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3 August 1970

Matériel Test Procedure 9-3-010
General Equipment Test Activity

U. S. ARMY TEST AND EVALUATION COMMAND
COMMODITY SERVICE TEST PROCEDURE

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BATH UNITS

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1. OBJECTIVE*

This document provides procedures to determine the degree to which bath units perform their missions as described in Qualitative Matériel Requirements (QMR's), Small Development Requirements (SDR's), Technical Characteristics (TC's) and the suitability of these items and their maintenance packages for use by the Army.

2. BACKGROUND

The Army has many requirements for troop support and subsistence in the field. The portable bath unit is a typical requirement; this unit is designed to take potable water, and water from streams, rivers, lakes and the like by means of suction and to heat it sufficiently to furnish normal bath temperature water to showerheads.

3. REQUIRED EQUIPMENT

- a. Miscellaneous Assembly and Maintenance Tools.
- b. Lubricants and Lubricating Equipment.
- c. Packaging Equipment.
- d. Transportation Facilities and Material Handling Equipment.
- e. Suitable Test Site.

4. REFERENCES

- A. USATECOM Regulation 70-23, Equipment Performance Reports (EPRs).
- B. USATECOM Regulation 385-6, Verification of Safety of Matériel During Testing.
- C. USATECOM Regulation 700-1, Value Engineering.
- D. USAGETA Document HEDGE, Human Factors Evaluation Data for General Equipment.
- E. FED-STD-101, Preservation, Packaging, and Packing Materials, Test Procedures.
- F. MIL-STD-129, Marking for Shipment and Storage.
- G. MIL-STD-130, Identification Marking of U. S. Military Property.
- H. MIL-STD-209, Slings Eyes and Attachments for Lifting and Tying Down Military Equipment.
- I. MIL-STD-1186, Cushioning, Anchoring, Bracing, Blocking, and Waterproofing, and Appropriate Test Methods.

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*This MTP is intended to be used as a basic guide in preparing actual test plans for the subject equipment. Specific criteria and test procedures must be determined only after careful appraisal of pertinent QMR's, SDR's, TC's, and any other applicable documents.

STATEMENT #2 UNCLASSIFIED

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MTP 9-3-010
3, August 1970

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- J. MIL-T-704, Treatment and Painting of Material.
- K. MTP 2-3-500, Preoperational Inspection and Physical Characteristics.
- L. MTP 9-2-010, Bath Units.
- M. MTP 9-3-503, Reliability.
- N. MTP 10-3-501, Operator Training and Familiarization.
- O. MTP 10-3-502, Durability.
- P. MTP 10-3-503, Transportability (General Supplies and Equipment).
- Q. MTP 10-3-504, Maintenance Evaluation.
- R. MTP 10-3-505, Human Factors, Engineering.
- S. MTP 10-3-507, Safety, Hazards.
- T. MTP 10-3-511, Quality Assurance.
- U. MTP 10-3-512, Reliability.

5. SCOPE

5.1 SUMMARY

This Materiel Test Procedure describes the following tests to be conducted on bath units.

a. Preparation for Test - A determination of the condition of the test item upon its arrival and other preparatory procedures to be completed prior to the start of active testing. These will include the following:

- 1) Packaging and test item inspection.
- 2) Inventory check.
- 3) Physical characteristics.
- 4) Operator training and familiarization.
- 5) Pre-operational checks.

b. Operational Performance - An evaluation to determine the ability of the test item to perform its intended mission when utilized by service personnel.

c. Durability - An evaluation to determine the test item's ability to withstand long periods of normal or cyclic operation without serious degradation to operational performance or physical characteristics.

d. Transportability - An evaluation to determine the ability of the test item to be prepared for transport and to be transported by service personnel.

e. Maintenance - An evaluation to determine and appraise the test item's maintenance characteristics and requirements, a verification and appraisal of its malfunctions, an evaluation of the test item's associated publications and other common and special support elements (maintenance test package), an appraisal of the test item's design for maintainability (AMCP 706-134: accessibility, ease of maintenance, standardization, and interchangeability), an evaluation of component and system durability and reliability, and the calculation of indicators which express the effects of appropriate preceding aspects.

f. Safety - An evaluation to determine the test item compliance with safety requirements and to confirm the test item's safety characteristics during conduct of all tests, to comply with requirements of the applicable section of USATECOM Regulation 385-6.

