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FOREWORD

The Field Evaluation Agency, a major element of the Quartermaster Research and Engineering Command, is responsible for the accomplishment of that portion of the research and engineering mission of the Quartermaster Corps which is reflected in programs and technical projects approved and assigned by Headquarters, Quartermaster Research and Engineering Command, and includes, but is not limited to the following:

1. Field Evaluations, including engineering studies, surveys, and engineering and service tests of Quartermaster Corps materiel, systems, and techniques.

2. Research for the development of new and improved field test methodology.

3. The provision of technical services and logistical support to other elements of the Quartermaster Research and Engineering Command and the Quartermaster Corps.

The Agency's end product is a technical report, published by the Agency and distributed by Headquarters, Quartermaster Research and Engineering Command, which sets forth the results of field tests, methods research studies, and air delivery projects. These reports are published in the form of Interim Letter Reports, Final Letter Reports, and bound Technical Reports. For the convenience of those desiring the information, this bibliography, which is a compilation of the Agency's accomplishments during the past fiscal year, contains abstracts of the bound technical reports published and a listing of other reports forwarded. The reports are cross-referenced by test number, project area number, and title.

The findings contained in the abstracts are presented for information purposes only since in many instances final action on them by higher headquarters has not been taken.

This report is not classified. However, information contained herein will not be released to private organizations, the press, industrial concerns, or any non-government personnel or Agency without written approval of the Office of The Quartermaster General or Headquarters Quartermaster Research and Engineering Command as appropriate.

HOWARD W. HEMBREE, Ph. D.
Scientific Director
QM R&E Field Evaluation Agency

ARTHUR H. NELSON, Colonel, QMC
Commanding Officer
QM R&E Field Evaluation Agency

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PART I

RESEARCH AND ENGINEERING PROGRAM

Abstracts of Final Reports
Final Letter Reports
Interim Letter Reports

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-163
FEA 60001

Engineer Test of Flexible Packages for Heat Processed Foods - Peaches

Conducted at Camp Pickett and Fort Lee, Virginia

July 1960

Abstract

Observer-Recorder Examining Flexible Package

Because of the logistical disadvantages long recognized and associated with hermetically sealed rigid metal food containers such as the tin can, research has been conducted on flexible containers as a possible replacement. Effort by the QM Food and Container Institute has resulted in the development of flexible packaged peaches which have been successfully

processed and stored for a period of one year at 100°F. An engineering test of individual portion size flexible containers of ready-to-eat sterile peaches was conducted by the Quartermaster Research and Engineering Field Evaluation Agency.

This test was conducted at Camp Pickett and Fort Lee, Virginia, during February and March, 1960. The objective of the test was to evaluate the performance of flexible packages under conditions which may prevail during their eventual use as a combat ration component. Testing included normal use during routine troop field training operations and accelerated use utilizing portions of the Field Evaluation Agency's accelerated wear courses.

Test results showed that the flexible package possesses adequate mechanical strength or durability for use under normal field conditions. The over-all percentage of failures for the flexible package under accelerated use conditions is higher than for normal use, but is not considered excessive. The durability of the 6-ounce, 300 x 200 metal can is greater than that of the flexible package. While 9 flexible packages (or the equivalent of approximately 1 ration) are more difficult to disperse on the person of the soldier than either 3 or 6, the number of packages carried has no apparent effect on the ability of the soldier to perform his assigned duties under normal field conditions. In many instances the flexible package as presently designed presents some difficulty in dispersing on the person due to incompatibility of the package length and the depth of the lower pockets of the soldier's field jacket. The flexible package as tested presents no serious problems in opening. Peaches may be eaten satisfactorily from the flexible package. The flexible package is superior to the metal can with respect to ease of dispersal, general ease of carrying, and over-all preference for use by the soldier under field or combat conditions.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-165
FEA 59056

An Engineering Test of Collapsible Container Repair Equipment

Conducted at Fort Lee, Virginia

July 1960

Abstract

Collapsible Container Being Repaired.

The only available material for repairing collapsible containers is limited to containers of 2-ply construction. This engineering test of experimental collapsible container repair equipment was conducted to evaluate its effectiveness for tanks and containers of 2- and 4-ply construction.

Testing for this repair equipment was conducted at the Agency's Materials Handling Equipment hangar at Fort Lee, Virginia.

A900- and a 500-gallon capacity collapsible container were used in evaluating 2- and 4-ply patches. The containers were subjected to normal and rough handling treatment simulating conditions of normal use. Patch-sealing effectiveness was tested at internal pressures up to 15 psi gauge measurement.

The experimental patches provided acceptable sealing under static conditions. Because of failures encountered during handling, however, the patch was modified. This modification resulted in positive sealing for distorted holes and greatly improved the durability and reliability of patches.

Final analysis of the repair equipment indicated that the patches are acceptable for static repair of the 900- and 500-gallon collapsible containers. The modified patch, however, is superior to the test patch for sealing effectiveness and durability. It is recommended that the basic design of the modified flexible patch be adapted for repair of the type of collapsible containers tested.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-169
FEA 59048

An Engineering Test of Tent, Frame-Type, Insulated, Sectional, 16' x 16', T 59-3

Conducted at Fort Lee, Virginia; Maynard Quartermaster Test Activity, Maynard, Massachusetts; and Mount Washington, New Hampshire

August 1960

Abstract

Identification View of Experimental Tent

The standard tent used by the Army in cold regions is considered too heavy for the highly mobile Army of the future. A multi-purpose tent was developed which can be lengthened by four-foot increments, is 40 percent

lighter than the standard item, can be erected without the floor, and has a frame of lightweight metal.

This experimental tent was tested in comparison with the standard item at Ft. Lee, Va.; Maynard Quartermaster Test Activity, Maynard, Mass.; and Mt. Washington, N.H. Included were tests of pitching and striking characteristics, heating characteristics, resistance to wind, snow, and water, high wind stability, blackout characteristics, and suitability of the experimental vestibule.

Test results indicate that the experimental tent and vestibule are not entirely satisfactory when compared with the standard tent. Some of the deficiences were: insulation became wet from rain and snow making the tent difficult to handle and to heat, did not meet blackout requirements, and sagging of roof blankets due to collection of rain and snow.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-170
FEA 56062
Phase II

An Accelerated Wear Test of Wool and Synthetic Fiber Blended Serge Fabric

Conducted at Fort Lee, Virginia

September 1960

Abstract

During August-October 1957, the Quartermaster Research and Engineering Field Evaluation Agency conducted the first phase of a comparative wear resistance test of wool and man-made fiber blends. Fabrics made from four types of wool-synthetic fiber blends, two blood grades of 100% wool, and the standard 100% wool, serge, OD 33, were evaluated.

Phase II, the present test, was conducted by the FEA on its Wool Fabric Course at Fort Lee, Virginia, from 10 June to 29 July 1960 to compare the wear resistance of fabrics made from seven other types of wool and man-made fiber blends and the standard 100% wool, serge, OD 33. The items made of the eight types of fabrics tested are as follows:

Trousers, 100% Wool, Serge, OD 33, 16 Ounce, Standard, FEA Code S.

Trousers, Air Force Blue, 70/30 Wool/Nylon, 60's Grade Wool, 2 x 2 Twill Weave, FEA Code A.

Trousers, Air Force Blue, 85/15 Wool/Nylon, FEA Code B.

Trousers, 70/30 Wool/Viscose, 56's Grade Wool, 3 Denier, Viscose, FEA Code C.

Trousers, Air Force Blue, 70/30 Wool/Viscose, 56's Grade Wool, 5.5 Denier, Viscose, FEA Code D.

Trousers, Air Force Blue, 70/30 Wool/Dynel, 60's Grade Wool, FEA Code E.

Trousers, Air Force Blue, 85/15 Wool Dynel, 60's Grade Wool, FEA Code F.

Trousers, Air Force Blue, 70/20/10 Wool/ Viscose/Nylon, FEA Code G.

Test results showed that the experimental fabrics Codes A and E are the most durable of all fabric types tested. The experimental fabric Codes F and G are the most durable of the remaining fabrics. The experimental fabrics Codes C and D are the fifth and sixth most durable fabrics. The standard Fabric Code S and the experimental fabric Code B are the least durable of the eight types of fabrics tested. There are no differences in the durabilities of each of the following paired types of fabrics: A and E; F and G; C and D; and S and B.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-171
FEA 60017

Time Study of Preparation and Use of the Ration, Small Detachment, 5-Persons

Conducted at Fort Lee and Camp Pickett, Virginia

September 1960

Abstract

Five-person ration being prepared by two-man team.

Now under development are rations whose improved logistics and flexibility of operations are presumed to be prime advantages. One example is the Simplified Food Logistics Quick-Serve meal. There have not been, however, adequate base line data on time required for preparation and water requirements for standard rations with which to compare newly developed items. The objective of this test was to obtain this comparison data during field testing.

This test was conducted by the QM Research and Engineering Field Evaluation Agency under normal field conditions at Fort Lee and Camp Pickett, Virginia, during the period 14 April through 13 May 1960.

