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

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*Test Operations Procedure 5-3-057
AD 757809

MISSILE, GUIDED, ANTITANK

SECTION I
GENERAL

1. Purpose and Scope.

a. This Test Operations Procedure (TOP) is a guide designed to

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assist a test officer in the preparation of a plan to support a service test of a type antitank guided missile. It describes methods and techniques to be used in determining if a candidate missile meets the criteria established in the applicable requirements documents and is suitable for use by the US Army.

b. Selected supporting subtests prescribe methodology for examining the physical characteristics, safety, functional and operational responses, training requirements, human factors considerations, and value analysis of a test missile. The procedures are applicable to light, medium, or heavy antitank weapons designed to be man or crew portable, and/or vehicle transported.

c. Lethality and other terminal effects of the missile are a function of engineering type tests and will not be addressed in these procedures.

2. Background.

After years of experimenting with a series of foreign-made antitank missiles in 1963, the US Army accepted and type classified Standard A the French produced ENTAC (ENgin-Telemechanique - Anti - Char). Subsequently, the Department of Army approved a requirement for a series of antitank weapons of light, medium, and heavy classifications. (At the time, the 3.5-inch rocket launcher was considered the light weapon; the 90-mm recoilless the medium; and the 106-mm recoilless rifle and the ENTAC heavy). By 1970 the light antitank weapon (LAW) was the M72, 66-mm rocket, and a new heavy antitank (HAW), tube-launched, optically tracked, wire command link guided missile (TOW) had replaced the ENTAC. A medium antitank weapon (DRAGON), a wire-guided missile similar to the TOW but man-portable, was service tested in 1972. If the DRAGON is approved type classified, the bulk of the Infantryman's antitank capability will have passed to tube-launched, optically tracked, wire-guided missile systems. As modifications and improvements of these systems take place, and as new antitank weapon proposals are submitted, some will be offered for testing. These procedures may be applied to any antitank guided missile system similar to those now in production, or envisioned as potential subjects for service testing.

3. Equipment and Facilities.

a. Equipment.

(1) Test items with components.

(2) Control item with components.

(3) Weighing scales or balances.

(4) Measuring instruments.

(5) Photographic equipment.

(6) Communications equipment.

(7) Tactical vehicles, air and ground.

(8) Meteorological instruments.

(9) CB protective clothing and equipment.

(10) Safety and first aid equipment.

(11) Ear plugs.

(12) Cleaning Equipment.

(13) Targets.

(14) Tentage.

(15) Demolitions.

(16) Smoke pots.

(17) Pyrotechnics.

(18) Chemical grenades, signal.

(19) Stopwatches.

(20) Binoculars.

(21) Mortar(s) (w/equipment).

(22) Mortar or artillery ammunition (illumination).

(23) Machine gun w/blank firing adapter.

(24) Machine gun ammunition, blank.

(25) Barbed wire.

(26) Sandbags.

(27) Voltmeter.

(28) Small arms w/blank adapters.

(29) Blank small arms ammunition.

(30) Simulators, battle sounds.

(31) Environmental clothing.

(32) Body armor.

(33) Sound system.

(34) Other, as prescribed in referenced documents.

b. Facilities.

(1) Classroom.

(2) Bleacher site.

(3) Terrain suitable for tank and mechanized infantry maneuver.

(4) Range failities.

(5) Other, as prescribed in referenced documents.

SECTION II
TEST PROCEDURES

4. Supporting Tests.

a. Although proposed testing procedures are described in successive paragraphs, some will overlap or be conducted concurrently. The procedures are flexible and general in nature and are not intended to limit the initiative of the test officer, whose exact and detailed plan of test should reflect the expertise and experience of available advisors and the state-of-the-art and methodology at the time and place of testing.

b. Data must be collected in sufficient quantities to support valid conclusions. This objective may be constrained by limited numbers of test or control items; a limited time in which to accomplish testing; or limited funds, manpower, or support facilities. To identify the best means of securing meaningful data within the limitations imposed, the test officer should consult available statisticians and human factors personnel for assistance. The statistician will contribute to selecting the experimental test design or pattern and assist

in solving requirements dealing with numbers of tests, test personnel, items to be tested, and repetitions needed for conclusive results during specific operations. Human Factors personnel should provide guidance for developing and presenting questionnaires, refining of interview techniques, and identifying information of human factors significance to be obtained throughout the course of the test. Guidance related to the selection of appropriate samples and confidence levels may be found in TOP 3-1-002, Confidence Intervals and Sample Size.

