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Material Test Procedure 6-3-180
U. S. Army Artillery Board

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

3468

METEOROLOGICAL EQUIPMENT

1. OBJECTIVE

The objective of this materiel test procedure is to set forth the service test methodology, and testing techniques necessary for determining to what degree meteorological equipment perform their mission as described in Qualitative Materiel Requirements (QMR's), or the Small Development Requirements (SDR's), and the Technical Characteristics (TC's), and the suitability of meteorological equipment for use by the Army.

2. BACKGROUND

Meteorological (Met) corrections to artillery firing data have been utilized for many years. In the past, the limited accuracy of devices to measure the parameters of the atmosphere permitted only gross corrections to be applied. More recently, however, the need has been for improvement in the accuracy of weapon systems because of new and changing concepts in Army operations.

The current standard single-station met system performs the basic functions of determining the position of a sounding balloon in space at given time intervals and requiring Met information from an attached radiosonde. From these data, the values of wind velocity and direction are determined by the change in the horizontal distance traversed by the balloon vehicle during a known time interval. Additionally, pressure, temperature, and relative humidity values are measured.

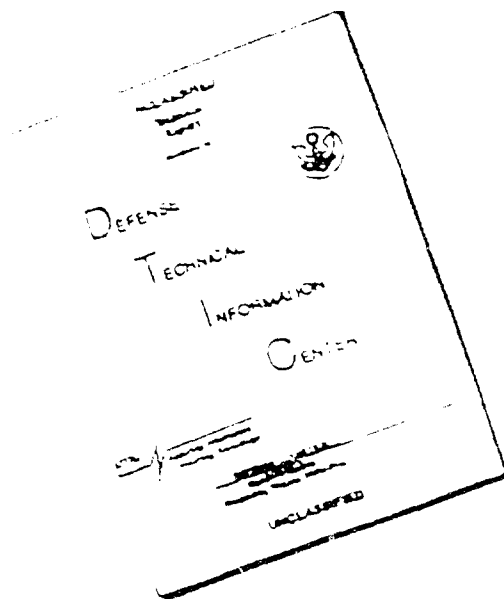
Since short-range army ballistic missiles such as the HONEST JOHN and LITTLE JOHN are completely unguided, the ballistic trajectory and point of impact of these missiles are dependent on the orientation of the missile at launch and the prevailing meteorological conditions along the trajectory. Hence, as in conventional artillery firing, accurate wind data are required for altitudes up to the maximum ordinate of the missile trajectory to ensure accurate performance, or as a minimum, adequate reductions in fall of short probable errors.

3. REQUIRED EQUIPMENT AND FACILITIES

- a. Shop Facilities (for organizational, direct and general support maintenance).
- b. Standard Rawinsonde System with associated equipment.
- c. Radio and Wire Communications.
- d. Radio Repair Equipment
- e. Suitable Operational and Emplacement Areas
- f. Appropriate Artillery Radar Sets and Other Electronic Devices and Operating Personnel.
- g. Still and Motion Picture Camera with Film.
- h. Meteorological Support (local met station to provide data for

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comparison).

4. REFERENCES

- A. USAMC Regulation, 385-12 Safety.
- B. USATECOM Regulation 385-6, Safety Release.
- C. USATECOM Regulation 385-7, Safety Confirmation.
- D. USATECOM Regulation 750-15, Maintenance of Supplies and Equipment.
- E. USAMC Reliability Handbook, Volume I.
- F. AR 705-15, Operation of Materiel Under Extreme Conditions of Environment.
- G. MTP 2-3-500, Preoperational Inspection and Physical Characteristics.
- H. MTP 2-3-501, Safety Hazards.
- I. MTP 2-3-503, Cargo Capacity.
- J. MTP 2-3-516, Human Factors Engineering.
- K. MTP 2-3-519, Surface Transportability (Vehicles).
- L. MTP 2-3-526, Cargo Loading Adaptability (CLA).
- M. MTP 6-3-500, Physical Characteristics.
- N. MTP 6-3-501, Technical Inspection.
- O. MTP 6-3-502, Personnel Training Requirements.
- P. MTP 6-3-504, Ease of Installation, Rigging, and Operation.
- Q. MTP 6-3-505, Emplacement, Action, and March Order.
- R. MTP 6-3-506, Durability.
- S. MTP 6-3-509, Effects of Weather.
- T. MTP 6-3-510, Transportability of Communication, Surveillance, and Electronic Equipment.
- U. MTP 6-3-512, Compatibility with Related Equipment.
- V. MTP 6-3-513, Qualitative Electromagnetic Interference.
- W. MTP 6-3-517, Electrical Power Requirements.
- X. MTP 6-3-523, Safety.
- Y. MTP 6-3-524, Maintenance.
- Z. MTP 6-3-525, Human Factors.
- AA. MTP 7-3-512, Air Drop Capability.
- BB. MTP 7-3-515, Air Transport, Internal.
- CC. MTP 7-3-516, Air Transport, External.
- DD. MTP 10-4-001, Desert Environmental Test of General Supplies and Equipment.
- EE. MTP 10-4-002, Arctic Environmental Test of General Supplies and Equipment.
- FF. MTP 10-4-003, Tropic Environmental Test of General Supplies and Equipment.

