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GRENADA LAUNCHER, SHOULDER FIRED

Army Test and Evaluation Command
Aberdeen Proving Ground, Maryland

24 August 1972

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IDENTIFIERS: •COMMODITY SERVICE TEST PROCEDURES,
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THE ARMY SERVICE TEST PROCEDURE DESCRIBES
TEST METHODS AND TECHNIQUES FOR EVALUATING THE
PERFORMANCE AND CHARACTERISTICS OF SHOULDER FIRED
GRENADE LAUNCHERS, AND FOR DETERMINING THE
SUITABILITY OF SUCH ITEMS FOR SERVICE USE BY THE U.
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13. ABSTRACT Describes a method for evaluation of grenade launcher operational and functional performance characteristics. Identifies supporting tests, facilities, and equipment required. Provides procedures for preoperational inspection, safety, personnel training, accuracy, dispersion, field firing, durability, reliability, transportability, portability, airdrop, human factors, and value engineering, applicable to shoulder fired grenade launchers.			

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U. S. ARMY TEST AND EVALUATION COMMAND
EXPANDED SERVICE TEST - SYSTEM TEST OPERATIONS PROCEDURES

AMSTE-RP-702-101

*Test Operations Procedure 3-3-032

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GRENADA LAUNCHER, SHOULDER FIRED

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SECTION I
GENERAL

1. Purpose and Scope.

a. The test operations procedures addressed herein apply to the expanded service testing of shoulder-fired grenade launchers which have been designed either as single-weapon systems or as the grenade launcher subsystem of dual-weapon systems. If it should fall in the latter category, the grenade launcher subsystem may be a permanently fixed part of the weapon system, or it may be a wholly detachable subsystem.

*This TOP supersedes MTP 3-3-032, 3 Aug 70.

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b. By using these procedures, test personnel will accumulate sufficient objective and subjective data to enable them to determine whether the tested grenade launcher satisfies the criteria stated in the appropriate materiel requirements documents, its suitability for Army use, and its compatibility with the other subsystem of a dual-weapon system, if such is the case.

c. While these procedures have been designed to test grenade launchers, they may be combined -- should a candidate weapon system consist of both a rifle and a grenade launcher -- with the test procedures outlined in MTP 3-3-065, Rifle, to facilitate an integrated test, and to assess the compatibility of the grenade launcher with the rifle.

d. The environmental conditions applicable to this document are those associated with climatic categories 5 and 6 specified in AR 70-38, Research, Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions.

2. Background. A continuing requirement for a grenade launcher which is an integral part of, or a subsystem to, the standard shoulder-fired Infantry weapon can be anticipated. One such launcher, the M203, 40-mm grenade launcher, has been adopted by the US Army for attachment to and use with the M16/M16A1 rifle. Other launchers are under consideration for use with future rifle systems. A combination rifle/grenade launcher system offers the significant advantage of giving each grenadier a weapon system which possesses both point and area target capabilities. It eliminates the restrictions imposed by a single-purpose, area-fire weapon and its dedicated grenadier.

3. Equipment and Facilities.

- a. Test and control weapons.
- b. Ammunition.
- c. Suitable firing ranges and appropriate targets.
- d. Safety and first aid equipment.
- e. Photographic equipment (still and motion pictures).
- f. Communications equipment.
- g. Vehicles, air and ground.
- h. Cleaning materials and lubricants.

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- i. Range instrumentation and recording equipment.
- j. Maintenance test package.
- k. Adequate field exercise area.
- l. Binoculars.
- m. Stopwatches.
- n. Parachutes.

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SECTION II TEST PROCEDURES

4. Supporting Tests.

a. The procedures outlined in this TOP provide general guidance for the conduct of expanded service tests. Detailed specific procedures are dependent on the characteristics of the grenade launcher system being tested, and the stated criteria in applicable requirements documents. Standard shoulder-fired grenade launcher systems should be used for comparison and control purposes.

b. Although supporting tests are described in succeeding paragraphs, they need not be conducted in the order presented; some may overlap or be performed simultaneously.

