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AD NUMBER
AD872272
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AUTHORITY
USATEC ltr, 14 Dec 1970

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AD 872 272

25 March 1970

Materiel Test Procedure 6-3-060
Electronic Proving Ground

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

3452

DATA PROCESSING EQUIPMENT

1. OBJECTIVE

The objective of this materiel test procedure is to describe the service test procedures required to obtain operational performance data and information to determine the degree to which tactical data processing equipment meets the military characteristics expressed in the applicable Qualitative Materiel Requirement (QMR) or Small Development Requirement (SDR), and the suitability of the test item for use by the Army.

2. BACKGROUND

Data processing equipment is varied-function electromechanical or electronic equipment that is utilized in semi-automated military information or data processing systems for the purpose of accepting information, performing operations on the information according to a plan, and producing the required results. The term includes analog and digital computers, and Automatic Data Processing (ADP) equipment.

A military information system consists of an assemblage of elements that engage in the accomplishment of some common purpose or purposes, and that are united by a common information flow network, the operating environment, and the interrelationships among these. The general characteristics of tactical information systems include the following:

- a. They are large-scale, as measured in terms of equipment and geographical operational environment.
- b. They are made up of many components or subsystems, such as, computers, input/output devices, displays, converters, external storage units, computer-programs, data bases, communications, and input data sources, all of which must be carefully integrated.
- c. They must improve upon an existing manual system and must operate as a part of some larger command information system.
- d. They process large amounts of raw data from many sources, and provide summarized information for men or other systems.
- e. They must perform the data processing "real-time" in order that the system response keeps pace with incoming data and required outputs, and must be available on a continuous basis.
- f. While they normally operate well below their design capacity, one which may not be required except in actual tactical operations, they must operate continuously at a high level of readiness.
- g. Despite the use of automatic data processing equipment, service personnel (operators) have a major role in the system operation.
- h. They take a significant time for the Army to acquire, during which time both the requirements and the available technology may change.
- i. They must be flexible in design and evolve during their operational lifetime to meet new requirements and situations.

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Analog and digital computers have been employed either as integral subsystems of weapon systems, for example as in the M33 Fire Control System, or as separate entities, for example as in the M18 Gun Direction Computer (FADAC).

The development of these computers as well as other equipments such as the Army Tactical Operations Central AN/MSQ-19 (ARTOC) and the Command Control Information System (CCIS-70) has demonstrated the feasibility of applying ADP to the accomplishment of various tactical functions.

Currently, the Army is engaged in the development of semi-automated information systems to assist tactical commanders and their staffs in the planning and conduct of military operations. The project known as Automatic Data Systems within the Army in the Field (ADSAF) includes the development of three systems: the Tactical Operations System (TOS), the Tactical Fire Direction System (TACFIRE), and the Combat Service Support System (CS₃). TOS addresses the function of employment of maneuver elements, TACFIRE addresses the function of control of supporting field artillery fires, and CS₃ addresses the function of provision of effective combat support.

In order to determine whether the operational characteristics and capabilities of developmental data processing equipment are in conformance with current military requirements, the commodity must be tested in a system context under simulated and planned field operational conditions by service personnel.

3. REQUIRED EQUIPMENT

- a. Simulated tactical environment.
- b. Maintenance support facility.
- c. Communication facilities, as required.
- d. Van or shelter (command post), for test configuration.
- e. Special test equipment, or simulators, as designed for the test item.
- f. Stopwatches.
- g. Sound recording equipment as required.
- h. Photographic equipment, still and/or motion picture (black and white or color).
- i. Instrumentational consisting of the following integral equipment (after calibration):
 - 1) Real-time clock
 - 2) Error detectors
- j. Associated equipment, for example:
 - 1) Computer table with integral power connection panel.
 - 2) Power cable and reel assembly.
 - 3) Generator set, gasoline, or other suitable power unit (primary).

4. REFERENCES

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- I. AMCR 385-12, Verification of Safety of Materiel from Development Through Testing, Production, and Supply to Disposition.
- J. MTP 3-1-002, Confidence Intervals and Sample Size.
- K. MTP 6-3-061, Computer, Analog.
- L. MTP 6-3-062, Computer, Digital.
- M. MTP 6-3-500, Physical Characteristics.
- N. MTP 6-3-502, Personnel Training Requirements.
- O. MTP 6-3-505, Emplacement, Action and March Order.
- P. MTP 6-3-506, Durability.
- Q. MTP 6-3-509, Effects of Weather.
- R. MTP 6-3-510, Transportability.
- S. MTP 6-3-513, Qualitative Electromagnetic Interference.
- T. MTP 6-3-523, Safety.
- U. MTP 6-3-525, Human Factors.
- V. MTP 7-3-512, Airdrop Capability.
- W. 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 data processing equipment 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, along with their objectives, are listed below:

a. Operational Characteristics

- 1) Ensure that the test item is operational, that is, that it will function in accordance with its designed logic and control characteristics.
- 2) Determine the military functional performance characteristics of the test item with programs, as applicable, under various simulated input loading conditions based upon prepared scenarios.
- 3) Determine the operational characteristics of the test item during operation of the tactical data processing system (equipment, programs, personnel, procedural data) in a simulated tactical environment, in accordance with prepared scenarios.

