UNCLASSIFIED

AD NUMBER

AD759227

NEW LIMITATION CHANGE

TO

Approved for public release, distribution unlimited

FROM

Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operatinal Use; 23 Mar 1970. Other requests shall be referred to U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, MD.

AUTHORITY

USATEC ltr, 14 Dec 1970

THIS PAGE IS UNCLASSIFIED

AD 759227

23 March 1970

Materiel Test Procedure 6-3-150
U. S. Army Air Defense Board

3434

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

INTERROGATOR SET

1. OBJECTIVE

The objective of this procedure is to describe the service test procedures required to determine the performance of interrogator sets and their ancillary equipment measured against the requirements of applicable Qualitative Materiel Requirement (QMR) or Small Development Requirement (SDR), and the suitability of such items for Army use.

2. BACKGROUND

Radar systems employed for air defense surveillance, fire distribution, fire control, and for aircraft landing operations - airport surveillance and Ground-Controlled Approach (GCA) - are augmented in capability by the addition of airborne transponders and ground-based interrogation equipment. Capabilities which transponder/interrogator equipment provides may include Identification, Friend or Foe (IFF), individual aircraft identity, range, bearing, and altitude. Improved combinations of these capabilities, including secure IFF features, are likely to be programmed for future models of ground-based interrogator sets, as well as for new radar systems with which they must operate compatibly. Tests of the ability of service personnel to accomplish the mission assigned to interrogator set installations will continue to be a requirement in the U. S. Army test and evaluation program.

3. REQUIRED EQUIPMENT

a. Appropriate designated Radar Systems.
b. Suitable Fixed and Rotary Wing Aircraft, equipped with appropriate models of Airborne Transponders.
c. Maintenance Package, including Preliminary Operational and Maintenance Manuals (POMM), Preliminary Maintenance Allocation Chart (PMAC), other applicable literature, Test Sets, Spare Parts and Special Tools.
d. Maintenance and Repair Facilities.
e. Suitable Operational Radar Sites, Landing Control Centrals.
f. Independent Reference Radar for Target Position.
g. Communication Facilities, Radio and Wire, as required.
h. Cameras and Film, Still and Motion Picture.
i. Voice Recorders and Recording Medium.
j. Suitable Oscilloscopes.
k. Suitable Radar Data Recorder.
l. Suitable Event Recorder.
m. Meteorological Instrumentation.

4. REFERENCES

A. AR 70-10 Army Materiel Testing.

Best Available Copy

20040205055

B. AR 70-38, Research, Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions.
C. AR 320-5, Dictionary of United States Army Terms.
D. USATECOM Regulation 385-6, Verification of Safety of Materiel During Testing.
E. USAMC Regulation 385-12, Verification of Safety of Army Materiel.
F. USAMC Regulation 385-224, AMC Safety Manual.
G. USATECOM Regulation 705-4, Equipment Performance Report.
H. USATECOM Regulation 705-24, Management of Test and Test Support Aircraft.
I. USATECOM Regulation 705-25, Reliability Program for Materiel and Equipment.
J. USATECOM Regulation 705-26, Maintainability Program for Materiel and Equipment.
K. USATECOM Regulation 705-35, Criteria for Air Transportability and Air Drop of Materiel.
L. USAMC Regulation 750-15, Maintenance of Supplies and Equipment.
M. MTP 3-1-002, Confidence Intervals and Sample Size.
N. MTP 5-3-502, Manuals and Technical Literature.
O. MTP 5-3-504, Reliability and Durability (Quantitative Measure of Mean Time Between Failures and Overhaul, Repair Time).
P. MTP 6-3-500, Physical Characteristics.
Q. MTP 6-3-501, Technical Inspection.
R. MTP 6-3-502, Personnel Training Requirements.
S. MTP 6-3-505, Emplacement, Action and March Order.
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 6-3-514, Qualitative Frequency Accuracy and Stability.
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 (Suitability of Materiel for).
AB. MTP 7-3-515, Air Transport, Internal (Suitability of Materiel for).

