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RDT&E Project No. Not Available
USATECOM Project No. 8-7-0220-01

TEST PLAN ON

PRODUCT IMPROVEMENT TEST OF

SUBMACHINE GUN, 5.56-MM, XM177E2

BY

ALLAN WILSON

JULY 1967

ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND

DEPARTMENT OF THE ARMY
ABERDEEN PROVING GROUND Mr. Wilson/ps/578-1500/3242
ABERDEEN PROVING GROUND, MARYLAND 21005

17 AUG 1967

STEAP-DS-TI

SUBJECT: Approved Plan for Product Improvement Test of Submachine Gun, 5.56-mm, XM177E2, RDT&E Project No. Not Available, USATECOM Project No. 8-7-0220-01

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FOR THE COMMANDER:

J. A. TOLEN
Deputy Director for
Engineering Testing
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1 Incl
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DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

15 AUG 1967

AMSTE-BC

SUBJECT: Approval of Test Plans for Product Improvement Test of Submachine Gun, Caliber 5.56mm, XM177E2, USATECOM Project No. 8-7-0220-01, 02

TO: Commanding General, USA Materiel Command, ATTN: AMCPM-RS, Rock Island, Illinois 61201
Commanding General, USA Combat Developments Command, ATTN: CDC LO, USATECOM, Aberdeen Proving Ground, Md. 21005
Commanding General, US Continental Army Command, ATTN: ATIT-RD-MD, Fort Monroe, Va. 23351

1. Subject test plans are approved.

2. Your comment and/or concurrence is requested.

FOR THE COMMANDER:

Robert B Tully

ROBERT B. TULLY
LTC GS
Dir, Inf Mat Test

2 Incl
1. APG Plan of Test, subj as above
2. USAIB Plan of Test, subj as above
(AMCPM-RS, 3 cys ea; CDC LO, 10 cys ea; ATIT-RD-MD, 4 cys incl 2 only)

Copies furnished:
CG USAMC ATTN: AMCRD-WI (2 cys); AMCAD-S (1 cy); AMCPP (1 cy); AMCQUA (1 cy); AMCMA-R (1 cy); AMCSU (1 cy); AMCMI (1 cy)
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USMC LO (1 cy)
CO APG ATTN: STEAP-DS (w/o incl)
Pres USAIB (w/o incl)

RDT&E PROJECT NO. NOT AVAILABLE

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OF

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ALLAN WILSON

JULY 1967

ABERDEEN PROVING GROUND

ABERDEEN PROVING GROUND, MARYLAND
21005

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SECTION 1. INTRODUCTION

1.1 BACKGROUND

During 1965 and 1966 ten 5.56-mm submachine guns, along with a number of other small arms weapons systems, were subjected to an extensive engineering test (Ref 1 and 2). The submachine guns were identified variously as the CAR-15 or C-SMG at the time of the test. Following the engineering test a modified flash suppressor and a new buffer design were submitted for an engineer-design test (Ref 7) and the weapon was designated as the XM177E1. A number of other product-improved components were then subsequently incorporated and the designation of the weapon was changed to XM177E2. In March 1967 USATECOM concurred in a recommendation from USAMC to type classify the CAR-15 for temperate zone use but withheld comment on the suitability of the XM177E2 until a test of the product improvements, the subject of this test plan, is conducted.

Of related interest in the development of the XM177E2 submachine gun is the recent introduction of a new extruded-grain cartridge propellant identified as IMR-8208M to be used in the loading of 200 million M193 and 105 million M196 cartridges. The M193 and M196 cartridges are the standard ball and tracer cartridges, respectively, for the XM177E2 as well as the M16A1 rifle. In addition, substantial quantities of M196 cartridges are now being loaded with ball propellant, a projectile and propellant combination not previously evaluated in either CAR-15 or XM177E2 weapons. By USATECOM direction, the new projectile-propellant combinations of M193 and M196 cartridges are to be tested simultaneously with the testing of the product-improved version of the submachine gun.

1.2 DESCRIPTION OF MATERIEL

A description of the XM177E2 submachine gun is contained in par 2 of Appendix I.

1.3 TEST OBJECTIVES

a. To evaluate the physical and technical characteristics of the XM177E2.

b. To evaluate weapon performance when using both extruded-grain and ball-propellant-loaded cartridges with both ball and tracer projectiles.

c. To evaluate test results regarding suitability of the XM177E2 product improvements for application to the M16A1 rifle.