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 susceptibility 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 conducive to error and delay

in mission accomplishment by user personnel.

j. Emplacement and Displacement - The objective of this subtest is to evaluate the physical 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 6-3-507, Reliability
- d. MTP 6-3-512, Compatibility with Related Equipment
- e. MTP 6-3-517, Electrical Power Requirements

5.2 LIMITATIONS

This document is limited to the testing of data processing equipment utilized in tactical data processing systems. For service testing of digital or analog computers, refer to MTP 6-3-061 and MTP 6-3-062. This test is designed to be performed by military personnel of the appropriate MOS level.

Procedures for determining test item design flexibility and evolutionary capability are excluded from the tests herein.

6. PROCEDURES

6.1 PREPARATION FOR TEST

a. Select and schedule suitable transportation and simulated tactical 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 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 Requirement (QMR), Small Development Requirement (SDR), and Technical Characteristic (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 scenarios representing hypothetical tactical conditions which stress the following:

- 1) Functional performance capabilities and capacities of the data processing system.
- 2) Mission performance capabilities and capacities of the system.

j. Prepare the following software:

- 1) Simulation package (message, data, voice scripts, time factors).
- 2) Data base.
- 3) Operational programs.
- 4) Control programs.
- 5) Support programs.
- 6) Standards for quality of output data and information, for example, format and accuracy.

k. 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.

1. Ensure 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 as necessary has been obtained.

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

n. Thoroughly inspect the test item for obvious physical and electrical defects such as cracked or broken parts, loose connections, bare or broken wires, loose assemblies, bent critical parts, and corroded plugs or jacks. Check for continuity of wire terminations to ensure that wiring is connected to the proper terminals, and that no damage will result when power is applied. All defects shall be noted and corrected before proceeding with the test.

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 observation and related time factors. Observer activities shall not interfere with or influence in any manner, the functions of test item.

6.2.1 Operational Characteristics

a. Utilizing an average trained crew, emplace the test item in a typical tactical operational site and 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.

b. Apply power to the test item and accomplish a routine check-out by performing the series of tests using the control panel in accordance with the particular test item instructions to verify satisfactory operation.

c. Record the following:

1) "Successful" or "Unsuccessful" completion of check-out routine for the following conditions.

- a) Normal check-out
- b) Normal check-out with momentary power switch-off
- c) Check-out under "marginal" conditions, as applicable

2) Description and number of errors and malfunctions which occur during check-out runs.

3) Time for successful normal check-out (min/sec).

d. Place the test item in a system configuration and test it for performance of military functions as stipulated in military requirements (Functional System Design Requirements), by simulating inputs. Input simulated tactical messages and representative data to the operating system from magnetic tape by means of a Test Control Program, based upon the prepared function-

oriented scenarios.

e. Record the following for each simulated input or message:

- 1) Description of input data or message.
- 2) Response time (minutes/seconds).
- 3) Detected errors (number and type).
- 4) Hard copy of output data or information.
- 5) Critique statement by the test officer that each simulated function was completed in either a satisfactory, unsatisfactory or excellent manner, or was not completed.
- 6) Concise analysis by the test officer following each simulated function, including a statement of the good points and the undesirable features (for example, violations of procedure). The analysis should follow generally the sequence of the simulated function.
- 7) Statement of operator opinion, as to ease of operation.

f. With the test item in a system configuration, test for operational performance parameters as stipulated in military requirements, by means of the terminal operator exercising the system in accordance with a prepared script for scheduling the simulated input messages, based upon the prepared mission-oriented scenarios.

g. Record the following for each message execution as prescribed in the prepared script for exercise of the system:

- 1) Description of message.
- 2) Time of message entry.
- 3) Time of message reply.
- 4) Detected errors (number and type).
- 5) Hard copy of output data or information.
- 6) Identity of each operator and terminal.
- 7) Critique statement by the test officer that each simulated mission was completed in either a satisfactory, unsatisfactory, or excellent manner, or was not completed.
- 8) Concise analysis by the test officer following each simulated mission, including a statement of the good points and the undesirable features (for example, violations of procedure). The analysis should follow generally the sequence of the simulated mission.
- 9) Statement of operator opinion, as to ease of operation.

h. Repeat steps (a) through (g) utilizing several different test crews in order to obtain a sampling of test times.