The Ration, Small Detachment, 5-Persons was used to determine the base line data. Results of the test showed that the average total elapsed time required for preparing, serving, eating, and cleaning up operations was 50 minutes. The estimated average man-minutes needed for perparing, serving, and cleaning up operation was 56 man-minutes. For a 5-man group, the average total water required per day for food preparation and clean-up was approximately four gallons. Total average daily water requirements per man for all purposes under field conditions totaled 1.9 gallons.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-172
FEA 59036

Engineering Test of Contour Packaged Clothing

Conducted at Richmond Quartermaster Depot, Fort Eustis, Virginia, and Fort Dix, New Jersey

September 1960

Abstract

Clothing items have been supplied to large units stationed in a relatively small geographical area by compressed or semi-compressed bales. The evolution of a concept which requires small, widely dispersed units, however, has resulted in a need for a method of packaging and packing clothing items in quantities which can be efficiently utilized by the smaller units, without corresponding loss of the cube and tare weight efficiency of the bale.

The Quartermaster Research and Engineering Command has developed the contour packaging technique which consists of inclosing an item in a flexible barrier material (in this instance a polyethylene-mylar combination), extracting the air from the package, and heat-sealing the opening. A reduction in cube of up to 50 percent may be obtained by this process. Also, the items are protected against damage from moisture and insects. The Quartermaster Research and Engineering Field Evaluation Agency conducted a shipping test of the experimental contour packaged clothing which originated at the Richmond (Virginia) Quartermaster Depot, continued at Fort Eustis, Virginia, and was terminated at Fort Dix, New Jersey.

Objectives of this test were to determine the condition of contour packages upon arrival at destination where items are to be issued, and the acceptance of contour packaged clothing by supply personnel. The test consisted of shipping 641 fiberboard boxes, each containing either wool OG shirts, undershirts, or socks inclosed in a contour package, to various destinations. Also, the shipment was on- and off-loaded from a ship. Thus the shipment of clothing underwent procedures that are normal for transportation of Army clothing.

Results of the test indicated that the fiberboard shipping cases are adequate for shipment of contour packaged clothing. The condition of the contour packaged clothing at the time of issue was excellent, though slightly wrinkled. Supply personnel preferred bale packaged clothing to contour packs in their type of issuing operations.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-173
FEA 59050

An Engineering Test of Heater, Water, Surface, 6-Quart Capacity

Conducted at Fort Churchill, Canada and Fort Lee, Virginia

October 1960

Abstract

This test was conducted to evaluate an experimental surface water heater developed for rapid heating of water for reconstituting and heating field rations designed under the Simplified Food Logistics Program. The test item consists of a burner unit, a burner head, and a wind shield. The burner unit of the heater operates on the principle of generating its own pressure.

Testing of the experimental heater was conducted at Fort Churchill, Manitoba, Canada, and Fort Lee, Virginia, by the Quartermaster Research and Engineering Field Evaluation Agency from January through August 1960. Objectives of the test were to determine its operating characteristics, its use-life, and the nature, time, and incidence rate of any deficiencies.

Results of the test indicate that, generally, the performance of the experimental heater is undependable and unsatisfactory. There were wide variations in water heating performance of any individual heater, even under zero wind velocity and 70°F. ambient temperature. At 70°F. and zero wind velocity, a single heater, if functioning properly, would boil 6 quarts of water in the allotted time.

The boiling point was reached only 75 percent of the time when the heaters were new. After 10 trials, the boiling point was attained only 40 percent of the time. Performance of heaters in combinations of two, or more, is similar to that of a single heater. Winds of 10 m.p.h. or greater practically precludes the boiling of water with single or combinations of heaters, under any ambient conditions.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-174
FEA 60019

Disinfectant, Food Service, T58-1 and T58-2

Conducted at Fort Lee and Camp Pickett, Virginia

November 1960

Abstract

The Armed Forces at times must purchase fruits and vegetables in areas where human excretia is used as a fertilizer for growing these foods. When these fruits and vegetables are to be consumed uncooked, they must be washed and thoroughly disinfected. The current disinfectant used by the Services, though generally acceptable, does not meet viricidal requirements at all temperatures.

This test, conducted at Fort Lee and Camp Pickett, Virginia, evaluated the possibility of using iodine as a disinfecting agent to correct the reported deficiency. Specific objectives included the effects of the disinfectant on mess gear with emphasis on residual taste or odor and corrosion or discoloration; effects of the solution on the food with respect to color, appearance, odor, and taste; and determination of the comparative suitability of two types of experimental packages.

The standard disinfectant was used for comparison. One of the experimental packages was a Mylar/Saran double compartment pouch, T 58-1; and, the second package was wax-coated Kraft/Mylar double compartment pouch, T 58-2. The contents of the experimental T 58-1 and T 58-2 packages were identical chemically and contained inorganic iodide in one of the pouches.

Tests to determine the effects on the mess gear were conducted during field maneuvers at Camp Pickett. The fruit and vegetable test phase was held in company mess halls at Fort Lee.

Based on field evaluations, the three disinfectants are equally acceptable to the troops. The standard package is superior in most respects to the experimental packages. None of the disinfectants affect the color or appearance of fresh fruits or vegetables.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-175
FEA 60003

Engineering Test of Cleaning and Inspection Unit, Collapsible Containers, Liquid Fuel

Conducted at Fort Lee, Virginia

November 1960

Abstract

A portable cleaning and inspection unit for liquid fuel collapsible containers has been developed for cleaning 5,000- and 10,000-gallon pillow-type containers and the 500-gallon container.

An engineering test of this unit was conducted at the Quartermaster Field Evaluation Agency by Agency technologists in August, 1960. The objective of the test was 4-fold: to determine the over-all effectiveness of the unit in cleaning collapsible containers; to determine the adaptability of the unit for transportation in 2 1/2-ton and M-211 cargo trucks; to determine minimum electrical power necessary for satisfactory operation of the unit; and to evaluate the separate components of the unit.

As a result of this test it was concluded that the unit will facilitate cleaning the inside and outside of 5,000- and 10,000-gallon pillow-type containers and the 500-gallon container, that it will facilitate in purging the containers of explosive vapors, and that it will facilitate removing sludge, grease, fuels, and substances existing in a colloidal state in or on the containers. It is also useful in locating small holes in the containers. It is, however, of no value in removing sand or heavy solids from the containers.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
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FORT LEE, VIRGINIA

TECHNICAL REPORT T-176
FEA 60024

An Engineering Test of Wear Resistance of Experimental Fabrics (100% Fiber #6 and 66/34 Cotton/Nylon 420 Blend)

Conducted at Fort Lee, Virginia

December 1960

Abstract

A continuous endeavor is being conducted by the Quartermaster Research and Engineering Command to obtain the most suitable fabric that will provide thermal protection for combat clothing.

This test conducted at Fort Lee, Virginia, by the Quartermaster Research and Engineering Field Evaluation Agency, involved two such experimental fabrics which were evaluated with the standard cotton poplin fabric to determine the durability of the new fabrics. Testing was accomplished on the Agency's Cotton Fabric Course.

One experimental fabric was Cloth, Poplin, Experimental Fiber #6, 5.7 ounce and the second was Cloth, Cotton/Nylon, 66/34, 420 Blend, 5.7 ounce. These were compared with the standard Cloth, Cotton Poplin, Wind Resistant, 5.7 ounce.

Results of this test show that the two experimental fabrics are equal in durability but better than the standard fabric in this respect.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-177
FEA 60025

An Engineering Test of Wear Resistance of Cotton/Nylon Fabrics

Conducted at Fort Lee, Virginia

December 1960

Abstract

A series of sateen weave fabrics have been developed by the Quartermaster Research and Engineering Center Laboratories to provide combat clothing with increased durability and greater thermal protection.

This test conducted at Fort Lee, Virginia, by the Quartermaster Research and Engineering Field Evaluation Agency, involved two such experimental fabrics. They were evaluated with the standard cotton carded sateen fabric to determine their durability quality. Testing was accomplished on the Agency's Cotton Fabric Course.

One experimental fabric was Cloth, Cotton/Nylon Sateen, 9.7 ounce, with a carded cotton warp and a nylon filament filling. The second item tested was Cloth, Cotton/Nylon, 8.0 ounce, 67/33, 420 Blend with carded singles yarns for both warp and filling.

Results of the test show that the fabric with a carded cotton warp and nylon filament filling is the most durable of the three fabrics. The second experimental fabric, carded singles warp and filling yarns, is more durable than the standard sateen fabric.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-178
FEA 60026

An Engineering Test of Wear Resistance of Experimental Fabric (Combed Cotton Sateen with High Pickage)

Conducted at Fort Lee, Virginia

December 1960

Abstract

An engineering test of an experimental 9-oz. combed cotton sateen fabric with more picks per inch than utilized in the standard fabric was carried out by the Quartermaster Research and Engineering Field Evaluation Agency. The purpose of the test was to determine the relative wear resistance of the experimental fabric in comparison with the standard 9-oz. cotton sateen fabric.