SECTION 2. DETAILS OF TEST

2.1 INTRODUCTION

2.1.1 Criteria

The majority of the criteria in this test plan are based on performance levels obtained during the engineering test of the CAR-15 (designated as C-SMG during the engineering test). The engineering test data are reported in Ref 1 and 2 and the source of the criteria are identified by paragraph designations from the pertinent report.

2.1.2 Ammunition

Four projectile-propellant combinations of 5.56-mm cartridges are to be fired in approximately equal numbers throughout this test (some exceptions are noted in certain subtests). The cartridge types are as follows:

a. M193 cartridges, ball projectile and ball propellant.

b. M193 cartridges, ball projectile and IMR8208M propellant.

c. M196 cartridges, tracer projectile and ball propellant.

d. M196 cartridges, tracer projectile and IMR8208M propellant.

2.1.3 Maintenance

The weapons will be disassembled, cleaned, inspected and lubricated with MIL-L-46000A (Ref 8), except for the low temperature test where MIL-L-14107A is to be used. The above maintenance will be performed before the initiation of each subtest and after approximately each 600 rounds of firing, except for the continuous firings without maintenance in the high and low temperature tests.

2.1.4 Control Weapons

Where test methodology has been substantially changed since conduct of the engineering test, XM177E1 control weapons are also fired and the performance of the control weapons will establish the minimum acceptable criteria for the test weapons.

2.1.5 Test Limitations

Should weapon-system deficiencies occur, the five product-improved XM177E2 test weapons may not be a sufficiently large sample to insure a completely definitive analysis in all instances. Additional firings beyond those specified in this test plan may be required to resolve the variables that may occur by simultaneously testing four

2.2 INSPECTION

2.2.1 Objective

To determine that the test items have been received in proper condition for test and to measure the physical characteristics of the test items.

2.2.2 Criteria

a. The weight of the test weapon, with sling and loaded 20-round magazine but no other ancillary equipment, shall not exceed the weight of the engineering test model (7.3 lbs) (Ref 1, par 2.1.3).

b. The length of the test weapon with the telescoping buttstock closed, shall not exceed the length of the engineering test model (27.3 inches) by more than two inches (Ref 1, par 2.1.3).

c. The chamber dimensions of plated barrel chambers shall be within the specifications of unplated chambers.

2.2.3 Method

Photographs are obtained of the assembled weapon, right and left side, and of the disassembled weapon in a field-stripped condition. Photographs are also obtained to illustrate, where possible, a comparison between the product-improved components and the similar engineering test model components.

Weights and measurements are recorded to include internal bore dimensions, rate of twist, chamber dimensions and other pertinent information.

2.2.4 Data Required

Photographs and tabular data of the physical measurements.

2.3 VELOCITY TEST

2.3.1 Objective

To determine the velocity of projectiles of various lots of M193 and M196 cartridges when fired from the test weapon.

2.3.2 Criteria

When fired in the test weapons and at a distance of 15 feet from the muzzle with cartridges temperature conditioned at +70°F:

a. The average velocity of M193 projectiles shall be at least 2500 feet per second with a standard deviation no greater than 40 feet per second (Ref 2, par 2.9.3).

b. The average velocity of M196 projectiles shall be at least 2650 feet per second with a standard deviation no greater than 40 feet per second (Ref 2, par 2.9.3).

2.3.3 Method

Sixty rounds of each of the four types of test ammunition are fired in each of three test weapons. The cartridges are temperature conditioned before firing at -65, +70 and +155°F, 20 rounds at each temperature. Dual sets of velocity screens are employed to measure time of flight at 78 feet from the weapon muzzle. A retardation factor of 1.4 fps per foot of travel is used to compute velocities at 15 feet from the muzzle.

2.3.4 Data Required

Average and standard deviation for each firing will be computed. Copies of the ballistic acceptance data sheets will be included in the Appendix of the report.

2.4 MANN BARREL TEST

2.4.1 Objective

To determine the dispersion, chamber pressure, port pressure and velocity levels of the test cartridges when fired in a Mann barrel.

2.4.2 Criteria

When fired in a 20-inch Mann barrel and with cartridges temperature conditioned at +70°F:

a. The average of the mean radii of 10-shot targets shall not exceed 1.00 inch for M193 cartridges and 2.50 inches for M196 cartridges at 100 yards (Ref 3, par 3.7; Ref 4, par 3.8).

b. The corrected average velocities of M193 projectiles at a distance of 15 feet from the muzzle shall be 3250 ± 40 fps with a standard deviation no greater than 40 fps (Ref 3, par 3.9).

c. The corrected average velocities of M196 projectiles at a distance of 15 feet from the muzzle shall be 3200 ± 40 fps with a standard deviation no greater than 40 fps (Ref 4, par 3.11).

d. The average chamber pressure of M193 or M196 cartridges shall not exceed 52000 psi and the average chamber pressure plus three standard deviations shall not exceed 58000 psi (Ref 3, par 3.10; Ref 4, par 3.12).

e. The average port pressure of M193 and M196 cartridges shall be 15000 ± 2000 psi (Ref 3, par 3.11; Ref 4, par 3.13).