5. SCOPE

5.1 SUMMARY

This MTP describes the following procedures to be performed for determining the suitability of meteorological equipment for artillery use:

- a. Pre-Test Operations - A study conducted to ensure that the test

item is in satisfactory condition prior to initiation of testing, and to determine its physical and electrical characteristics.

b. Operational Characteristics consisting of:

- 1) Emplacement, Preparation for Action, Operation, and March Order Suitability - A study to determine the ease of installation of the test item, preparation for action, operation and restoring it to its transport configuration under various conditions.
- 2) Electrical Characteristics - A study to determine the electrical characteristics of the test item.
- 3) Accuracy - A study to determine the degree of accuracy obtained when using the test item.

c. Power Source - A study to determine the adequacy of the provided power source whether it be from the test item's parent source or alternate power source.

d. Electrical Interference - A study to determine the effects of electronic signals on the operability of the test item and its effect on local electronic equipment.

e. Effects of Weather - A study conducted to determine if the test item is sufficiently weather proofed in the transport and operating positions and the effects of various weather conditions on the test item's capability.

f. Durability, Reliability and Ruggedness - A study conducted to determine if the test item and its ancillary equipment are sufficiently reliable, durable and rugged to withstand the effects of continuous operation and transport over all types of roads and terrain with varying degrees of slope, and the extent and effects of numerous emplacements, operation and march order.

g. Vulnerability to Detection and Identification - A study conducted to determine the degree of security from aural and visual detection that the test item has. Ground and aerial observations are included.

h. Air Transportability - A study conducted to determine the suitability of the test item for air transport, both internal and external, and airdrop, and its effect on the test item's operability.

i. Surface Transportability - A study conducted to determine the suitability of the test item for surface transportation.

j. Compatibility with Related Equipment - A study conducted to determine the suitability of the test item for operations with its related equipment in various configurations.

k. Human Factors Engineering - A study conducted to determine if the test item has been designed to reduce strain and fatigue during emplacement, operation and march order.

l. Safety Confirmation - Study conducted to determine the adequacy of safety devices, existence of safety hazards, and possible safety hazards. Confirm the safety release.

m. Maintenance and Maintenance Evaluation - A study conducted to determine the maintenance requirements of the test item and the ease of performing organizational, direct and general support maintenance.

n. Environmental Suitability - A study to determine the effects of tropic, desert, and arctic environmental conditions on the operability of the test item.

5.2 LIMITATIONS

None

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Scheduling

6.1.1.1 Personnel

a. Ensure the availability of service personnel who have been, or are being, trained using the criteria of MTP 6-3-502 and are familiar with the em-
placement, preparation for operation, operational and maintenance aspects of
the test item.

NOTE: 1. Personnel required for operating and maintaining the test
item at organizational, direct support, and general support
level shall attend special instruction classes conducted
by the manufacturer or equivalent engineering agency prior
to the beginning of the test. The training shall consist
of oral instruction, on the job application, and study
and review of pertinent literature. Personnel skills
shall be evaluated to determine needs for additional in-
struction or special training devices.

2. Training shall include 24-hour operation of a ballistic
meteorological station for a period of several days, with
a normal load of observations and the performance of
routine maintenance. All phases of the operation will be
completed to include the development of two types of mes-
sages for each observation; for example, NATO types 2 and
3. Observations will be taken every 2 hours to simulate
the operations during rapid weather changes.

b. Review and analyze the results of the training program.

c. Record the following:

1) For the service test personnel:

- a) Rank
- b) MOS
- c) Time spent in MOS (experience)
- d) Time spent in training

2) Adequacy of training program

d. Adequacy of training literature furnished with the test item shall
be determined and recorded.

e. Ensure that experienced personnel are available for the duration
of testing.

6.1.1.2 Equipment and Facilities

- a. Requisition required supplies and special equipment not readily available at the test site.
- b. Make necessary arrangements for use of equipment, special facilities, and instruments listed under paragraph 3.
- c. Upon notice of arrival or estimated time of arrival of the test item, arrange for or secure the following:
 - 1) Request authority to operate the electronic equipment on required frequencies during specific periods.
 - 2) Appropriate met station field emplacement points.
 - 3) Assistance of the Aviation Command for an appropriate aircraft to be used in conjunction with the vulnerability to detection and identification test.
 - 4) Assistance of the U. S. Army Airborne, Electronics and Special Warfare Board (USAAESWBD) in conducting the air transportability position of this test.