c. Whenever possible, the test item will be compared to an appropriate control item. Control items should be selected from the current inventory and be as closely related, characteristically, to the test item as possible. The control item should be new, or in near new condition, and subjected throughout the test to the same care and maintenance standards as those for the test system.

d. A log should be maintained as a chronological record of events, observations, data, times, comparisons, weather, and other pertinent information. Accurate and comprehensive data will expedite the collation processes required to support reports of test findings and judgments.

e. Test results will be presented in a narrative form supplemented with tables, charts, graphs, photographs, or motion pictures when appropriate. The results of questionnaires, the opinions of test soldiers, and the comments and personal judgments of participating personnel will be identified as such and considered as subjective input rather than as factual data.

f. Whenever feasible, testing and firing of the test guided missile should be conducted as a part of a tactical exercise. Appropriate exercises, suitable for use in most subtests, may be selected from TOP 1-1-046, Field Combat Test Exercises.

g. When directed, the results of risk analysis will be provided to HQ, TECOM. TECOM Reg 70-34, Risk Analysis for Suitability Tests, will provide the guidance for preparing such reports.

h. Common TOP, the tests defined in Section III, and other publications to be considered in formulating a test plan are listed in the reference appendix and below:

	TEST SUBJECT TITLE	PUBLICATION NO.
(1)	Preoperational Inspection and Physical Characteristics (refer to para 5)	6-3-500
(2)	Safety (refer to para 6)	5-3-510
(3)	Personnel Training (refer to para 7)	3-3-501
(4)	Operational Suitability (refer to para 8)	
(5)	Range and Accuracy (refer to para 9)	5-3-528
(6)	Suitability of Sight(s) (refer to para 10)	3-3-116
(7)	Suitability of Mount(s) (refer to para 11)	
(8)	Wire-snag Vulnerability (refer to para 12)	
(9)	Portability/Transportability (refer to para 13)	5-3-501, 7-3-511, 7-3-512, 7-3-515, 7-3-516
(10)	Reliability/Durability (refer to para 14)	
(11)	Signature Effects (refer to para 15)	1-3-515, 3-3-516
(12)	Adverse Conditions (refer to para 16)	3-3-524
(13)	Maintainability (refer to para 17)	
(14)	Training Devices (refer to para 18)	5-3-536
(15)	Human Factors Engineering (refer to para 19)	5-3-507
(16)	Value Analysis (refer to para 20)	

SECTION III
SUPPLEMENTARY INSTRUCTIONS

5. Preoperational Inspection and Physical Characteristics.

a. The applicable procedures of TOP 6-3-500, Preoperational Inspection and Physical Characteristics (Missile and Rocket Systems), should be performed to (1) verify the condition and completeness of the test missile, (2) compare the test item's physical characteristics with those stated in appropriate requirements documents, and (3) determine that all test item components are in operating condition and suitable for testing.

b. TOP 6-3-500 describes the operations required to prepare a test missile system for service testing. It outlines procedures which begin with the arrival of the item at the test site, advances through unpacking, inventory, and physical inspection stages, and terminates with an installation inspection designed to evaluate site conditions for subsequent testing. The importance of this initial subtest cannot be overemphasized. Service testing is time consuming and costly and must be undertaken only when the condition of the test item is assured to be complete and free from defects which could prematurely terminate testing or introduce error into the interpretation of test results.

6. Safety.

a. The appropriate procedures of TOP 5-3-510, Safety Hazards should be performed to determine (1) the effectiveness of the test item's safety features, (2) whether the specific safety measures stated in the applicable requirements documents have been met, and (3) whether the test system is safe for further testing.

b. The procedures referenced above outline a concept designed to conduct detailed safety inspections of a test system during service test activities and to evaluate the safety responses of test participants during all phases of operational use and maintenance. Actual and potential safety hazards will be identified and recorded.

c. Testing will not begin until a Safety Release is received. Prior to committing test items to field exercises, airdrop operations, or firing performances, the applicable Safety Release should be reviewed and the test item examined for conformity to safety requirements and the presence of other hazardous conditions. The Safety

Release should also be reviewed to determine if it places undue restrictions on tactical use of the test missile. Particular emphasis will be placed on verification of safety limitations cited in the Safety Release and on the compilation of safety data relevant to the Safety Confirmation required by TECOM Reg 385-6.

d. A uniform method of classifying safety deficiencies and shortcomings will be employed. This system is based on a classification of hazard levels associated with personnel and equipment as defined in MIL-STD-882, Requirements for System Safety Program for Systems and Associated Subsystems and Equipment.

