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

ARCTIC ENVIRONMENTAL TEST OF INDIVIDUAL LOAD CARRYING EQUIPMENT

1. OBJECTIVE

The objective of this procedure as outlined in this MTP is to provide a means of evaluating the performance of individual load carrying equipment under arctic winter environmental conditions.

2. BACKGROUND

Engineering tests of load carrying equipment are conducted to determine the characteristics and performance of the equipment under various conditions of operation, and to ensure their compliance with specified requirements. Testing in a natural arctic winter environment is used to substantiate or supplement data obtained from simulated tests conducted during the Engineer Design and Engineering Test phase. Testing in the arctic winter environment generally is not authorized until data from simulated environmental tests provides reasonable assurance that the test item will perform its intended function satisfactorily when subjected to the conditions that would be encountered in the arctic.

3. REQUIRED EQUIPMENT

a. Appropriate Arctic winter uniforms and individual field gear.
g. Vehicles as required.
c. Support aircraft.
d. Drop zone.
e. M 1950 Parachutists individual weapon container (or latest standard containers).
f. All general and special tools and ancillary items required.
g. Photographic equipment (black and white or color).
h. Meteorological support facility.

4. REFERENCES

A. AR 705-15, Operations of Materials Under Extreme Conditions of Environment.
B. AR 705-5, Army Research and Development.
C. AR 70-8, Human Factors and Social Sciences Research.
D. AR 70-10, Army Materiel Testing.
E. USATECOM Regulation 705-2, Documenting, Test Plans and Reports.
F. USATECOM Regulation 350-6, Training in New or Modified Equipment and Training Devices.
G. MTP 10-4-500, Arctic Preoperational Inspection, Physical Characteristics, Human Factors.

5. SCOPE

5.1 SUMMARY

The procedures outlined in this MTP are designed to determine and evaluate the performance characteristics of load carrying equipment under arctic winter environmental conditions.

The specific tests to be performed and their intended objectives are listed below:

a. Preoperational Inspection and Physical Characteristics - This test provides for an inspection of the test item to:

1) Identify damage received during shipping and handling.
2) Determine its physical conditions.
3) Determine if the test item dimensions, weight and characteristics conform to applicable criteria.
4) Locate any defects.

b. Functional and Operational Suitability - The objective of this subtest is to determine the ease of carrying and transporting the load carrying equipment across country and over ski trails while wearing snowshoes and skis.

c. Aerial Delivery - The objective of this subtest is to determine the suitability of load carrying equipment for Phase I airborne operations under arctic winter environmental conditions.

d. Human Factors Engineering - The objective of this test is to determine if all accessories and components of the test items enable easy operation by test crews wearing the appropriate arctic winter uniforms.

e. Maintenance Evaluation - The objective of this test is to determine if the load carrying equipment meet maintenance and maintainability requirements as defined by QMR, TC MC, or other established criteria under arctic winter environmental conditions.

5.2 LIMITATIONS

The procedures described in this MTP are limited to the testing of individual load carrying equipment under arctic winter environmental conditions.

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 equipment as the troops who will use the item.

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

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

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manufacturer, contractor, or government, as well as reports of previous tests conducted on the same type of equipment, and familiarize all test personnel available for reference.

e. Record the grade, MOS, background, and training of all test personnel and ensure that all personnel receive new equipment training (NET) as referenced in 4 F.

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 selected for the tests.

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

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

i. Prepare adequate safety precautions to provide safety for personnel and equipment, and ensure that all safety releases are obtained and safety SOP's are observed throughout the test.

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

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

l. Record the prevailing meteorological conditions during the storage phase, as well as test conduct, to include:

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

m. Select a minimum of 50 test and comparison items for testing.

6.2 TEST CONDUCT

NOTE: When applicable, the test items shall be tested on or in conjunction with other test items of individual equipment, clothing, and rations as well as with standard items, e.g. sleeping gear with load-carrying equipment, boots with skis, etc.