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 interrogator set and its ancillary equipment, associated with applicable surveillance and control radar systems, meets current military requirements relative to criteria expressed in applicable documentation. The cumulative test results, along with the results of appropriate Common Service Tests, will permit an estimate to be made of the operational performance of the set and its suitability for military use.

The specific tests to be performed, and their objectives, are

described in succeeding paragraphs. These tests need not be conducted in the order presented; some may overlap or be performed simultaneously.

a. Preoperational Inspection and Physical Characteristics - The objective of this subtest is to verify the physical characteristics and arrival condition of the test item, its completeness and readiness for testing, and the overall Technical Characteristics (TC) as outlined for the test item.

b. Safety - The objective of this subtest is to confirm the safety of the test item and to determine the safety hazards encountered during installation and operation.

c. Personnel Training - The objective of this subtest is to determine the type of instruction required and whether the proposed Program Of Instruction (POI) is adequate to ensure soldier proficiency in the use of the test item.

d. Operational Characteristics - The objectives of this subtest are to:

1) Determine the times of functions and the skills required of military personnel to emplace, prepare for action, and march order the test item with each of the radar and fire distribution systems with which it is to be associated.
2) Evaluate the test items performance compared with requirements of the QMR or SDR, including, as applicable: maximum range, maximum and minimum altitude, accuracies of range and altitude displays, identification challenge and accuracy of identity symbol display.
3) Determine the test items susceptibility to jamming, to garbling by multiple aircraft in close formation, and whether multiple interrogator sets can successfully interrogate a single transponder without causing an over-interrogation condition.
4) Determine the capabilities and limitations imposed upon the operation of the test item caused by exposure to extremes of weather and terrain.

e. Transportability - The objective of this subtest is to determine the capability of the test item to be transported by appropriate carriers under service conditions.

f. Maintainability - The objectives of this subtest are to:

1) Determine the adequacy of the concepts defined for organizational, direct support, general support, and depot levels of maintenance, the skill levels required of maintenance personnel, the adequacy and completeness of the maintenance package, and the degree to which the test item's maintainability satisfies requirements of the QMR or SDR.
2) Determine the service availability of the test item under normal and adverse operating conditions, whether its reliability factor meets requirements of the QMR or SDR, and to derive information relative to expected service life and

necessary logistic support.

3) Evaluate the adequacy of recommended common and special tools and test equipment, and their suitability for the intended purpose and maintenance level.
4) Determine the completeness, adequacy, and utility of the literature package supplied with the test item.

g. Human Factors Engineering - The objective of this subtest is to determine the man-machine interface characteristics of the test item, including stress, fatigue, and errors associated with installing, operating, and maintaining the test item.

h. Compatibility with Related Equipment - The objective of this subtest is to evaluate the interrogator set in conjunction with each of the radar, GCA, and fire distribution systems to which it is interconnected, to determine compatibility and whether the operational characteristics of the systems are degraded by the addition of the test item and its associated integration kit.

5.1.2 Common Service Tests

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

a. MTP 6-3-509, Effects of Weather.
b. MTP 6-4-001, Desert Environmental Test of Communication, Surveillance, and Avionic Electronic Equipment.
c. MTP 6-4-002, Arctic Environmental Test of Communication, Surveillance, and Avionic Electronic Equipment.
d. MTP 6-4-003, Tropic Environmental Test of Communication, Surveillance, and Avionic Electronic Equipment.

5.2 LIMITATIONS

This procedure is limited to service tests of interrogator sets, integrated with applicable radar systems. However, the tests described in this procedure may be adapted to provide service testing of individual functional components of interrogator sets.

6. PROCEDURES

6.1 PREPARATION FOR TEST

a. Select and schedule suitable radar system site installations at representative environmental and terrain locations as required by applicable 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 statement.
2) Maintenance support facilities and personnel.
3) On-site location of spare parts basic load.
4) Required equipment, special facilities, instrumentation, and

supplies. All test equipment and instrumentation selected shall be in keeping with the state-of-the-art, with calibrations traceable to the National Bureau of Standards.

5) Assistance of U. S. Army Airborne, Electronics, and Special Warfare Board (USAAESWBD) in the conduct of airborne operations.