2.4.3 Method

Fifty rounds of each of the four types of test ammunition are fired in a Mann barrel with the cartridges temperature conditioned at +70°F for velocity measurements in the same manner as described in par 2.2.3. In addition, dispersion targets are obtained at 100 yards simultaneously with the velocity firings. Twenty rounds are then fired for chamber pressure and 20 rounds for port pressure measurements. Chamber pressure tests are then repeated with 20 rounds temperature conditioned at -65°F and with 20 rounds temperature conditioned at +155°F. Twenty rounds each of a reference lot of M193 cartridges, temperature conditioned at +70°F, are also fired for velocity, dispersion, chamber and port pressure measurements during each day of firing.

2.4.4 Data Required

The average and standard deviation for each velocity and pressure firing will be computed. The corrected velocities will also be computed by the method indicated in Ref 3, Appendix K, par 2.2. The x and y coordinates of the targets will be recorded and standard target measurements computed.

2.5 TIME-OF-FLIGHT TESTS

2.5.1 Objective

To determine the time-of-flight characteristics of the test projectiles.

2.5.2 Criteria

When fired from a test weapon:

a. The average velocity of M193 projectiles at 500 meters range shall be at least 950 fps with a maximum ordinate not to exceed 5.1 feet (Ref 2, par 2.9.3).

b. The average velocity of M196 projectiles at 500 meters range shall be at least 1100 fps with a maximum ordinate not to exceed 3.7 feet (Ref 2, par 2.9.3).

2.5.3 Method

A minimum of ten record rounds of each type of test ammunition are fired in a test weapon while employing the Hawk velocimeter to measure time-of-flight.

2.5.4 Data Required

Initial launch velocities will be those determined in par 2.3. Time-of-flight data will include bore elevation, time-of-flight, maximum ordinate and terminal velocity as functions of range in increments of 100 meters of range.

2.6 FLASH TEST

2.6.1 Objective

To evaluate the muzzle flash of the test weapon.

2.6.2 Criteria

a. Essential: When firing the test lots of ammunition, and by comparing photographic results, the muzzle flash shall not exceed the results reported in par 2.4 of Ref 7.

b. Desirable: The muzzle flash characteristics shall be comparable to the muzzle flash of the XM16E1 rifle reported in Appendix IV of Ref 1.

2.6.3 Method

The method of test is described in Ref 1, par 2.15.2, except that a different weapon with a barrel in "new" condition (fired more than 30 rounds and less than 250 rounds) is employed for each type of ammunition. Used 30-round magazines from the engineering test model are employed.

2.6.4 Data Required

Photographic results will be presented and compared to the referenced test results.

2.7 SMOKE TEST

2.7.1 Objective

To evaluate the signature and target obscuration effects of smoke caused by firing.

2.7.2 Criteria

When firing the test lots of ammunition, and by comparing photographic results, the signature and target obscuration results of smoke shall be judged to be at least comparable to the results obtained with the control weapon.

2.7.3 Method

The method of test is described in Ref 2, par 2.6.2, except that only 20 rounds are to be fired in each trial. The test is conducted with one control and one test weapon firing each of the four types of ammunition.

2.7.4 Data Required

Photographic results will be presented and compared to the engineering test results.

2.8 SOUND PRESSURE LEVEL

2.8.1 Objective

To evaluate the sound pressure level of the test weapon.

2.8.2 Criteria

The sound level measurements shall not exceed the criteria established in Interim Pamphlet 70-74, TECP 700-700, dated 19 August 1965.

2.8.3 Method

The method of test is described in Interim Pamphlet 70-74, TECP 700-700, dated 19 August 1965. The test is conducted with each type of ammunition, first with a "new" barrel (fired more than 30 rounds but less than 250 rounds) and repeated with an "old" barrel (fired more than 5000 rounds but still serviceable).

2.8.4 Data Required

Peak sound pressure levels as well as time durations are to be recorded. An attempt will be made to x-ray the muzzle device periodically during other firings, between "new" and "old" condition, to measure fouling accumulation.