This test was conducted at Fort Lee, Virginia. Trousers made from each of the two fabrics were worn over the Field Evaluation Agency's Cotton Fabric Course to provide data for evaluation of the durability of the two fabrics.

Test results showed that the experimental fabric was more durable than the standard fabric.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-179
FEA 59024

An Engineering Test of Ponchos With Liners for Use as Combat Sleeping Gear Hot and Cool Weather

Conducted at Fort Lee, Virginia, and Camp Pickett, Virginia

November 1960

Abstract

Two experimental multi-purpose ponchos with detachable liners have been developed by the Quartermaster Research and Engineering Command. The primary use for these ponchos is to provide combat sleeping gear for hot weather, above 68°F., and for cool weather, to 45°F. The ponchos are also designed to be used as a rain garment, ground cloth, shelter-half, and foxhole cover.

An evaluation of the two experimental items in comparison with the standard poncho was conducted by the Quartermaster Research and Engineering Field Evaluation Agency at Fort Lee and Camp Pickett, Virginia. The Cool Weather testing was conducted from 4 April through 12 May 1960, and the Hot Weather Phase from 5 July through 19 August 1960. In addition to field testing, controlled operations were held at the Agency's Dynamic Rain Course facility to determine the water resistance capability of the test items when worn as rain garments.

One of the experimental ponchos is fabricated from neoprene-coated fortisan. The liner component consists of an OD vinyl top and bottom sheet with a non-woven cotton web center sheet. The other experimental poncho is fabricated of Quarpel-treated cotton/nylon poplin cloth. The snap-in liner of this poncho is made of bonded Dacron batt encased within nylon ripstop fabric. The standard poncho is vinyl-coated nylon cloth, and is supplemented with two standard wool blankets.

Field testing included simulated combat problems, extensive cross-country marches, and overnight bivouacs.

Results of the test indicate that the standard and Quarpel poncho systems are equally satisfactory and superior to the neoprene ponchos system with regard to protection afforded test subjects when sleeping outdoors in hot and cool temperatures.

The standard and Quarpel poncho systems are equally satisfactory and both are superior to the neoprene system with regard to fabric durability.

Of the three poncho systems evaluated, the standard poncho-liner combination is the only system which is satisfactory for overall field use including use for sleeping gear, ground cloth, shelter half, foxhole cover, and rain garment.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-180
FEA 60038

Pilot Investigation on Psychological Effects of Package Labels

Conducted at Fort Lee, Virginia

December 1960

Abstract

Labels play an important part in a commercial food processor's effort to sell his product. An attractive label can create a favorable consumer attitude toward a product. The Quartermaster Corps intererest in this marketing theory is two fold: First, to make known to military personnel that the Army's research and development work in producing foods is designed to meet their needs and desires. Second, to establish a favorable predisposition toward canned foods.

This study, conducted at Fort Lee, Virginia, was to obtain an indication of the effectiveness of three types of labels in inducing favorable attitudes toward canned foods.

Three groups of test personnel evaluated three types of can labels. One was a plain white label showing only the name of the food contained therein. The second label consisted of blue print on tan paper with the name of the food and the Quartermaster indicia certifying quality. The third type of label was a nationally known commercial item.

On the basis of hedonic scale averages, the commercial label was more effective in inducing initial favorable consumer attitude toward canned foods than was the plain white label with only the food name. There were no differences between the commercial label and the Quartermaster label, nor between the Quartermaster label and the plain label with respect to effects on consumer attitudes toward canned foods.

On the basis of food consumption data, there were no differences between any of the three labels with respect to effects on consumer attitudes toward canned foods.

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TECHNICAL REPORT T-182
FEA 59051

An Engineering Test of Tent, Maintenance, Army Aircraft, Air-Supported w/Auxiliary Rigid Frame, T 59-1 (Vehicle Maintenance)

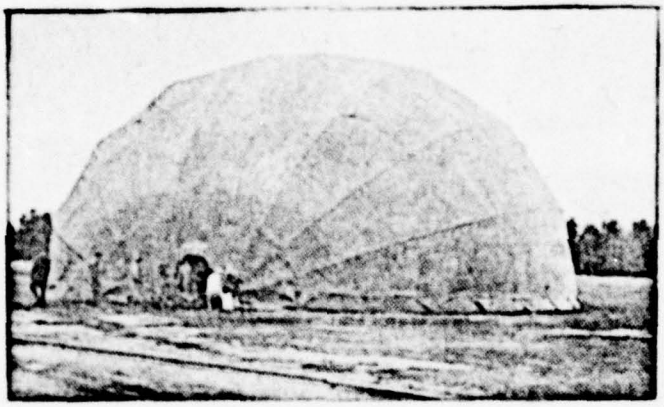
Conducted at Fort Lee, Virginia

and

Fort Devens, Massachusetts

December 1960

Abstract



Item Tested

An engineering test of Tent, Maintenance, Army Aircraft, Air-Supported w/Auxiliary rigid frame, T 59-1 (Vehicle Maintenance) was conducted by the Quartermaster Research and Engineering Field Evaluation Agency.

The purpose of the test, conducted at Fort Lee, Virginia, and Fort Devens, Massachusetts, was to determine whether the test tent was suitable for maintenance work on the M-48 tank and other large vehicles organic to the tank group. Also, an evaluation was made of erecting and striking instructions for the tent.

Test operations consisted of pitching and striking trials, determination of ambient temperature conditions within the tent, and sound level studies. Test results showed that the Tent, Maintenance, Army Aircraft, Air-Supported,

w/Auxiliary Rigid Frame, T 59-1 (Vehicle Maintenance), provides sufficient space for all types of maintenance work on the M-48 tank and other large vehicles organic to a tank group. The ventilating characteristics of the test tent are not satisfactory. The erecting and striking instructions furnished by the manufacturer are adequate. The tent is not suitable for use by maintenance units in direct support of fast moving, mobile forward tank units. The tent is satisfactory for use in static rear areas where a large level space is available for the tent, where the tent can be erected and struck during daylight hours, and where extensive camouflage is not required.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-183
FEA 60023

An Engineering Test of Apron, Disposable, T 60-1 and T 60-2

Conducted at Fort Lee, Virginia

January 1961

Abstract

Student Cooks Wearing Experimental Aprons

In order to determine the suitability of disposable aprons for use by food handlers, two experimental paper aprons were evaluated by the Quartermaster Research and Engineering Field Evaluation Agency.

This engineering test was conducted at Fort Lee, Virginia. The two experimental items are fabricated from somewhat similar scrim reinforced paper-base material, and each is coated on one side with polyethylene. While one side of the apron is impermeable, the other is absorbent and can be used to wipe the wearer's hands if necessary. Two classes of students taking Applied Cookery at the Quartermaster School and cooks in four Army messes were utilized as test subjects.

Based on a 4-point scale ranging from Very Unacceptable to Very Acceptable, the two experimental paper aprons were rated slightly above Acceptable by the Applied Cookery students. The company mess cooks rated the two paper aprons slightly above Unacceptable. Both groups of test subjects considered the two paper aprons equally acceptable. Although the Applied Cookery students found the standard and experimental aprons equally acceptable, the company mess cooks considered the standard aprons more acceptable than the two paper aprons. Both standard and paper aprons gave excellent protection to the test subjects' duty clothing. Both groups of test subjects preferred to wear the coated side of the paper aprons out.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-186
FEA 61018

An Engineering Test of Repair Kits, Collapsible Containers

Conducted at Fort Lee, Virginia

February 1961

Abstract

This report relates the findings of a test conducted to evaluate experimental repair kits for temporary and permanent repairs of collapsible tanks and containers of 2- and 4-ply materials when empty and filled. Currently, only a kit providing for limited permanent repair of empty 2-ply containers is available for the Armed Forces.

This test, conducted at Fort Lee, Virginia, also re-evaluated patches and the tools required for installation of flexible mechanical patches of 5/8- and 7/8-inch diameter for sealing effectiveness, stability, and inner liner protection. These patches previously had been evaluated during FEA 59056, Test of Collapsible Container Repair Equipment.

The experimental items tested in this report consisted of four repair kits containing patches to be used in forward areas and two kits containing permanent patches to be used in rear areas. Patches were evaluated when applied to empty and water- and gasoline-filled containers damaged by various means, including small arms fire. Container sizes utilized were 2-ply 900- and 6,000-gallon capacity and 4-ply 500-gallon capacity, in addition to 2-, 4-, and heavier plys of surplus container material. Repair sizes ranged from 1/8-inch to 7 1/4-inches.

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The temporary repair components evaluated during this test and during FEA 59056 provide patches and tools adequate for emergency and temporary repair of 2- and 4-ply collapsible containers. The permanent repair components are not sufficiently reliable for general field use.