6) Assistance of U. S. Army Electronic Proving Ground (USAEPG) and/or White Sands Missile Range (WSMR) for conduct of the vulnerability tests.

c. Select test personnel (soldiers), with the exception of service test supervisors, who are representative of those expected to operate and maintain the test item in the field. Some should be left-handed, some should wear glasses, and some should represent the physical extremes of size.

d. Prepare record forms for systematic entry of data, chronology of test, test results, and such observations and measurements that would be of value in analysis and final evaluation of the test item.

e. Prepare a test item sample plan 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 sample plan modification during test progress as may be indicated by monitored test results.

f. Ensure that appropriate security measures are instituted to safeguard classified materiel and data, as applicable, 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.

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 the test item operators.

6.2.1 Preoperational Inspection and Physical Characteristics

a. Upon receipt of the interrogator set under test at the testing agency, carefully examine the set and its ancillary equipment for completeness and obvious mechanical or electrical defects such as cracked or broken parts, loose assemblies, bent fragile parts, corroded plugs and jacks, etc., using the Preliminary Operating and Maintenance Manual (POMM) as a guide. All defects shall be noted and corrected before proceeding with the test.

b. Determine the physical characteristics of the interrogator set and ancillary equipment under test by photographing, weighing, and measuring the test items in accordance with applicable portions of MTP 6-3-500.

NOTE: Interrogator set and ancillary equipment characteristics obtained during the Engineering Test should not be redetermined here unless there is evidence that the data is

not valid or not representative of the test item(s).

c. In addition to the data required by applicable sections of MTP 6-3-500, record the following:

1) Completeness of inventory and damages to the test item(s) incurred during transit and/or handling.
2) Weights and measurements taken.
3) Discrepancies in physical characteristics.

d. Carefully align the interrogator set, if necessary, as specified in the draft technical manual to ensure, insofar as possible, it represents an average equipment in normal operating condition.

e. Prepare a checklist of technical characteristics containing the values and acceptable limits of applicable interrogator set parameters.

f. Subject the item under test to technical characteristics inspections in accordance with applicable portions of MTP 6-3-501, to include verification of:

1) Pulse Repetition Frequency
2) Transmitter Power Output
3) Receiver Sensitivity

g. In addition to the data required by applicable sections of MTP 6-3-501, record a "yes" or "no" notation against each parameter as its measurement is taken.

6.2.2 Safety

a. Review all safety precautions and possible hazards associated with the interrogator set and ancillary equipment under test and potential hazards of the overall testing environment. The review shall include, but need not be limited to; electrical shock hazards, prevention, and emergency action required.

b. Examine the interrogator set and ancillary equipment for the presence of necessary guards, shields, interlocks, safety fuzes, and warning plates.

c. Verify the operation of all safety devices provided in the interrogator set and associated equipment.

d. Record the following:

1) Non-operable safety features
2) Inadequate warning statements

e. 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.

f. In addition to the 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) Any undue restrictions or limitations imposed on the tactical use of the test interrogator set and ancillary equipment by Safety Statements and/or Safety Release(s).
3) Evaluation of the safety control(s) of the test item with reference to convenience of location, ease of identification of safe positions by sight and touch, ease and quietness of operation, and design to prevent accidental shifting of position.
4) Evaluations of any safety hazards observed by test personnel during storage, transportation, operation, and maintenance of the test item, to include:

   a) Electrical hazards
   b) Sharp edges, corners, or projections
   c) Radiological hazards
   d) High voltage hazard control

5) Operating techniques which appear to present a potential hazard.
6) Recommendations for additions to the interrogator set's safety program and/or safety features.

6.2.3 Personnel Training

a. Orient and instruct all test personnel (soldiers) in interrogator equipment mission applications, capabilities, limitations, and the maintenance aspects of the item under test in accordance with the Preliminary Operating and Maintenance Manual (POMM) and the proposed Program of Instruction (POI). If no POI is provided, develop one in coordination with the agency concerned with training. The proposed POI should include crew personnel operational training in the nomenclature and characteristics of the interrogator set under test, as well as techniques of proper employment.

b. After training, require user personnel to perform all functional operations related to interrogator equipment usage as directed by the project officer.

c. Throughout the conduct of all testing as outlined in this MTP, monitor and evaluate all test item crew member training in accordance with the above POI and MTP 10-3-501.

d. In addition to the data required by MTP 10-3-501, record narrative comments concerning the following training factors:

1) Observations and analyses relative to the clarity, completeness, and general adequacy of the proposed POI and POMM.
2) For each member of test team:

   a) MOS
   b) Training time in MOS, weeks
   c) Experience in MOS, months
   d) Training time on test item, weeks
   e) Team experience in test item crew, weeks

3) Extent of additional training required.

