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13. ABSTRACT

Describes a method for evaluation of parachutist individual clothing and equipment suitability for airdrop operations. Provides procedures for preliminary activities, physical characteristics, rigging, airdrop operations, and post operational inspection. Applicable to items attached to and worn by the parachutist.

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U. S. ARMY TEST AND EVALUATION COMMAND
EXPANDED SERVICE TEST - COMMON TEST OPERATIONS PROCEDURES

AMSTE-RP-702-106
*Test Operations Procedure 7-3-511 15 March 1972

AIRDROP OPERATIONS - PERSONNEL AND INDIVIDUAL EQUIPMENT

SECTION I
GENERAL

1. Purpose and Scope. The purpose of the procedures outlined in this Test Operations Procedure (TOP) is to prescribe a method for determining whether selected test item(s) meet the characteristics contained in applicable Materiel Need &MN) documents and the items suitability for attaching to and wearing by the parachutist.

2. Background.

a. The parachutist normally jumps with the equipment and weapons required for combat, plus any organizational equipment assigned to him for delivery to the drop zone (DZ). This combat load should be as light in weight as possible, consistent with his mission, and should include only those items absolutely necessary for the immediate combat effectiveness of the parachutist (fighting and survival loads).

b. The airdrop operation is required to determine the ability of a parachutist to complete a successful jump. Results of the test provide the basis for a recommendation of suitability.

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3. Equipment and Facilities.

a. Aircraft (transport and chase).

b. Vehicles (personnel and emergency).

c. Safety and first aid equipment.

d. Meteorological instrumentation.

e. Photographic equipment (still, motion).

f. Communications equipment (ground-to-air, ground-to-ground).

g. Parachutes (main and reserve).

h. Parachutist's adjustable equipment (PAE) bag.

i. H-harness and kit bag.

j. Ammunition carrying bag.

k. Adjustable individual weapons case.

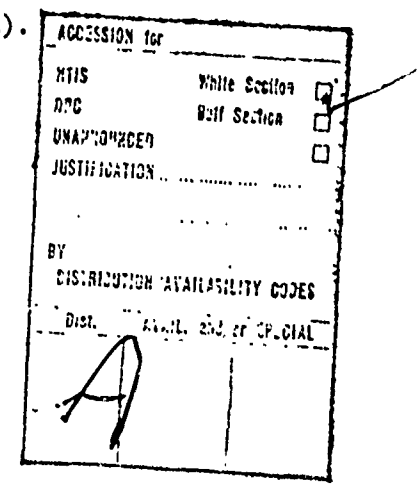
l. Container, weapon and individual equipment (CWIE).

m. Lowering strap.

n. Tiedown cord, 50 lb. test.

o. Navigation equipment.

p. Drop zone.



SECTION II
TEST PROCEDURES

4. Preliminary Activities.

a. The test officer conducts an informal conference with an aviation officer, a safety officer, the agency Airborne Operations Officer, and an experienced parachutist prior to the start of the airdrop test. The agenda should provide for:

(1) A study of the Safety Release to determine whether it places undue restrictions on the tactical delivery of the test item by a parachutist.

(2) Identification of safety hazards for which special precautions must be taken, or which would prevent delivery by a parachutist.

(3) The selection of a suitable DZ. The DZ selected shall be appropriate to the item being tested, and will meet the requirements of the established line of contact (LC) standing operating procedure for airdrop operations.

(4) Medical evacuation plans in the event of a malfunction, accident, or similar occurrence.

(5) Establishment of qualifications for test personnel who will participate in the test.

(6) Safety considerations in the choice of aircraft to be used in the test.

(7) Selection of the type of aircraft best suited for the supporting test. The aircraft should be the same type from which the test item(s) would be "jumped" in a combat environment. More than one "jump" from different types of aircraft may be required to evaluate the test item(s) properly.

