	-	-	-	
1344	UK	73	2" Above	.280	1/2"	-	No	Four inch flash on face of plate. Small smudge on can. No pieces of jacket stuck in plate.
1345	US	74	-	-	-	-	-	Missed can.
1347	US	75	2" Above	.30	1/2"	-	No	Three inch flash on face of plate. Large flash smudge on can. Base of bullet jacket stuck in hole in plate.
1352	UK	76	-	-	-	-		Unfair hit, below fuel.
1357	UK	77	-	-	-	-	-	Missed can.
1358	UK	78	-	-	-	-	-	Missed can.
1400	UK	79	4" Above	.280	1/2"	-	No	Four inch flash on face of plate. Small smudge on face of can. No pieces of jacket stuck in plate.

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Appendix "O"

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			8" between plate and can W/Plate - Below Fuel Level					
1408	US	80	9" Below	1/2"	1"	-	Yes	Ignition prevented observation of flash and smudge characteristics
1412	UK	81	8" Below	.280	3/4"	-	Yes	Four inch flash on face of plate. Ignition appeared to occur after flash.
1418	US	82	2" Below	1/2"	1"		No	Three inch flash on face of plate. Large flash smudge on can.
1425	UK	83	-	-	-	-	-	Unfair hit on bottom of can.
1430	UK	84	10" Below	.280	1/2"	-	Yes	Four inch flash on face of plate.
1435	US	85	3" Below	1/2"	1"	-	No	Three inch flash on face of plate. Large smudge on can.
1441	UK	86	-	-	-	-	-	Missed can.
1442	UK	87	8" Below	.280	3/4"	-	Yes	Five inch flash on face of plate.
1448	US	88	-	-	-	-	-	Unfair hit on top of can.
1452	US	89	6" Below	1/2"	3/4"		No	Two inch flash on face of plate. Large flash smudge on can.
1500	UK	90	[redacted]			-	-	Missed can.
1502	UK	91	-	-	-	-	-	Missed can.
[redacted]			-	-	-	-	-	Missed can.

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TILE	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1504	UK	93	8" Below	.280	1"		Yes	Four inch flash on face of plate.
1507	US	94	-	-	-	-	-	Missed can.
1508	US	95	-	-	-	-	-	Missed can.
1509	US	96	9" Below	1/2"	1"		No	One inch flash on face of plate. Large smudge on can. Base of bullet jacket stuck in plate.
1515	UK	97	3" Below	.280	.280		Yes	Five inch flash on face of plate.
		Date:	20 March 1950					
			8" between plate and can W/Plate - Above Fuel Level					
0945	US	1-9	-	-	-	-	-	Locators
0950	UK	10-13	-	-	-	-	-	Locators
1015	US	14	8" Above	1/2"	1/2"		No	Three inch flash on face of plate. Small flash smudge on face of can. Base of jacket stuck in plate.
1021	UK	15	-	-	-	-	-	Missed can.
1022	UK	16	4" Above	.280	1/2"	-	No	Four inch flash on face of plate. Very faint-flash smudge on can.
1026	US	17	7" Above	1/2"	1"	-	No	Two inch flash on face of plate Large smudge on can. No pieces of jacket in plate.

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TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1030	UK	18	3" Above	.280	1/2"		No	Four inch flash on face of plate. Small smudge on can.
1034	US	19	-	-	-	-	-	Missed can.
1036	US	20	8" Above	1/2"	1"	-	No	Four inch flash on face of plate. Large smudge on can. Base of jacket stuck in plate.
1038	UK	21	-	-	-	-	-	Missed can.
1040	UK	22	-	-	-	-	-	Missed can.
1041	UK	23	-	-	-	-	-	Missed can.
1042	UK	24	-	-	-	-	-	Missed can.
1043	UK	25	1" Above	.280	.280	-	No	Four inch flash on face of plate. Very faint smudge on face of can.
1045	US	26	-	-	-	-	-	Missed can.
1046	US	27	-	-	-	-	-	Missed can.
1047	US	28	5" Above	.30	1"	-	No	Two inch flash on face of plate. Large smudge on can.
1049	UK	29	-	-	-	-	-	Missed can.
1050	UK	30	7" Above	.280	.280	-	No	Four inch flash on face of plate. Very faint smudge on can.
1053	US	31	9" Above	1/2"	-	-	No	Two small exit holes. Two inch flash on face of plate. Small smudge on can.
1056	UK	32	-	-	-	-	-	Missed can.
1058	UK	33	2" Above	.280	1/2"	[redacted]	No	Three inch flash on face of plate. Faint smudge on can.