6.2.4 Operational Characteristics

6.2.4.1 Normal Conditions

a. With the interrogator set and ancillary equipment under test in travelling configuration, approach a designated operational site during daylight hours and under prevailing weather conditions.

b. Utilizing an average trained, standard TOE crew (dressed in full field uniforms and personal equipment), install the test item(s) complete and ready for operation in an applicable tactical situation in accordance with the draft instruction manual and applicable portions of MTP 6-3-505.

NOTE: The interrogator set and ancillary equipment shall be integrated with the applicable system in accordance with the concepts of employment as expressed in the applicable QMR/SDR and current doctrine.

c. 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.
3) Energize or otherwise prepare the test item for operation.

d. 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 (to include independent radar observation for target position data at envelope boundaries).
2) Flight paths and altitudes for airborne elements (inbound, outbound, parallel, climbing, and descending as required).
3) Inter-element angular relationship (horizontal and vertical).

e. Station observers as required to measure and record data, verify correct power sources, necessary test instrumentation and inter-connection cabling, and establish communication links as required to provide coordination between aircraft and test item site of mode and code changes.

f. Conduct interrogation operations as required to determine the performance envelopes of aircraft altitude, speed and distance as applicable for the test item. Challenge the aircraft in all modes, using random selection of codes as applicable. Observe the capability of operators to accomplish selection of modes and insertion of codes with speed and accuracy.

g. In addition to data obtained from oscilloscopes, display screens, event recorders, and ancillary test equipment, record the following:

1) Target position.

2) Number of challenges by mode and code.
3) Number of correct responses.
4) Data on accuracy of video displays.
5) Data on interrogation envelope limits: range in miles, altitude in feet, azimuth in degrees true bearing.
6) Number of antenna scans required for correct target identification, counted from time of target detection.

h. During the performance of Step (f) above, determine the susceptibility of the test item to jamming or garbling and its overall compatibility with the electromagnetic operational environment in accordance with applicable portions of MTP 6-3-513 and MTP 6-3-514, to include:

1) Effects on test item performance of various types of airborne, jamming transmissions.
2) Effects on test item performance of simultaneously interrogating multiple aircraft in close formation.
3) Effects on test item performance of simultaneous challenges of a single aircraft.

i. In addition to data required by applicable sections of MTP 6-3-513, and MTP 6-3-514, record the following:

1) Narrative comments and observations regarding effects of jamming.
2) Narrative comments and observations concerning effects of over-reply interface.
3) Narrative comments and observations concerning effects of overinterrogation.

j. Recover the test item and ancillary equipment from the emplaced battlefield situation and record the activities and times required to:

1) De-energize or otherwise inactivate the test item(s).
2) Remove from emplacement.
3) Make ready for transportation and/or re-emplacement

k. Repeat steps (a) through (j) above, adding or subtracting one crew member for each trial, until the minimum and optimum crew sizes required to emplace, operate, and march order the interrogator set and ancillary equipment are established.

1. Record the following for each trial:

1) Date, site location, elevation in meters.
2) Times of day for start and finish of each phase of testing and for each meteorological observation.
3) Illumination (daylight, moonlight, starlight, darkness).
4) Weather conditions (clear, overcast, rain, snow, sleet, icing).
5) Atmospheric conditions as appropriate:

a) Temperature, degrees F.
b) Relative humidity, percent.
c) Wind conditions when wind is a factor.
d) Atmospheric contaminants: dust, fog, blowing sand, smoke.

6) Observations concerning ease or difficulty of accomplishment of emplacement, operation, and march order activities.