6.1.2 Safety

- a. Secure the engineering safety release or a safety statement from the engineering agency as prescribed by references 4B and 4C.
- b. Verify that the test item's safety statement is valid and up-to-date.
- c. Verify that all service test personnel have been adequately trained in the safety requirements and the safety restrictions pertaining to the test item.

6.1.3 Pre-Test Operations

6.1.3.1 Technical Inspection

Perform a technical inspection on the test item as described by the applicable sections of MTP 6-3-501 and MTP 2-3-500 for vehicles/vans which are a permanent part of the test item.

6.1.3.2 Physical Characteristics

Determine the physical characteristics of the test item as described in the applicable sections of MTP 6-3-500 and MTP 2-3-500 for vehicles/vans which are permanent part of the test item.

6.1.3.3 Electrical Characteristics

Determine the electrical characteristics and the power requirements of the test item as described by the applicable sections of MTP 6-3-517.

6.2 TEST CONDUCT

- a. Subtests shall be conducted concurrently with, or in conjunction

with, other subtests, whenever possible, so that the time taken to collect the required data can be minimized.

b. Subtests shall be conducted under all conditions of weather prevailing during the period of test.

6.2.1 Operational Characteristics

6.2.1.1 Emplacement, Preparation for Action, Operation, and March Order Suitability

Determine the ability of the average trained crew to emplace, prepare for action, operate and march order meteorological equipment as described by the applicable sections of MTP 6-3-505 and MTP 6-3-504, during daylight hours having moderate ambient temperatures with no precipitation, as follows:

- a. Unload the test item from the transport, unpack it from the carrying case(s), and emplace it as described in the test plan.
- b. Determine and record the optimum crew size.
- c. Record the following:
 - 1) Time required for:
 - a) Unloading
 - b) Unpacking
 - c) Emplacement
 - 2) Crew's proficiency
 - 3) Difficulties encountered
- d. Photograph the emplaced test item with a still camera.
- e. Prepare the test item for action and record the following:
 - 1) Time required to:
 - a) Orient the test item
 - b) Warm-up of the test item
 - c) Perform all required preoperational checks and adjustments
 - 2) Ease of:
 - a) Orienting the test item
 - b) Performing preoperational checks and adjustments
 - 3) Crew's proficiency
 - 4) Types of adjustments required (mechanical and electrical)
 - 5) Difficulties encountered
- f. Determine and record the optimum crew size for preparation for action of the test item.
- g. Operate the test item and record the following for each operational procedure:

NOTE: Double radiosonde flights, or applicable test item equipment flights, shall be made with meteorological values obtained from both radiosondes or test item equipments to maximum sounding levels. Tests shall include all processes involved in the production of a met message to determine operational suitability.

- 1) Time required, from start of emplacement, for:
 - a) Sounding to maximum height
 - b) Computing the initial message
- 2) Ease of operation
- 3) Crew proficiency
- 4) Types of adjustments required
- 5) Difficulties encountered
- 6) Adequacy of crews operating space

h. Determine and record the optimum crew size for operating the test item.

i. March order the test item and record the following:

NOTE: Performance to include packing the test item and loading it on it's transport.

- 1) Time required for:
 - a) Breakdown of equipment
 - b) Packing
 - c) Loading
- 2) Crew proficiency
- 3) Difficulties encountered

j. Determine and record the optimum crew size for march order.

k. Repeat steps a, c, e, f and h under conditions of darkness and blackout.

6.2.1.2 Electrical Characteristics

During the conduct of paragraph 6.2.1.1, determine and record the following:

- a. Equipment sensitivity tuning requirements
- b. Effects of minor variance and frequency on measurement accuracy
- c. Minimum warm-up time required for valid results

6.2.1.3 Accuracy

- a. Emplace the test item for operation.
- b. Calibrate the test item, as required, and conduct repeatability



checks.

c. Operate the test item utilizing a schedule of test soundings established to parallel other Fort Sill and special environmental location Met flights for comparison purposes.

d. If Met data is not available for comparison, gather Met data with instrumented measurements of the atmosphere by U. S. Air Force and U. S. Weather Bureau.

NOTE: The test item shall be emplaced and operated from the immediate vicinity of the comparison equipment.

e. Record the following:

- 1) Each test item sounding readings (data obtained from scheduled flights with the test item(s).
- 2) Discrepancies noted when comparing met data from test item and other sources.