7. Personnel Training.

a. The applicable procedures of TOP 3-3-501, Personnel Training should be applied to determine (1) the amount and type of training required for operators and crew of team members to become proficient in the tactical operation and operator maintenance of the test missile, (2) whether the proposed program of instruction is adequate, and (3) whether the training package meets the criteria as stated in the appropriate requirements documents.

b. Test soldiers should be selected as representative of the user population. Characteristically, as described in Military Standard 1472A, Human Engineering Design Criteria, they should represent the 5th through the 95th percentile in height, weight, and body configuration. Some should be left-handed and, in addition to those with normal vision, a representative number should wear eye glasses. Each test soldier should become familiar with the characteristics of the test and control systems; the conduct, procedures, and objectives of the service test; and their individual assignments and responsibilities.

c. It is essential that test participants become equally familiar with the test and control items to minimize bias during comparison tests. The performance of the test weapon should not be downgraded because of newness or unfamiliarity. If personnel are familiar with the control item, emphasis should be placed on familiarization training with the test missile to promote an impartial and fair judgment.

8. Operational Suitability.

a. Objectives.

(1) To determine the capability of the test missile to perform a specified military role under tactical conditions simulating those encountered on a battlefield.

(2) To compare the performance of the test item with the stated criteria.

(3) To compare the test item with a type classified control weapon.

b. Method.

(1) The test guided missile system and a control weapon should be employed in every conceivable mode of operation within the scenerio of those tactical exercises designed to examine the performance of an antitank system under simulated battlefield conditions. Selected exercises should include:

(a) Defense, stressing dismounted operations.

(b) Delay, emphasizing mounted operations.

(c) Attack, mounted and dismounted.

(d) Hunter-Killer, featuring dismounted operations.

(e) Raid, testing dismounted employment, including the use of helicopters.

(f) Ambush, employing both mounted and dismounted tactics, including the use of helicopters.

(2) Many of the judgments rendered in the other subtests will depend upon the data obtained during the conduct of the tactical exercises outlined above. Therefore, detailed and thorough planning must ensure the gathering of pertinent data in each area, and the timely and accurate reporting and recording of relevant events.

(3) The nature, characteristics, and configuration of the test missile system, along with the specific requirements provided in the applicable requirements documents, will dictate the type and duration of exercises to be conducted. This same variable will control the number and types of test soldiers, amounts of equipment required, and the support facilities needed.

(4) Appropriate portions of the tactical exercises should be conducted during periods of limited daytime visibility, and at night. The nature of such operations will be dictated by the characteristics of the test item, i.e., a missile with a complementing night sight will be fired extensively at night, while a system without an aid to night vision will be tested in other nighttime employment situations, using artificial illumination for nighttime firing.

(5) Counter-countermeasure (CCM) data to evaluate the degree to which the test item's tracking system will perform in an environment that includes enemy countermeasures will be gathered during the tactical exercises. Methodology to support the evaluation will be determined by the characteristics of the test item and the criteria stated in the applicable requirements documents.

(6) Type exercises to support the requirements of this subtest will be found in TOP 1-1-046.

c. Data Required. Check lists, data sheets, questionnaires, and logs will be used during the course of tactical exercises to record the following:

(1) Type and duration of exercise conducted, and terrain used.

(2) Role of the antitank missile.

(3) Performance and comparison data of test and control weapons and components, by mode.

(4) Weather and visibility.

(5) Ambient light conditions.

(6) Comments and observations of test personnel.

d. Analytical Plan.

(1) The collected data should be processed by:

(a) Marking test results for identification and correlation.

(b) Organizing data into tabular and/or graphic form.

(c) Modifying data to reflect nonstandard conditions.

(d) Determining the statistical variation of results in terms of the mean, standard deviation of the specific quantities, and the correlation among two or more quantities (to be determined with assistance from statistical personnel).