6.2.4.2 Adverse Conditions

a. Repeat the emplacement and march order tests and the system performance tests of paragraph 6.2.4.1 under the following adverse weather 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

b. Repeat the system performance test of paragraph 6.2.4.1 under conditions imposed by unfavorable terrain (e.g., mountain peaks, tall structures, forests and trees, blowing sand, etc.), as applicable.

6.2.5 Transportability

a. Utilizing average trained test soldiers, dressed in full field uniforms and personal equipment, determine the surface transportability of the interrogator set and ancillary equipment under test in accordance with applicable portions of MTP 6-3-510.

b. In addition to data required by applicable sections of MTP 6-3-510, record the following:

1) Availability and adequacy of means provided for lifting or otherwise loading the test item on transport vehicles.
2) Suitability of provisions for blocking and tie-down.
3) Dimensional clearances, referred to standards for shipping configurations (Berne tunnel, etc.).
4) Times required for performance.
5) Estimated transportation speed.

c. Determine the air transportability and air drop capability of the test item(s) in accordance with applicable sections of MTP 7-3-512 and MTP 7-3-515, 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.

d. In addition to data required by applicable portions of MTP 7-3-512 and MTP 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 unloading from aircraft as well.
2) Narrative comments, supported by photographs, covering experience with airdrop of the test item, including rigging, airdrop operations, and final condition of the test item(s) after drop.

6.2.6 Maintainability

a. Throughout the conduct of all testing outlined in this MTP, continuously monitor and evaluate the test item's maintenance concept, in accordance with applicable instructions in USATECOM Regulation 705-26 and USAMC Regulation 705-15.

b. Initiate and maintain a record of performance of all scheduled and unscheduled maintenance as outlined in applicable manuals, and a continuous, detailed historical record or log of the exposure and related maintenance experience of the test item, in accordance with applicable sections of MTP 6-3-524.

c. In addition to data required by applicable portions of MTP 6-3-524, record observation concerning the following:

1) Adequacy of tools and test equipment, with attention to:

a) Availability of tools and test equipment at place and time of need.
b) Suitability of tools and test equipment for intended purpose.
c) Possibility of substitution of common items for special items.

2) Adequacy of repair parts basic load, including:

a) Availability of repair parts at place and time of need.
b) Consistency of repair parts stockage lists at organizational, direct support, and higher maintenance levels.

c) Evidence of maximum parts interchangeability.
d) Recommendations concerning repair parts standardization.

3) Experience of personnel at organizational and direct support levels during maintenance on the test item, including:

a) Appropriateness of maintenance levels assigned by MAC.
b) Levels of skills required by personnel to accomplish maintenance tasks as authorized.
c) Adequacy and suitability of maintenance procedures in technical manuals as applied on the test item.
d) Difficulties with maintenance operations arising from deficiencies in the test item which prevent or inhibit accomplishment.
e) Effects of sudden loss of power. If this condition is artificially induced, make certain that personnel are informed and protected from injury.

4) Effects of extremes of weather and environment upon maintainability of the test item. When possible, perform maintenance operations under such conditions, or otherwise review and comment on likely environmental effects, including for each applicable condition the requirements for protection, additional time allowances, and special instructions at each maintenance level.
5) Human engineering implications of maintenance operations, such as:

a) Adequacy of nomenclature for parts and controls.
b) Ease of locating parts requiring maintenance, and accessibility of parts for maintenance.
c) Safety of maintenance operations.

d. Throughout the entire test period, monitor the durability and reliability characteristics of the test item in accordance with applicable sections of MTP 5-3-504. 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 - 1000 miles
3) Tactical vehicles, cross-country - 100 miles

e. In addition to data required by applicable sections of MTP 5-3-504, observe and record at 100-mile intervals, or at the end of the exposure, the defect or failure experience of the test item and its components, to include:

1) Inoperable electronic equipment (damaged enclosures, loose or broken connections, foreign material accumulations, damaged components, etc.).
2) Damaged or worn mechanical parts, to include component

packaging, bent or broken handles and fasteners, defective seals, sluggish or restrained mechanical action, etc.