It is recommended that suitable protective garments including face protection, be developed and included in the forward area repair kit.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-188
FEA 60018

An Engineering Test of Poncho Material, Experimental Coated Fabric

Conducted at Fort Lee, Virginia

March 1961

Abstract

Results of exposure to thermal weapons - flaming, continued burning, and resultant melt of the nylon base fabric - have shown a deficiency of the standard poncho fabric, vinyl coated nylon. A new fabric, neoprene coated fortisan, rectified to a large degree this deficiency, but lacked sufficient durability. Two substances have been incorporated with neoprene coated fortisan material to develop fabrics with improved durability. In one fabric, isocynate was incorperated in the first coating layer to increase its adhesion to the base fabric. The second fabric had an overcoating of hypalon applied to improve abrasion resistance and weathering characteristics.

These two treated fabrics with the untreated neoprene coated fortisan fabric and the standard poncho material were tested to determine their comparative abrasion resistance quality by the Agency at Fort Lee, Va.

To obtain a more precise analysis and to conserve time and material, the four types of fabrics were fabricated into mittens for evaluation. These testing activities simulated the environment and abrasive actions to which the poncho is exposed.

Results of this test show that the isocynate and hypalon neoprene coated fortisan fabrics are superior for resistance to abrasion than the standard vinyl coated nylon fabric. Also, that the poncho material incorporating hypalon is superior to the non-treated neoprene coated fortisan fabric.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-190
FEA 59044

An Engineering Test of Boots, Combat, Rubber, Insulated, T 59-1

Conducted at Maynard Quartermaster Activity, Maynard, Massachusetts; and Mount Washington, New Hampshire

May 1961

Abstract

Cross Section View of Experimental T 59-1 Boot

Previous tests have shown that wool fleece now used in the standard rubber insulated combat boot, though satisfactory for insulation in undamaged

boots, becomes wetted when the boots are damaged. The fleece absorbs moisture resulting in lower insulation. An experimental rubber insulated combat boot has been developed which incorporates an unicellular type of insulation which does not absorb moisture thus providing a more constant level of insulation. The unicellular insulator is designed to replace wool fleece.

When previously tested, former models of boots made of unicellular insulation exhibited certain deficiencies. The experimental boot evaluated in this test was constructed with features designed to remedy these defects. Included are a more waterproof inner liner and an improved mid-sole construction. Two types of air release valves were also incorporated in the experimental boots. One is a spring-type valve and the other a screw-type. Both are manually operated. Two models of the T 59-1 experimental boot were manufactured to test the two types of valves and other minor differences.

The wear characteristics of the experimental boots and the operating efficiency of the two types of air release valves were tested at the Maynard Quartermaster Test Activity, Maynard, Massachusetts, and at Mount Washington, New Hampshire. Testing was accomplished from 11 January to 24 February 1960, and from 12 January to 28 February 1961.

The boots were tested in field activities simulating battle conditions and during a flight in a non-pressurized plane flying at 12,000 feet. These evaluations show that both experimental boots provide satisfactory comfort for walking, marching, hiking, and oversnow activities; insulation for cold-wet operation; and, traction. Both types of air release valves are adequate for relieving pressure during airborne travel. The spring-type valve can be operated more easily with and without handwear.

Certain boot components lacked sufficient durability. These items included the coating of the underside of the eyelet stay, the fabric gusset cover, and the rubber foxing strip in the boots incorporating the screw-type air release valve and the fabric gusset cover, the outer rubber coating in the counter area, and the circular rubber valve base cover in the boots incorporating the spring-type air release valve.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-192
FEA 59032

A Joint U.S. Army - U.S. Marine Corps Test of Standard USMC Combat Boots in USMC Tariff, Standard U.S. Army Combat Boots in Army Tariff and USMC and U.S. Army Combat Boots made Over the Ft. Knox V Last in a Reduced Tariff

Conducted at Fort Lee, Virginia; Fort Benning, Georgia; Fort Bragg, North Carolina; and Camp Lejeune, North Carolina

June 1961

Abstract

As the primary users of combat boots, the Army and Marine Corps combined efforts to conduct this joint test for the purpose of developing valid data for determining a single combat boot last, as well as a single combat boot, for use by all armed forces.

The four types of boots included in the test were the standard Army boot made over the modified Munson last and the standard USMC boot made over the USMC last, in a 56- and 90-size tariff, respectively, and the Army and USMC boots made over the geometrically graded Fort Knox V last in a reduced tariff of 29 sizes. Each of the four types of boots was worn for alternate 30-day periods by Army Airborne and Infantry troops at Fort Bragg, North Carolina, and Fort Benning, Georgia, and by Marine Corps troops at Camp Lejeune, North Carolina. The boots were worn on extensive field marches, simulated combat maneuvers, amphibious operations, and in parachute jumps during the test period.

The clinical acceptability of the boots was determined by on-the-spot examinations of the feet of troops by Army and Navy Medical Teams.

The boots made over the Fort Knox V last in a reduced tariff of 29 sizes are superior to boots made over either standard last. Even in the reduced size tariff, 99.7 percent of the troops were able to be acceptably fitted initially in the boots made over this last, and the fit and comfort afforded by the Fort Knox V last boots during wear equal to that of the other types.

No single boot, of the four types tested, is best in all respects for use by the armed services. A composite boot, made over the Fort Knox V last incorporating the grain-out leather upper, full-lace closure system, and composition rubber outsole of the Army boot, and the plain leather vamp, no toe cap, and the full beveled heel of the USMC boot will provide the best single combat boot for the armed services.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-194
FEA 61043

Engineering Test of Uniform, Integrated, Cold-Wet, T 60-2

Conducted at Maynard Quartermaster Test Activity, Maynard, Massachusetts

June 1961

Abstract

A prototype of an integrated system of combat clothing to provide the combat soldier with the highest practicable level of environmental, ballistic, CBR, and thermal protection desired by the United States Continental Army Command was developed and tested in 1958. For use in cold-wet environments, the clothing was designed with emphasis upon insulation and design affecting comfort and mobility of the soldier. New features to correct deficiencies of the prototype have been incorporated into a second model designated a cold-wet, integrated uniform, T 60-2.

The experimental uniform was compared with the standard cold-wet ensemble in field exercises at the Maynard Quartermaster Test Activity, Maynard, Massachusetts, during January and February 1961 under appropriate weather conditions.

After four 10-day bivouac periods during which participants simulated battle maneuvers, the experimental integrated uniform was equal or superior to the standard item in every respect except general durability and launderability of the coat shell.

The objectives for which the experimental and standard uniforms were evaluated included effectiveness of insulation during inactive periods, strenuous activity and at all activity levels, adequacy of closures, freedom of movement, compatibility of component items and required equipment, vision, hearing, and dexterity while performing tasks and adequacy of head and neck protection.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-196
FEA 59055

An Engineering-User Test of the Laundry, Trailer-Mounted, Single Trailer Type

Conducted at Fort Lee and Camp Pickett, Virginia, and at Fort Bragg, North Carolina

June 1961

Abstract

The recent successful combining of a washer-extractor has led to the development of mounting a complete field laundry on a single, 1 1/2-ton trailer. This idea has always been a desirable military characteristic in view of the anticipated reduction in cost, manpower and time to operate the trailer, and weight of the item.

The experimental Single Laundry Trailer has the same capacity as the present standard two-trailer type, but the weight has been reduced by 40 percent. The equipment provided on the experimental item includes the newly-developed combination washer-extractor, the same tumbler-dryer used with the standard laundry, and a 10-KW electric generator set. The hot water heater, pump, and hoses from the standard 8-showerhead bath unit are utilized for supplying hot water for the new washer-extractor.

The trailer consists of a fabricated trailer bed mounted on a standard Ordnance running gear rather than the special purpose vehicles as required by the standard two-trailer type.

Results of the engineering-service field tests conducted at Fort Lee and Camp Pickett, Va., and Fort Bragg, N.C., show that the subject item meets the approved military characteristics to a degree which warrants consideration for type classification as standard. The engine generator set is suitable for its application on the experimental trailer. The trailer is capable of being towed over rough terrain and across cross-country, according to requirements, without undue vibration, damage, or loosening of the equipment and accessories during transit. The tools supplied with the unit were satisfactory for setting-up and re-loading the equipment. No special tools were found necessary during the test.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-199
FEA 61046

Engineering Test of Flexible Packages for Heat Processed Food - Blueberries and Whole Cranberry Sauce

Conducted at Fort Churchill, Canada

June 1961

Abstract

In a previous test of flexible packages, the QM R&E Field Evaluation Agency evaluated individual portion size flexible packages of ready-to-eat sterile peaches. Results indicated that the flexible package when compared to the metal can was satisfactory in most respects for use under normal field conditions in a temperate climate.

The present test was conducted at Fort Churchill, Canada, during January-March 1961. In this test flexible packages and standard metal cans containing blueberries and whole cranberry sauce were evaluated as to effects of freezing, durability, and general utility under existing cold weather conditions.

