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Materiel Test Procedure 6-3-105
Electronic Proving Ground

11 February 1970

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

GROUND STATION, GEODETIC, RADIO RANGING

1. OBJECTIVE

The objective of this MTP is to describe the service test procedures required to determine the degree to which the ground station portion of geodetic survey systems meets the military characteristics expressed in the Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), or other applicable criteria, and the suitability of the equipment for military use.

2. BACKGROUND

Geodetic surveying by air-ground radio ranging techniques relies on the ability of the system to measure long distances on the earth's surface efficiently and accurately. The long distance measuring capability permits accurate surveying under conditions which would not allow the use of any other method. Large bodies of water can be crossed and surveys extended across land masses impenetrable to ground survey parties.

A typical geodetic survey system employing radio ranging techniques is composed of an airborne interrogator-distance measuring set and several compatible transponder sets located at widely separated pre-planned ground positions. With the aircraft operating on planned flight paths relative to the ground stations, the airborne set sequentially interrogates the transponders and transmits ranging signals. As each transponder is interrogated, it retransmits the ranging signals it receives from the aircraft. The airborne set compares the ranging signals received from the ground with those it transmitted, measures the phase delay and converts the delay data to slant range data. The range to each ground station is displayed in decimal form as it is computed and, in addition, the range, time, and identification data is recorded for post-mission computer processing to geodetic data. Each ground station responds only to its own coded interrogation signal which occurs 10 times each second, thus the total number of ground stations, e.g. six are interrogated and reply sequentially 10 times each second.

A single ground station normally consists of a transmitter-receiver-antenna unit mounted on a telescoping mast and a control-indicator unit which incorporates operating condition test features and provision for alternate use of the station for voice radio communication with the aircraft when not ranging.

The various factors involved in establishing and operating the survey ground stations in requisite locations, frequently in remote areas difficult of access, requires that prototype ground station equipments be subjected to a comprehensive service test to determine the suitability for military use.

3. REQUIRED EQUIPMENT

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a. Field test sites.
b. Distance measuring-interrogator set compatible with test item.
c. Aircraft (rotary wing) and ground vehicles.
d. Radio sets for test coordination net.
e. Stop watches.
f. Power unit (primary) if not furnished as part of test item.
g. Photographic equipment, still and/or cine, and sound recording equipment.
h. Meteorological instrumentation.

4. REFERENCES

A. MIL-E-5400, Electronic Equipment, General Specification for, 1966.
B. MIL-E-4158, Electronic Equipment, Ground, General Specification for, 1967.
C. MIL-E-9412, Data for Aerospace Ground Equipment.
D. Technical Report SEG-TR-64-72, SHORAN Geodetic Survey System, Electronic AN/USQ-32, Cubic Corporation, April 1965.
E. ROSS, J.E.R., "Geodetic Applications of SHORAN", Geodetic Survey of Canada, Publication No. 78.
F. Report No. 43, Notes, Tables and Glossary on Orbital and Geodetic Terms, Dynalectron Corporation, February 1963.
G. Aalakson, E.I., Fickeissen, I.O., "The Effects of Meteorological Conditions on the Measurement of Long Distances by Electronics," Transactions, American Geophysical Union, Vol. 31, No. 6, pp 816-826, December 1950.
H. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.
I. MTP 3-1-002, Confidence Intervals and Sample Size.
J. MTP 6-3-500, Physical Characteristics.
K. MTP 6-3-502, Personnel Training Requirements.
L. MTP 6-3-505, Emplacement, Action and March Order.
M. MTP 6-3-506, Durability.
N. MTP 6-3-509, Effects of Weather.
O. MTP 6-3-510, Transportability.
P. MTP 6-3-513, Qualitative Electromagnetic Interference.
Q. MTP 6-3-523, Safety.
R. MTP 6-3-524, Maintenance Evaluation.
S. MTP 6-3-525, Human Factors.
T. MTP 7-3-512, Airdrop Capability.
U. MTP 7-3-515, Air Transportability, Internal.