3) Reliability parameters, including:

a) Types and seriousness of malfunctions.
b) Times of occurrence of failures, including operating time accumulated on test item and failing component.
c) Amount of down time and corrective maintenance effort in clock hours and man-hours.
d) Repair parts usage and part life.

4) Any other parameters required by the applicable QMR, SDR, or Test Directive to enable computation of mean time between maintenance, mean time between failures, mean time to repair, mean down time, availability (inherent, achieved, operational) and reliability.

f. Throughout the entire testing period, monitor and evaluate the adequacy of manuals, Preliminary Operational and Maintenance Manuals (POMM) and/or manuscripts to describe installation, operation, and maintenance procedures at all levels of maintenance, in accordance with applicable sections of MTP 5-3-502. Determine whether all illustrations and diagrams are complete and suitable for their respective purposes.

g. Observe and analyze the maintenance procedures conducted in accordance with instructions in the manuals. Evaluate the adequacy of repair parts and special tools lists (RPSTL) and maintenance allocations charts (MAC), and determine whether the assigned maintenance tasks can be accomplished at the lowest level of maintenance assigned, commensurate with authorized training, tools, and test equipment at that echelon.

h. In addition to data required by applicable sections of MTP 5-3-502, record narrative comments and observations concerning adequacy of the manuals and technical publications with respect to:

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

6.2.7 Human Factors Engineering

a. Throughout the conduct of all testing as outlined in this MTP, monitor and appraise the interrogator set and ancillary equipment under test with respect to human factors, in accordance with applicable portions of MTP 6-3-525.

b. In addition to data required by applicable sections of MTP 6-3-525, record narrative comments, obtained from all test personnel through observation, interview, and questionnaire, concerning the following:

1) Any human performance difficulties associated with in-

stallation, manipulation of controls, adjustment procedures, parts replacement, and exposure of personnel to service environmental conditions.

2) Unusual instances of stress, fatigue, or needs for special training attributable to test item design.

6.2.8 Compatibility with Related Equipment

a. Throughout the conduct of all testing as outlined in this MTP, monitor all operations, in accordance with applicable sections of MTP 6-3-512, regarding the suitability, compatibility, and functionability of the test with which it is employed, including the following, as applicable:

1) Basic radar
2) Ground control approach equipment (GCA)
3) Fire distribution system

b. Compare the characteristics of the basic radar, GCA, or fire distribution system as determined prior to interconnection of the test item and its associated integration kit with the respective system performance after the test item has been added. Perform the applicable basic aircraft tracking missions with and without the test item installed.

c. In addition to data required by applicable portions of MTP 6-3-512, record the following:

1) Detailed performance parameters of the basic radar, GCA, or fire distribution system prior to interconnection of the test item and after the test item has been added, as well as any difference attributable to the addition of the test item.
2) Effects of the addition of the test item on the following:

   a) Radar trigger.
   b) Azimuth servo signal.
   c) Load effects at test item power pick-off point.
   d) IFF video effects on system performance.
   e) Effects of system operation IFF video accuracy.
   f) Effects of test item on accuracy of display presentations.

3) Descriptions and photographs of any physical interfacing problems (connectors, receptacles, for example).
4) Appropriate records (strip chart or scope photos) of any electronic interfacing problems (phasing, interference, for example).
5) Shortages in equipment, supplies, or instructions for operating in conjunction with related equipment.

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 last date calibrated of the test equipment selected for the tests.

c. Sufficient narrative comments pertaining to training, logistical requirements, statistical considerations, etc., to provide background information to be used in the analysis of test results.

6.3.2 Test Conduct

Data to be recorded in addition to specific instructions listed below for each subtest shall include:

a. A block diagram of the test setup employed in each specified test, where applicable. The block diagram shall identify by model and serial number, all test equipment and interconnections (cable lengths, connectors, attenuators, etc.) and indicate control and dial settings where necessary.

b. Photographs or motion pictures (black and white or color), sketches, charts, graphs, or other pictorial or graphic presentations which will support test results or conclusions.

c. An engineering logbook containing, in chronological order, pertinent remarks and observations which would aid in a subsequent analysis of the test data. This information may consist of descriptions of equipment or components, and functions and deficiencies, as well as theoretical estimations, mathematical calculations, test conditions, intermittent or catastrophic failures, test parameters, etc., that were obtained during the test.

d. Test item sample size (number of measurement repetitions).

e. Instrumentation or measurement system mean error stated accuracy.