Test results showed that when issued to subjects in a frozen condition, a larger number of cans remained frozen than did flexible packages. This was true whether items were carried in the inner or outer garment of the cold weather uniform. When issued in an unfrozen condition and carried in the inner garment there was no difference in the number of flexible packages and cans which froze. When issued in an unfrozen condition and carried in the outer garment of the uniform a greater number of cans than flexible packages froze. With regard to relative durability or mechanical strength only 2 of 282 flexible packages carried during the first 6-day period failed, while none of the cans failed. When issued in a frozen condition a greater number of packages of blueberries than cranberry sauce remained frozen. This was true for items carried in both inner and outer garments of the uniform. When issued in an unfrozen condition there was no difference between the number of blueberry and cranberry packages which froze, when carried in the inner or outer garments of the uniform. The flexible package exhibited adequate mechanical strength throughout the test. Of 1,284 packages of blueberries and whole cranberry sauce evaluated, less than 2 percent failed while being carried by subjects. The flexible package was preferred to the metal can with regard to such factors as ease of dispersal, ease of opening and disposal after use, preference for carrying with regard to size, weight, and shape, and general suitability for use under cold weather field conditions.

Research and Engineering

Final Letter Reports Submitted During

FY 1961

FEA No.	Title
	September
59039	Individual Load Carrying Equipment
	October
60032	Pilot Study of Experimental Disposable Paper Items
	March
61052	Disposable Clothing Material - Accelerated Wear
	April
59058	Panels, Exposure (Synthetic Fibers Combined with Cotton, Including Solution Dyed Dynel)
61045	Sizing Study of Lightweight Cold Weather and Integrated Combat Uniform Ensembles
	May
60009	Tent, Maintenance, Army Aircraft, Air-Supported w/Auxiliary Rigid Frame, T 59-1
60010	Tent, Frame-Type, Aviation Maintenance, Small Adjustable, Nose-In (Fritsche) T 59-1
60012	Tent, Aviation, Small, Adjustable, for Rotor Head, T 59-1; Tent, Aviation, Maintenance, Small, Adjustable, for Fixed Wing Aircraft, T 59-1 (Set)
60016	Boots, Combat, Leather, w/Direct Molded Sole (Shank Construction)

Research and Engineering

Interim Letter Reports Submitted During

FY 1961

FEA No.	Title
	July
58011	Panels, Exposure
59050	Heater, Water, Surface, 6-Qt. Capacity
59055	Engineering and User Tests of Laundry, Trailer-Mounted, Single Trailer Type
59058	Panels, Exposure (Synthetic Fibers Combined with Cotton, Including Solution Dyed Dynel)
	August
58011	Panels, Exposure
59032	Joint U.S. Marine Corps, U.S. Army Test of Standard USMC Combat Boots in USMC Tariff and USMC and U.S. Army Combat Boots, Made Over Fort Knox V Last in Reduced Tariff
59055	Engineering and User Tests of Laundry, Trailer-Mounted, Single Trailer Type
59058	Panels, Exposure (Synthetic Fibers Combined with Cotton, Including Solution Dyed Dynel)
60028	Uniform, Field, Hot Weather (Emergency), T 59-1 and Uniform, Basic Shell, All-Purpose, Integrated, T 60-2
	September
58011	Panels, Exposure (2)
59055	An Engineering-User Test of the Laundry, Trailer-Mounted, Single Trailer Type

Research and Engineering

Interim Letter Reports Submitted During

FY 1961 (Cont'd)

FEA No.	Title
	September (Cont'd)
59064	Release, Cargo Parachute, Mechanical, 9000-Lb. Capacity
60002	Conveyor, Powered, Lightweight
	October
57060	Exposure of Threads for Tentage and Textile Items of Equipage
58011	Panels, Exposure
59042	Boots, Combat, Tropical, T 59-1, -2, -3 (Direct Molded Sole)
60016	Boots, Combat, Leather, w/Direct Molded Sole (Shank Construction)
	November
59034	Pasteurizer, Portable, for Bath Unit, Portable, 8-Showerhead
59058	Panels, Exposure (Synthetic Fibers Combined with Cotton, Including Solution Dyed Dynel)
60033	Exposure Panels (Tentage Fabrics)
61018	Repair Kits, Collapsible Containers

Research and Engineering

Interim Letter Reports Submitted During

FY 1961 (Cont'd)

FEA No.	Title
	December
58011	Panels, Exposure
59055	Engineering and User Tests of Laundry, Trailer-Mounted, Single Trailer Type
60010	Tent, Frame-Type, Aviation, Maintenance, Small, Adjustable, Nose-In (Fritsche), T 59-1
60016	Boots, Combat, Leather, w/Direct Molded Sole (Shank Construction)
	January
60033	Exposure Panels (Tentage Fabrics)
	February
58011	Panels, Exposure (2)
59042	Boots, Combat, Tropical, T 59-1, -2, -3 (Direct Molded Sole Construction)
60016	Boots, Combat, Leather, w/Direct Molded Sole (Shank Construction)
	March
59055	Engineering and User Tests of Laundry, Trailer-Mounted, Single Trailer Type
59063	A Study of the Heater, Bunker, 15,000 BTUH Capacity
61054	Tent Set, Maintenance, Small, for Arctic Use

Research and Engineering

Interim Letter Reports Submitted During

FY 1961 (Cont'd)

FEA No.	Title
	April
59034	Pasteurizer, Portable, for Bath Unit, Portable, 8-Showerhead
59055	An Engineering-User Test of the Laundry, Trailer-Mounted, Single Trailer Type
60033	Exposure Panels (Tentage Fabrics)
61038	Nozzles, Gasoline Dispensing, Automatic, 1-Inch and 1 1/2-Inch
61053	Panels, Exposure (Sateen Fabrics)
61054	Tent Set, Maintenance, Small, for Arctic Use
	May
57060	Exposure of Threads for Tentage and Textile Items of Equipage
58011	Panels, Exposure
59042	Boots, Combat, Tropical, T 59-1, -2, -3 (Direct Molded Sole Construction)
60009	Tent, Maintenance, Army Aircraft, Air-Supported, w/Auxiliary Rigid Frame, T 59-1
61016	Filling System, Tank, Fabric, Collapsible, Non-Vented, Pressure Shut-Off (Modified Model)
61042	Uniform, Integrated, Cold-Dry, T 60-2 (2)

Research and Engineering

Interim Letter Reports Submitted During

FY 1961 (Cont'd)

FEA No.	Title
	May (Cont'd)
61043	Uniform, Integrated, Cold-Wet, T 60-2 (2)
61053	Panels, Exposure (Sateen Fabrics)
	June
58011	Panels, Exposure (2)
60033	Exposure Panels (Tentage Fabrics)
61053	Panels, Exposure (Sateen Fabrics)

PART II

APPLICATIONS ENGINEERING PROGRAM

Abstracts of Final Reports
Final Letter Reports
Interim Letter Reports

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

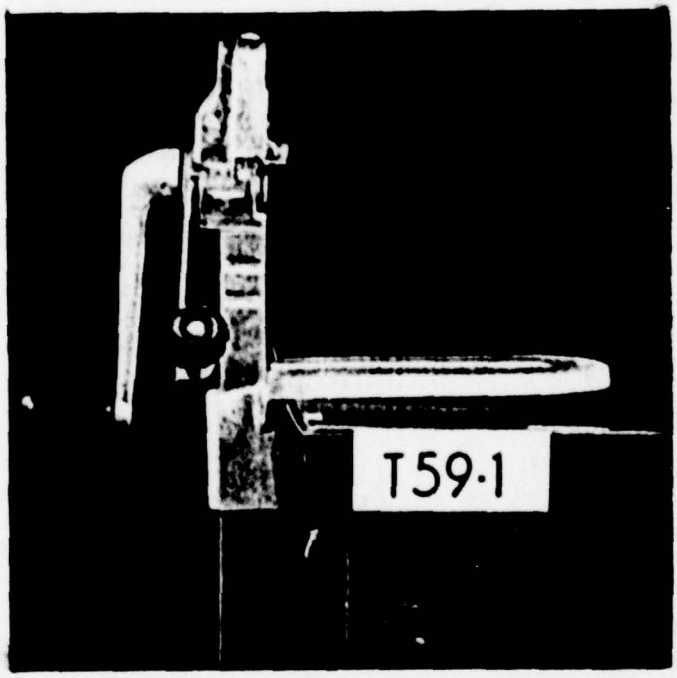
TECHNICAL REPORT T-166
FEA 59041

Engineering Test of Openers, Can, Hand, Mechanical, Table Type, T 59-1, -2, -3

Conducted at Fort Lee, Virginia

July 1960

Abstract



Example of a Table Type Can Opener Tested

An engineering test of three commerical hand-operated mechanical can openers was conducted by the Quartermaster Research and Engineering Field Evaluation Agency. The purpose of the test was to determine general suitability for use in Army mess halls and to develop information for use in pending revision to Federal Specification FF-O-601a, Opener, Can.

Eighteen can openers - six of each of three types of commercially manufactured can openers, T 59-1, T 59-2, and T 59-3 - were used in this test. Controlled use and normal use tests were conducted at Fort Lee, Virginia. Six mess halls, each of 200-man or larger capacity were utilized for the normal use phase, while controlled testing was conducted at the Field Evaluation Agency's Experimental Kitchen.