(e) Converting the test data measurement units to compatible units expressed in the applicable requirements documents.

(f) Collating and reducing all data to a concise and workable form.

(2) An appropriate analysis should be performed of:

(a) The comments and observations expressed by test soldiers and evaluators.

(b) The collated data of significance to determine:

1. The degree to which the test item met the stated criteria.

2. Whether the test missile system is equal, inferior, or superior to the control item in the tested areas of operational suitability.

(3) The findings should be presented in a narrative form, supplemented with pictorial or graphic augmentation as appropriate.

9. Range and Accuracy.

a. The applicable procedures of TOP 5-3-528, Accuracy (Firing), should be conducted to (1) determine the ability of the test missile system to hit a target, (2) compare the test system with the control item, and (3) evaluate the degree to which accuracy results are in compliance with requirements stated in the applicable requirements documents.

b. Firing should be integrated into the format of the tactical field exercises of paragraph 8, above. Due to economic considerations connected with the cost and/or availability of test items, careful and detailed planning is required for the firing phases of the service test. Each firing, from launch to impact, must provide performance data obtainable from no other operation. However, the relatively short time in flight dictates extremely precise and exact observation requirements. Photography should be used extensively to capture the firing-flight-impact sequence for post-firing study, analysis, and evaluation.

10. Suitability of Sight(s).

a. The appropriate procedures of TOP 3-3-116, Sight, Direct Fire, should be selected to determine the ability of the test item's sight(s) to perform the function stated in requirements documents.

b. The sighting system of a test antitank missile system may be in any configuration, ranging from a simple non-magnifying optic with cross hair alignment means to a complex imaging device. Whatever the design, an evaluation of sight suitability should be conducted concurrently with those subtests which require system employment. A

suitable sighting system must provide a clear picture of an aiming point superimposed upon a target at any range commensurate with the maximum effective range design of the system. Sights should be tested against such criteria.

11. Suitability of Mounts.

a. Objective. To determine the degree to which the test missile's ground mount, vehicular mount, and/or mounting kit complies with the criteria of applicable requirements documents.

b. Method.

(1) Specific mount criteria will be detailed in the test-item's related directives and requirements documents. This subtest will deal with the general requirements common to most antitank guided missiles, assuming the procedures may be used as a base for expansion to meet more specific criteria for a particular system. The ground mount may, in the case of an individually launched system, be a simple bipod type device which serves as a support for steadying a launcher tube. Any evaluation of this type mount may be made during the conduct of field exercises. The comments and observations of gunners and evaluators will provide the input for such an evaluation.

(2) Vehicular mounts, dual-purpose mounts, and vehicle adapter kits may be evaluated while conducting mounting and dismounting exercises, using prescribed mounts, crews, and vehicles. The timed exercises (crew drills) should be conducted by representative personnel, operating under a variety of weather conditions, day and night, while wearing standard or special clothing and equipment designated by criteria. An appropriate sequence of drills follows:

(a) Ground mounted to vehicle stowed.

(b) Vehicle stowed to ground mounted.

(c) Vehicle firing position to vehicle stowed.

(d) Vehicle stowed to vehicle firing position.

(e) Ground mounted to vehicle firing position.

(f) Vehicle firing position to ground mounted.

(3) In each situation, the positions should be separated by at least 25 meters, and timing should begin and end with crews in an appropriate firing station or travel posture.

c. Data Required. The following should be recorded:

(1) Mount and vehicle used, and type exercise conducted.

(2) Number of personnel required, and tools used, by exercise.

(3) Time to place weapon in and out of action, each exercise.

(4) Comparative times, test and control items, each exercise.

(5) Weather and light conditions.

(6) Traverse available, in degrees.

(7) Degree of slope accommodated (degree of elevation and depression available).

(8) Ease of control manipulation, day and night.

(9) Clothing and equipment work by crews (CB, environmental).

(10) Comments and observations of test personnel related to the performance of the test missile mounting system.

d. Analytical Plan.

(1) An analysis of comments, judgments, and observations related to mounts solicited throughout all testing should be performed

(2) Times, comparative data, and other statistics should be collated and subjected to an analysis designed to identify areas of quantitative significance.