MTP 9-3-010
3 August 1970

g. Human Factors Evaluation - An evaluation of the suitability of the test item for operation, maintenance, and transport without causing undue fatigue, mental error, and delay in mission accomplishment by user personnel.

h. Value Analysis - An evaluation directed at analyzing the primary functions and features of the test item for the purpose of reducing the cost of the test item without compromising its performance, quality, maintainability or safety.

i. Quality Assurance - A review for the purpose of determining and evaluating defects in material and workmanship.

5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Initial Inspection

The test item and its associated accessories shall be subject to the following upon arrival at the test site:

6.1.1.1 Shipping and Packaging Inspection

a. Examine the shipping method, preservation and packaging and determine any non-conformance with FED-STD-101. The container shall also be marked in accordance with MIL-STD-129.

b. Record the following:

- 1) Evidence of damage to, or deterioration of packaging or shipping components and materials.
- 2) All identification markings.
- 3) A list of all printed material accompanying the test item and its agreement with test item markings.

c. Remove the test item from its shipping carrier, if applicable, and record the following:

- 1) Equipment, time and personnel required.
- 2) Comments regarding the method and materials used to secure the test item.

6.1.1.2 Test Item Inspection

The test item shall be marked in accordance with MIL-STD-130. Visually inspect the test item for evidence of defects, damage and wear in its manufacture, materials, and workmanship. In particular, the following will be considered:

a. Metal surfaces shall be treated for corrosion and painted in

MTP 9-3-010
3 August 1970

accordance with MIL-T-704. Painted surfaces should be adequately covered, even and smooth in finish, texture, and appearance, and consistent in color.

b. Component junctions.

- 1) Welding shall be free from slag, cracks, fractures and have a smooth, clean appearance.
- 2) Hardware shall be of sufficient size and strength and be tightly drawn.
- 3) Seams, joints and edges shall have a good fit and alignment and there shall be no sharp edges or burrs.

c. Ensure that all controls, indicators, access ports and points of attachment are marked clearly and legibly as to their function.

d. Verify that all doors and covers have the proper fit and operate easily.

e. Inspect for improperly protected wiring.

f. Check all electrical cables and connectors for damage and secure mating.

6.1.2 Inventory Check

Verify completeness of the test item and associated parts and material with the Basic Issue Item List (BIIL); file an Equipment Performance Report (EPR) if required.

6.1.3 Physical Characteristics

NOTE: Do not test for data obtained and verified during engineering tests.

The physical characteristics of the test item shall be determined by performing the applicable sections of MTP 2-3-500.

6.1.4 Operator Training and Familiarization

Service personnel who will test the equipment, should undergo the applicable procedures of MTP 10-3-501 and in particular the following shall be performed:

a. Instruct and train the service personnel in the safety, operation and maintenance of the test item utilizing the draft technical manuals.

b. Service personnel shall be informed of the objectives and be knowledgeable in the procedures of the tests to be performed.

c. Record all personal data required for the selected service personnel.

6.1.5 Pre-Operational Checks

Perform the following:

- a. Depreservation and assembly - remove all preservation from the

MTP 9-3-010
3 August 1970

test item and attach any devices, etc., which were removed from the test item for transporting convenience.

b. Controls - check all electrical and mechanical controls for freedom and smoothness of operation.

c. Lubrication - verify complete lubrication of the test item ensuring that all oil holes and grease fittings are accessible to service but designed to exclude foreign material.

6.2 TEST CONDUCT

NOTE: All equipment failures shall be reported in accordance with USATECOM Regulation 70-23.

6.2.1 Operational Performance

The operational performance of the test item will be determined by placing the test item in extended service in actual mission-type assignments under TOE environments. Authorized MOS-qualified personnel will operate and maintain the test item using TOE authorized products, tools and equipment. The length of the operational period will be planned using designated unit mission time and will include sustained mission operations and provisions for scheduled maintenance and allowable downtime. Where mobility is a requirement, moves and relocations will be arranged to use TOE transportation. Suitability of the test item for task operations and conformance with the specified QMR or SDR requirements will be determined by conducting the test item applications and usage under environmental conditions, as required.

6.2.1.1 Operation

The test item will be installed in its operational configuration at a proper test site prepared for operation.

Perform the following:

- a. Apply power to the test item.
- b. Operate all controls to ensure that they are functioning properly.
- c. Examine all indicators (meters, gauges, etc.) for proper operation.
- d. Record any difficulties in performing the operations of sub-paragraphs a. through c., above.