(8) Determination of flight data to include: Altitude, air speed, wind velocity, signals, and special conditions imposed due to the type aircraft used.

b. Insure that the test personnel are briefed on the objectives of the airdrop test and the required data.

c. Insure that the parachutists are trained in proper methods of securing the test equipment to their persons, and alert them to any safety hazards which may be involved.

d. Insure that the equipment necessary to conduct the test is present in sufficient time to provide for a timely and efficient airdrop operation.

5. Physical Characteristics.

a. Objectives. In addition to applicable requirements stated in the MN, the following will be addressed:

(1) The test item is capable of delivery as a complete unit by one parachutist or as components for delivery by a team or squad.

(2) The test item has sharp or extended projections which might endanger the parachutist, interfere with his performance and equipment, or may be subject to damage during exit, descent, and landing.

b. Method.

(1) Review the data obtained from the preoperational inspection and physical characteristics supporting test of the expanded service test. Make particular note of the weight and dimensions of the test item.

(2) Determine the suitability of the test item as one-man loads for jumping.

(3) Determine the extent of disassembly required to adapt the test item for parachute delivery.

(4) Examine the test item to identify any sharp or extended projections which may endanger the parachutist, or interfere with his performance. This examination should be conducted jointly by the test officer and a qualified rigger.

(5) During the steps above, note any equipment characteristics that may make the equipment subject to damage during exit, descent, or landing.

c. Data Required.

(1) The weight and dimensions of the test item.

(2) Data relative to whether the test item can be jumped in one-man loads.

(3) The selected method of disassembly, if appropriate.

(4) The weights and dimensions of separate parts, if appropriate.

(5) Photographs of the test item before and after disassembly, if appropriate.

(6) Results of the examination described in paragraph 5b(4).

(7) Data pertaining to whether the test item possesses any characteristics that may cause damage during exit, descent, or landing.

d. Analytical Plan.

(1) Analysis of qualitative and quantitative data will be reported separately. The data shall be presented in narrative form supplemented with tables, charts, graphs, photographs, and motion pictures as required.

(2) For quantitative data, underlying distribution will be stated. A statement will be made pertaining to the adequacy of the length of test time. Confidence levels will be stated. A detailed method of statistical analysis for each different set of data will be defined.

(3) With either qualitative or quantitative results, the final evaluation as to whether or not the criteria were met will be subjective.

6. Rigging Techniques.

a. Objective. To determine the most effective means of rigging the test item(s) for parachutist delivery by selecting:

(1) The most efficient means of attaching the proper container to the parachutist for delivery.

(2) The best means to secure the item to the parachutist providing the configuration of the item adapts itself to this means of delivery.

b. Method. In conjunction with a qualified rigger and experienced parachutist, and using TM 57-220 (Technical Training of Parachutists) as a guide:

(1) Compare the various types of equipment available for packaging or attaching the test item for parachutist delivery.

(2) Determine one or more methods of attaching and securing the test item to the parachutist. This determination shall include but not be limited to:

(a) The proper connections.

(b) The location and position on the parachutist.

(c) What part of the item must be taped or otherwise padded.

(3) Determine the requirement for, and placement of, quick-release ties.

c. Data Required.

(1) Data relative to adaptability of the test item to be delivered by parachutist within a container or secured to his person.

(2) The method(s) of rigging selected for parachutist delivery.

(3) Photographs of parachutists with the test item rigged for a "jump" either in a container affixed to the jumper or secured to his person.

(4) Comments of test soldiers

(5) One test item is sufficient to determine the rigging techniques.

d. Analytical Plan.

(1) Subjectively evaluate whether the test item should be delivered by the parachutist in a container or secured to his person.

(2) Providing a container is selected as the means of delivery, subjectively determine which container is the optimum container.

(3) Providing the optimum means of delivery is determined to be attached to the parachutist, subjectively evaluate the following:

(a) Proper connections selected.

(b) Placement of quick-release ties.

(c) Portions of the test item that require taping, if appropriate.

(4) The final determination as to whether or not the test item meets the appropriate criteria will be subjective.