6.2.2 Qualitative Electromagnetic Interference Test

a. Deploy 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 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 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 5-3-506, 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 the 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 tying 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 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/Effects 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 temperature 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, shortcomings 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 item 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 computing mission 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.
- 3) Energize or 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 battle field 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 part's 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 last date calibrated of the test equipment selected for the tests.

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

d. Record the following for all service personnel:

- 1) Rank
- 2) MOS

- 3) Training Time
- 4) Experience in months

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 officers' logs
- 2) Narrative comment and observations
- 3) Maintenance records
- 4) Photographs; still and/or motion picture
- 5) Diagrams
- 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 Characteristics

a. Record the following for the check-out test:

- 1) "Successful" or "unsuccessful" completion of check-out routine for the following conditions:
 - a) Normal check-out
 - b) Normal check-out with momentary power switch-off
 - c) Check-out under "marginal" conditions; as applicable
- 2) Description and number of errors and malfunctions which occur during check-out runs.
- 3) Time for successful normal check-out (min/sec)

b. Record the following for the functional tests:

- 1) Description of input data or message
- 2) Response time (minutes/seconds)
- 3) Detected errors (number and type)

- 4) Hard copy of output data or information
- 5) Critique statement by the test officer
- 6) Statement of operator opinion, as to ease of operation

c. Record the following for the system tests:

- 1) Description of message.
- 2) Time of message entry.
- 3) Time of message reply.
- 4) Detected errors (number and type).
- 5) Hard copy of output data or information.
- 6) Identity of each operator and terminal.
- 7) Critique statement by the test officer that each simulated mission was completed in either a satisfactory, unsatisfactory, or excellent manner, or was not completed.
- 8) Concise analysis by the test officer following each simulated mission, including a statement of the good points and the undesirable features (for example, violations of procedure). The analysis should follow generally the sequence of the simulated mission.
- 9) Statement of operator opinion, as to ease of operation.

6.3.2.2 Qualitative Electromagnetic Interference Test

Record the 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:

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- 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 tying 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:

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, shortcomings 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 repacked 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 mean time 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 of 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 pretest 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, and ease of use.
- b. The 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

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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.

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.

Present scenarios for both functional and system tests with all applicable data and give analysis of overall success of the test item in meeting applicable requirements.

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 be not be feasible or economical for small scale tests.

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 the remedial suggestions for its improvement.

GLOSSARY

Automatic Data Processing Equipment: (1) Electronic digital computer - a machine or group of interconnected machines (input, storage, computing, control, and output devices) which uses electronic circuitry in the main computing element to perform arithmetic and/or logical operations automatically by means of internally stored or externally controlled programmed instructions. (2) Auxiliary equipment - all other data processing equipment (excepting communications equipment) which directly supports or services the computer, including punch card machines.

Automatic Data Processing System: In addition to the configuration of equipment defined under Automatic Data Processing Equipment, including the recording, filing, computing, data production, and sequential and automatic processes required for operation of automatic data processing equipment.

Control Programs: Those computer programs designed to coordinate processing, augment the equipment components of the system, and coordinate and service operational programs. They handle process scheduling, input/output operations, error actions, and other functions.

Response Time: Time interval between an event (input) and the systems response (output) to the event.

Support Programs: A set of programs needed to assemble or install the system, including diagnostics, testing aids, data generator programs, terminal simulators, and so on.

Simulation of Input Devices: A testing aid. For various reasons it may be undesirable to use actual lines and terminals for some of the system testing. Therefore, magnetic tape or other media may be used and read in by a test control program which makes the data appear as if they came from actual lines and terminals. Simulation in this sense is the replacement of one set of equipment (input device) by another set of equipment and programs, so that the behavior is similar.

Test Control Programs: The control program used solely for testing purposes. It may read the input to the test at appropriate moments and log the output from the test. It may be controlled by a timing device.

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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 6-3-060, Commodity Service Test Procedure, - "Data Processing Equipment".			
4. DESCRIPTIVE NOTES (Type of report and, inclusive dates) Final			
5. AUTHOR(S) (First name, middle initial, last name) -----			
6. REPORT DATE 25 March 1970	7a. TOTAL NO. OF PAGES 22	7b. NO. OF REFS 23	
8a. CONTRACT OR GRANT NO. DA-18-001-AMC-1045 (R)	9a. ORIGINATOR'S REPORT NUMBER(S) MTP 6-3-060		
b. PROJECT NO. AMCR 310-6			
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) -----		
d.			
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 describes test methods and techniques for evaluating the operational performance and characteristics of Tactical Data Processing Equipment and for determining its suitability for service use by 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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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Army Service Test						
Data Processing Equipment						
Tactical Data Processing						
Test Procedures						
Test Methods and Techniques						

DD FORM 1 NOV 65 1473 (BACK)

DA FORM 0101-307-5921

A-2

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Security Classification

4-31403