6.2.2 Power Source

The provided power source and/or alternate power sources shall be used to furnish power to the test item during all phases of testing.

a. Determine the suitability and reliability of the test item's power source using the criteria in the applicable sections of MTP 6-3-517.

b. Determine and record the adequacy of the power source(s) in respect to providing sufficient and proper electrical output with emphasis on peak power requirements.

c. Record the number and types of power failure experienced during testing.

d. Determine whether actual performance meets the expected performance requirements as depicted in appropriate technical manuals and publications for specific power supplies.

e. Record all requirements for replacement of parts, electrical or mechanical.

f. Determine and record equipment reaction to commercial power (110-120 volt, 60 cycle) sources.

6.2.3 Electrical Interferences

Determine the effects of electronic signals on the operability of the test item(s), and the test item's effect on local electronic equipment by performing the tests described in the applicable sections of MTP 6-3-513 and the following:

a. Representative radio, radar, and other electronic equipment normally operated in the vicinity of the test item will be emplaced and operated in conjunction with the test item(s) to reflect any degradation of effects on the emplaced equipment, the test item, or both.

b. Two sets of test item(s) equipment will be emplaced at various distances apart for determination of any mutual interference or effects on the

accuracy of readings.

c. Record the following:

- 1) Effects of the test item's operation on radios, radars, and other electrical equipment within the immediate area.
- 2) Effects of operating an emplaced radio, radar, and other electrical equipment on the test item's operation.
- 3) Any mutual interference between two test items operating simultaneously in the same immediate vicinity.

6.2.4 Effects of Weather

a. Throughout testing and during periods of inclement weather, including rain, snow, sleet and wind, blowing sand, extreme heat and cold, the test item will be employed to acquire Met information.

NOTE: When possible, the met data shall be acquired in conjunction with other U. S. Army Artillery Board (USAARTYBD) test projects and/or troop until training.

b. Determine the effects of weather on the test item as described in the applicable sections of MTP 6-3-509.

c. Record the following:

- 1) Types of weather causing specific type of malfunction during testing.
- 2) All malfunctions, failures, or difficulties attributable to inclement weather.
- 3) Any noted requirements for special care in cleaning and lubricating the test item due to changes in temperature, humidity, etc.
- 4) Any changes noted in normal speeds required to accomplish specific tasks due to weather effects.

6.2.5 Durability, Reliability and Ruggedness

Determine the durability, reliability and ruggedness of the test item and it's ancillary equipment using the criteria of MTP 6-3-506 and the following:

a. The test item shall be transported in various types of tactical vehicles over the following types of roads, for the mileage specified:

- NOTE:
1. Mileage shall be determined in accordance with reliability reference data of AMC Reliability Handbook, Volume I, and/or the appropriate QMR/SDR.
 2. Operational personnel shall accompany the test item.
 3. Mileage accumulated during the conduct of the other sections of this MTP may be included in the total mileage.

- 1) Twenty-five percent of the mileage over improved (secondary) roads.

- 2) Fifty percent of the mileage over unimproved roads
- 3) Twenty-five percent of the mileage cross-country

b. At the completion of each 200 miles of travel, the test item shall be subject to a meteorological mission (emplacement, setup, operation and march order).

c. After each 200 miles of tactical transporting and operation with only scheduled maintenance, note and record the following, as applicable:

- 1) Effects of prolonged field operation on test item.
- 2) Type of tactical vehicle(s) transporting the test item, if various vehicles are used for transporting.
- 3) Stowed configuration of test item.
- 4) Effects of stowing.
- 5) Damage sustained due to transporting.
- 6) Effects on accuracy determinations immediately after travel cycle.

d. Using the results of the maintenance and maintenance evaluation paragraph (6.2.12), determine and record the reliability and availability of the test item.

6.2.6 Vulnerability to Detection and Identification

6.2.6.1 Daylight Conditions

a. Emplace and operate the test item in an isolated area.

b. Determine and record the maximum distance at which the test item and it's ancillary equipment are audible to:

- 1) Unaided ear
- 2) Acoustic aids

c. If required, repeat step b with similar type equipment for comparison of noises. Record the results.

NOTE: Similar equipment shall be emplaced out of noise range of the test item.

d. Repeat steps b and c using available electronic locating device. Record the results and type of equipment used.

e. Determine and record the maximum distances at which the test item is discernible without and with camouflage, from it's emplacement, using:

- 1) Unaided eye
- 2) Optical instruments

f. Determine and record the maximum altitudes at which the test item is discernible with and without camouflage from aerial observations, using:

NOTE: Aerial observation shall be coordinated with the aviation command.

- 1) Unaided eye
- 2) Optical instruments
- 3) Aerial photography

6.2.6.2 Darkness and Blackout Conditions

Repeat steps e and f, paragraph 6.2.6.1, under conditions of darkness and blackout.