6.2.1 Preoperational Inspection and Physical Characteristics

Upon receipt, carefully inspect all test and comparison items and their

shipping or packaging containers for completeness, damage and general conditions in accordance with the applicable section of MTP 10-4-500.

6.2.2 Functional and Operational Suitability

a. Check the physical condition of each test and comparison item and place in the best possible condition prior to test.

b. Direct the personnel to carry the test and comparison items over the following courses.

NOTE: Conduct each test so that 25 percent of tests are performed in air temperature of 0°F to -25°F; 50 percent in -25°F to -45°F; and the remaining 25 percent in -45°F to the lowest available temperature.

1) Snowshoe 16 miles through dense, snow-covered brush.
2) Snowshoe 12 miles over open snow-covered (cross-country) terrain.
3) Ski 100 miles over cross-country ski trails.
4) Perform a vehicular march of 100 miles cross-country in tracked vehicles.
5) Perform a vehicular march of 100 miles on secondary roads in wheeled vehicles.

NOTE: 1. During the above tests the test and comparison items should be mounted and dismounted on vehicles at least 10 times. Similarly rotate test and comparison items during snowshoe and ski courses to ensure complete testing of the load carrying equipment.
2. Conduct tests concurrently where possible to effectively utilize manpower and materiels available.

c. Utilizing a platoon or squad, conduct four field operations (four days each) consisting of attack, defense, patrol and retrograde operations which will require the soldiers to use all TO & E equipment in addition to special equipment issued for use under arctic winter environmental conditions.

NOTE: A mortar squad (or gun crew) from the Indirect Fire Branch of the Infantry, Airborne and Individual Equipment Test Division shall carry the test and comparison items during preparation for and testing of indirect fire weapons and munitions.

d. Each test soldier shall complete the comparison-compatibility form (Appendix A), at the end of each day of testing and the opinion form (Appendix B), after each field training exercise and test.

e. Thoroughly inspect each test item and record the following:

1) Damage attributed to environmental effects.
2) Problems encountered while transporting loads.

3) Damage to the load carrying equipment due to excessive loads.
4) Damage due to wear, use, and handling.
5) Completed comparison - compatibility forms.
6) Completed opinion forms.

6.2.3 Aerial Delivery

a. Inspect each test item for loose, damaged or missing parts and place in the best possible condition.

b. Subject all test and comparison items to a minimum of three parachute jumps using the following procedures:

1) Each parachutist shall be equipped with standard equipment and shall jump in accordance with latest TM's.
2) Each parachutist shall wear the test items as prescribed by appropriate TM's.

c. Inspect all test and comparison items after jump for damage.

d. Each parachutist shall complete a comparison-compatibility form (Appendix A), and opinion form (Appendix B) after each jump. Record the following data:

1) Altitude and speed of delivery aircraft.
2) Ambient air temperature.
3) Results of inspections.
4) Methods used for attachment of test and comparison items to parachutists.
5) Malfunctions of test and comparison items.
6) Compatibility with parachutist's equipment.

6.2.4 Human Factors Engineering and Safety

a. Conduct all Human Factors Engineering and Safety Tests in accordance with the applicable sections of MTP 10-4-500.

b. Conduct these tests concurrently with the operational tests (Functional and Operational Suitability and Aerial Delivery), as described in this MTP.

6.2.5 Maintenance Evaluation

a. Conduct all maintenance evaluation tests (maintenance and reliability) in accordance with the applicable sections of MTP 10-4-500.

b. Conduct these tests concurrently with the operational tests (Functional and Operational Suitability and Aerial Delivery), as described in this MTP.

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, 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 and Operational Suitability

The operation of the load carrying equipment under test in extreme arctic winter conditions shall be determined by comparison with previously accepted items of like nature and specifications. The damage to the items attributed to environmental effects of handling shall be compared with applicable specifications contained in the appropriate QMR, SDR and TC.