5. SCOPE

5.1 SUMMARY

5.1.1 Technical Characteristics

The procedures outlined in this MTP provide general guidance for determining the degree to which the test item meets current military requirements for radio ranging ground stations as expressed in the appropriate QMR,

SDR, or other applicable criteria. The cumulative test results together with the results of appropriate common service tests will allow an estimate to be made of the suitability of the equipment to meet the required military needs.

The specific tests to be performed, (as appropriate for a specific item), along with their intended objectives, are listed below:

a. Operational Test - The objective of this subtest is to determine the capability of average crews trained to accomplish the entire radio ranging and communications mission with the test items, utilizing electrical/electronic operating features such as the integral functional test facilities, response to interrogations, and integral radio communications.

b. Qualitative Electromagnetic Interference - The objective of this subtest is to determine the objectionable radiation or emission caused by operation of the test item, and the interference to the test item caused by electromagnetic radiation from other equipment in the system operating environment.

c. Physical Characteristics - The objective of this subtest is to determine the adequacy and suitability of vehicle, van, or shelter when provided or specified for use with the test item.

d. Durability - The objective of this subtest is to evaluate the time in service, failure potential of components, and operational durability limits of the test item during transportation, emplacement and functioning.

e. Transportability - The objective of this subtest is to determine the suitability of the test item for movement in tactical situations by those modes common to the Army.

f. Adverse Conditions/Effects of Weather - The objective of this subtest is to determine the capabilities and limitations imposed upon the operation of the test item caused by exposure to extremes of weather and terrain.

g. Maintenance - The objective of this subtest is to determine the accessibility and susceptability of the test item to the accomplishment of the scheduled and non-scheduled maintenance tasks over the entire period of service testing, and needs for specialized tools and instruments to accomplish assigned levels of maintenance, and to determine the mission reliability of the test item in terms of failure-free operation time, mean time between failures, maintenance down time, and mean time for repair.

h. Safety - The objective of this subtest is to determine the safety hazards encountered during transportation, emplacement, functioning, and recovery of the test item throughout the period of testing.

i. Human Factors - The objective of this subtest is to determine the design operational features of the test item conductive to error and delay in mission accomplishment by user personnel.

j. Emplacement and Displacement - The objective of this subtest is to evaluate thephysical aspects of transporting, installing, and displacing the test item in different types of terrain relative to time, manpower, and vehicle requirements.

k. Personnel Training Requirements - The objective of this subtest is to determine the scope and effectiveness of pre-test training associated with operation of the test item and needs for additional training in the same or different fields.

l. Adequacy of Instruction Manuals - The objective of this subtest is to determine whether the instruction manuals conform to the applicable Army Regulations and are suitable for training operating and maintenance personnel

possessing the required basic skills.

5.1.2 Common Service Tests

Not included in this MTP are the following Common Service Tests which apply to these commodities:

a. MTP 6-3-501, Pretest Inspection for Service Test
b. MTP 6-3-504, Ease of Installation and/or Rigging Operations
c. MTP 6-3-517, Electrical Power Requirements

5.2 LIMITATIONS

The procedures contained in this MTP are limited to the testing of those characteristics of ground station transponder sets which are not covered in the referenced common MTP's, and are intended to be performed by military personnel of appropriate MOS level.

6. PROCEDURES

6.1 PREPARATION FOR TEST

a. Select and schedule suitable transportation and operational areas at representative environmental locations as required by applicable test directive, test procedure and corresponding MTP.

b. Upon establishing the scheduled availability of the test item coordinate the availability of the following:

1) Engineering safety release or other safety statement.
2) Maintenance support facilities, spare parts, and personnel.
3) Equipment, special facilities, and instrumentation with special attention to timely provision of additional supplies or special equipment not readily available at the test site.

c. Select test equipment having ideally an accuracy of at least ten times greater than that of the function to be measured, that is in keeping with the state of the art, and with calibrations traceable to the National Bureau of Standards.

d. Record the following information:

1) Nomenclature, serial number(s), manufacturer's name and function of the item(s) under test.
2) Nomenclature, serial number, accuracy tolerances, calibration requirements, and last date calibrated of the test equipment selected for the tests.