6.2.7 Air Transportability

NOTE: The conduct of airborne tests shall be coordinated with the U. S. Army Airborne Electronics and Special Warfare Board (USAAESWBD).

6.2.7.1 Internal Air Transportability

a. Determine the suitability of the test item to be air transported tied down in an aircraft, as described in the applicable sections of MTP 7-3-515, and record the following:

- 1) Difficulties encountered while loading, unloading and tying-down.
- 2) Type of aircraft used
- 3) Damage(s) sustained by the test item, if any
- 4) Air conditions

b. At the completion of the test, unload the test item, emplace and operate it with only operator type of maintenance. Record any difficulties.

c. Repeat steps a and b for each suitable aircraft, as applicable.

d. Repeat steps a through c with the test item secured in a vehicular transporter, if applicable.

e. The test item as secured on the aircraft shall be photographed with a still camera.

6.2.7.2 External Air Transportability

a. Determine the suitability of the test item to be air transported while being carried externally by a rotary wing aircraft, as described in the applicable sections of MTP 7-3-516, and record the following:

- 1) Difficulties encountered while attaching, detaching, and carrying the test item.
- 2) Type of aircraft used.
- 3) Damage(s) sustained by the test item, if any.
- 4) Air conditions

b. At the completion of the test, detach the test item, emplace and operate it with only operator type of maintenance. Record any difficulties.

c. Repeat steps a through c with the test item secured in a vehicular transporter, if applicable.

- d. Repeat steps a and b for each suitable aircraft, as applicable.
- e. The test item as secured to the aircraft shall be photographed with a still camera.

6.2.7.3 Air Drop Capability

a. Determine the suitability of the test item for a parachute drop as described in the applicable sections of MTP 7-3-512, and record the following:

- 1) Difficulties encountered preparing and loading the test item for drop by parachute.
- 2) Aircraft used.
- 3) Damage(s) sustained by the test item.
- 4) Air conditions.

b. At the completion of the air drop, the test item shall be emplaced and operated with only operator type maintenance. Record any difficulties.

c. Repeat steps a and b with the test item secured in a vehicular transporter, if applicable.

d. Air drop test procedures shall be photographed with a motion picture camera.

6.2.8 Surface Transportability

6.2.8.1 Individual Test Item

a. Determine the surface transportability of the test item as described in the applicable sections of MTP 6-3-510, and record the following:

- 1) Type of transport used (2½ T truck, 3/4 T truck, LST, railcar, etc.).
- 2) Damage(s) sustained by test item.
- 3) Difficulties encountered while loading, unloading, and tying-down the test item.

b. At the completion of the test, the test item shall be emplaced and operated with only operator type maintenance. Record any difficulties.

c. Repeat steps a and b with the test item being transported by each carrier prescribed in the test plan.

6.2.8.2 Vehicular Mounted Test Item

a. Vehicular mounted test items shall be tested using the criteria of MTP 2-3-519, and the following shall be determined and recorded:

- 1) Type of vehicle.
- 2) Damage(s) sustained by the test item.
- 3) Vehicle cargo loading adaptability as described in the applicable sections of MTP 2-3-526.
- 4) Vehicle cargo capacity as described in the applicable sections of MTP 2-3-503.

5) Any difficulties encountered.

b. At the completion of the test, the test item shall be prepared for operation and operated with only operator type maintenance. Record any difficulties.

c. Repeat steps a and b using the appropriate vehicles as prescribed in the test plan and record comparative results among the vehicles utilized as transport platforms in relation to automotive performance, space allowance, ventilation, and adequacy of component stowage.

d. Photograph the test item as mounted and stowed on each type vehicle with a still camera.

6.2.9 Compatibility with Related Equipment

Determine the compatibility of the test item with it's related equipment as described in the applicable sections of MTP 6-3-512.

6.2.10 Human Factors Engineering

a. During the conduct of the test, determine the skill level required for operation and maintenance, the suitability of the test item's design with respect to location of indicating devices, adjustment devices, carrying, handling and fastening and connecting devices, adequacy of operating space, those operations which are unduly time consuming, fatiguing or inconvenient, and existing and/or potential safety hazards as described in MTP 6-3-525.

b. For vehicular mounted test items, repeat step a and perform the applicable sections of MTP 2-3-516, and determine the following:

- 1) The adequacy and suitability of seating for required crew members.
- 2) Availability of space for servicing the test item to include adequacy, comfort and safety.