c. During each subtest, sufficient data should be collected to support valid conclusions. This goal may be constrained by limitations on the number of test items, the time available for testing, the manpower and funds available, and the support and control equipment available. To identify the best techniques to collect the most meaningful data available, methodology personnel should be consulted when planning the test to insure sufficient data will be acquired to permit a valid evaluation of the test item. These personnel can advise and assist the test officer in determining the appropriate experimental design to include the techniques for random sampling, sample size required to evaluate the true performance, estimating average performance (or variability of performance) from a sample, comparing materials or products with respect to average performance (or variability of performance), number of test soldiers needed, and the number of repetitions required for a specific exercise. Additional statistical guidance may be found in TOP 3-1-002, Confidence Intervals and Sample Size, and in National Bureau of Standards Handbook 91, Experimental Statistics.

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d. Common Service TOP's, the tests defined in Section III, and other published documents to be considered in formulating a test plan are as follows:

<u>TEST SUBJECT TITLE</u>	<u>PUBLICATION NO.</u>
(1) Preoperational Inspection and Physical Characteristics (refer to para 5)	MTP 3-3-500
(2) Safety (refer to para 6)	MTP 3-3-517 and MTP 3-2-504
(3) Personnel Training (refer to para 7)	MTP 3-3-501
(4) Accuracy and Dispersion (refer to para 8)	
(5) Field Firing (refer to para 9)	
(6) Durability and Reliability (refer to para 10)	
(7) Transportability/Portability (refer to para 11)	
(8) Airdrop Operations (refer to para 12)	TOP 7-3-511
(9) Security from Detection	TOP 1-3-515
(10) Adverse Conditions	MTP 3-3-524
(11) Maintenance Evaluation	TECR 750-15
(12) Human Factors Engineering (refer to para 13)	MTP 3-3-521
(13) Value Engineering (refer to para 14)	

SECTION III
SUPPLEMENTARY INSTRUCTIONS

5. Preoperational Inspection and Physical Characteristics.

a. Objectives.

- (1) To verify the completeness of the test item.
- (2) To compare the physical characteristics of the test item with the control item and those stated in materiel requirements documents.
- (3) To determine that the test item is in serviceable condition and suitable for testing.

b. Method.

(1) Determine the test equipment's physical characteristics, condition, and adherence to test directives specifications by a series of tests described in MTP/TOP 3-3-500, Preoperational Inspection and Physical Characteristics.

(2) A functional firing check should be conducted on test and control items as appropriate.

c. Data Required.

- (1) A detailed description of test item, including completeness.
- (2) The individual and average weight and dimensions of test items.
- (3) A recorded comparison of physical characteristics of the test item against the criteria established in materiel needs, military standards, and other test standards.
- (4) A record of functional firing checks.
- (5) Additional data as directed in MTP/TOP 3-3-500.

d. Analytical Plan. Subjectively compare physical characteristics of test equipment with control equipment and test standards.

6. Safety. This subtest should be conducted in accordance with MTP 3-3-517, Infantry Weapons and Ammunition Safety. Particular attention should be placed on the verification of the safety limitations in the

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Safety Release, and on the compilation of safety data pertinent to the safety confirmation required by TECOM Regulation 385-6. The test officer should also consult MTP 3-2-504, Safety Evaluation -- Hand and Shoulder Weapons.

7. Personnel Training.

a. Objectives.

- (1) To evaluate all training material furnished with the test item.
- (2) To determine the adequacy of the appropriate army training programs, field manuals, and army subject schedules as relates to the test item or similar weapons.
- (3) To insure that all test personnel are adequately trained in the use and tactical application of the test and control items.

b. Method.

- (1) MTP 3-3-501, Personnel Training, should be reviewed and applicable portions of it used as a guide during training.
- (2) All training material to include preliminary operators' manuals and draft technical publications should be thoroughly reviewed by test supervisory personnel to determine adequacy, and clarity.
- (3) Current training programs, field manuals, technical manuals, and subject schedules should be carefully reviewed to determine their applicability to the test item.
- (4) The requirement for new equipment training for test supervisory personnel should be considered. If such a requirement should exist, this training should be arranged for prior to the initiation of testing.
- (5) A series of orientation and training sessions should be presented to all test soldiers. These classes must be in sufficient detail to insure that each test soldier has a working knowledge of the test and control items. Hands-on-the-equipment training, firing exercises, and operator maintenance should be emphasized. Sufficient pretest training, to include firing the current grenade launcher qualification firing course, should be accomplished to ensure that the test soldiers are equally familiar with the test and the control

item. It is important that the performance of the test item not be degraded because of its newness, or because the test soldiers are unfamiliar with the item. If the test soldiers are familiar with the control item, emphasis must be placed on test item training to overcome bias due to previous use or familiarization.

c. Data Required.