e. Ensure that all test personnel are familiar with the required technical and operational characteristics of the item under test, such as stipulated in Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), and Technical Characteristics (TC).

f. Review all instructional material issued with the test item by

the manufacturer, contractor, or government, as well as reports of previous tests conducted on the same types of equipment, and familiarize all test personnel with the contents of such documents. These documents shall be kept readily available for reference.

g. Prepare record forms for systematic entry of data, chronology of test, and analysis in final evaluation of the test item.

h. Prepare adequate safety precautions to provide safety for personnel and equipment, and ensure that all safety SOP's are observed throughout the test and that the item has successfully completed MTP 6-3-523, Safety.

i. Prepare a test item sample plan sufficient to ensure that enough samples of all measurements are taken to provide statistical confidence of final data in accordance with MTP 3-1-002. Provisions shall be made for modification during test progress as may be indicated by monitored test results.

j. Ensure that all support aircraft are properly instrumented, that arrangements for supporting and participating agencies, activities, and facilities have been made, and that authorization for electromagnetic radiation at specific frequencies, power levels, and modulations for required periods has been obtained.

k. Ensure that appropriate security measures are instituted as required to safeguard classified materiel and data.

6.2 TEST CONDUCT

NOTE: Performance assessment shall be accomplished throughout this test primarily by observers equipped with the means of recording visual, aural, and judgmental observations and related time factors. Observer activities shall not interfere with or influence in any manner, the functions of test item or system operators.

6.2.1 Operational Test

NOTE:

1. This test shall be performed at a minimum of two test sites which differ with respect to accessibility, i.e. requiring transportation by:

   a) Ground vehicle and/or manpack
   b) Air lift or air drop

2. The separate site tests may be conducted consecutively or concurrently dependent upon the number of available test items, personnel, and vehicles and the total available test time.
3. A test signal source shall be emplaced at a distant line-of-sight ground location relative to each test site or operated in an aircraft flying prescribed flight patterns. The test signal source may be the interrogator-DME set of the survey system or comparable equipment having the minimal capability of transmitting typical signals, receiving-verifying transponder reply signals, and compatible voice radio communication.

a. Deploy the ground station(s) in a representative tactical relationship in consonance with the system type and concepts of employment as expressed in the applicable QMR/SDR and current doctrine.

b. Prepare a description of the test phase to include a scenario-type sequence of events and scaled diagrams showing, as appropriate:

1) Location of ground-based elements
2) Flight paths and altitudes for airborne elements
3) Inter-element angular relationship (horizontal and vertical)

c. Station observers as required to measure and record data, verify correct power source, necessary test instrumentation and inter-connection cabling, and that the equipment is aligned, if necessary, as specified in the pertinent operating instructions to ensure, insofar as possible, it represents an average equipment in normal operating condition.

d. Energize all equipment and calibrate all test instrumentation as a unit.

e. Check the test item operating values and modes by means of the integral test facility in accordance with the instructions provided with the test item. Record the data.

f. Set the station select control to the #1 position, making the test item responsive only to a Station #1 interrogation keying signal. Set other controls as required for the ranging mode of operation.

g. Using the test coordination radio net, request activation of the interrogator set (test signal source) and transmission of Station #1 interrogation-ranging signals.

h. Observe the test item reaction as displayed on the control-indicator unit and record the data, for example:

1) AGC LEVEL meter deflection, indicating that the test item receiver is phase-locked to the carrier.
2) KEY RECEIVED lamp lighted, indicating recognition of the keying signal for which the transponder is set.
3) SIGNAL LEVEL meter deflection, indicating the level of the received ranging (modulation) signal.
4) TRANSMIT POWER meter deflection, indicating that the transponder transmitter is functioning.

i. Determine if the interrogator-DME set is receiving usable ranging signals from the test item.

j. Request the interrogator set operator to inhibit Station #1 interrogation and transmit sequentially, the interrogation signals coded for other stations of the system (#2 through #6 for instance). Observe that the test item does not respond as described in Step h, above. Record results.

k. Repeat Steps f. through j. above, with the test item operating as stations #2 through #6 in turn, as established by the station select control setting and appropriate interrogator set operation.