(3) Findings should be presented in narrative form supported by photographs, charts, or graphs as appropriate.

12. Wire-snag Vulnerability.

a. Objective. To determine the susceptibility of the test missile's wire command link to snag in flight. This subtest is appropriate to wire command link systems only and, when applicable, will be a part of operational performance testing.

b. Method.

(1) Test missiles which depend on a wire command link system should be test fired under the following conditions:

(a) Missile guided to pass over a concertina wire entanglement.

(b) Missile guided through small trees and underbrush while tracking a moving target.

(2) A control missile should be fired under identical conditions to afford comparison data.

c. Data Required. The results of all firing conducted during the course of the service test should be surveyed for evidence of wire-snags. The details of any instance where wire-snag affected mission completion should be recorded.

d. Analytical Plan. A narrative report of significant findings and supplement the report with pictorial or graphic evidence when appropriate should be prepared.

13. Portability/Transportability.

a. The applicable procedures of TOP 5-3-501, Battlefield Mobility (Battlefield Mobility, Tactical Flexibility and Portability) (Missiles) should be performed to: (1) determine the degree to which the test missile is man-portable and/or vehicle transportable and, (2) compare the candidate test weapon's battlefield mobility with the criteria stated in the applicable requirements documents.

b. The tactical exercises of paragraph 8, above, will be the principal vehicle for assessing the objectives. Throughout the course of the exercises, range firings, and other field movements, the test missile will be hand carried, crew moved, or vehicle transported depending upon its design and proposed method of employment. Data to support a mobility judgment should be noted and recorded following each phase of administrative or tactical movement by man or vehicle.

c. Depending upon characteristics of size, weight, and configuration, a guided missile may lend itself to parachutist-carried air-drop; to a packaged drop; or to internal or external air movement. Procedures for testing such suitability will be found in:

(1) TOP 7-3-511, Airdrop Operations, Personnel and Individual Equipment.

(2) TOP 7-3-512, Airdrop, Suitability of Supplies and Equipment for.

(3) TOP 7-3-515, Air Portability, Internal.

(4) TOP 7-3-516, Air Portability, External.

14. Reliability/Durability.

a. Objective. To determine the degree to which the test missile system will perform its mission adequately, for a specified period of time, under operating conditions expected to be encountered in combat.

b. Method.

(1) Reliability is usually measured in terms of equipment mean-time-between-failures (MTBF), which can be translated to a probability of success (or failure) if the statistical distribution of failure times is known or can be determined. Therefore, a reliability judgment may be obtained during the course of service testing by a methodical and accurate accounting of these factors. Throughout the conduct of all subtests, a log will be kept of all malfunctions, equipment failures, and down-time which interfere with the test missile being ready when needed. Any malfunction or loss of adjustment which renders a missile system inoperative or degrades system performance and cannot be corrected by operating personnel within time periods that do not jeopardize mission accomplishment will be considered a system failure. Likewise, any malfunction or loss of adjustment which can be corrected by operating personnel but continues to recur will be considered a failure.

(2) The durability of a test item may be examined by observing varied and representative testing for sufficient time to develop a test item history of deterioration, degradation, weakness, malfunction, and/or other failures. Records should cover each component of the system and accurately document the time and circumstances of events having durability significance.

(3) The tactical exercises of the Operational Suitability subtests described in paragraph 8, above, will provide an excellent base for observation and data production to support a reliability/durability judgment of a test guided missile. Frequent and thorough inspections should be conducted to assure timely recording of pertinent information and data.

c. Data Required. The following should be recorded as it becomes available during the conduct of service testing:

(1) Type of failure or malfunction.

(2) Time and date of test weapon leaving service as a result of failure.

(3) Time and date of return of test item to service following downtime.

(4) Breakage or other manifestations of defects leading to a deadline status of the test item.

(5) The results of inspections.

(6) Statistics related to time, distance, and comparison of the test item with the control weapon and with stated criteria.

(7) Pictures of supporting interest.

(8) The comments, observations, and findings of failures, weaknesses, or malfunctions occurring during the test. Particular emphasis should be placed on scrutinizing the information available during the conduct of firing exercises, mobility testing, adverse conditions reports, and air delivery phases of tactical employment exercises.

d. Analytical Plan. An appropriate narrative report should be prepared to include:

(1) The MTBF of the test and control items with confidence level, as applicable.