6.2.1.2 Performance

- a. Start the generator.
- b. Operate the bath unit under mission-type assignments in TOE environments.
- c. Record the satisfactory completion of performance operations and/or indications that the bath unit is ineffective.

6.2.2 Durability

On completion of the operational performance tests, the durability

MTP 9-3-010
3 August 1970

of the test item will be determined by the following:

- a. Perform the appropriate procedures of MTP 10-3-502.
- b. Examine the test item for evidence of the following:
 - 1) Corrosion, discolored or missing paint.
 - 2) Loose or missing hardware.
 - 3) Leakage in fluid lines.
 - 4) Broken parts.
 - 5) Uneven or excessive wear in moving components.
 - 6) Excessive temperatures on the test item housings.
 - 7) Loss of adjustment or control.
- c. Record the following for each defect revealed in subparagraph b.
 - 1) Nature of the defect.
 - 2) Cause (if known).
 3. Possible remedy to avoid recurrence of failure.

6.2.3 Transportability

Examine the transportability characteristics of the test item as revealed during the preparation for and during the actual conduct of transporting operations. Conduct the evaluation in accordance with MTP 10-3-503. For each phase of the evaluation determine the following:

- a. Procedures, materials and tools utilized.
- b. Time required.
- c. Personnel required.
- d. Adequacy of instructions in draft technical manuals for tying down, lifting and transporting of various media.
- e. Difficulties experienced and suggestions for changes to improve the operations.

6.2.3.1 Preparation for Transport

- a. Perform any drainage, disassembly, locking or removal operations required on the test item.
- b. Package and/or enclose the test item using instructions of the draft technical manual and material, equipment and tools indigenous to the user organization.
- c. Where appropriate evaluate the effectiveness of tie-down/securing devices and lifting attachments.

6.2.3.2 Load/Unload

Use appropriate equipment and material handling techniques to move the packaged test item to and into or onto the carrier. Examine the effectiveness of the operations and compatibility of the equipment used.

6.2.4 Maintenance

Evaluate the maintenance - related factors of the test item as described in MTP 10-3-504, MTP 9-3-503, and MTP 10-3-512 with emphasis on the following:

- a. Organizational (O), Direct Support (F), and General Support (H) Maintenance Requirements.
- b. Operator through General Support Maintenance Literature.
- c. Repair parts.
- d. Tools
- e. Test and handling equipment.
- f. Calibration and maintenance facilities.
- g. Personnel skill requirements.
- h. Maintainability.
- i. Reliability.
- j. Availability.

6.2.5 Safety

NOTE: Safety Confirmation shall comply with the requirements of USATECOM Regulation 385-6. Hazards will be reported to the testing officer where a decision will be made as to the continuation of testing.

Throughout the service test, personnel shall examine and note the safety characteristics of the item while at all times adhering to the operating instructions found in the draft technical manual. The following shall be performed:

- a. The appropriate sections of MTP 10-3-507.
- b. Examine the test item for the inclusion of suitable guards, shields, interlocks and warning plates.
- c. Verify the operation of all safety and overload devices provided on the test item.
- d. Throughout all tests observe hazards to personnel and other equipment and record the following:
 - 1) Non-operable safety devices.
 - 2) Inadequate warning signs
 - 3) Recommendations for additions to the safety program and test item's safety features.
- e. Safety restrictions contained in the safety release should be reviewed and discussed with test personnel. The test officer is responsible for assuring that all test personnel are thoroughly briefed on all safety procedures and limitations connected with the test item prior to conducting the test.

6.2.6 Human Factors Evaluation

Throughout the test evaluate the effectiveness and characteristics of the man-item interaction as related to human factors by performing the

MTP 9-3-010
3 August 1970

applicable sections of MTP 10-3-505 and the following:

a. Prepare checklists to evaluate the human factor characteristics using Human Factors Evaluation Data for General Equipment (HEDGE) for the Class IIIC equipment, including the following:

- 1) Operability
 - a) Assemble and place in operation.
 - b) Prepare for use.
 - c) Activate/deactivate and perform prime function.
- 2) Maintainability.
 - a) Perform routine maintenance.
 - b) Detect malfunction; isolate and identify cause.
 - c) Remove defective component and replace or repair.
- 3) Transportability
 - a) Prepare for transport.
 - b) Load/unload.
 - c) Secure/unfasten

b. Evaluation of the tasks of step a shall include but not be limited to the following:

- 1) Adequacy of instructions and tools to perform the task.
- 2) Mental and physical effort required.
- 3) Design of the test item as it affects the task.
- 4) Personnel required for the task.

c. Determine whether or not the sound level of the item is annoying either to user personnel or to non-user personnel who located near the test item.