6.2.11 Safety Confirmation

Determine the safety of the test item by performing the applicable sections of MTP 6-3-523 and MTP 2-3-501 for vehicles/vans which are a permanent part of the test item, and the following:

a. Confirm the safety release or safety statement under the specified conditions of the release, and determine that no foreseeable hazards exist in the testing or continuous use of the test item.

b. Conduct a thorough inspection of the electrical system to ensure that adequate provisions have been made to eliminate or minimize high voltage and fire hazards. Record results of inspection.

c. Confirm the requirement or nonrequirement for establishing a danger zone to protect against RF energy in the vicinity of the radiator.

d. Record, evaluate, and analyze any safety hazards resulting from storage, transport, operation, and maintenance of the test item to include any specific peculiarities of the transport vehicle.

6.2.12 Maintenance and Maintenance Evaluation

Perform maintenance evaluation of the test item as described in applicable sections of MTP 6-3-524, as follows:

- a. Perform authorized maintenance functions in consonance with the level of assignment by the maintenance allocation chart and appropriate technical manuals, and determine the ease of performing each task.
- b. Record all requirements for additional tools, shortcomings in authorized tools, and special tools needed to accomplish the assigned level of maintenance.
- c. Inspect, check, and evaluate the contents of the maintenance package. Record any shortcomings or oversimplification of the tasks to be performed.
- c. Record all maintenance man-hours expended by job performed.
- e. Evaluate and record the skill level required to perform maintenance.
- f. Record all requirements for replacement of parts, electrical or mechanical, and note interchangeability of parts.

6.2.13 Environmental Suitability

The applicable procedures of paragraphs 6.2.1 through 6.2.1.2 shall be performed under actual or simulated tropic, desert, and arctic environmental test conditions as described in the applicable sections of MTP 10-4-001 (Desert), MTP 10-4-002 (Arctic), and MTP 10-4-003 (Tropic) to determine the effects of these conditions on the operability of the test item with emphasis on the following, as applicable:

- a. Time required for installation, emplacement and march order.
- b. Time required to complete specific operational procedures when dressed in special clothing with individual equipment.
- c. Effects of extreme temperature on lubricants and requirements for special lubricants.
- d. Durability of knobs, handles, cables, movable parts, etc., under temperature extremes.
- e. Effects of heavy rainfall, continuous exposure to high relative humidity of the air, dust, insects, and fungi (mold, mildew, and slime).
- f. Effects of corrosion on electronic devices and components, metal components, fabrics, and the etchings of glass optical instruments.
- g. Environmental testing will be conducted in accordance with applicable requirements of AR 705-15.

6.3 TEST DATA

6.3.1 Preparation for Test

6.3.1.1 Personnel

Record the following:

- a. For the test personnel:

- 1) Rank
- 2) MOS
- 3) Time spent in MOS, in weeks
- 4) Time spent in training, in weeks

b. Adequacy of training literature furnished with test item.

6.3.1.2 Pre-Test Operation

6.3.1.2.1 Technical Inspection -

Data shall be collected and recorded as described in the applicable sections of MTP 6-3-501 and MTP 2-3-500, as applicable.

6.3.1.2.2 Physical Characteristics -

Data shall be collected and recorded as described in the applicable sections of MTP 6-3-500 and MTP 2-3-500, as applicable:

6.3.1.2.3 Electrical Characteristics -

Data shall be collected and recorded as described in the applicable sections of MTP 6-3-517.

6.3.2 Test Conduct

6.3.2.1 Operational Characteristics

6.3.2.1.1 Emplacement, Preparation for Action, Operation, and March Order Suitability -

a. Record the following:

- 1) Light conditions (daylight, darkness, blackout).
- 2) Description of emplacement (i.e., van setup for operation, operational site prepared in an opening of a wooded area, etc.).
- 3) Ambient temperature, in °F.
- 4) Precipitation, if any.
- 5) Wind speed, in mph.
- 6) Relative humidity, in percent.
- 7) Wind direction.
- 8) Data collected as described in the applicable sections of MTP 6-3-504 and MTP 6-3-505, including the following:

a) For emplacement:

- (1) Optimum size crew
- (2) Time, in minutes, required for:
 - (a) Unloading
 - (b) Unpacking
 - (c) Emplacement

- (3) Crew's proficiency
 - (4) Difficulties encountered
- b) For preparation for action:
- (1) Time, in minutes, required to:
 - (a) Orient the test item.
 - (b) Warmup the test item.
 - (c) Perform all required preoperational checks and adjustments.
 - (2) Ease of:
 - (a) Orienting the test item
 - (b) Performing preoperational checks and adjustments
 - (3) Crew's proficiency
 - (4) Types of adjustments required
 - (5) Difficulties encountered
 - (6) Optimum crew size
- c) For operations:
- (1) Time, in minutes, required, from start of emplacement, for:
 - (a) Sounding to maximum
 - (b) Computing the initial message
 - (2) Ease of operation
 - (3) Crew's proficiency
 - (4) Types of adjustments required
 - (5) Difficulties encountered
 - (6) Adequacy of crew's operating space
 - (7) Optimum crew size
- d) For march order:
- (1) Time, in minutes, required for:
 - (a) Break down of equipment
 - (b) Packing
 - (c) Loading
 - (2) Crew's proficiency
 - (3) Difficulties encountered
 - (4) Optimum crew size

b. Retain all photographs taken.