6.3.2.1 Preoperational Inspection and Physical Characteristics

The following shall be recorded:

a. Data as required by applicable portions of MTP 6-3-500.

b. Critical dimensions (meters, centimeters) and weights (kilograms).

c. Annotated photographs of test item configuration, transit and/or handling damage.

d. Lists of missing documents, equipment, and tools.

e. Discrepancies in physical characteristics.

f. Data as required by applicable portions of MTP 6-3-501.

g. "Yes" or "No" notation against each salient parameter as measurement is taken.

6.3.2.2 Safety

The following shall be recorded:

a. Non-operable safety features.
b. Inadequate warning statements.
c. Data as collected under applicable sections of MTP 6-3-523.
d. Confirmation of safety release under conditions as specified in USATECOM Regulation 385-6.
e. Any undue restrictions or limitations imposed on the tactical use of the test item by Safety Statements and/or Safety Release(s).
f. Evaluation of the safety control(s) of the test item with reference to convenience of location, ease of identification of safe positions by sight and touch, ease and quietness of operation, and design to prevent accidental shifting of position.
g. Evaluations of any safety hazards observed by test personnel during storage, transportation, operation, and maintenance of the test item.
h. Operating techniques which appear to present a potential safety hazard.
i. Recommendations for additions to the interrogator set's safety program and/or safety features.

6.3.2.3 Personnel Training

The following shall be recorded:

a. Data as collected under applicable sections of MTP 10-3-501.
b. Observations and analyses relative to the clarity, completeness, and general adequacy of the proposed POI and POMM.
c. For each member of test team:

1) MOS
2) Training time in MOS, weeks
3) Experience in MOS, months
4) Training time on test item, weeks
5) Team experience in test item crew, weeks

d. Extent of additional training required.

6.3.2.4 Operational Characteristics

The following shall be recorded for each test condition, as applicable:

a. Data as required by applicable portions of MTP 6-3-505.
b. Times of performance required to:

1) Dismount the test item and perform pre-operational adjustments.
2) Install the test item.
3) Energize the test item.

c. Target positions.
d. Number of challenges by mode and code.
e. Number of correct responses.

f. Data on accuracy of video displays.
g. Interrogation envelope limits.
h. Number of antenna scans required for correct target identifications.
i. Data as required by applicable portions of MTP 6-3-513 and MTP 6-3-514.
j. Effects of jamming, over-reply interface and overinterrogation.
k. Times of performance required to:

1) Inactivate the test item
2) Remove from emplacement
3) Make ready for transportation and/or re-emplacement

l. Minimum and optimum crew sizes required to emplace, operate, and march order the test item.
m. Motion pictures of all operations.
n. Date, site location, elevation.
o. Time of day for start and finish of each test phase.
p. Ambient conditions.
q. Observations concerning ease or difficulty of accomplishment of emplacement, operation, and march order activities.

6.3.2.5 Transportability

The following shall be recorded:

a. Data as required by applicable portions of MTP 6-3-510.
b. Availability and adequacy of means provided for lifting or other-wise loading the test item on transport vehicles.
c. Suitability of provisions for blocking and tie-down.
d. Dimensional clearances, referred to standards for shipping configuration (Berne tunnel, etc.).
e. Times required for performance of surface transport movements.
f. Estimated transportation speed.
g. Data in accordance with applicable sections of MTP 7-3-512, and MTP 7-3-515.
h. 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. Unloading from aircraft shall also be recorded as well.
i. Narrative comments, supported by photographs, covering experience with airdrop of the test item, including rigging, airdrop operations, and final condition of the test item after drop.