(1) A record of the adequacy and clarity of the training materials furnished with the test items.

(2) A record of the review of pertinent training programs, field manuals, technical manuals, and subject schedules.

(3) A record of any new equipment training received by the test supervisory personnel and their subjective evaluation of this training.

(4) A copy of all lesson plans, outlines, and other pertinent training materials used to train the test soldiers.

(5) A record of comments and questions of the test soldiers relevant to training.

(6) A record of the results of qualification firing for each test soldier.

(7) A record of the degree of proficiency demonstrated by the test soldiers throughout the testing period.

d. Analytical Plan. Data relevant to training, to include qualification scores, should be subjectively analyzed to determine if the established training objectives have been met.

8. Accuracy and Dispersion.

a. Objective. To determine the man/system accuracy of the test item when employed against targets at known distances.

b. Method.

(1) Sample sizes, the number of repetitions of each exercise, and the number of rounds per shot group should be determined through a study of applicable requirements documents and of MTP 3-1-002, Confidence Intervals and Sample Size, and after consulting with methodology personnel.

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(2) Prior to the conduct of the test exercises, all test and control grenade launchers should be zeroed in accordance with the procedures prescribed in the appropriate field manual or test item publication. If the other subsystem in a dual-weapon system is a rifle, then the test and control rifle subsystems should also be zeroed. The zero of each man/system should be recorded and, thereafter, sight adjustments made by setting the sight scale, or other devices, at the appropriate graduation for each range. Any deviation from the appropriate graduation setting required to hit a target should be recorded.

(3) Ranges for the grenade launcher firing exercises should vary from the minimum safe range to ranges beyond the stated maximum effective range of the launcher being tested. Sight configurations and ammunition types will influence maximum and minimum ranges. Requirements documents should be carefully reviewed for specified targets, ranges, and accuracy characteristics.

(4) Well-defined and easily identified targets should be set up for each firer at ranges known to him. Each test soldier should then fire a shot pattern of the size determined in paragraph (1) above at each target. The center of impact, extreme spread, and range and deflection probable error of each shot pattern should be determined. This procedure should be repeated using all sighting devices and/or techniques available with both the test and control items. The firing positions used should be the most stable ones appropriate to the weapon being fired.

(5) Using the rifle zero and grenade launcher zero obtained in paragraph (2) above, each test soldier should fire a confirmation of zero exercise. This exercise for the rifle should be fired without the grenade launcher mounted, if appropriate; with the grenade launcher mounted and not loaded; and again with the grenade launcher mounted and loaded. This exercise should be fired before, during, and after the exercises described in paragraph (3) above to determine what effect, if any, attachment and detachment of the grenade launcher has on the zero of the rifle and on the zero of the grenade launcher. Data relevant to the interacting effects of firing impulses on the rifle zero and the grenade launcher zero should be recorded.

c. Data Required.

(1) Grenade launcher.

(a) A record of the individual zero of each grenade launcher subsystem.

(b) A record of any difficulties experienced during the zero exercises, to include the number of rounds of ammunition required to zero.

(c) A record of any deviation from the appropriate sight graduation setting required to hit the target.

(d) A record of the meteorological conditions during testing.

(e) The X and Y coordinates from the target of all ground or vertical target impacts within each shot pattern by type launcher, range sight configuration, and/or technique, type ammunition, and firing position.

(f) A record of the lot number of all ammunition used during testing.

(g) A record of any change in grenade launcher zero attributable to its attachment to or detachment from the rifle, if appropriate.

(h) A record of any change in grenade launcher zero attributable to the interacting effect of firing impulses of the rifle.

(i) A record of comments by test soldiers and observations by test supervisory personnel as to the difficulty of using the grenade launcher and sights. Particular note should be made of any target obscuration effects of the grenade launcher and sights and any restrictions to field of view caused by the rifle.