6.3.2.1.2 Electrical Characteristics -

Record the following:

- a. Equipment sensitivity tuning requirements
- b. Effects of minor variance and frequency on measurement
- d. Minimum allowable warm-up time, in minutes

6.3.2.1.3 Accuracy -

Record the following:

- a. Each test item sounding reading.
- b. Met data made available or gathered for comparison.
- c. Discrepancies noted when comparing met data from test item and other sources.

6.3.2.2 Power Source

Record the following:

- a. Data collected and recorded as described in the applicable sections of MTP 6-3-517.
- b. The adequacy of the power source in respect to providing sufficient and proper electrical output.
- c. Number of power failures during testing.
- d. Types of power failures.
- e. Whether actual performance meets the expected performance requirements.
- f. All requirements for replacements of parts, electrical or mechanical.
- g. The effect of commercial power on the test item(s) operation.

6.3.2.3 Electrical Interference

Record the following:

- a. Data collected as described in the applicable sections of MTP 6-3-513.
- b. Effects of the test item's operation on radios, radars, and other electrical equipment within the immediate area.
- c. Effects of operating an emplaced radio, radar, and other electrical equipment on the test item's operation.
- d. Any mutual interference between two test items operating simultaneously in the same immediate vicinity.

6.3.2.4 Effects of Weather

Record the following:

- a. Data collected as described in the applicable sections of MTP 6-3-509.

- b. All malfunctions, failures or difficulties attributable to inclement weather.
- c. Prevailing weather conditions which contributed to each malfunction, failure, etc.
- d. Any noted requirements for special care in cleaning and lubricating the test item.
- c. Any changes noted in normal speed required to accomplish specific tasks due to weather effects.

6.3.2.5 Durability, Reliability and Ruggedness

Record the following:

- a. Data collected using the criteria of MTP 6-3-506.
- b. Mileage traveled, in miles, over:
 - 1) Improved roads
 - 2) Unimproved roads
 - 3) Cross-country
- c. At the completion of each 200 miles of tactical transporting, field operation and continuous operation with only scheduled maintenance, record the following, as applicable:
 - 1) Effects of prolonged field operation
 - 2) Type(s) of tactical transporting vehicle(s)
 - 3) Stowed configuration of test item
 - 4) Effects of stowing
 - 5) Damage sustained due to transporting
 - 6) Effects on accuracy determination immediately after travel cycles
- d. The reliability and availability of the test item as determined using the results of maintenance requirements.

6.3.2.6 Vulnerability to Detection and Identification

- a. Record the following for each aural observation:
 - 1) Maximum distance, in meters, at which the test item and it's ancillary equipment can be detected by:
 - a) Unaided ear
 - b) Acoustic aids
 - 2) If required, the results of comparing the test item noises with similar equipment.
 - 3) When using electronic locating devices:
 - a) Type of equipment used
 - b) The results

b. Record the following for each visual observation from ground positions:

- 1) Visibility conditions (daylight, darkness, blackout).
- 2) Test item emplacement condition (camouflage, uncamouflage).
- 3) Maximum distance, in meters, at which the test item is discernible by:
 - a) Unaided eye
 - b) Optical instruments

c. Record the following for each aerial observation:

- 1) Visibility condition (daylight, darkness, blackout).
- 2) Maximum altitude, in feet, at which the test item can be detected by:
 - a) Unaided eye
 - b) Optical instruments
 - c) Aerial photography

d. Retain all photographs.

6.3.2.7 Air Transportability

6.3.2.7.1 Internal Air Transportability -

a. Record data collected as described in the applicable sections of MTP 7-3-515.

b. Record the following for each aircraft used:

- 1) Difficulties encountered while loading, unloading, and tying-down.
- 2) Aircraft used.
- 3) Damage(s) sustained by the test item, if any.
- 4) Air conditions.
- 5) Type of vehicular transporter, if applicable.

c. Record any operational difficulties due from air transportability.

d. Retain all photographs.

6.3.2.8 Surface Transportability

6.3.2.8.1 Individual Test Item -

Record data collected as described in the applicable sections of MTP 6-3-510, and the following for each mode of transportation:

- a. Type of transport.
- b. Damage(s) sustained by test item.
- c. Difficulties encountered while loading, unloading and tying-down

the test item.

- d. Any operational difficulties due from the test.