l. Change the test item operating mode from "ranging" to "communication" and request the interrogator set operator (via the test coordination radio net) to make the comparable mode change.

m. Conduct two-way signaling and talking tests between the inter-

rogator and test item stations via the survey system voice radio channel and record results.

n. With the interrogator set restored to the "ranging" mode and transmitting ranging signals, attempt ground-to-air voice radio transmission at the test item. Results should be negative until the emergency override feature is employed, e.g. by operating the test item "mode" control to "voice test" which signals the interrogator set.

o. Repeat the ranging and communication procedures a sufficient number of times to ensure acquisition of valid test data, rotating the operating personnel assignments in order to obtain meaningful human factors data.

p. Record the following for each trial:

1) Start and elapsed time of each operation
2) Test item location, ground coordinates
3) Number of test operators
4) Difficulties encountered

6.2.2 Qualitative Electromagnetic Interference Test

a. Deploy friendly electronic systems/equipments, of representative tactically collocated types to the item under test, at various distances (slant range) and orientations with respect to the test item.

b. Operate the friendly systems at intervals during the test phases outlined in paragraphs 6.2.1, and determine their effect on the test item and the test item's effect on the friendly systems in accordance with the procedures given in MTP 6-3-513.

6.2.3 Physical Characteristics

a. Subject the item under test to physical characteristics determination according to the procedures given in MTP 6-3-500.

b. Throughout the entire testing period, monitor any vehicle, van or shelter provided as part of or specified for use with the test item with respect to its adequacy and suitability for the intended mission.

c. Record narrative comments, obtained from all test personnel through daily observation, interview and questionnaire, concerning the following:

1) Equipment arrangement and mounting.
2) Ventilation, heating and air conditioning.
3) Lighting and blackout provisions.
4) Acoustical properties.
5) Protective features (CBR).
6) Roadability and safety.
7) Any other features which might affect the overall adequacy, suitability and physical characteristics of the test item.

d. Measure and record space required for:

1) Equipment (including integral and external antenna systems)
2) Power sources

3) Operator and maintenance activity

6.2.4 Durability

a. Throughout the entire period, monitor the durability characteristics of the test item in accordance with the procedures given in MTP 6-3-506. Ensure that the test item has been subjected to at least the following exposures:

1) Transport vehicles, paved roads - 500 miles
2) Transport vehicles, secondary roads - 100 miles
3) Tactical vehicles, cross country - 100 miles

b. In addition to the data specified in MTP 6-3-506, observe and record at 100-mile intervals, or at the end of the exposure, the incidence of defects in the test item and its components, including:

1) Inoperable electronic equipment (damaged enclosures, loose or broken connections, foreign material accumulations, damaged components).
2) Damaged or worn mechanical parts, to include component packaging, (bent or broken handles, and fasteners, defective seals, sluggish or restrained mechanical action).

6.2.5 Transportability

a. Subject the item under test to the transportability procedures given in MTP 6-3-510.

b. Utilizing appropriate tactical vehicles, transport the test item from a supply point to an emplacement site under daylight conditions.

c. Observe and record activities and times required to traverse the following applicable routes, for the distances noted:

1) Pavement - 50 miles
2) Secondary roads - 100 miles
3) Cross-country terrain - 50 miles

d. Repeat Steps (b) and (c) above, under conditions of darkness (blackout).

e. Determine the air transportability and air drop capability of the test item in accordance with applicable sections of MTP's 7-3-515 and 7-3-512, with attention to the following:

1) Adequacy of provisions and instructions for lifting or otherwise loading the test item in or on transport aircraft.
2) Suitability and adequacy of provisions and instructions for blocking and tie-down.
3) Suitability and adequacy of provisions, including materials and instructions, for rigging the test item for airdrop.

f. In addition to data required by applicable portions of MTP's

7-3-512 and 7-3-515, record the following:

1) Narrative comments, supported by photographs, relative to experience with loading and tieing down the test item inside aircraft, or rigging the test item for external transportation by aircraft. Cover un-loading from aircraft as well.
2) Narrative comments, supported by photographs, covering experience with air drop of the test item, including rigging, air drop operations, and final condition of the test item after drop.