(2) Rifle (if rifle subsystem is included).

(a) A record of the individual zero of each man/rifle system, as appropriate.

(b) A record of any difficulties experienced during the zeroing exercises, to include the number of rounds of ammunition required to zero.

(c) A record of any change in the rifle zero attributable to attachment/detachment of the grenade launcher loaded and unloaded.

(d) A record of any change in the rifle zero attributable to the interacting effects of firing impulses of the grenade launcher.

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(e) A record of the comments made by the test soldiers and the observations of the test supervisory personnel as to the difficulty of using the rifle and sights. Particular note should be made of any target obscuration effects of the rifle and sights and of any restrictions to field of view caused by the grenade launcher.

d. Analytical Plan.

(1) Grenade launcher.

(a) Data relevant to the ease of establishing and retaining zero should be subjectively analyzed to determine if the established requirements have been met.

(b) The center of impact, mean of radius, and extreme spread should be computed for each shot group. The mean center of impact, average mean radius, and average extreme spread for the test and control weapons should be calculated and an appropriate lower confidence limit determined for each. An analysis of variance may then be performed to determine if a significant difference exists between the test and control systems for these measures of accuracy and dispersion.

(c) The range probable error and deflection probable error should be computed for each shot group. The mean range probable error and mean deflection probable error for the test and control weapons should be calculated and an appropriate lower confidence limit determined for each. An appropriate statistical test may then be performed to determine if a significant difference exists between the mean range probable error for the test and control systems. An appropriate statistical test may also be performed between the mean deflection probable errors of the test and control systems.

(d) The comments by the test soldiers and observations of the test supervisory personnel should be subjectively evaluated to determine if the test item demonstrates a significant difference in ease of use.

(2) Rifle (if rifle subsystem is included). Data relevant to the ease and retention of zero should be subjectively analyzed to determine what effects, if any, the attachment and detachment of the grenade launcher and the grenade firing impulses have on rifle zero.

9. Field Firing.

a. Objective. To determine the man/system accuracy of the test item against both point and area targets in a tactical environment.

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b. Method.

(1) The sample size of test soldiers, number of test and control items, number of rounds in test shot groups, and number of repetitions should be determined from a study of TOP 3-1-002, Confidence Intervals and Sample Size, and consultation with methodology personnel.

(2) Prior to conducting the test exercises, all test and control grenade launcher/rifles should be zeroed in accordance with the procedures prescribed in the appropriate field manual or test item publication. Then zero of each weapon/man/system should be recorded and, thereafter, sight adjustment made by setting the sight scale, or other device, at the appropriate graduation for each range. Any deviation from the appropriate graduation setting required to hit the target should be recorded.

(3) Firing exercises for the grenade launcher should include firing the test and control weapons systems from different tactical positions at stationary, moving and point type targets at varying ranges which are unknown to the firers. Sight configurations and ammunition types will influence maximum and minimum ranges. Target arrays should be set up as individual and multiple targets in tactical dispositions and should contain both personnel and materiel-type targets. Some of these targets should be in defilade. Firing positions should be representative of those expected to be used in combat. Selected exercises should insure:

(a) Shifts in both range and deflection from one target to one or more successive targets.

(b) The collection of adequate data to determine the accuracy of the man/system test and control items in a rapid reaction role.

(c) The collection of adequate data to determine the ease with which the test soldiers can change the mode of fire from grenade launcher fire to rifle fire and back to grenade launcher fire.

(d) The collection of adequate data to determine and compare the average tactical rate of fire and hit probability of the test and control launchers.

(4) Firing exercises for the rifle should include firing the rifle at appropriate tactical targets with launcher detached (if applicable); with the launcher attached, but unloaded; and with the launcher attached and loaded to determine if any changes in

rifle hit probability are caused by the attachment and/or detachment of the grenade launcher or the impulses of grenade launcher fire. Firing exercises should include firing at targets of short exposure times and at quick fire type targets in random presentations. Firing should be conducted in both the semiautomatic and automatic modes of fire, with the grenade launcher attached and unloaded, and with the grenade launcher attached and loaded.

c. Data Required.