6.2.7 Value Analysis

a. During the conduct of all tests, service personnel shall rate the test item from a value standpoint and shall record comments concerning any features of the test item which can be eliminated and/or cost reduced without degrading the test item in performance and safety. The applicable portions of USATECOM Regulation 700-1 shall be used as a basis for this evaluation.

b. Record the following for each feature or component of the test item being examined:

- 1) Description of feature.
- 2) Recommended change to be made.
- 3) Reason(s) for recommendations.

6.2.8 Quality Assurance

Determine the quality of the test item as described in the applicable section of MTP 10-3-511.

6.3 TEST DATA

NOTE: In compiling the Test Data Section, service personnel shall expound upon those data procedures which are other than quantitative in nature by recording narrative descriptions which will provide full details of conditions and/or events occurring during the conduct of the test.

6.3.1 Preparation for Test

6.3.1.1 Initial Inspection

6.3.1.1.1 Shipping and Packaging Inspection

Record the following:

- a. Any non compliance with the standards for shipping, marking, perservation and packaging.
- b. Evidence of damage, identification markings and list of printed matter enclosed.
- c. Equipment, time, and personnel required to unpack the test item and comments concerning the method and materials used in packing.

6.3.1.1.2 Test Item Inspection

Record the following:

- a. Any instances of noncompliance with the marking requirements of MIL-STD-130.
- b. Evidence of defects in the manufacturing, materials and workmanship.
- c. Ineffective legends.
- d. Doors or covers which have an improper fit.
- e. Loose or unprotected power leads.
- f. Damaged hoses or connectors or those with an improper fit.

6.3.1.2 Inventory Check

List any materials missing from the Basic Issue Item List.

6.3.1.3 Physical Characteristics

Record the data required by MTP 2-3-500.

6.3.1.4 Operator Training and Familiarization

MTP 9-3-010
3 August 1970

Record the data required by MTP 10-3-501 and the following:

- a. Methods used and completion of service personnel training and evaluation of the draft technical manuals.
- b. Evidence that the service personnel are sufficiently knowledgeable in objectives and procedures.
- c. The personal data required for selected personnel.

6.3.1.5 Pre-Operational Checks

Record the following:

- a. Depreservation procedures utilized.
- b. Any assembly required.
- c. Any controls or adjustments which are locked or do not function smoothly.
- d. Adjustment mechanisms which do not operate, are not smooth or which cannot be locked.
- e. Lubrication procedures, material and equipment utilized or defective lubrication points on the test item.

6.3.2 Test Conduct

6.3.2.1 Operational Performance

6.3.2.1.1 Operation

Record the following:

- a. Any controls which are inoperative, binding or whose settings are not proportional to the changes produced on the test item.
- b. Any meters or gauges which do not indicate proper operation.
- c. Mechanical adjustments which are binding, difficult to operate, improperly calibrated or excessively loose.

6.3.2.1.2 Performance

Record on the completion of performance operations the following:

- a. Inability of the bath unit to provide for any of the operations denoted.
- b. Excessive temperature, vibration, etc.
- c. Accelerated wear.

6.3.2.2 Durability

Record the following:

- a. The data required by MTP 10-3-502.
- b. For each fault exhibited by the test item.

- 1) The nature of the defect.
- 2) Location on the test item.
- 3) Cause (if known).
- 4) Recommending changes to avoid a recurrence of the fault.

6.3.2.3 Transportability

Record the following:

- a. The data required by MTP 10-3-503.
- b. For each phase of the test.
 - 1) Procedures, materials and tools utilized.
 - 2) Time required.
 - 3) Personnel required.
 - 4) Adequacy of instructions.
 - 4) Difficulties experienced and suggested changes to reduce effort required for any task.

6.3.2.3.1 Preparation for Transport

Record the following:

- a. List all disassembly, locking or removal operations required on the test item, if they are easily accomplished, and suggestions for elimination where possible.
- b. Comments on the effectiveness of tools and equipment provided for packaging the test item and problems encountered.
- c. Evaluate tie-down devices and lifting attachments for their effectiveness through location, number, accessibility, etc.