Test results showed that the T 59-1 opener was satisfactory and the T 59-2 and T 59-3 openers were unsatisfactory with respect to the general requirement for cutting tops out of oval, square, and round cans, up to and including standard #12 cans. The T 59-1 opener was satisfactory and the T 59-2 and T 59-3 openers were unsatisfactory with respect to the general requirement that the can opener be designed and constructed so as to avoid unduly deforming the metal, or producing metal chips or slivers, leaving a smooth safe edge on the can. The T 59-1 and T 59-2 openers were satisfactory while the T 59-3 was unsatisfactory with respect to the general requirement that the cans be opened in such a manner that contents can be readily extracted whole when congealed in a solid mass.

The requirements of Federal Specification FF-0-601a as modified by the proposed deviations furnished for test are suitable with one possible exception - the required surface finish of electro-zinc plating may be too restrictive.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

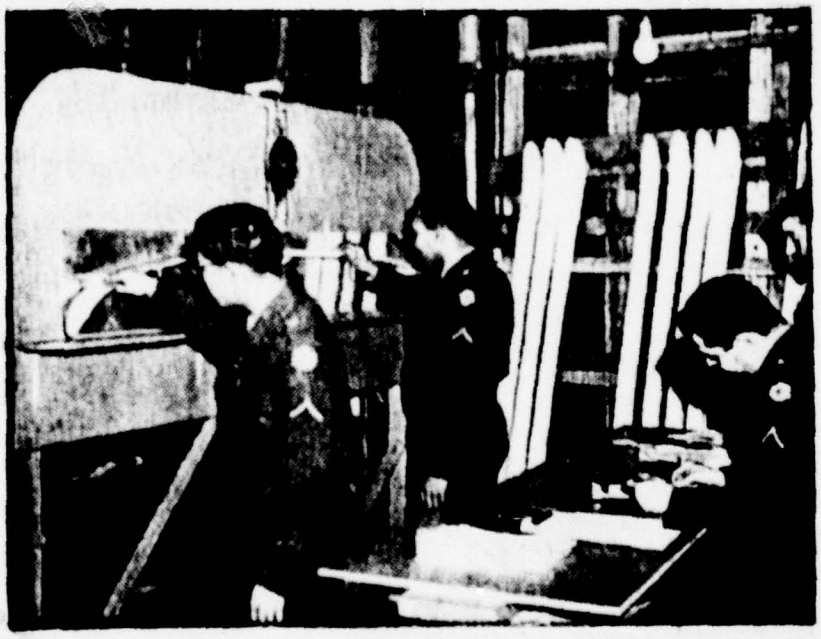
TECHNICAL REPORT T-167
FEA 56067

Packaging and Packing Test of Skids, 7'0", Utilizing Fiberboard Shipping Containers, Fiberboard Camber Block and Wooden Toe Block

Conducted at Schenectady General Depot, N.Y.; Maynard QM Test Activity, Massachusetts; and Fort Churchill, Canada

July 1960

Abstract



Inspection of Skids to Determine Effectiveness of Packaging Utilizing Camber Block and Wooden Toe Block

A packaging and packing test of skids, 7'0", utilizing fiberboard shipping containers, fiberboard camber block and wooden toe block was conducted by the QM R&E Field Evaluation Agency. The purpose of the test was to determine the

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effectiveness of packaging techniques developed by the QM Food and Container Institute; also, to determine whether the fiberboard shipping container developed could withstand the hazards of shipment and storage of skis.

This test was conducted at Schenectady General Depot, Maynard QM Test Activity, and Fort Churchill. Test operations consisted of shipping and storage of mountain and cross-country skis in five types of containers at the three indicated test sites.

Test results showed that fiberboard ski containers, Codes A, B, C, D, and E, will withstand the hazards of shipment, transshipment, and storage. Since no containers failed, all five container types can be considered to be equal. A wooden toe block positioned and secured between the toe rise of each pair of skis will maintain the toe rise. Warp can be reduced if a toe block and taping are effectively applied. The average loss of camber can be expected to be 1/32" or less regardless of ski type, storage sites, and 1- and 2-year storage periods, with the exception of Type II skis stored at Fort Churchill. The lift of heel can be expected to decrease approximately 20% the first year of storage and 25% the second year of storage. Flexibility measurements can be expected to increase on skis after one and two years' storage.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-184
59047-F

An Engineering Test of Glove, Shell, Leather, T59-1 and T59-2

Conducted at Fort Lee, Virginia

December 1960

Abstract

The Quartermaster Research and Engineering Field Evaluation Agency conducted this test to evaluate two experimental cowhide leather gloves as compared with the standard horsehide glove.

The two experimental items were tested at the Agency's Fort Lee, Virginia, test site. The gloves were worn by enlisted military personnel in a series of controlled trials on the Handwear Testing Course to ascertain their resistance to water penetration and absorption, dexterity, gripping characteristics, and duribility.

The T 59-1 glove is made from water-resistant cowhide leather with a continuous rubber-type welt seam. The T59-2 glove is made from waterproof cowhide leather with a conventional seam.

Results of these evaluations show that the experimental gloves are substantially equal and both are superior to the standard item for resistance to water penetration. The T59-2 gloves are superior to the T59-1 gloves which are better than the standard gloves for resistance to water absorption. The standard gloves are superior and preferable to the two experimental items, and the T59-2 gloves are superior to the T59-1 gloves for hand and finger dexterity and gripping characteristics.

For durability, the T59-2 gloves are superior to the T59-1 and standard items, which are substantially the same for this category. The conventional seam system is superior to the rubber welt system. The T59-2 cowhide gloves are an acceptable substitute for the standard item.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-187
FEA 61020

Soldier Preference Test for Instant Coffee - 1961

Conducted at Fort Lee, Virginia

March 1961

Abstract

An engineering test of instant coffees was conducted by the Quartermaster Research and Engineering Field Evaluation Agency. The purpose of this test was to determine the relative consumer preference for 20 brands of instant coffee.

The test was conducted at Fort Lee, Virginia, utilizing 840 troops as test subjects. Each coffee was rated at least 20 times in each of 10 test sessions, 4 times in each of 5 serving orders. Each coffee was rated on a nine-point scale ranging from Like Extremely to Dislike Extremely.

The coffees were coded #1 through #21 (one additional coffee was procured and inserted in the sample solely to satisfy test design requirements). Test results showed that coffees coded as follows are statistically equivalent at the 5 percent level to #4, the highest rated coffee: #3, #9, #5, #2, #12, #18, #17, #14, #13, #21. Coffees coded #13 and #21 are also statistically equivalent to #16, the poorest rated coffee.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-189
FEA 61015

An Engineering Test of
Raincoat, Woman's, Taupe, T 60-5

Conducted at Fort McClellan, Alabama

March 1961

Abstract

Identification views of test items.

The Raincoat, Woman's, Taupe, T 60-5, was developed to meet a request by the Chiefs of the Women's Services, Department of the Army, for a new raincoat designed to improve the style and appearance. The raincoat-

made of Cloth, Coated, Nylon Polyvinyl Butyral, Taupe Shade #179, conforming to MIL-C014366A - is a beltless, double-breasted design, with raglan sleeves, seamless back, and matching hood and capelet. Rain shields are provided in the shoulder area; and the waist and sleeves are lined with a rayon fabric. A test sample of the raincoats was evaluated by the Quartermaster Research and Engineering Field Evaluation Agency to determine whether the experimental raincoat was satisfactory with respect to appearance, style and fit.

The test was conducted at Fort McClellan, Alabama, under the supervision of Field Evaluation Agency personnel. The test items were worn in normal use for approximately 6 months by Women's Army Corps military personnel. Test results showed that, based on subjective opinions of WAC military personnel and judgments of WAC Center staff personnel, the appearance, style, and fit of the experimental raincoats are not satisfactory.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-191
FEA 60021

An Engineering Test of Stockings, Nylon Stretch-Type, Women's, T 60-2

Conducted at Fort McClellan, Alabama

May 1961

Abstract

Stockings, Nylon Stretch-Type, Women's, T 60-2, were engineer-tested by the Quartermaster Research and Engineering Field Evaluation Agency. These stockings were evaluated in comparison with the standard nylon stockings. The purpose of the test was to compare the experimental stretch-type and standard stockings with respect to comfort, fit, appearance, wearer's preference, and durability. Also, an evaluation was to be made of the adequacy of the three-size system of the experimental as compared with the nine-size system of the standard stockings.

Field testing was conducted using military personnel of the Women's Army Corps at Fort McClellan, Alabama, under the supervision of technical personnel from the Field Evaluation Agency, during the period 29 July 1960 through 15 February 1961. Test results showed that initially and after prolonged wear the experimental stretch-type nylon stocking is equal to the standard stocking in comfort and acceptability of appearance. The experimental stretch-type nylon stocking is better in overall fitting characteristics than the standard stocking. The preference for the experimental stretch-type nylon stocking is no different than that for the standard nylon stocking. The experimental stretch-type nylon stocking is more durable than the standard nylon stocking. The three-size system employed in the stretch-type stocking is satisfactory.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-193
FEA 59004

An Engineering Test of Shoes, Low Quarter, Black (Men's), T 59-2 (Experimental Sole Leather Tannage)

Conducted at Fort Lee, Virginia

June 1961

Abstract

Low quarter shoes with outsoles and insoles made of leather tanned with an experimental tanning agent utilizing chemical tannins were tested by the Quartermaster Research and Engineering Field Evaluation Agency in comparison with standard low quarter shoes incorporating standard tannage outsoles and insoles. The purpose of the test was to compare and evaluate the experimental and standard sole leathers used with respect to wear resistance of outsoles and insoles, comfort and appearance of shoes.