[redacted]

APPENDIX O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			12" between plate and can W/Plate - Below Fuel Level					
1105	US	34	-	-	-	-	-	Missed can.
1108	US	35	-	-	-	-	-	Unfair hit on top of can.
1113	US	36	-	-	-	-	-	Unfair hit on top of can.
1116	US	37	5" Below	1/2"	-	-	No	Core dented rear side of can but remained in can. Two inch flash on face of plate. Small smudge on can.
1125	UK	38	-	-	-	-	-	Missed can.
1126	UK	39	-	-	-	-	-	Missed can.
1127	UK	40	-	-	-	-	-	Missed can.
1132	UK	41	-	-	-	-	-	Missed can.
1134	UK	42	4" Below	.280	.280	-	Yes	Two inch flash on face of plate.
1138	US	43	10" Below	1/2"	1/2"	-	Yes	Three inch flash on face of plate. Base of jacket stuck in plate.
1143	UK	44	8" Below	1/2"	1/2"	-	Yes	Four inch flash on face of plate.
1307	US	45	8" Below	3/4"	-	-	No	Core dented rear of can, but did not come through. Two inch flash on face of plate. Slight flash smudge on can.
1314	UK	46	-	[redacted]		-	-	Unfair hit.
1317	UK	47	-			-	-	Missed can.
1319	UK	48				-	-	Missed can.

[redacted]

Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1320	UK	49	4" Below	1/2"	1"	-	No	Three inch flash on face of plate. No flash smudge on face of can.
1328	US	50	3" Below	1/2"	-	-	No	One inch flash on face of plate. Very faint flash smudge. Core dented rear of can, but did not penetrate.
1336	UK	51	5" Below	.280"	1/2"	-	Yes	Three inch flash on face of plate.
1343	US	52	4" Below	3/4"	3/4"		No	Two inch flash on plate. Slight flash smudge on can.
1350	UK	53	5" Below	.280	.280	-	Yes	Five inch flash on face of plate.
			12" between plate and can W/Plate - Above Fuel Level					
1355	US	54	-	-	-	-	-	Unfair hit, below fuel.
1408	US	55	2" Above	1/2"	3/4"	-	No	Three inch flash on face of plate. Slight smudge on can.
1411	UK	56	3" Above	1/2"	1/2"	-	No	Four inch flash on face of plate. Faint flash smudge on can.
1413	US	57	-	-	-	-	-	Missed can.
1414	US	58	-	-	-	-	-	Missed can.
1415	US	59	4" Above	1/2"	-		No	Two 1/2" exit holes. Two inch flash on face of plate. Small smudge on can.

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[redacted] [redacted]

Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1416	UK	60	5" Above	.280	1/2"	-	No	Five inch flash on face of plate. Faint smudge on can.
1418	US	61	-	-	-	-	-	Unfair hit on side of can.
1420	US	62	-	-	-	-	-	Missed can.
1421	US	63	5" Above	1/2"	-	-	No	Three inch flash on plate, very faint smudge on can. Two 1/2" exit holes
1424	UK	64	-	-	-	-	-	Unfair, hit, below fuel level.
1427	UK	65	-	-	-	-	-	Missed can.
1430	UK	66	-	-	-	-	-	Missed can.
1431	UK	67	-	-	-	-	-	Missed can.
1432	UK	68	-	-	-	-	-	Missed can.
1433	UK	69	6" above	1/2	1"	-	No	Five inch flash on face of plate. Very faint smudge on can.
1436	US	70	3" Above	1/2"	3/4"	-	No	Two inch flash on plate. Slight smudge on can.
1439	UK	71	-	-	-	-	-	Missed can.
1440	UK	72	-	-	-	-	-	Missed can.
1441	UK	73	10" Above	.280	.280	-	No	Three inch flash on plate. No flash smudge on can.
1445	US	74	-	-	-	-	-	Missed can.
1446	US	75	1/2" Above	1/2"	3/4"	-	No	Three inch flash on plate. Faint smudge on can.
1450	UK	76	4" Above	.280	.280	-	No	Five inch flash on face of plate. No smudge on can.

[redacted] [redacted]

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	(REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
			W/O Plate - Above Fuel Level					
1510	US	77	3" Above	.30	1/2"	-	No	Six inch flash in rear of can. Small flash smudge around exit hole in rear of can.
1514	UK	78	-	-	-	-	-	Missed can.
1515	UK	79	-	-	-	-	-	Missed can.
1516	UK	80	-	-	-	-	-	Missed can.
1517	UK	81	-	-	-	-	-	Missed can.
1518	UK	82	-	-	-	-	-	Missed can.
1519	UK	83	-	-	-	-	-	W/plate.
1520	UK	84	-	-	-	-		Fired for locating.
1521	UK	85	-	-	-	-	-	W/Plate Fired for locating.
1522	UK	86	-	-	-	-	-	W/Plate Fired for locating.
1525	UK	87	9" Above	.280	.280	-	No	Two inch flash visible at rear of can.
			Date: 21 March 1950					
1255	US	1-4	-	-	-	-	-	Locators.
1300	UK	3-14	-	-	-	-	-	Locators.
1306	US	15	3" Above	.30	.30	None	No	
1310	UK	16	-	-	-	-	-	Missed can.
1311	UK	17	-	-	-	-	-	" "
1312	UK	18	4" Above	.280	.280	-	Yes	Small flash visible at rear of can. Can ignited at exit hole.
1315	US	19	8" Above	.30	1/2"	-	No	Four inch flash at rear of can. Small flash smudge around exit hole in can.

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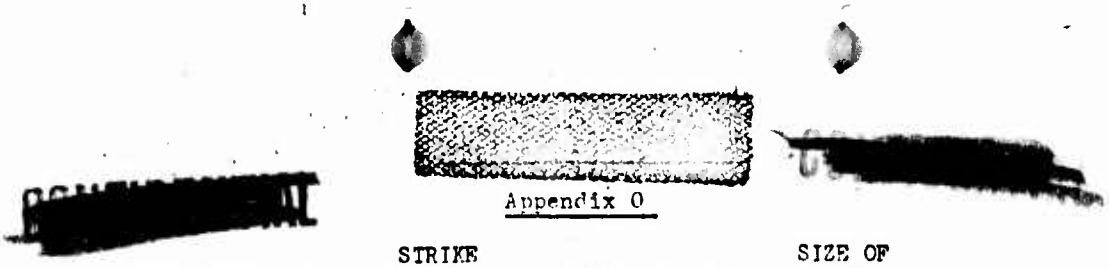
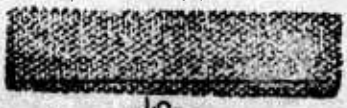


Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF. TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1317	UK	20	-	-	-	-	-	Missed can.
1319	UK	21	1/2" Above	.280	.280	-	No	
1321	US	22	-	-	-	-	-	Missed can.
1322	US	23	7" Above	.30	.30	-	Yes	Three inch flash at rear of can. Can ignited at exit hole.
1327	UK	24	-	-	-	-	-	Missed can.
1330	UK	25	-	-	-	-	-	Missed can.
1334	UK	26	-	-	-	-	-	Missed
1335	UK	27	-	-	-	-	-	Unfair hit.
1337	UK	28	-	-	-	-	-	Missed can.
1340	UK	29	6" Above	.280	.280	None	No	
1342	US	30	9" Above	.30	.30	-	No	Long streak of flash from rear of can.
1345	UK	31	-	-	-	-		Missed can.
1346	UK	32	9" Above	.280	.280	-	Yes	Can ignited at exit hole, but burned only about 5 secs. Two inch flash visible at exit hole.