(1) Grenade Launcher.

(a) Time to fire first round by type launcher, range, target, type sight, firing position, type ammunition, and mode of fire.

(b) Time to first target hit by type launcher, range, target, type sight, firing position, type ammunition, and mode of fire.

(c) Time to shift fire, by type launcher, range, target, type sight, firing position, type ammunition, and mode of fire.

(d) Total targets hit by range, target, type sight, firing position, type ammunition, and mode of fire.

(e) Total rounds fired by type launcher, range, target, type sight, firing position, type ammunition, and mode of fire.

(f) A record of required sight adjustments from original zero.

(2) Rifle.

(a) Total number of hits per rounds fired by type rifle, range, target, type sight, firing position, and mode of fire.

(b) Total targets hit by type rifle, range, target, type sight, firing position, and mode of fire.

(c) Total target hits by type rifle, range, target, type sight, firing position, and mode of fire.

(d) Time to fire first round by type rifle, range, target, type sight, firing position, and mode of fire.

(e) Time to first hit by type rifle, range, target, type sight, firing position, and mode of fire.

(f) Time to shift fire by type rifle, target, type sight, firing position, and mode of fire.

(g) Number of hits on a group of targets by type rifle, target, type sight, firing position, and mode of fire.

d. Analytical Plan. Grenade Launcher and Rifle. The mean time to first hit, mean time to fire, and mean time to shift fire for each condition expressed in paragraph 9b(3) and (4) should be computed and submitted to an appropriate statistical test to determine if significant differences exist between the test and control items for these measures of effectiveness. Hit probabilities by type weapon, range, firing position, and mode of fire should be normalized using an appropriate transformation and submitted to appropriate statistical tests to determine if a significant difference exists between the test and control items.

10. Durability and Reliability.

a. Objective. To determine the durability and reliability of the test item under tactical conditions.

b. Method.

(1) A careful review of all requirements documents and test directives should be made to insure that specific requirements which relate to the durability and reliability of the test item are thoroughly examined.

(2) The test item should be inspected at the beginning and end of each test phase.

(3) Tactical field exercises should be conducted to evaluate the test and control items in a simulated combat environment. These exercises must be of sufficient duration to determine if the life expectancy of the test item as stated in applicable requirements documents is met. The firing exercises defined in paragraph 9 should be incorporated into these field exercises if facilities permit.

(4) This subtest should be conducted concurrently with other subtests, when possible.

(5) Most of the factors affecting durability and reliability are part of the operating environment in which the test item will be used, and consist mainly of mechanical (forces of shock, vibration, pressure, bending) and atmospheric (temperature, moisture, gases in the air) conditions. Proper testing will insure that the test item is exposed to all conditions which may affect its durability and reliability and that the effects on the test item are accurately determined and recorded, i.e., a clear "cause and effect" relationship is established.

c. Data Required.

(1) A record of all test item failures, malfunctions, breakage, or other equipment failures throughout the conduct of the test program, and the conditions under which they occurred.

(2) A record of the total number of rounds fired per test item in relation to all failures or malfunctions.

d. Analytical Plan.

(1) Reliability is defined as the probability that an item will perform its intended function for a specified interval under stated conditions. Reliability is usually determined in terms of equipment Mean Time Between Failures (MTBF), which can be translated to a probability of success (or failure) when the statistical distribution of failure times is known or can be determined. MTBF should be submitted to appropriate statistical tests. Confidence levels based on established criteria or those stated in requirements documents should be stated and a detailed method of statistical analysis of different sets of data should be defined.

(2) Durability is the ability of the item to perform satisfactorily for a specified duration under specified operating (and non-operating) conditions. The durability characteristics of the test item may be determined during the course of the test by conducting accelerated life testing and transport for sufficient time to develop a test item history on deterioration, degradation, and maintenance. This history, together with observations of test item performance recorded by supervisory personnel, should then be subjectively analyzed to determine test item durability.

11. Transportability/Portability.

a. Objective. To determine the portability of the test weapon system.

b. Method.

(1) Man-portability should be evaluated throughout appropriate portions of the test program and comparisons made between test and control weapon systems. Observations should be made and test soldier's comments recorded concerning difficulties encountered with the portability of the test item.