7. Airdrop Operations.

a. Objective. To evaluate the ease or difficulty experienced by the parachutist in carrying the test item during exit and descent from an aircraft and during his parachute landing fall (PLF).

b. Method.

(1) Conduct a prejump briefing to insure that the test personnel know the objectives of the test, how it is to be conducted, the safety aspects, data to be collected, and instructions for their actions during and after the jump.

(2) Instruct the parachutists to don their parachutes and equipment.

(3) Orally question the parachutists during the donning period as to:

(a) Ease of packing or affixing the test item in connection with donning his parachute.

(b) Freedom of movement when the test item is attached to his parachute harness or his body.

(c) Ability to locate and reach the tie downs and/or quick release.

(4) Upon entering the selected aircraft, orally question the parachutists as to:

(a) Ease of entering the aircraft.

(b) Ability to fasten seat belts or securing hardware.

(c) Interference between the rigged test item and the parachute or other equipment.

(d) Ability to stand when the command "stand up" is given.

(e) Ability to perform additional duties as required, e.g., jumpmaster.

(5) Conduct the jump(s) noting the following:

(a) Ability of the jumpers to make a proper exit with the equipment.

(b) Safety hazards that may develop in the slip stream caused by the test item.

(6) Use high speed motion photography to verify comments concerning any problems that develop during this portion of the subtest.

(7) Note any hazards occurring during the PLF's that are attributable to the test item. Extensive use of high speed motion photography is recommended for detailed study of PLF's.

c. Data Required.

(1) The number of jumps per parachutist.

(2) Number of times each test item was "jumped."

(3) The number of parachutists employed for the jumps.

(4) Aircraft altitude, air speed, and wind velocity.

(5) Test soldier comments and test officer observations of those activities described in paragraph 7b.

(6) Motion photography film footage.

(7) Sample size should be determined in coordination with methodology personnel and statisticians based on test criteria and assumed distribution. Other factors influencing sample size to be considered are:

(a) Availability of test items.

(b) Test item available.

(c) Economic considerations.

(8) The control item will be subjected to the same exercises as the test item. Sample size will be the same as for the test item. Each parachutist should "jump" the control item the same number of times as the test item.

(9) Alternative courses of action should be considered based on reduction of desired sample size.

(10) Statisticians will be present to observe or to participate in operational tests to the extent necessary to become familiar with the actual data collection methods and to advise on the validity of data being collected.

d. Analytical Plan.

(1) Analysis of qualitative and quantitative data will be reported separately. The data shall be presented in narrative form supplemented with tables, charts, graphs, photographs, and motion pictures.

(2) For quantitative data, underlying distribution will be stated. A statement will be made pertaining to the adequacy of the sample size and length of test time. Confidence levels will be stated. A detailed method of statistical analysis for each different set of data will be defined.

(3) With either qualitative or quantitative results, the final evaluation as to whether or not the criteria were met will be subjective.

8. Postoperational Inspection.

a. Objective. To determine the effects of a parachutist delivery on the test item.

b. Method.

(1) Inspect the test item(s) for dents, broken parts, cracks, leaks, and similar damage.

(2) If applicable, determine times necessary to reassemble both the control and test item into operating configurations.

(3) Functionally operate the test item. Note any malfunctions in the operation of the test item(s) and if related to parachute delivery.

(4) Require the test parachutists to complete a questionnaire containing but not limited to the questions shown in the sample questionnaire at appendix C. The test officer should insure that the test parachutists are furnished the proper materials and time to complete the questionnaire in the proper manner.

(5) Inspect the air items used to parachute the test item for damage caused by the test item.

c. Data Required.

(1) The results of the visual inspection of the test item(s) and the air items.

(2) Questionnaires completed by the test parachutists.

(3) The results of the functional operation exercise.

(4) Film from the exercise described in paragraph 7.

(5) Photographs of damaged test items and air items.

d. Analytical Plan.

(1) Confidence levels will be stated.