6.2.6 Adverse Conditions/Effect of Weather

a. Subject the test item to the effect of weather procedures given in MTP 6-3-509.

b. Repeat the procedures given in paragraph 6.2.1 under the following conditions, as applicable:

1) Darkness (blackout).
2) Conditions not previously encountered in the course of testing to include:

a) Moderate temperatures with rain
b) Frigid temperatures with:

(1) Snow
(2) Sleet or icing conditions

c) Hot temperatures with:

(1) High humidity
(2) Low humidity

6.2.7 Maintenance

a. Throughout the conduct of all testing as outlined in this MTP, maintain a record of performance of scheduled and unscheduled maintenance as prescribed in the appropriate test item maintenance instructions. Assessment of all maintenance factors shall be accomplished in accordance with MTP 6-3-524 with special attention to record accuracy.

b. Compare all replacement parts and components provided with the test item with anticipated and actual requirements, evaluating spare parts requirements under actual operating conditions.

c. Record the requirements for additional tools and instruments, short comings in authorized tools and instruments, and needs for specialized tools and instruments to accomplish assigned levels of maintenance.

d. Record all repair parts used, man hours and elapsed time required, and level of skill demanded.

e. Starting with the initial assembly, set-up, and check-out of the test item upon receipt at the test agency, maintain a complete log of all assembly, installation, operation, disassembly, and maintenance activities

for the purpose of reliability analysis. The log shall include the following information:

1) Number of times the test item is assembled and installed from the field transport configuration.
2) Number of times the test is disassembled and repacked in the field transport configuration.
3) Hours of operation, daily and cumulative.
4) Equipment failures and malfunctions, including chronological data required to determine failure-free operating time, mean time between failures, maintenance downtime, and mean time for repair.
5) Effect of failures on the operational test conduct.

6.2.8 Safety

a. Throughout the conduct of all testing as outlined in this MTP, monitor all safety aspects associated with the test item in accordance with MTP 6-3-523.

b. In addition to data required by MTP 6-3-523, record narrative comments concerning the following:

1) Confirmation of safety release under conditions as specified in USATECOM Regulation 385-6.
2) Analysis to establish that no foreseeable hazards are present during testing or operation of the test item.
3) Inspection for high voltage hazard control and adequacy of protective provisions to include interlocks and warning placards.
4) Evaluation of any safety hazards, including radiological hazards, associated with storage, transportation, operation, and maintenance of the test item.

6.2.9 Human Factors

a. Throughout the conduct of all testing as outlined in this MTP, monitor and appraise human factors for the purpose of identifying design or operational features conducive to error and delay in mission accomplishment by user personnel in accordance with the procedures given in MTP 6-3-525.

b. Observe and record activities and average times of phases of the geodetic survey missions as accomplished by average trained crews.

6.2.10 Emplacement and Displacement

a. With the test item packed for field transit, transport the component items, auxiliary items, and personnel to a test site by the selected means (surface or air), and utilizing an average trained crew, install the test item complete and ready for operation in an applicable tactical situation in accordance with the instruction manual and MTP 6-3-505.

b. Observe and record the activities and times required to:

1) Dismount or otherwise make ready the test items, starting from the transportation configuration, and perform pre-operational adjustments.
2) Install the test items with the antenna mast in a precisely vertical position directly over the site control point, and the antenna oriented to the planned azimuth or sector relative to the distant test signal source.
3) Energize or otherwise prepare the test item for operation.

c. Repeat Steps (a) and (b) above, adding or subtracting one crew member for each trial, until the minimum and optimum crew sizes required to emplace the test item are established.

d. Utilizing the optimum crew size as determined above, recover the test items from an emplaced battlefield situation.

e. Observe activities and record times required to:

1) Disassemble the test item in an approximate reverse order to assembly.
2) Secure the component parts/subassemblies in the configurations prescribed for transit.
3) Load the test item assemblies and other equipment on the selected vehicles and accomplish movement to the next test site or test termination point.

f. Repeat Steps (d) and (e) above, at least three times, rotating the crew assignments for each trial.

g. In addition to data required by applicable portions of MTP 6-3-505, record the following for each emplacement/displacement trial:

1) Items handled
2) Vehicles used
3) Description of terrain traversed
4) Weather conditions

6.2.11 Personnel Training Requirements

a. Throughout the conduct of all testing as outlined in this MTP, monitor and evaluate all test item crew members and organizational maintenance personnel in accordance with MTP 6-3-502.

b. In addition to the data required by MTP 6-3-502, record narrative comments concerning the following training factors:

1) Scope and effectiveness of pre-test training.
2) Needs for additional training in the same or different fields.