(2) Test soldiers armed with the test and control items and ammunition should be required to take part in tactical field combat exercises and to perform such activities as running, jumping, and crawling. They should also be transported by appropriate tactical vehicles, to include helicopters and armored personnel carriers. Difficulties encountered, breakage, and other problem areas should be noted and recorded.

(3) TOP 10-2-509, Combat Effectiveness Test Facility* describes procedures and facilities which evaluate the test item with respect to man-portability, compatibility with other items that must be carried, and the ability to withstand normal transport conditions. The procedures outlined may be modified to provide realistic tasks and situations for evaluation of portability without the need for extensive instrumentation of test facilities.

c. Data Required.

(1) A description of weapon system carried by test soldier.

(2) The type of terrain over which test items are man-carried and any difficulties encountered that are attributable to the test items.

(3) The type vehicles used and any difficulties encountered while carrying the test and control items.

d. Analytical Plan. A subjective evaluation will be derived from frequency counts of difficulties encountered in the areas of man/vehicle portability.

12. Airdrop Operations.

a. The applicable procedures of TOP 7-3-511, Airdrop Operations, should be accomplished to determine the suitability of the test item for delivery by individual parachutist.

*To be rewritten as Clothing and Equipment Test Facility.

b. The parachutist normally jumps with the equipment and weapons he carries in combat. This combat load should be as light as possible, consistent with his mission, and should include those items necessary for the immediate combat effectiveness of the parachutist. In the design of equipment to be delivered by the parachutist, consideration must be given to other equipment he is required to carry, and to overall weight limitations dictated.

c. The procedures prescribed in TOP 7-3-511 allow the test item to be evaluated in an actual parachute jump and to determine if a representative parachutist is able to successfully complete a jump while carrying the equipment as part of his fighting load.

13. Human Factors Engineering.

a. The applicable procedures of TOP 3-3-521, Human Factors Evaluation, should be accomplished to determine if the test item is suitable for US Army use from the standpoint of compliance with human factors principles. TOP 3-3-521 is intended for use in planning and conducting human factors evaluation for weapons. Specific criteria and test procedures for the test item must be determined after an appraisal has been made of the pertinent requirements documents.

b. The test item's technical, operating, and maintenance characteristics should be reviewed to insure that complete and realistic criteria are selected and that the methodology is in keeping with the field conditions of the affected units. This evaluation can normally be carried out in conjunction with other testing. The primary objective is to obtain adequate data describing the man-item relationship while the test item is being operated, or used, by typical soldiers confronted with the organizational mission and climatic conditions representing the scope of intended Army use.

14. Value Engineering.

a. Objective. To determine if the test item contains any unnecessary or costly features which could be eliminated without adversely affecting essential quality, reliability, maintainability, performance, or mission accomplishment.

b. Method. During all testing, special attention should be given to identifying nonessential, nice-to-have accessories, components, and features which could be eliminated without compromising the performance, durability, or safety of the test item.

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c. Data Required. Comments of test soldiers and test supervisory personnel will be recorded, to include a description of the feature, recommended changes to be made, and the reasons for the recommendation. The recorded comments may be in narrative form, and should provide full details of the conditions or events which occurred during the conduct of the test.

d. Analytical Plan. All data collected during the test should be summarized and the results presented with charts and photographs, as appropriate. Where opinions of test soldiers or judgments of test supervisory personnel are presented, these should be so identified and separated from factual data. Accumulated data will be subjectively analyzed to determine if the appropriate criteria have been met. The test officer should conclude with a recommendation of the specific changes to be made to the test item.

Recommended changes to this publication should be forwarded to Commanding General, US Army Test and Evaluation Command, ATTN: AMSTE-ME Aberdeen Proving Ground, Maryland 21005. Technical information related to this publication may be obtained from US Army Infantry Board, ATTN: STEBC-MO-M, Fort Benning, Georgia 31905. Additional copies of this document are available from the Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314. This document is identified by the accession number (AD No) printed on the first page.