2.9 KINEMATICS

2.9.1 Objective

To obtain basic kinematic data for the test weapon as an aid in evaluating the significance of product-improved components and to compare the performance of the weapon when firing various ammunition lots and types.

2.9.2 Criteria

For information purposes only.

2.9.3 Method

The basic method of test is described in Ref 5. However, the test procedure is investigatory in nature and may be directed by the project engineer to evaluate specific problem areas encountered in other subtests. As a minimum, time-displacement curves are obtained to illustrate the firing sequence with each of the four types of test ammunition. A control weapon will be fitted at APG with the product-improved buffer and barrel, and modified to permit kinematic studies.

2.9.4 Data Required

Pertinent time-displacement curves will be reproduced and included in the final report.

2.10 ACCURACY AND DISPERSION

2.10.1 Objective

To determine the accuracy and dispersion characteristics of the test weapons when fired from a benchrest.

2.10.2 Criteria

The average standard deviation for 10-shot targets fired semi-automatically at 100 meters range for each of the test weapons shall not exceed, either horizontally or vertically, 3.4 inches for M193 cartridges and 10.7 inches for M196 cartridges (Ref 2, par 2.1.1.3; 2.1.2.3).

2.10.3 Method

With each of three test weapons, three 10-round targets are obtained at each range (1000 inches, 50, 100, 200, 400 meters) with each type of ammunition. Firing is done by master-class shooters from a bench rest under minimum wind conditions (0-5 mph). Night firing employing illuminated targets is permitted.

2.10.4 Data Required

All standard target measurements will be obtained and the x and y coordinates of each round for each target will be made available to USABRL (AMXBR-WD).

2.11 SUSTAINED FIRE

2.11.1 Objective

To determine the durability, reliability and other performance characteristics of the test weapons.

2.11.2 Criteria

a. The malfunction rate[1] of the test weapons shall not exceed .003 (Ref 1, par 2.22.3).

b. No significant degradation shall be permitted for dispersion, velocity, projectile yaw or cyclic rate of fire throughout test (Ref 1, par 2.22.3).

2.11.3 Method

The method of test is described in Interim Pamphlet 20-20, TECP 700-700, dated 11 April 1966.

Four weapons are employed in this test; each weapon to be fired exclusively with a single type of ammunition.

2.11.4 Data Required

A suggested tabular form for the firing performance data is shown in Ref 1, Table 36 and 37.

[1]Only malfunctions that cause a stoppage in firing, regardless of how easily they may be cleared, are counted in the malfunction rate. Failures to feed, to fire, to extract and eject are the most common. A broken or damaged part is also included in the malfunction rate if the part is a critical component in gun operation even if the breakage did not cause a firing stoppage.

2.12 NON-STANDARD CLEANERS

2.12.1 Objective

To determine if the delrin charging handle latch, the buffer and the nylon-coated buttstock are impervious to various cleaning fluids.

2.12.2 Criteria

a. Essential: The latch, buffer and buttstock coating shall be impervious to lubricants MIL-L-644B, MIL-L-14107A, Lubriplate 130-A and to dry cleaning solvent (SD), bore cleaner (CR), and insect repellant (FSN 6840-558-0918).

b. Desirable: The above items shall be impervious to carbon removing compound (P-C11A), gasoline, kerosene and diesel fuel.

2.12.3 Method

At the conclusion of all other tests, portions of the weapon components specified above are individually immersed in or coated with each of the materials listed in par 2.12.2 for one minute. Following a 24-hour normal storage period,the items are then inspected for damage and photographs obtained where pertinent.

2.12.4 Data Required

As specified in par 2.12.3.

2.13 HIGH TEMPERATURE/HIGH HUMIDITY TEST

2.13.1 Objective

To evaluate the performance of the weapon when subjected to and fired in a high temperature/high humidity environment.

2.13.2 Criteria

The malfunction rate of the test weapons shall not exceed that of the control weapons.

2.13.3 Method

The method of test is described in par 3.3.1c, IP 20-20, TECP 700-700, dated 11 April 1966, except that the high temperature is +155°F and daily firing is conducted only after a minimum of four hours of continuous high temperature conditioning. Two test weapons and two control weapons are fired, one test weapon and one control weapon are each fired only with cartridges loaded with ball propellant the the remaining control and test weapons fired only with cartridges loaded with IMR8208M propellant. Additionally, magazines loaded with ball projectile cartridges and magazines loaded with tracer projectile cartridges are fired alternately in each weapon throughout the test.

2.13.4 Data Required

Cyclic rates of fire are obtained each firing day and performance data recorded.