6.2.12 Adequacy of Instruction Manuals

a. Throughout the entire testing period, review all operation and maintenance manuals furnished with the equipment for compliance with applicable Army Regulations, and utilize the manuals for classroom instruction and as

references throughout the tests.

b. Record narrative comments concerning adequacy of the manuals with respect to:

1) Accuracy
2) Completeness
3) Clarity
4) Ease of use
5) Effectiveness of prescribed methods

6.3 TEST DATA

6.3.1 Preparation for Test

Data to be recorded prior to testing shall include but not be limited to:

a. Nomenclature, serial number(s), manufacturer's name, and function of the item(s) under test.

b. Nomenclature, serial number, accuracy tolerances, calibration requirements, and the last date calibrated of the test equipment selected for the tests.

c. Damages to the test item incurred during transit and/or manufacturing.

6.3.2 Test Conduct

a. Data originating in all tests and phases shall be recorded in the following forms, as appropriate.

1) Operators', observers', and test controllers' logs
2) Narrative comment and observations
3) Maintenance records
4) Photographs; still, and/or cine
5) Diagrams, maps
6) Tape recordings

b. All data items shall be properly identified and annotated with respect to:

1) Test, subtest, test phase
2) Source
3) Time
4) Pertinent correlative information

c. Security classification shall be determined for each data item and appropriate security measures applied.

d. Data to be recorded in addition to specific instructions given in succeeding paragraphs for each subtest shall include:

1) Test item sample size (number of measurement repetitions)

2) Instrument or measurement system mean error stated accuracy

6.3.2.1 Operational Test

Record the following:

a. Test item operating values and modes.
b. Test item indications for each station interrogation keying signal.
c. Results of two-way signalling and talking tests for each survey system voice radio channel.
d. Start and elapsed time of each operation.
e. Test item location, ground coordinates.
f. Number of test operators.
g. Difficulties encountered.

6.3.2.2 Qualitative Electromagnetic Interference Test

Record the following:

a. Data as required by applicable portions of MTP 6-3-513

6.3.2.3 Physical Characteristics

Record the following:

a. Data as required by applicable portions of MTP 6-3-500
b. Narrative comments concerning the following:

1) Equipment arrangement and mounting.
2) Ventilation, heating and air conditioning.
3) Lighting and blackout provisions.
4) Acoustical properties.
5) Protective features (CBR).
6) Roadability and safety.
7) Any other factors which might affect overall adequacy, suitability and physical characteristics of the test item.

c. Space required for:

1) Equipment
2) Power sources
3) Operator and maintenance activities

6.3.2.4 Durability

Record the following:

a. Data as required by applicable portions of MTP 6-3-506.
b. Incidence of defects in the test item and its components at specified intervals.

6.3.2.5 Transportability

Record the following:

a. Data as required by applicable portions of MTP 6-3-510.
b. Times for accomplishment of transit and transit speed in miles per hour, annotated to define type of terrain and mode of transport.
c. Data as required by applicable portions of MTP's 7-3-512 and 7-3-515.
d. Narrative comments pertaining to loading and tieing down of test item inside the aircraft, rigging the test item for external transportation by aircraft, and unloading the test item from aircraft.
e. Narrative comments pertaining to airdrop of the test item.

6.3.2.6 Adverse Conditions/Effects of Weather

Record the following:

a. Data as required by applicable portions of MTP 6-3-509, annotated to show adverse conditions as applicable.