6.4.3 Aerial Delivery

The suitability of the load carrying equipment under test for airborne operations under arctic winter environmental conditions shall be determined by comparison with previous items of like nature and specifications. The damage to and/or malfunctions of the test items attributed to parachute jumps shall be compared to data contained in appropriate QMR, SDR and TC.

6.4.4 Human Factors Engineering and Safety

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

6.4.5 Maintenance Evaluation

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

APPENDIX A

COMPARISON-COMPATIBILITY FORM

GENERAL: This form is to be completed by each individual after each day's use of the test or control item.

NAME: _____ DATE: _____

TEMPERATURE RANGE: _____

1. What type of exercise were you participating in?

☐ March ☐ Bivouac ☐ Airborne ☐ Tactical Exercise

Ski _____ Attack _____
Snowshoe _____ Defense _____
Foot _____ Patrol _____
Vehicular _____ Other _____
Type Parachute _____ _____

2. Which did you wear/use?

☐ Test ☐ Standard

3. Which outer garment did you wear?

☐ Pile Cap ☐ Steel Helmet

☐ Field Jacket w/Parka Hood ☐ Field Trousers

w/Liner ☐ Yes ☐ No w/Liner ☐ Yes ☐ No

☐ Parka w/Hood ☐ Parka w/Hood and Overwhites w/Liner

w/Liner ☐ Yes ☐ No ☐ Yes ☐ No

4. What problems or difficulties did you encounter while wearing/using the _____. (Check one or more and explain in paragraph 11.)

☐ Poor Stability ☐ Moisture ☐ Noise

☐ Restricted Head Movement ☐ Tight

☐ Restricted Breathing ☐ Snow, Ice or Frost ☐ Loose

☐ Cold ☐ Too Warm

☐ Uncomfortable ☐ Restricted Movement ☐ Adjustments

☐ Other _____
(problem)

☐ Other _____
(problem)

_____

5. I wore the _____ in conjunction with the following equipment:

☐ Skis

☐ Snowshoes

☐ Weapon-M14, M16, M79, M60 or other _____

☐ Rucksack

☐ Other _____

_____

☐ Other _____

_____

6. I wore the _____ in or on:

☐ M116 ☐ 2 1/2 Ton ☐ Other _____

☐ M113 ☐ 1/4 Ton ☐ Other _____

☐ Tank ☐ Aircraft

7. The _____ was or was not compatible with the following equipment:

Equipment	Was	Was Not
_____	☐	☐
_____	☐	☐
_____	☐	☐

ETC.

APPENDIX B

GENERAL: This form will be filled out by each individual at the conclusion of each field exercise, parachute jump and at the completion of the test.

NAME: _____ DATE: _____

_____
(Exercise No. or period of time)

TEMPERATURE RANGE: _____

1. Check the _____ you wore/used during the period:

   ☐ Test ☐ Standard

2. Write your opinion of the _____ you used:

TEST: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

STANDARD: _____

_____

_____

_____

_____

_____

_____

3. Rank by number your order of preference:

   Test _____

   Standard _____

4. Explain why you like the _____ rated no. 1.

_____

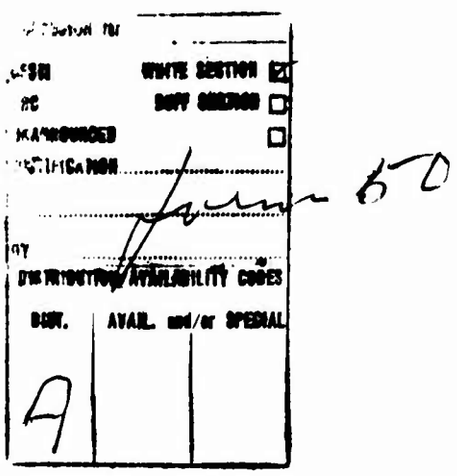
_____

_____

_____

_____

_____



_____
(Signature)

_____
(Rank)