W/O Plate - Below Fuel Level

1350	US	33	-	-	-	-	-	Unfair hit.
1355	US	34	6" Below	.30	1/2"	-	Yes	Three inch flash at rear of can. Can ignited at exit hole.
1400	UK	35	-	-	-	-	-	Missed can.
1402	UK	36	5" Below	.280	.280	None	No	No visible indication of functioning.



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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUSE LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1406	US	37	-	-	-	-	-	Missed can.
1407	US	38	-	-	-	-	-	Missed can.
1408	US	39	-	-	-	-	-	Missed can.
1409	US	40	-	-	-	-	-	Unfair hit.
1414	US	41	-	-	-	-	-	Missed can.
1415	US	42	-	-	-	-	-	Missed can.
1416	US	43	5" Above	.30	.30	-	No	Small streak of flash 3 feet in rear of can.
1420	UK	44	-	-	-	-	-	Missed can.
1421	UK	45	-	-	-	-	-	Missed can.
1425	UK	46	-	-	-	-	-	Missed can.
1426	UK	47	-	-	-	-	-	Missed can.
1427	UK	48	-	-	-	-	-	Missed can.
1428	UK	49	-	-	-	-	-	Missed can.
1430	UK	50	-	-	-	-	-	Missed can.
1431	UK	51	-	-	-	-	-	Missed can.
1433	UK	52	-	-	-	-	-	Missed can.
1436	UK	53	-	-	-	-	-	Missed can.
1439	UK	54	-	-	-	-	-	Missed can.
1440	UK	55	-	-	-	-	-	Missed can.
1441	UK	56	10" below	.30	1/2"	-	No	Four inch flash visible at rear of can. Faint smudge around exit hole in can.
1446	US	57	5" Below	.30	1/2"	None	No	No visible indication of functioning.
1450	UK	58	-	-	-	-	-	Missed can.
1451	UK	59	-	-	-	-	-	Missed can.
1452	UK	60	-	-	-	-	-	Missed can.
1453	UK	61	-	-	-	-	-	Unfair hit.
1458	UK	62	-	-	-	-	-	Missed can.
1500	UK	63	-	-	-	-	-	Missed can.
1501	UK	64	-	-	-	-	-	Missed can.
1503	UK	65	-	-	-	-	-	Unfair hit.
1512	UK	66	-	-	-	-	-	Missed can.
1513	UK	67	-	-	-	-	-	Missed can.
1514	UK	68	5" Below	.280	.30	None	No	
1520	US	69	-	-	-	-	-	Missed can.

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Appendix O

TIME	AMMUNITION TYPE	RD. NO.	STRIKE (REF.TO FUEL LEVEL)	ENTRANCE HOLE	EXIT HOLE	SIZE OF FLASH INCHES	IGNITION	REMARKS
1521	US	70	5" Below	.30	1/2"	-	No	Four inch flash 3 feet in rear of can.
1527	UK	71	-	-	-	-	-	Missed can.
1528	UK	72	9" Below	.30	1/2"	None	No	
1532	US	73	4" Below	.30	1/2"	-	No	Six inch flash one foot in rear of can.
1537	UK	74	-	-	-	-	-	Unfair hit.
1540	UK	75	-	-	-	-	-	Missed can.
1542	UK	76	5" Below	.280	1/2"	-	No	Five inch flash at rear of can. Small flash smudge around exit hole in can.