6.3.2.7 Maintenance

Record the following:

a. Data as required by applicable portions of MTP 6-3-524.
b. Performance of scheduled and unscheduled maintenance.
c. Requirements, short comings, and needs for specialized tools and instruments.
d. Repair parts used, man hours and elapsed time required, and level of skill demanded.
e. Number of times test item is assembled and installed from the field transport configuration.
f. Number of times test item is disassembled and repeated in the field transport configuration.
g. Hours of operation, daily and cumulative.
h. Equipment failures and malfunctions, including chronological data required to determine failure-free operating time, mean time between failures, maintenance downtime and meantime for repair.
i. Effects of failures on the operational test conduct.

6.3.2.8 Safety

Record the following:

a. Data as required by applicable portions of MTP 6-3-524
b. Narrative comments concerning the following:

1) Confirmation of safety release
2) Analysis of foreseeable hazards
3) Adequacy of protective provisions

4) Evaluation of present safety hazards

6.3.2.9 Human Factors

Record the following:

a. Data as required by applicable portions of MTP 6-3-525.
b. Test phases on motion picture film.
c. Times of accomplishment of phases in hours and minutes.
d. Narrative comments pertaining to capability of average trained crews to complete missions under all assigned conditions.

6.3.2.10 Emplacement and Displacement

Record the following:

a. Data as required by applicable portions of MTP 6-3-505.
b. Emplacement and displacement phases on motion picture film.
c. Times of accomplishment of emplacement and recovery in hours and minutes.
d. Items handled.
e. Vehicles used.
f. Description of terrain traversed.
g. Weather conditions.

6.3.2.11 Personnel Training

Record the following:

a. Data as required by applicable portions of MTP 6-3-502
b. Narrative comments concerning:

1) Scope and effectiveness of pre-test training
2) Needs for additional training

6.3.2.12 Adequacy of Instruction Manuals

Record the following:

a. Narrative comments concerning the accuracy, completeness, clarity, ease of use, and effectiveness of the prescribed methods of the manuals.

6.4 DATA REDUCTION AND PRESENTATION

Processing of raw test data shall, in general, consist of organizing, marking for identification and correlation, and grouping the test data according to subtest title. Test criteria or test item specifications shall be noted on the test data presentation to facilitate analysis and comparison. Where necessary, test data measurement units shall be converted to be compatible with units given by test criteria or specifications.

Pertinent data shall be extracted from daily activities logs and notes and collated for presentation in chart, graphic, and narrative form, as appropriate.

The data reduction process shall be accomplished by manual and/or automatic processes, employed as appropriate to the nature and form of the raw data. Insofar as possible, automatic data processing (ADP) methods and facilities should be used to facilitate extraction of data pertinent to various test parameters in different combinations. However, ADP methods may not be feasible or economical for small scale tests.

Common service test factors shall be treated individually in a separate section or in supplements or annexes if they are of sufficient scope, importance, and/or complexity. Each subject supplement shall include the applicable supporting data.

Equipment evaluation usually will be limited to comparing the actual test results to the equipment specifications and the requirements as imposed by the intended usage. The results may also be compared to data gathered from previous tests of similar equipment performed under similar conditions.

A written report shall accompany all test data and shall consist of conclusions and recommendations drawn from test results. The test engineer's opinion, concerning the success or failures of any of the functions evaluated shall also be included. In addition, equipment specifications that will serve as the model for a comparison of the actual test results should be included.

If the equipment is found to be unacceptable, reasons for its unacceptability shall be forwarded along with remedial suggestions for its improvement.

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10. DISTRIBUTION STATEMENT
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11. SUPPLEMENTARY NOTES
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12. SPONSORING MILITARY ACTIVITY
Headquarters
US Army Test and Evaluation Command
Aberdeen Proving Ground, Maryland 21005

13. ABSTRACT
This Army Service Test Procedure describes test methods and techniques for evaluating the performance and characteristics of Ground Station portion of Geodetic Survey Systems (Radio Ranging), and for determining the suitability of such equipment for service use in the U. S. Army. The evaluation is related to the criteria expressed in applicable Qualitative Materiel Requirements (QMR), Small Development Requirements (SDR), or other appropriate design requirements and specifications.

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