2.14 LOW TEMPERATURE/FOULING TEST

2.14.1 Objective

To evaluate the performance of the weapons when subjected to and fired in a low temperature environment expected to increase the severity of fouling.

2.14.2 Criteria

The malfunction rate of the test weapons shall not exceed that of the control weapon.

2.14.3 Method

Two test and two control weapons and sufficient rounds of ammunition are subjected to +20°F for a minimum of 12 hours prior to firing and between firing cycles. Each of the weapons is fired 1500 rounds, 300 rounds on each of five days, in 100-round groups at 4-hour intervals. Firing is conducted with respect to propellant-projectile combinations as in par 2.13.3. Each weapon is disassembled, cleaned and lubricated with the prescribed oil prior to storage at +20°F but no cleaning or lubrication is permitted during the test. The effect of combustion residue build-up on weapon performance is evaluated and cyclic rates of fire are recorded during each firing day. At the conclusion of firing at +20°F the weapons are cleaned and lubricated and the environmental chamber temperature lowered to -65°F and the test repeated. If weapon performance is unsatisfactory at -65°F the test is then repeated at -40°F.

2.14.4 Data Required

See par 2.13.4.

2.15 ENVIRONMENTAL TESTS

2.15.1 Objective

To determine the performance of the test weapons when subjected to various adverse conditions.

2.15.2 Criteria

The malfunction rate of the test weapons shall not exceed that of the control weapons.

2.15.3 Method

Only M193 cartridges with ball propellant are fired.

The weapons are tested as described in the following test procedures:

a. Dynamic dust test; Ref 6, par 2.11.

b. Water spray test; Ref IP 20-20, TECP 700-700, dated 11 April 1966.

c. Salt water immersion test; IP 20-20, TECP 700-700, dated 11 April 1966.

The two control weapons fired in par 2.14 and two of the test weapons fired in par 2.12 are tested.

2.15.4 Data Required

Functioning and reliability data are recorded and the effects of adverse conditions on weapon performance are noted.

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

S - 15 May 67
S - 5 Jun 67

AMSTE-BC

21 APR 1967

SUBJECT: Test Directive for Product Improvement (PI) Test of the Submachine Gun, Cal. 5.56mm, XM177E1, USATECOM Project No. 8-7-0220-01, 02

TO: Commanding Officer, Aberdeen Proving Ground, ATTN: STEAP-CO-P
President, USA Infantry Board, ATTN: STEBC-SA

1. References:

a. Report, AMSTE-BC, 28 Jan 66, subject: Analysis of Results of SAWS Engineering and Service Tests, USATECOM Project No. 8-5-0400-03 through 06.

b. Partial Report, DPS-1851, Dec 65, subject: Engineering Test of Small Arms Weapons Systems (SAWS), USATECOM Project No. 8-5-0400-03, Volume I and Final Report DPS-1970, Mar 66, Volume II.

c. Final Report, USAIB-3110, Dec 65, subject: Service Test of SAWS, USATECOM Project No. 8-5-0400-04.

d. Final Report (DPS-2215) on Engineer Design Test of Modified Flash Suppressor for 5.56mm CAR-15 Submachine Gun, USATECOM Project No. 8-6-0200-06.

e. Message, AMCPM-RS, 141920Z Mar 67, subject: Type Classification XM177E1 Submachine Gun (CAR-15 SMG).

f. Message, AMSTE-BC 6056, 22 Mar 67, subject: Type Classification of Submachine Gun (CAR-15).

g. Letter, AMCPM-RS, 5 Apr 67, subject: Effectiveness Evaluation of XM177/XM177E1 SMG, inclosure 1.

h. Letter, AMCPM-RS, 31 Mar 67, subject: Minutes of M16/M16A1 Rifle Technical Coordinating Committee Meeting on 2 Mar 67, inclosure 2.

AMSTE-BC 21 APR 1967

SUBJECT: Test Directive for Product Improvement (PI) Test of the Submachine Gun, Cal. 5.56mm, XM177E1, USATECOM Project No. 8-7-0220-01, 02

2. Description of Materiel: The CAR-15 Submachine Gun is a lightweight, gas-operated, front locking rotary bolt weapon capable of firing either the semi or full automatic mode. A thumb-actuated safety is provided with three positions: safe, semiautomatic, and full automatic. The weapon is capable of being fed from a 20 or 30-round detachable box magazine and fires from a closed bolt position; bolt remains open after last round is fired. The weapon is equipped with an adjustable peep and post sight system. The weapon features a telescoping buttstock. The sling is the only accessory. Since the "SAWS" test, several product improvements have been made. These are buffer, *chrome plated chamber to minimize corrosion and promote extraction, 1½" increased barrel length (for mounting XM148 Grenade Launcher), *delrin on charging handle latch to minimize wear on upper receiver, *new handguard slip ring to assure physical integrity, *cadium-plated slip ring spring to minimize corrosion, *shot peened upper and lower receivers to minimize corrosion, nylon-coated buttstock and release lever, and XM148 Grenade Launcher spacer. (The asterisk denotes those improvements pertinent to the M16A1 Rifle). When available, the material used and reasons for the improvements will be forwarded under separate cover. This information should be available during week of 24 April.