(2) A graphic representation of the accept/reject criteria with failure-time data plotted to a decision point, and a decision statement, if applicable.

(3) An analysis of the subjective and quantitative data available.

15. Signature Effects.

a. Two common service test procedures, TOP 1-3-515, Security from Detection, and TOP 3-3-516, Obscuration, will provide adequate methods for determining:

(1) The degree to which the test missile system produces signature effects which will aid an enemy in locating the friendly position by sight, sound, or instrumentation.

(2) The degree to which a target may be obscured from the missile operator's view by signature characteristics of smoke, flash, dust, and/or blast.

(3) The degree to which the test item lends itself to standard camouflage techniques and procedures.

b. Successful combat operations dictate a desired minimum of position disclosing effects from any weapon. Because of its direct fire characteristics and close proximity to enemy armor, an antitank missile system's signature effects become most important items of evaluation. Noise, flash, reflection, blast, smoke, and heat radiation may be tested by following the applicable procedures of TOP 1-3-515.

c. Obscuration of the target immediately after firing is a phenomenon typically caused by smoke discharged or by dust raised by a muzzle blast. Muzzle blast is a generic term used frequently in conjunction with direct fire weaponry to describe the physical effects of the release of propellant gases at high pressure upon the ground. This normally lifts dust, dried vegetation, or other small debris. This cloud, or sometimes the flash of firing, may destroy a gunner's line of sight, thereby obscuring the target and obstructing the sensing required for tracking or missile adjustment. TOP 3-3-516 provides methodology for examining this area.

d. The techniques of testing described in the two common service test procedures referenced above allow applicable data to be obtained in each of the two areas from common firing exercises. Position disclosing is the signature effect an enemy sees, while obscuration is an effect of firing experienced by the gunner who fires the missile. Conclusive data to support a judgment in each area may be obtained by positioning observers and/or photographers in positions representing each view during the firing exercises.

e. During the employment of the test missile during this and other appropriate subtests requiring field emplacement, the missile will be camouflaged in accordance with standard practices. Note will be taken of the ease or difficulties encountered in preparing and maintaining adequate camouflage security as test crews take advantage of existing vegetation and natural terrain features and, if required, use man-made materials for camouflaging. Reports of observers, comments from test crew members, and photographs taken will be a source of data pertinent to a camouflage evaluation.

16. Adverse Conditions.

a. The applicable procedures of TOP 3-3-524, Adverse Conditions, should be accomplished to determine the performance of the candidate guided missile under abnormal environmental conditions.

b. An antitank missile and its ancillary equipment must be designed to function properly under the most rigorous environmental conditions

likely to be encountered in combat. During the preliminary stages of development and engineering, weapons are subjected to precisely controlled and highly instrumented environmental chamber tests under extremes of temperature, humidity, and other atmospheric conditions. However, the actual use of the test item under various and existing weather conditions, in a tactical environment and in the hands of test soldiers representative of the user population, may produce results undiscovered during previous tests. Of the tactical exercises prescribed in the operational suitability tests of paragraph 8, many should be conducted under conditions which will produce data to support a finding in this area.

17. Maintainability.

a. Objectives.

(1) To determine whether the maintenance functions, as listed on applicable maintenance allocation charts, can be readily accomplished using the manuals, tools, repair parts, and skills authorized.

(2) To determine whether the pertinent manuals are adequate.

(3) To determine whether the test item with maintenance package meets the criteria of appropriate requirements documents.

b. Method. An evaluation of maintainability should be conducted in accordance with the applicable provisions of TECOM Reg 750-15, Maintenance Evaluation During Testing. As a minimum the following should be emphasized:

(1) Throughout the course of testing, all scheduled and unscheduled maintenance functions will be performed while using only those tools, procedures, and personnel authorized in the maintenance package instructions.

(2) Operator maintenance will be performed by designated test soldiers and their activity closely monitored.

(3) Direct and general support maintenance functions will be performed by MOS-qualified technicians at the appropriate level of maintenance.

(4) Test soldiers and maintenance technicians will be observed while performing tasks and their comments solicited in the following areas:

(a) Are any functions unduly difficult?

(b) Does any facet of maintenance require excessive time?

(c) Does the missile system require any maintenance function detrimental to the service life of the weapon?