6.3.2.8.2 Vehicular Mounted Test Item -

a. Record data collected as described in the applicable sections of MTP 2-3-519, and the following for each type of vehicle:

- 1) Type of vehicle (3/4 T trailer, van, etc.).
- 2) Damage(s) sustained by the test item.
- 3) Cargo loading adaptability as described in the applicable sections of MTP 2-3-526.
- 4) Cargo capacity as described in the applicable sections of MTP 2-3-503.

b. Record any operational difficulties due from the test.

c. Comparative results determined from the vehicles utilized in relation to automotive performance, space allowance, ventilation, and adequacy of component storage.

d. Retain all photographs.

6.3.2.7.2 External Air Transportability -

a. Record data collected as described in the applicable sections of MTP 7-3-516.

b. Record the following for each aircraft used:

- 1) Difficulties encountered while attaching, detaching, and carrying test item.
- 2) Aircraft used.
- 3) Damage(s) sustained by the test item, if any.
- 4) Air conditions.
- 5) Type of vehicular transporter, if applicable.

c. Record any operational difficulties due from air transportability.

d. Retain all photographs.

6.3.2.7.3 Air Drop Capability -

a. Record data collected as described in the applicable sections of MTP 7-3-512.

b. Record the following for each air drop:

- 1) Difficulties encountered preparing and loading the test item for drop by parachute.
- 2) Aircraft used.
- 3) Damage(s) sustained by the test item.
- 4) Air conditions.

c. Record any operational difficulties due from air dropping.

d. Retain all photographs.

6.3.2.9 Compatibility with Related Equipment

Record data collected as described in the applicable sections of MTP 6-3-512.

6.3.2.10 Human Factors Engineering

Record data collected as described in the applicable sections of MTP 6-3-525, including the following:

- a. Suitability of the location and shape of:
 - 1) Dials, meters, indices, and other instruments or indicators.
 - 2) Knobs, handles, straps, fasteners, cables, connectors, and other items requiring manual operations.
- b. Suitability of the display of data.
- c. Presence of existing and/or potential safety hazards.
- d. Tasks which are unduly time-consuming, fatiguing, or inconvenient.
- e. Adequacy of space for efficient operations and easy access for maintenance, including when personnel are wearing environmental and/or protective clothing.
- f. Skill levels required for:
 - 1) Operation
 - 2) Maintenance
- g. Additionally, for vehicular mounted test items, data collected as described in the applicable sections of MTP 2-3-516, and the following:
 - 1) Adequacy and suitability of seating for required crew members.
 - 2) Availability of space for servicing the test item to include adequacy, comfort, and safety.

6.3.2.11 Safety Confirmation

Record the following:

- a. Data collected and recorded as described in the applicable sections of MTP 6-3-523, and MTP 2-3-501, if applicable:
- b. Discrepancies of safety conditions of test item from safety release or safety statement.
- c. Corrections required to minimize electrical hazards.
- d. Safety hazards resulting from:
 - 1) Stowage
 - 2) Transportation
 - 3) Operation
 - 4) Maintenance
 - 5) Peculiarities of the transport vehicle

e. Confirmation of the requirement or nonrequirement for establishing a danger zone to protect against RF energy in the vicinity of the radiator.

6.3.2.12 Maintenance and Maintenance Evaluation

Record the following:

- 6-3-524.
- a. Data collected as described in the applicable sections of MTP
 - b. Ease of performing each maintenance task.
 - c. Shortcomings in authorized tools.
 - d. Requirement for additional or special tools to accomplish the assigned level of maintenance.
 - e. Deficiencies in maintenance package.
 - f. Any shortcomings or oversimplification of the tasks to be performed.
 - g. Number of man-hours expended.
 - h. Skill level required to perform assigned levels of maintenance.
 - i. Requirements for replacement of parts (electrical or mechanical).
 - j. Interchangeability of parts (electrical or mechanical).
 - k. Difficulties encountered.

6.3.2.13 Environmental Suitability

Data shall be collected and recorded as described in paragraphs 6.3.2.1 through 6.3.2.12 and the applicable sections of MTP 10-4-001, MTP 10-4-002, and MTP 10-4-003.

6.4 DATA REDUCTION AND PRESENTATION

a. All data outlined or referred to under conduct of test shall be recorded and retained in log form for reference and comparison purposes and to be used during the collection of test data and preparation of the final report. This shall include, but not necessarily be limited to:

- 1) The results of inspection upon arrival.
- 2) The initial and final reports of technical inspection.
- 3) Organizational preoperational maintenance requirements.
- 4) All locally produced photography.

b. The obtained test data when analyzed and reduced to recurrent failures or design shortcomings shall determine the degree that the test item meets the requirements of the QMR and TC.