6.3.2.6 Maintainability

The following shall be recorded:

a. Data in accordance with applicable sections of MTP 6-3-524.
b. Adequacy of tools and test equipment.

c. Adequacy of repair parts basic load.

d. Experience of personnel at organizational and direct support level during maintenance on the test item.

e. Effects of extremes of weather and environment upon maintainability of the test item.

f. Human engineering implications of maintenance operations.

g. Data in accordance with applicable sections of MTP 5-3-504.

h. Defect or failure record of the test item and its components.

i. Reliability parameters of test item and components.

j. Any other parameters required by Test Directive, etc.

k. Data in accordance with applicable sections of MTP 5-3-502.

l. Adequacy of manuals and technical publications.

6.3.2.7 Human Factors

The following shall be recorded:

a. Data in accordance with applicable sections of MTP 6-3-525.

b. Human performance difficulties associated with installation, operation, adjustment, and maintenance of the test item under both normal and extreme environmental conditions.

c. Unusual instances of stress and/or fatigue of personnel, or needs for special training attributable to test item design.

6.3.2.8 Compatibility with Related Equipment

The following shall be recorded:

a. Data in accordance with applicable sections of MTP 6-3-512.

b. Performance characteristics of the radar, GCA, and fire distribution system prior to interconnection of the interrogator set and after its addition, as well as differences attributable to addition of the test item.

c. Effects of the addition of the test item on the following:

1) Radar trigger level
2) Azimuth servo data
3) Power pick-off data
4) Video power level
5) Display accuracy effects

d. Descriptions and annotated photographs of any physical interfacing problems.

e. Appropriate records of any electronic interfacing problems.

f. Shortages in equipment, supplies or instructions.

6.4 DATA REDUCTION AND PRESENTATION

Data, including observations and comments of operators, obtained under each Test Conduct section (paragraph 6.2) of this procedure, shall be summarized, compared, and evaluated according to procedures described in the

individual referenced MTP's, or equivalent current practice where not covered by MTP's. Appropriate charts, graphs, and tables shall be used to display summaries and comparisons of test data. Coordinates and other features of charts, graphs, and tables should be selected for clarity and uniformity with like presentations in other reports. Special consideration in data presentation shall be given to any condition or circumstance which may have significantly influenced test results.

NOTE: Certain special conditions are likely to prevail during service testing at established test facilities. The proportion of well-trained, experienced personnel is likely to be greater than under actual field conditions. Data analysis and conclusions from test observations and results will consider and allow for this bias - especially in connection with maintenance operations.

Efforts will be maintained to take advantage of digital data recording, automatic data processing and automatic data read-out.

Calculations shall be performed as specified by the individual referenced MTPs, or in accordance with equivalent current practice when not covered by MTPs. All photographs, motion pictures, oscillograms, recorder tapes, audio tapes, and other records shall be explicitly identified and referenced; significant frames, transcriptions and samples shall be selected for illustrative purposes. All illustrations shall be completely identified.

Data collected under adverse weather or terrain conditions shall be separately compared with data collected during normal conditions.

THIS PAGE INTENTIONALLY LEFT BLANK

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) US Army Test and Evaluation Command (USATECOM) Aberdeen Proving Ground, Maryland 21005	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP ----------

3. REPORT TITLE
US Army Test and Evaluation Command Materiel Test Procedure 6-3-150, Commodity Service Test Procedure, - "Interrogator Set"

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
Final

5. AUTHOR(S) (First name, middle initial, last name)
---

6. REPORT DATE 23 March 1970	7a. TOTAL NO. OF PAGES 22	7b. NO. OF REFS 28
8a. CONTRACT OR GRANT NO. DA-18-001-AMC-1045(R) b. PROJECT NO. AMCR 310-6 c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) MTP 6-3-150 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) ----------	

10. DISTRIBUTION STATEMENT
This document is subject to special export controls and each transmittal to foreign governments or foreign nationals,-WITH THE EXCEPTION OF AUSTRALIA, CANADA, AND UNITED KINGDOM,-may be made only with prior approval of HQ,USATECOM.

11. SUPPLEMENTARY NOTES ----------	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 Interrogator Sets, and for determining the suitability of such items 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), or other appropriate design requirements and specifications.

DD FORM 1 NOV 65 1473 (PAGE 1)
S/N 0101-807-6811

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Army Service Test						
Interrogator Set						
Test Procedures						
Test Methods and Techniques						

DD FORM 1 NOV 65 1473 (BACK)