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Matériel Test Procedure 7-4-010  
U. S. Army Arctic Test Center

U. S. ARMY TEST AND EVALUATION COMMAND  
ENVIRONMENTAL TEST PROCEDURE

ARCTIC ENVIRONMENTAL TEST OF AIRCRAFT ARMAMENT

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1. OBJECTIVE

The objective of the procedures outlined in this MTP is to provide information for evaluating the performance, safety, and human factors engineering characteristics of Aircraft Armament equipment under arctic winter conditions.

2. BACKGROUND

Arctic environmental testing of aircraft armament subsystems is conducted to determine if the items perform satisfactorily in an arctic winter environment. These tests are intended to supplement engineering and service tests performed in the temperate zone.

Testing under arctic winter conditions is normally not conducted until the aircraft armament subsystem has been evaluated under simulated climatic extremes (environmental hangar). Environmental hangar testing is used to determine operational performance characteristics of the subsystem down to -65°F. Testing in natural climatic environments is used to substantiate or supplement data obtained during the environmental hangar tests.

Results of arctic testing produce data required for type classification and information essential for procurement or other logistical decisions.

3. REQUIRED EQUIPMENT

- a. Appropriate arctic winter uniforms.
- b. Vehicles (cargo).
- c. General and special tools and ancillary items required for repairs or maintenance on the test item.
- d. Test equipment as required.
- e. Still and motion picture cameras with associated photographic equipment (black and white or color).
- f. Supply of armament subsystem repair parts for the duration of the test period.
- g. Support aircraft.
- h. Meteorological instrumentation.
- i. Suitable firing range.
- j. Skis (aircraft).
- k. Ammunition.
- l. Winterization Kit(s).
- m. Warming facility for arming personnel.

4. REFERENCES

- A. AR 70-10, Army Materiel Testing.

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- B. AR 70-38, Research, Development, Test and Evaluation of Materiel for Extreme Climatic Conditions.
- C. AR 385-63, Regulations for Firing Ammunition, for Training, Target Practice and Combat.
- D. AR 705-25, Reliability Program for Materiel and Equipment.
- E. USATECOM Regulation 750-15, Maintenance of Supplies and Equipment.
- F. TM-9 series pertaining to the test armament subsystem.
- G. TM 9-207, Operation and Maintenance of Army Materiel in Extreme Cold.
- H. TM 9-1300-206, Care, Handling, Preservation, and Destruction of Ammunition.
- I. MTP 3-3-501, Personnel Training.
- J. MTP 7-2-015, and 7-3-015, Aircraft Armament.
- K. MTP 10-4-500, Arctic Preoperational Inspection, Physical Characteristics, Human Factors, Safety and Maintenance Evaluation.
- L. Maintenance Publications and Manuals.

5. SCOPE

5.1 SUMMARY

The procedures outlined in this Materiel Test Procedure (MTP) provide guidance for the arctic winter environmental testing of aircraft armament subsystems. Specific requirements and test criteria will vary for each armament subsystem and the test procedures must be modified accordingly.

The following tests will be performed to the extent necessary to determine if test aircraft armament subsystem meets the criteria contained in QMR's, SDR's, TC's, MC's or other criteria specified in the test directive. It may be necessary to add tests to those contained herein to accomplish unusual requirements.

Plans of test will be tailored to accomplish the specific purpose of the test as prescribed in the test directive for the item. Applicable portions of the test procedures may be used verbatim in this plan of test; however, care must be exercised to ensure that unnecessary portions are deleted and the procedures are adjusted to satisfy test requirements.

a. Preoperational Inspection and Physical Characteristics - The objective of this subtest is to determine:

- 1) If the test and comparison items are in proper condition for testing.
- 2) If the test items physical characteristics conform to the applicable criteria.

b. Functional Suitability - The objective of this subtest is to determine the suitability of the test item for operation in an arctic winter environment.

c. Human Factors Evaluation and Safety - The objective of this subtest is to determine the safety aspects of the test item, when operated in an

arctic winter environment and the effects of this environment on human factors.

d. Maintenance Evaluation - The objective of this subtest is to determine the maintenance requirements for the test items by their use in an arctic environment, and to determine whether these test items maintenance requirements meet maintenance and maintainability standards as defined in QMR's, SDR's, TC's, Test Directives or other established criteria. In addition, a reliability study shall be made to determine the reliability of the test items and derive information regarding expected service life and required logistical support under arctic environmental conditions.

## 5.2 LIMITATIONS

This MTP is limited to general procedures for environmental testing of aircraft armament subsystems.

Those procedures that duplicate testing that has been conducted at other facilities and are not peculiar to an arctic winter environment will be conducted only when so directed by higher headquarters.

## 6. PROCEDURES

### 6.1 PREPARATION FOR TEST

a. Since arctic winter environmental tests are normally scheduled from October through March (6 months), ensure that the test and comparison items are delivered to the Arctic Test Center prior to 1 October.

b. TDY personnel shall be used to augment assigned personnel and shall be trained to the degree that they are as proficient on the individual test and comparison items as the troops who will use these items.

c. Ensure that all test personnel are familiar with the required physical, technical and operational characteristics of the item under test, such as stipulated in Qualitative Materiel Requirement (QMR), Small Development Requirement (SDR) and Technical Characteristics (TC), and record this criteria in the test plan.

d. 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 type of test item, and familiarize all test personnel with available references.

e. Record the grade, MOS, background, and training of all test personnel and ensure that all personnel receive New Equipment Training (NET).

f. Record the following information:

- 1) Nomenclature, serial number(s), and manufacturer's name of the test items.
- 2) Nomenclature, serial number(s), accuracy tolerances, calibration requirements, and last date calibrated of the test equipment which is used to obtain test data.
- 3) Date test items were packed.

g. Select test equipment ideally having an accuracy 10 times greater than that of the specified tolerance of the function to be measured.

h. Prepare record forms for systematic entry of data, chronology of tests, and analysis in final evaluation.

i. Prepare adequate safety precautions to provide safety for personnel and equipment, and ensure that all safety SOP's are observed throughout the test. Ensure that a Safety Release has been obtained prior to test conduct.

j. Outfit all test personnel in appropriate arctic winter clothing as described in MTP 10-4-500, and with individual field equipment, during all equipment testing.

k. Ensure that when not in use, all test and comparison items are stored and maintained in an unsheltered area and exposed to ambient air temperature and prevailing weather conditions.

l. Record the prevailing meteorological conditions during the testing and storage phase, to include:

- 1) Temperature
- 2) Humidity, relative or absolute
- 3) Temperature gradient
- 4) Atmospheric pressure
- 5) Precipitation
- 6) Solar Radiation
- 7) Wind speed and direction
- 8) Frequency of readings
- 9) Source of data

## 6.2 TEST CONDUCT

NOTE: During all testing the test armament subsystem will be operated in as wide a range of temperatures as available. Attempts will be made to accumulate data and evaluate performance in ambient air temperatures between 0°F and -25°F, and from -25°F to the lowest ambient air temperature available. The length of cold soak periods and ambient air temperatures during cold soak periods will be recorded during each subtest as appropriate.

### 6.2.1 Preoperational Inspection and Physical Characteristics

a. Upon receipt, carefully inspect all test items and their shipping and/or packaging containers for completeness, damage and general conditions in accordance with applicable sections of MTP 10-4-500.

b. Identify each test item with an appropriate sequential code number.

### 6.2.2 Functional Suitability

a. Install the test armament subsystem on the aircraft in accordance with applicable sections of MTP 7-2-015, MTP 7-3-015 and individual equipment instructional procedures.

NOTE: Cold soak until the test item component temperatures approximate those of the existing ambient air temperature. The

minimum cold soak period will always exceed 6 hours.

- b. Make all necessary adjustments, including boresighting, lubrication and maintenance settings prior to operation of the equipment.
- c. Determine and record any difficulties encountered in steps a and b above.
- d. Load and prepare to fire in accordance with individual equipment procedures.
- e. Institute all necessary safety procedures as directed by the test director.
- f. Test fire each armament subsystem in ambient air temperature of 0°F to -25°F, and -25°F to the lowest available temperature.
- g. If the armament subsystem can be altered to different configurations by changing components, each configuration shall be test fired in each of the above ambient temperature ranges.
- h. The number of test firings will be in accordance with the requirements of the QMR or the test directive.

NOTE: Repeat the cold soak before each firing.

1. Record the following data:

- 1) Ambient air temperatures during arming and loading.
- 2) Difficulties encountered during installation, adjustments, loading or arming.
- 3) Type of aircraft (or helicopter).
- 4) Operational malfunctions and failures.
- 5) Initial loading and arming time.
- 6) Ammunition expended.
- 7) Turn-around time between firing missions.
- 8) Time required to clear armament subsystem of malfunctions.

NOTE: Still photographs and motion picture coverage shall be utilized to supplement all other recorded data.

6.2.3 Human Factors Evaluation and Safety

- a. Conduct all Human Factors and Safety Tests in accordance with the applicable sections of MTP 10-4-500.
- b. To the maximum extent possible, conduct these tests concurrently with the operational tests (Functional Suitability).

6.2.4 Maintenance Evaluation

- a. Conduct all Maintenance Evaluation Tests (Maintainability, durability and reliability) in accordance with applicable sections of MTP 10-4-500.
- b. Conduct these tests concurrently with the operational tests. (Functional Suitability).

6.3 TEST DATA

All test data to be recorded shall be as specified in the individual subtests of this MTP.

#### 6.4 DATA REDUCTION AND PRESENTATION

Processing of raw test data shall, in general, consist of organizing and marking for identification and correlation, and grouping the test data according to test title.

Specific instructions for the reduction and presentation of individual test data are outlined in the succeeding paragraphs.

##### 6.4.1 Preoperational Inspection and Physical Characteristics

Preoperational inspection and physical characteristics data shall be reduced and presented in accordance with MTP 10-4-500.

##### 6.4.2 Functional Suitability

Examine the recorded data and evaluate the suitability of the test item in arctic environment by determining if it meets or exceeds the appropriate specifications contained in QMR's, SDR's, TC's and Test Directives. Data recorded in paragraph 6.2.2. shall be reviewed to determine functional suitability.

Data recorded in paragraph 6.2.2., Functional Suitability, shall be reviewed and the ease of operation shall be evaluated.

Prepare a comprehensive report on the findings of the above evaluations.

##### 6.4.3 Human Factors Evaluation and Safety

Human Factors and Safety data shall be reduced and presented in accordance with MTP 10-4-500.

Evaluate recorded data and relate results of evaluation to improvements in test equipment.

##### 6.4.4 Maintenance Evaluation

Maintenance data shall be reduced and presented in accordance with MTP 10-4-500.

MTP 7-4-010  
5 December 1969

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13. ABSTRACT This Environmental Test Procedure describes test methods and techniques for evaluating the performance and characteristics of Aircraft Armament, under Arctic winter conditions, relative to the criteria contained in Qualitative Materiel Requirements, (QMR) Small Development Requirements, (SDR), Technical Characteristics (TC) or other applicable requirements or specifications.			

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