6.3.2.3.2 Load/Unload

List comments regarding the effectiveness of the material handling equipment and procedures utilized in moving the packaged test item to and into/onto the carrier.

6.3.2.4 Maintenance

6.3.2.4.1 Maintainability

Record the following:

- a. The data required by MTP 10-3-504.
- b. For each scheduled or unscheduled maintenance involving minor adjustment.
 - 1) Operation performed.
 - 2) Personnel, time, tools, etc., required.
 - 3) Elapsed time since last performance of the same procedure.

MTP 9-3-010
3 August 1970

- 4) Difficulty in using instructions provided.
- 5) Deficiencies in the design which hinder the performance of maintenance procedures (accessibility, etc.).

c. For each unscheduled maintenance involving excessive downtime and/or replacement or repair of component record the data required by section 6.3.2.4.2.

d. For the total maintenance test package.

- 1) Instances where the instructions, tools or repair parts are ineffective or insufficient for the performance of maintenance procedures.
- 2) Any other difficulties and suggestions for improvement.

6.3.2.4.2 Reliability

Record the following:

- a. The data required by MTP 9-3-503.
- b. For each unscheduled maintenance procedure:
 - 1) Symptoms of the failure as indicated by the test item.
 - 2) Methods and equipment utilized to determine the failing component or feature.
 - 3) Total elapsed run time since the previous major failure.
 - 4) Secondary damage caused by the failure such as discoloration or breakage of associated parts.
 - 5) The repair procedures followed, downtime and personnel, material and tools utilized in performing the repair.

6.3.2.5 Safety

Record the following:

- a. The data required by MTP 10-3-507.
- b. For guards, shields, warning plates, etc., list the following:
 - 1) Missing feature.
 - 2) Ineffective feature.
 - 3) Suggested additions, improvements or changes to safety features.
- c. Any inoperative safety or overload device.

6.3.2.6 Human Factors Evaluation

Record the data required by MTP 10-3-505 and in addition, complete the checklists prepared for the HEDGE test function tasks of the operability, maintainability, and transportability subtests. Rate each task as satisfactory or unsatisfactory from a human factors standpoint. In rating each task consider and record instances of the following:

MTP 9-3-010
3 August 1970

- a. Instructions.
 - 1) Lacking clarity.
 - 2) Insufficient or excessive detail.
- b. Tools.
 - 1) Proper tools not supplies.
 - 2) Excess of special tools required.
 - 3) Additional tools recommended.
- c. Mental and Physical Effort.
 - 1) Above average skill or strength required of service personnel.
 - 2) Task is excessively tiring.
- d. Test Item Design.
 - 1) Poor location of component.
 - 2) Component not accessible.
 - 3) Visibility hindered.
 - 4) Insufficient variables (controls, adjustments).
- e. Time required for task is excessive and reasons why.
- f. Personnel Requirements.
 - 1) Insufficient number specified.
 - 2) Substitute support equipment in place of personnel.
 - 3) Qualifications for personnel in error
- g. Record qualitative comments as to whether or not the sound level of the test item is annoying, not annoying, etc.

6.3.2.7 Value Analysis

For each feature or component of the test item being considered for cost reduction, record the following:

- a. Description of the feature/component.
- b. Recommended changes(s) to be made.
- c. Reason(s) for recommendations.

6.3.2.8 Quality Assurance

Record data collected as described in the applicable section of MTP 10-3-511.

6.4 DATA REDUCTION AND PRESENTATION

All data will be summarized using tabulations and/or charts as

MTP 9-3-010
3 August 1970

appropriate. Where photographs are used, they will be positively identified. The data will be analyzed to determine to what degree the test item and its maintenance package meet the requirements of QMR's, SDR's and detailed military specifications of the test item.

A Safety Release Recommendation, based on the data of paragraph 6.3.2.5 shall be presented in accordance with USATECOM Regulation 385-6.

MTP 9-3-010
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13. ABSTRACT This Army Service Test Procedure describes test methods and techniques for evaluating the performance and characteristics of Bath Units (for Field Use), and for determining their suitability for service use by the U. S. Army. The evaluation is related to criteria expressed in applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), Technical Characteristics (TC), or other appropriate design requirements and specifications.		

DD FORM 1473 (PAGE 1)
1 NOV 65
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MTP 9-3-010
3 August 1970

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