24 August 1972

APPENDIX
REFERENCES

1. AR 70-10, Test and Evaluation During Development and Acquisition of Materiel.
2. AR 70-32, Supplement 1, Work Breakdown Structures for Defense Materiel Items.
3. AR 70-38, Research, Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions.
4. AMCR 385-12, Safety.
5. TECR 70-8, Test Resource Management System.
6. TECR 70-23, Equipment Performance Reports.
7. TECR 70-24, Documenting Test Plans and Reports.
8. TECR 70-33, TECOM Test Cost Estimates.
9. TECR 70-34, Risk Analysis for Suitability Tests.
10. TECR 386-6, Safety.
11. TECR 750-15, Maintenance Evaluation During Testing.
12. FM 23-16, Automatic Rifle Markmanship, June 1965.
13. Draft FM 23-31, 40-mm Grenade Launchers, M203/M79.
14. FM 23-71, Rifle Markmanship, December 1966.

COORDINATION

TOP 3-3-032, Grenade Launcher, Shoulder-Fired

The following is a list of the agencies with which this TOP was coordinated:

- a. US Army Weapons Command, AMCPM-RES, Rock Island, Illinois 61201.
No reply received. Concurrence is assumed.
- b. US Army Munitions Command, AMSMU-RE, Dover, New Jersey 07801.
No reply received. Concurrence is assumed.
- c. Aberdeen Proving Ground, STEAP-MT-T, Aberdeen Proving Ground, Maryland 21005. No reply received. Concurrence is assumed.
- d. US Army Arctic Test Center, STEAC-IN, APO Seattle 98733. No reply received. Concurrence is assumed.
- e. US Army Ballistics Research Laboratories, AMXBR-WD, Aberdeen Proving Ground, Maryland 21005. No reply received. Concurrence is assumed.
- f. US Army Human Engineering Laboratory, AMXHE-SYS, Aberdeen Proving Ground, Maryland 21005. Reply received. Concurred without comment.
- g. US Army Infantry School, AT SIN-I-M, Fort Benning, Georgia 31905. Reply received. Concurred without comment.
- h. US Army Tropic Test Center, STETC-OO-P, APO New York 09827.
Reply received. Concurred without comment.
- i. US Army Combat Developments Command Infantry Agency, CDCIN-CM, Fort Benning, Georgia 31905.

Comment. The Expanded Service Test (EST) defined in AR 70-10 involves more extensive measurements and evaluations than those included in this TOP and outlines the criteria to be included in the EST report. It is believed the TOP should more appropriately address operational testing and evaluation, training package testing and evaluation, and maintenance testing and evaluation. It is suggested the TOP be subdivided into sections, each of which addresses the major objectives listed above.

USAIB Accommodation. Nonconcur. TOPs are prepared in the format prescribed by TECOM Regulation 310-6 and TECOM Pamphlet 310-3.

j. US Army Small Arms Systems Agency, AMXAA-CD, Aberdeen Proving Ground, Maryland 21005.

Comment. Recommend the Accuracy and Dispersion and Field Firing instructions specifically state a requirement for direct and indirect fire modes.

USAIB Accommodation. Concur in part. Paragraph 9b(3) has been changed to reflect the comment.

Comment. This TOP should explicitly state that the Field Firing will be conducted at unknown ranges.

USAIB Accommodation. Concur. Paragraph 9b(3) has been changed to reflect the comment.

k. US Army Airborne, Communications and Electronics Board, STEBF-MO, Fort Bragg, North Carolina 28307.

Comment. If a control item is to be used, each subtest should contain methodology, data required, and analytical plan related to the use of the control item. Treatment of the control item seems to be inadequate in Paragraphs 1, 5, 7, 10, 11, 12, 13, and 14.

USAIB Accommodation. Nonconcur. Repeating every detail for the control item is considered redundant.

Comment. In Paragraph 9b(1), change "MTF 3-1-002" to read "TOP 3-1-002" for consistency with Paragraph 4c.

USAIB Accommodation. Concur. Paragraph 9b(1) has been changed to reflect the comment.

Comment. In Paragraph 12c, add to the end of the last sentence, ". . . as part of his combat load", since jumping with only the test item as an individual load is not realistic.

USAIB Accommodation. Concur. Paragraph 12c has been changed to reflect the comment. The words "combat load" are interpreted as the CDC approved terminology "fighting load".

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