(2) All data collected during the test shall be correlated and reduced to a concise, workable form. Present the data in narrative form supplemented with tables, charts, graphs, and photographs, as required.

(3) Analysis of qualitative and quantitative data will be reported separately. A detailed method of statistical analysis of each set of data will be defined.

(4) With either qualitative or quantitative results, the final evaluation as to whether or not the objectives and criteria were met will be subjective.

SECTION III
SUPPLEMENTARY INSTRUCTIONS

9. Safety. Throughout all testing, observe all safety standards prescribed in TM 57-220 and the local airborne SOP's.

Recommended changes to this publication should be forwarded to Commanding General, U.S. Army Test and Evaluation Command, ATTN: AMSTE-ME, Aberdeen Proving Ground, Maryland 21005. Technical information related to this publication may be obtained from the U.S. Army Infantry Board, ATTN: STEBC-TE-F, Fort Benning, Georgia 31905. Additional copies of this document are available from the Defense Documentation Center, Cameron Station, Alexandria, Viginia 22314. This document is identified by the accession number (AD No.) printed on the first page.

APPENDIX A
REFERENCES

1. FM 10-8, "Air Drop of Supplies and Equipment in the Theater of Operations."

2. FM 57-1, "U.S. Army/U.S. Air Force Doctrine for Airborne Operations (AFM 2-51)."

3. FM 57-35, "Airmobile Operations."

4. FM 57-38, "Pathfinder Operations."

5. TM 55-450-15, "Air Movement of Troops and Equipment (Administrative)."

6. TM 57-220, "Technical Training of Parachutists."

7. TECR 70-24, "Documenting Test Plans and Reports."

8. TECR 385-6, "Verification of Safety of Materiel During Testing."

9. TECR 750-15, "Maintenance Evaluation During Testing."

10. USAICR 95-4, "Military Parachuting at the US Army Infantry Center."

11. TOP 8-3-506, "Safety."

12. TOP 5-3-507, "Human Factors Engineering."

13. TOP 7-3-512, "Airdrop (Suitability of Equipment for)."

14. JACOBS, T.O., "A Guide for Developing Questionnaire Items." HUMRRO, Fort Benning, Georgia 31905, January 1970.

APPENDIX B
ABBREVIATIONS

1.	AFM	Air Force Manual
2.	AR	Army Regulation
3.	CWIE	Container, Weapon and Individual Equipment
4.	DDC	Defense Documentation Center
5.	DZ	Drop Zone
6.	FM	Department of the Army Field Manual
7.	MN	Materiel Needs
8.	PAE	Parachutists Adjustable Equipment
9.	PLF	Parachute Landing Fall
10.	SOP	Standing Operating Procedure
11.	TECOM PAM	Test and Evaluation Command Pamphlet
12.	TECR	Test and Evaluation Command Regulation
13.	TM	Department of the Army Technical Manual
14.	TOP	Test Operations Procedure
15.	TECOM	United States Army Test and Evaluation Command
16.	USAIB	United States Army Infantry Board

APPENDIX C
QUESTIONNAIRE

1. Which item was easier to rig for jumping?

CONTROL TEST NO DIFFERENCE

2. Did the test item interfere with your entering the aircraft?

YES NO

If YES, explain how _____

_____

3. Did the test item interfere with your fastening the seat belt?

YES NO

If YES, explain how _____

_____

4. Did the test item interfere with you or your equipment when you were standing up to hook up?

YES NO

If YES, explain how _____

_____

5. Did the test item interfere while exiting the aircraft?

YES NO

If YES, explain how _____

_____

6. Did the test item interfere while you were checking your canopy or during descent?

YES NO

If so, explain how _____

_____

7. Did the test item affect your PLF?

YES NO

If so, explain how _____

_____

8. Were the furnished quick-release ties adequate?

YES NO

If your answer was NO, explain why _____

_____

9. Which item would you rather jump?

TEST CONTROL

Explain why you chose the above item _____

_____

_____

10. How many equipment jumps have you made?

_____