3. Background:

a. During the "SAWS" tests (reference 1a, b, c), approximately 140,000 rounds of ammunition were fired with the CAR-15 Submachine Gun. As reported, excessive flash was observed when firing ammunition loaded with ball propellant. Subsequent firings with ammunition loaded with extruded grain propellant significantly reduced the flash.

b. At the request of the Project Manager, Rifles, engineer design tests of a modified flash suppressor was conducted by this command which also included limited firings of a new buffer design. The suppressor was found to be durable and a reduction of flash was observed as compared to the model tested during "SAWS".

c. Reference 1e requested comment and/or concurrence on type classification of the XM177E1 Submachine Gun (CAR-15 SMG). Based on results of the "SAWS" tests this command concurred in type classification of the CAR-15 Submachine Gun.

4. Test Objectives:

a. To evaluate the physical and technical characteristics.

b. To evaluate weapon performance when using both IMR (extruded grain) and ball propellants.

c. To evaluate suitability of the product improvements.

d. To evaluate test results regarding suitability of the product improvements for application to the M16A1 Rifle as shown in paragraph 2.

5. Responsibilities:

a. Commanding Officer, Aberdeen Proving Ground is responsible for preparation of test plan, execution and final reporting by which the test objectives of paragraphs 4a, b and d may be evaluated. Also, support of tests required by the Ballistics Research Laboratories.

b. President, USA Infantry Board is responsible for preparation of test plan, execution and final reporting by which the test objectives of paragraph 4 may be evaluated.

6. Coordination: Draft test plans will be coordinated with the following:

Coordination Agency	Test Plan (APG)	Test Plan (USAIB)
CG USAMC (AMCPM-RS)	X	X
CG USAWECOM (AMSWE-RDS)	X	X
Comdt USA Infantry School	X	X
CO USA Infantry Agency	X	X
CO APG (STEAP-DS)		X
Pres USAIB	X	

7. Special Instructions:

a. DA Project No. - Unknown.

b. AMCMS Code No. - Unknown.

c. For a comprehensive and objective test of subject weapon it is deemed necessary to evaluate weapon performance by utilizing both types of propellants on both ball and tracer projectiles. Additionally, 30-round magazines will be evaluated.

d. Five weapons will be available for test at APG in April. Three control weapons without improvements will also be available. Five additional weapons have been requested for tests at USA Infantry Board but availability is unknown at this time.

e. Tests will include but not necessarily be limited to the following:

(1) For Aberdeen Proving Ground:

(a) Examination to include photographs of major component parts.

(b) Accuracy - 1000 inches; 50, 100, 200 and 400 meters (ball and tracer ammunition).

(c) Extreme Temperature - measure cyclic rates.

(d) Environmental to include dynamic dust test.

(e) Smoke and flash (ball and extruded grain propellant with ball and tracer ammunition).

(f) Sustained fire.

(g) Reliability and durability - measure cyclic rates; use 20 and 30-round magazines.

(h) Time of flight and velocity using velocimeter.

(2) For USA Infantry Board:

(a) Physical examination.

(b) Accuracy - 50 meters, 100, 200 and 400 meters with ball and tracer ammunition.

(c) Quick fire.

(d) Day and night defense.

(e) Day and night assault.

(f) Flash and smoke - ball and extruded grain propellant with ball and tracer cartridges under various light conditions.

(g) Maintenance.

(h) Human factors.

SUBJECT: Test Directive for Product Improvement (PI) Test of Submachine Gun, Cal. 5.56mm, XM177E1, USATECOM Project No. 8-7-0220-01, 02

Since basic weapon was tested in the SAWS Program, only limited testing in paragraphs (2)(c), (d) and (e), above, should be planned unless results are such that extensive tests are necessary for complete evaluation.