This test was conducted at Fort Lee, Virginia. Half of the experimental low quarter shoes had the experimental tannage outsoles oil-treated; the outsoles of the other half were impregnated with a resin-rubber impregnant. Both types of these low quarter shoes were cross-mated with standard low quarter shoes. The cross-mated shoes were worn in normal garrison wear by military personnel.

Test results showed that the experimental tannage leather outsoles of both types, oil-treated and impregnated with resin-rubber impregnant, offer greater resistance to loss of leather than the standard tannage leather outsoles. The standard tannage leather outsoles offer greater resistance to spreading and curling than either type of experimental tannage leather outsoles. The standard tannage leather outsoles and the two types of experimental tannage leather outsoles offer equal resistance to outsole cracking. The standard and experimental tannage leather insoles offer the same degree of wear resistance in respect to cracking, curling, piping, and guttering. The shoes incorporating the standard tannage leather components and those incorporating the experimental tannage leather components are equal with respect to comfort, and appearance initially and after prolonged wear, including shape stability.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-195
FEA 59049

An Engineering Test of Bag, Sleeping, Cold-Wet, T 59-4 and T 59-5

Conducted at Maynard QM Test Activity, Massachusetts
and Mount Washington, New Hampshire

June 1961

Abstract

An engineering test of two cold-wet sleeping bags was conducted by the QM Research and Engineering Field Evaluation Agency. The T 59-4 sleeping bag used the standard 40/60 waterfowl down and feather mixture as the insulating filler material. The T 59-5 bag differed from the T 59-4 only in that the filler material is made up of 40% chemically modified chicken feathers (Tan-O-Quill - QM Process) and 60% of the standard waterfowl mixture. The two bags were evaluated with respect to comfort and protection from cold, durability, and test subjects' preference.

The two sleeping bags were tested during field exercises in two phases. Phase I was an experimental cold weather training exercise designated Quartrex II, utilizing as test subjects Strategic Army Corps Troops. This phase was conducted February 1960 at Maynard QM Test Activity and Mount Washington. Phase II utilized FEA troops as test subjects and was conducted January - February 1961 during field exercises at Maynard QM Test Activity. Test results showed that both bags provide adequate comfort and protection from cold when supplemented with components of the cold-wet uniform. There was no difference in the durability of the two bags throughout the two phases of testing and two laundering cycles. There was no difference between the two bags in the test subjects' preference for cold-wet use.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-198
FEA 60007

An Engineering-Service Test of Dough-Mixing and Make-Up Outfit, Trailer-Mounted - 1960

Conducted at Fort Lee, Virginia; Camp Pickett, Virginia; and Eglin Air Force Base, Florida

June 1961

Abstract

The experimental Dough-Mixing and Make-Up Outfit, Trailer-Mounted - 1960 is a modified version of the present standard Dough-Mixing and Make-Up Outfit, Trailer-Mounted, M1945. Modifications to the outfit are designed to improve operation and reduce field maintenance.

An Engineering-service test was conducted to compare the operating performance and maintenance characteristics of the experimental outfit with those of the standard outfit, with particular emphasis on the design modifications. The test was conducted by the Quartermaster Research and Engineering Field Evaluation Agency at Fort Lee and Camp Pickett, Virginia and at Eglin Air Force Base, Florida during Operation Southwind.

Test results showed that the performance and maintenance characteristics of the metal pressure board of the experimental outfit are superior to those of the wooden pressure board of the present standard outfit. The conveyor belts of the experimental item are more easily maintained; however, the roller bearings of the continuous conveyor-belt idler pulley lack provisions for cleaning and lubrication. Functional and lubrication characteristics of the idler sprocket on the drive of the kneading rolls are satisfactory. The lightweight monorail system is adequate to support loaded dough troughs, although structual weaknesses detract from the performance of the system. Trailer springs are not sufficiently strong to prevent excessive swaying when the trailer is towed over uneven terrian. The trailer is compatible with present standard Ordnance prime movers normally used for towing it.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-200
FEA 60008

An Engineering-Service Test of Bakery Oven, Trailer-Mounted - 1960

Conducted at Fort Lee and Camp Pickett, Virginia, and Eglin Air Force Base, Florida

June 1961

Abstract

The experimental Bakery Oven, Trailer-Mounted - 1960, is a modification of the present standard Bakery Oven, Trailer-Mounted, M-1945. The experimental oven is designed to improve operation and reduce maintenance requirements and difficulties. The experimental item incorporates a modified heat-exchanger in which flue tubes have been provided with cleanouts removal of soot accumulation. Also, the experimental trailer makes maximum use of present standard Ordnance components. The experimental item was evaluated in comparison with the standard Bakery Oven, Trailer-Mounted, M-1945, with respect to baking qualities, adequacy of the trailer to support the oven during cross-country movement, and compatibility with present standard Ordnance prime movers normally used with this item.

This test was conducted at Fort Lee and Camp Pickett, Virginia, and at Eglin Air Force Base, Florida. Testing consisted primarily of controlled and normal field operations, and roadability trials. Test results showed that the baking characteristics of the experimental oven are equal to those of the standard oven. The trailer is adequate to support the oven during cross-country movement. The trailer is compatible with present standard Ordnance prime movers normally used with this item.

Applications Engineering

Final Letter Reports Completed During

FY 1961

FEA No.	Title
	August
60041	Sizing Study of Raincoat, Man's, Lightweight, Taupe 179
	December
60036	Recalibrated Foot Measuring Devices

Applications Engineering

Interim Letter Reports Completed During

FY 1961

FEA No.	Title
	July
59059	Panels, Exposure
59066	Test of Pallets, Materials Handling, 40 x 48 Inches, 4-Way, Expendable
	September
59059	Panels, Exposure
59066	Test of Pallets, Materials Handling, 40 x 48 Inches, 4-Way, Expendable, T 59-4 and -5
	December
59066	Test of Pallets, Materials Handling, 40 x 48 Inches, 4-Way, Expendable
	March
61033	Dough Mixer, Portable, Gasoline Engine-Driven with Exchangeable Electric Motor
	April
59059	Panels, Exposure
	May
59059	Panels, Exposure
60007	Dough Mixing and Make-Up Outfit, Trailer-Mounted - 1960
60008	Bakery Oven, Trailer Mounted - 1960
	June
59059	Panels, Exposure

PART III

AIRBORNE PROGRAM

Research and Engineering Program

Abstracts of Final Reports
Interim Letter Reports

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT E-48
FEA 61036

Termination Report

High Velocity, Low Altitude Air Delivery of Truck, Utility, 1/4-Ton, 4 x 4, M38A1

Conducted at Yuma Test Station, Yuma, Arizona

January 1961

ABSTRACT

Objectives of this study were to (1) design an air delivery system to deliver the Truck, Utility, 1/4-Ton, 4 x 4, M38A1 at a higher rate of descent using the combat expendable platform, and (2) determine whether or not the air delivery system is functionally suitable for submission to appropriate agencies for service test.

Results of static drop tests conducted to evaluate the air delivery system and, in particular, the energy dissipating unit are presented. In addition, results of airdrop tests conducted to determine the functional suitability of the air delivery system as airdropped from a C-130A cargo aircraft flying at an indicated airspeed of 130 knots and absolute altitudes from 300 to 1,600 feet are presented. All testing was conducted at Yuma Test Station, Yuma, Arizona.

Results clearly show that (1) the Truck, Utility, 1/4-Ton, 4 x 4, M38A1, can be successfully air delivered at approximately 45 feet per second which approaches a rate of descent in the high velocity range; (2) a cluster of 5 modified G-13 cargo parachutes is satisfactory to stabilize and retard the load; and (3) the minimum safe absolute altitude for air delivery from a C-130 aircraft flying at 130 knots indicated airspeed is 350 feet.

It was concluded that (1) the Truck, Utility, 1/4-Ton, 4 x 4, M38A1, can be efficiently and accurately air delivered by high velocity techniques utilizing a combat expendable platform and a cluster of 5 modified G-13 cargo parachutes and (2) the proposed air delivery system is functionally suitable for submission to appropriate agencies for service test.