(5) Preliminary Operating and Maintenance Manuals (POMM) should be checked for clarity, errors, and omissions.

c. Data Required. Throughout testing the following should be recorded.

(1) Operator maintenance performed, by item and operator.

(2) Organizational, direct support, and general support maintenance required and performed, by item, technician, and MOS.

(3) Comments and observations related to ease or difficulty of the maintenance effort required at each level.

(4) Data related to the adequacy of the maintenance package.

d. Analytical Plan.

(1) Information and data should be collated and analyzed as appropriate.

(2) A narrative report of significant findings should be prepared, and the report should be supplemented with pictures or other graphic portrayal when appropriate.

18. Training Devices.

a. The applicable procedures of TOP 5-3-536, Training Devices (Missile and Rocket Systems) should be performed to evaluate the test guided missile system's training device.

b. Because of the inherent complexity and high costs of a guided missile system, it will normally be advantageous, if not essential, for a training package to include a training device capable of simulating the operational functioning of the test missile system. The overall experimental test design or pattern recommended by the statistician will include measures to ensure an accurate objective evaluation of the training device's influence on test results. The evaluation should include an

assessment of the trainer's value toward producing a gunner with sufficient knowledge, skill, and motivation to successfully fire the live missile system, and a conclusion of whether proficiency with the trainer necessarily correlates with live missile firing proficiency.

19. Human Factors Engineering.

a. The applicable procedures of TOP 5-3-507, Human Factors Engineering (Compatibility of Man-Machine by Observation), should be accomplished to determine (1) whether the test missile meets the human factors requirements stated in the applicable needs documents, (2) whether the test item is designed in accordance with basic human factors principles, and (3) the degree to which the test item meets with troop acceptance.

b. In the process of recommending a new weapon as suitable for Army use, care must be exercised in evaluating the man-machine relationship which dictates compatibility with skills, aptitudes, and the limitations of the soldier who will use the item. Human Factors personnel should assist the test officer in identifying, examining, recording, and reporting relevant data essential to an accurate judgment in this area.

20. Value Analysis.

a. Objective. To identify potential areas for value engineering by the developer.

b. Method. Throughout testing, note will be taken of any unnecessary, costly, or nice-to-have equipment features which might be eliminated or modified without compromising the effectiveness or safety of the candidate missile system.

c. Data Required. The comments, observations, and reports of areas detected and identified as potential areas for further value engineering effort should be recorded.

d. Analytical Plan. The collated data should be analyzed and presented in a narrative report, supplemented with pictorial or graphic evidence as appropriate.

Recommended changes to this publication should be forwarded to Commander, 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 NOO printed on the first page.

APPENDIX
REFERENCES

1. AR 70-10, Research and Development, Test and Evaluation During Development and Acquisition of Materiel.

2. DA Training Circular 23-23, TOW, Heavy Antitank Weapon System.

3. MIL-STD-882, System Safety Program for Systems and Associated Subsystems and Equipment: Requirements for.

4. MIL-STD-1472A, Human Engineering Design Criteria.

5. FM 7-20, Infantry, Airborne Infantry, and Mechanized Infantry Battalions.

6. FM 23-33, 66-mm High Explosive Antitank Rocket, M72.

7. FM 23-82, 106 Recoilless Rifle.

8. TECOM Reg 70-24, Documenting Test Plans and Reports.

9. TECOM Reg 70-34, Risk Analysis for Suitability Tests.

10. TECOM Reg 385-6, Verification of Safety During Tests.

11. TECOM Reg 700-1, Value Engineering.

12. TECOM Reg 750-15, Maintenance Evaluation During Testing.

13. TOP 1-1-012, Classification of Deficiencies and Shortcomings.

14. TOP 1-1-046, Field Combat Test Exercises.

15. TOP 3-1-002, Confidence Levels and Sample Size.

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1. ORIGINATING ACTIVITY *(Corporate author)*

United States Army Test and Evaluation Command
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13. ABSTRACT

Describes a method for evaluation of antitank guided missile operational and functional performance characteristics. Identifies facilities and equipment required. Discusses supporting tests. Provides procedures for operational suitability, suitability of mounts, reliability, durability, maintainability, and value analysis. Excludes lethality and terminal effects tests.

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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Rocket Launcher						
Missile System						