(3) For Aberdeen Proving Ground (Ballistics Research Laboratories) Tests:

(a) As indicated by reference 1g, BRL has overall responsibility for an effectiveness evaluation to include dispersion and projectile yaw. Special target paper will be supplied by BRL. Maximum coordination is directed so that single tests may be designed to satisfy requirements of both BRL and APG.

(b) General test outline for BRL is as follows:

1. Dispersion and yaw firings at approximately 3, 7, 10 and 15 meters at ambient temperature with five weapons. Fire 20-round samples from each weapon. If multiple firings at close range makes target measurements inaccurate, select alternate aim points on same target. Mark each aim point.

2. Within the climatic chamber, using a weapon to be supplied by BRL, fire at temperatures of minus 65°F, 25°F, 0°F, plus 125°F and 155°F to provide yaw, velocity and dispersion data as required by BRL.

3. Fire for accuracy and yaw from a bench rest at ambient temperature at ranges of 1000 inches; 50, 100, 200 and 400 meters from each of the five weapons delivered to APG.

(c) All measurements of targets fired in support of BRL are the responsibility of BRL.

(d) The above outline of tests is subject to change as dictated by test results.

f. Materiel and cost requirements should be provided this headquarters as soon as possible but not later than 15 May 67. Sufficient funds to support the BRL tests will be included in the APG cost estimate but listed separately.

g. USATECOM Project Numbers are as follows:

APG - 8-7-0220-01 (includes support for BRL)
USAIB - 8-7-0220-02

h. USATECOM Priority 2 is assigned.

AMSTE-BC 21 APR 1967

SUBJECT: Test Directive for Prouduct Improvement (PI) Test of Submachine Gun, Cal. 5.56mm, XM177E1, USATECOM Project No. 8-7-0220-01, 02

8. Test Plans and Reports:

a. Test plans from APG are required by 5 Jun 67. The USAIB will be notified of a firm date for submission of test plans subject to availability of test weapons.

b. A brief outline of the BRL tests will be included in the APG test plan. Also, within each subtest indicate the data pertinent to the BRL area of interest.

c. Test plans will be specifically designed to address the significance of the indicated improvements.

d. A firing record will be published for the BRL data and included in the appendix of final APG report.

e. Formal test plans and reports are required.

9. Security: Test plans and reports will be unclassified.

10. Safety: Since the product improvements do not affect the basic weapon design, the XM177E1 is considered safe to shoulder fire.

FOR THE COMMANDER:

AUSTIN TRIPLETT, Jr
Colonel
Dir, Inf Mat Test

4 Incl
1-2 as
3. STE Form 1027 (APG only)
4. Distribution List

Copies furnished:(w/o incls)
CG USAMC ATTN: AMCPM-RS
CO BRL ATTN: AMXBR-WD

APPENDIX II - SUPPORT REQUIREMENTS

Item	Quantity
Submachine gun, XM177E1	3
Submachine Gun, XM177E2	5
Cartridge, 5.56-mm, M193	35000[a]
Cartridge, 5.56-mm, M196	25000[b]
Extra barrels	3[c]
Spare parts	-[d]
20-round magazines	50

[a] 22,500 rounds are to be loaded with ball proepllant, 12,000 rounds to be loaded with IMR8208M propellant; 500 rounds are to be from a reference lot as defined in Reference 3.

[b] 12,500 rounds are to be loaded with ball propellant; 12,500 rounds to be loaded with IMR8208M propellant.

[c] Barrels must incorporate product improvements.

[d] Sufficient to support testing with an emphasis on extra buffers, bolt and bolt carrier assemblies.

APPENDIX III - TEST SCHEDULE

1. Schedule of Events

Preliminary Planning	May 1967
Coordination Completed	June 1967
Test Plan Submission Date	June 1967
Support Equipment Delivery	X
Test Completion	X + 5 Months
Final Report	X + 6 Months

2. Detailed Test Schedule

Name of Subtest	Time Increment (months) X + 1	X + 2	X + 3	X + 4	X + 5
Inspection	—				
Velocity	—				
Mann Barrel	—				
Time-of-Flight	—				
Flash	—				
Smoke	—				
Sound	—		—		
Kinematics	—	—	—	—	—
Accuracy		—			
Sustained Fire		—			
Non-Standard Cleaners					—
High Temp/High Humidity			—		
Low Temp/Fouling				—	
Environmental					—

APPENDIX IV - REFERENCES

1. DPS 1851, Partial Report of Engineering Test of Small Arms Weapons Systems (SAWS).

2. DPS 1970, Final Report of Engineering Test of Small Arms Weapons Systems (SAWS).

3. MIL-C-99630, Military Specification for Cartridge, 5.56-mm, Ball, M193.

4. MIL-C-60111, Military Specification for Cartridge, 5.56-mm, Tracer, M196.

5. USABRL 610, Displacement Time Recorder.

6. Test Plan on Military Potential Test of Weapon Lubricants, January 1967.

7. DPS 2215, Final Report on Engineer Design Test of Modified Flash Suppressor for CAR-15 Submachine Gun.

8. AMSWE-SMM-SA letter, 2 June 67, Subject: Lubrication and Preservatives for M16A1 Rifle.

APPENDIX V - DISTRIBUTION LIST

USATECOM PROJECT NO. 8-7-0220-01

Distribution denoted by an asterisk (*) will be made from those copies forwarded to Headquarters, USATECOM.

AGENCY ADDRESSEE	TEST PLAN	EPR	INTERIM REPORTS	FINAL REPORTS
Commanding General USA Test and Evaluation Command ATTN: AMSTE-BC Aberdeen Proving Ground, Maryland 21005	30	1	3	30
Commanding General USA Materiel Command ATTN: AMCRD-WI	2*	2	2	2*
AMCAD-S	1*			1*
AMCPP	1*			1*
AMCQA	1*			1*
AMCMA-R	1*	1		1*
AMCSU	1*			1*
AMCMI Washington, D.C. 20315	1*			1*
Commanding General USA Combat Developments Command ATTN: CDC Liaison Officer, USATECOM Aberdeen Proving Ground, Maryland 21005	10*	5	5	10*
US Marine Corps Liaison Officer, USATECOM Aberdeen Proving Ground, Maryland 21005	1*			1*
Commanding Officer USA Engineer Research & Development Laboratories ATTN: SMOFB-KX Fort Belvoir, Virginia 22060				4
Commanding General USA Weapons Command ATTN: AMSWE-RDS Rock Island, Illinois 61200	3*	1	3	3*

AGENCY ADDRESSEE	TEST PLAN	EPR	INTERIM REPORTS	FINAL REPORTS
Commanding General USA Munitions Command ATTN: AMSMU-RE Dover, New Jersey 07801	3		3	3
Commanding General US Continental Army Command ATTN: ATIT-RD-MD Fort Monroe, Virginia 23351	4*			4* (ST only)
Commanding Officer USA Frankford Arsenal Philadelphia, Pa. 19137	3		3	3
Commanding Officer USA Limited War Laboratory Aberdeen Proving Ground, Md. 21005	3		3	5
Commanding Officer Springfield Armory Springfield, Mass. 01101	3		3	3
Commanding Officer Rock Island Arsenal Rock Island, Ill. 61200	3		3	3
Commanding Officer Army Materiels Research Agency Watertown Arsenal Watertown, Mass. 02172	3		3	3
Commanding Officer USA Arctic Test Center APO Seattle 98733	1		1	1
President USA Infantry Board Fort Benning, Georgia 31905	1	1	1	1
President USA Armor and Engineer Board Fort Knox, Ky. 40121	1		1	1
Commanding Officer Yuma Proving Ground Yuma. Arizona 85364	1		1	1

AGENCY ADDRESSEE	TEST PLAN	EPR	INTERIM REPORTS	FINAL REPORTS
Commandant USA Ordnance Center & School Aberdeen Proving Ground,Md 21005				1
Commandant USA Armor School Fort Knox, Ky. 40121				1
Commandant USA Engineer School Fort Belvoir, Va. 22060				1
Commandant USA Special Warfare School Fort Bragg, N.C. 28307				1
Commandant USA Infantry School ATTN: AJIIS-M Fort Benning, Ga. 31905				1
Commanding General USA Ammunition Procurement & Supply Agency ATTN: SMUAP-A Joliet, Illinois 60431				3
President USA Maintenance Board Fort Knox, Ky. 40121	1		1	1
Commandant US Marine Corps Washington, D.C. 20380				1
Director Marine Corps Landing Force Dev. Center Quantico, Va. 22134	1		1	1
UA Marine Corps Liaison Officer at Agency or Board	1		1	1
Commander Defense Documentation Center for Scientific and Technical Information ATTN: Document Service Center Cameron Station, Alexandria, Va. 22313				20

AGENCY ADDRESSEE	TEST PLAN	EPR	INTERIM REPORTS	FINAL REPORTS
President USA Airborne, Electronics & Special Warfare Board Fort Bragg, North Carolina 28307	1		1	1
AFSC STLO Building 314 Aberdeen Proving Ground, Md. 21005				1 (ET only)
US Army Standardization Group, UK Box 65 FPO New York 09510				1