It was recommended that the proposed air delivery system for the Truck, Utility, 1/4-Ton, 4 x 4, M38A1 be submitted to the appropriate agencies for air delivery service test.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

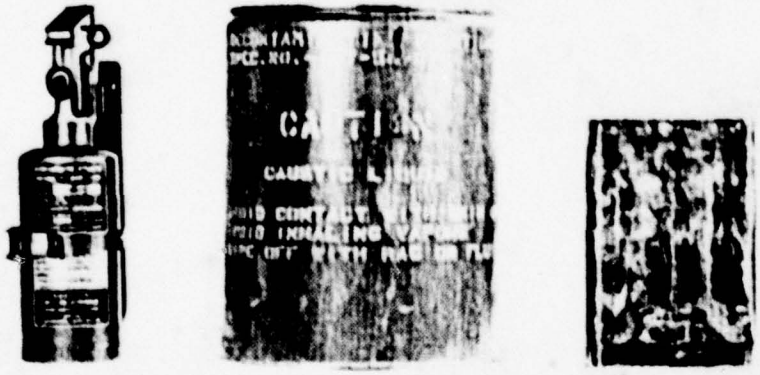
TECHNICAL REPORT E-50
FEA ABN 5959

Engineering Study of Decontaminating Apparatus, E17R1, for Air Delivery

Conducted at Yuma Test Station, Yuma, Arizona

May 1960

ABSTRACT



Test Items

Left to right: Decontaminating Apparatus, E17R1; 5-gallon DS2 Solution Container; and 1-gallon DS2 Solution Container.

Engineering tests were conducted to determine the functional suitability of the Decontaminating Apparatus, E17R1, and DS2 solution containers for air delivery as wing and door bundles from U.S. Army aircraft, as door bundles from U.S. Air Force aircraft, and by parachutist when jumping from U.S. Army and U.S. Air Force aircraft.

Airdrop tests were made from the wing of the L-19 and L-20 aircraft and from the door of the L-20 and U-1A aircraft flying at 500 feet absolute altitude and 80 knots indicated airspeed, and from the door of the C-130A aircraft flying at 1,500 feet absolute altitude and 130 knots indicated airspeed. Tests were conducted at the Yuma Test Station, Yuma, Arizona.

It is concluded that the Decontaminating Apparatus, E17R1, and 5-gallon DS2 solution containers are functionally suitable for air delivery as wing and door bundles from U.S. Army aircraft, and as door bundles from U.S. Air Force aircraft; and the decontaminating apparatus and 1-gallon DS2 solution containers are functionally suitable for delivery by parachutist from U.S. Army and U.S. Air Force aircraft.

It is also concluded that the systems tested are suitable to submit to the appropriate agencies for service test.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

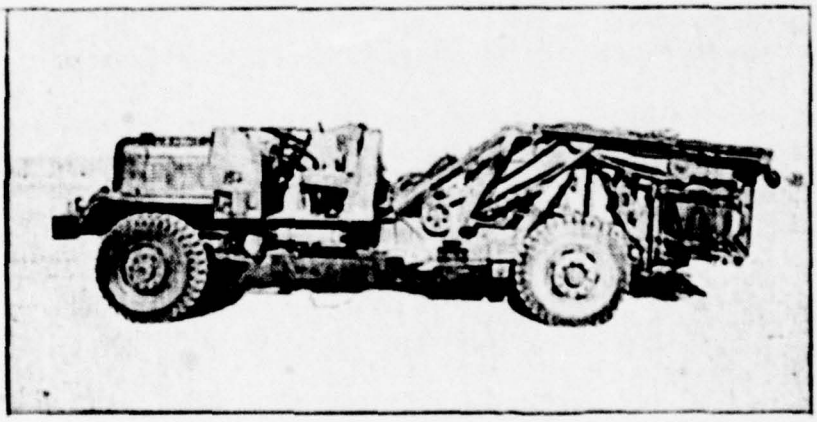
TECHNICAL REPORT E-51
FEA ABN 5937

Air Delivery Engineering Study, M-831, Airborne Ditcher

Conducted at Yuma Test Station, Yuma, Arizona

September 1960

ABSTRACT



M-831 Airborne Ditcher

An air delivery engineering test was conducted to determine the structural adequacy of the M-831 Airborne Ditcher for air delivery. Both static and airdrop tests were made to obtain the necessary data required for evaluation. Standard air delivery equipment was used wherever possible.

The air delivery system was designed for an impact velocity of 25 feet per second and an impact deceleration not to exceed 20g's or a damage susceptibility factor of 20.

Four instrumented static drop tests were performed at the FEA's Static Drop Facility from a height of 8 feet to determine a suitable energy dissipating unit. The results of static drop tests gave an average impact load factor of 17.9 g's.

Five air drop tests were made on the FEA's Tracking Range from a C-130 aircraft flying at an indicated airspeed of 130 knots and an absolute altitude of 1,500 feet. The gross weight of the system, rigged for air delivery, was 20,600 pounds. A 24-foot flat ribbon cargo extraction parachute was used for extraction and 6 G-11A cargo parachutes were used for retardation. The extraction force varied between 17,000 and 19,500 pounds and the average opening force for each of the 6 G-11A cargo parachutes was 2.23 g's. The results of the airdrop tests gave the average equilibrium rate of descent, w_{e_o}, as 21.7 feet per second.

It was concluded that the test item is functionally suitable for air delivery providing the test item is modified to include (1) 4 suspension points, (2) 4 load-bearing plates attached to the basic frame, and (3) installation of a permanent brace to secure the discharge conveyor assembly.

It was recommended that the M-831 Airborne Ditcher be submitted to the appropriate agencies for air delivery service test when the proposed modifications are accomplished.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT E-52
FEA 61005

Air Delivery Engineering Study of High Velocity Parachute Delivery of Combat Rations

Conducted at Yuma Test Station, Yuma, Arizona

January 1961

ABSTRACT

An improved method is presented for high velocity air delivery of Combat Rations. Through the use of standard equipment and improved techniques, this system accomplishes efficient utilization of the volumetric and weight capacities of the U.S. Air Force C-130A Cargo aircraft.

As a result of static and airdrop tests conducted at the Quartermaster Research and Engineering Field Evaluation Agency's Airborne Systems Test Activity, Yuma, Arizona, it is concluded that the high velocity air delivery system proposed herein is functionally suitable for air delivery of Combat Rations and for submission to the appropriate agencies for service test.

Airborne

Interim Letter Reports Submitted During

FY 1961

Research and Engineering

FEA ABN No.	Title
	August
6014	Engineering Tests of Fixed Pin Combat Expendable Platform
	December
61029	Engineering Tests of Load Configurations and Sealed Canisters Using the M-4A High Speed Air Delivery Container

PART III (Cont'd)

AIRBORNE PROGRAM

Applications Engineering Program

Abstracts of Final Reports
Interim Letter Report

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

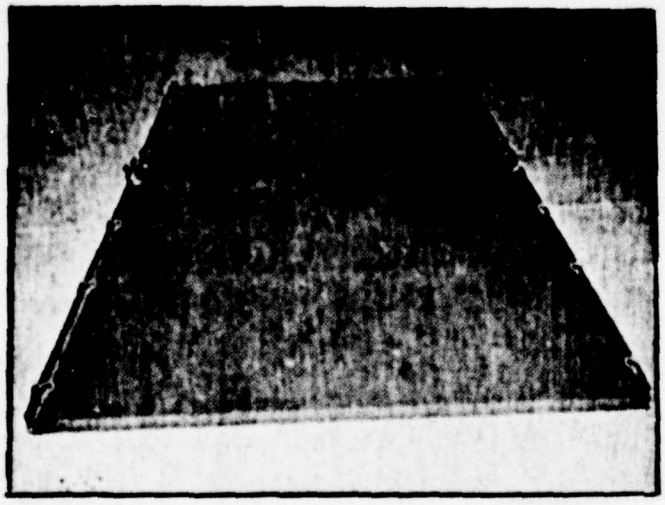
TECHNICAL REPORT T-148
59031-1

Engineering Tests of Low Cost Platform for Air Delivery of Heavy Equipment

Conducted at Yuma Test Station, Yuma, Arizona

July 1960

ABSTRACT



Low cost platform

Engineering tests were conducted to determine (a) the degree to which the low cost platform skid conforms with the U.S. Continental Army Command approved Military Characteristics and (b) the functional suitability of the test item for submission to the appropriate agencies for service testing or type classification. Both static drop and airdrop tests were conducted to obtain the necessary engineering data for evaluation.

Twenty-seven static drop tests were made with 6 representative items of heavy equipment varying in rigged gross weights from 4,104 to 15,823

pounds to evaluate the energy dissipator configurations. These configurations were designed to protect the equipment dropped on the test item at impact velocities in the range of 25 feet per second.

Thirty-one airdrop tests were made with the test item using 6 representative items of heavy equipment, varying in rigged weights from 4, 395 to 17, 300 pounds. These tests were made from C-130A aircraft. These tests revealed several design deficiencies in the test item of sufficient magnitude to render the item unsatisfactory for service test. The design deficiencies were corrected and the test item, as modified, was returned to this Agency for further engineering tests.

Eleven airdrop tests were made on the modified test item with 4 representative items of heavy equipment. These tests were also made from a C-130A aircraft.

It was concluded that, within the scope of this test, the modified test item was functionally suitable for intended purpose and conformed to the approved Military Characteristics to a degree which warranted submission for service test or type classification.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

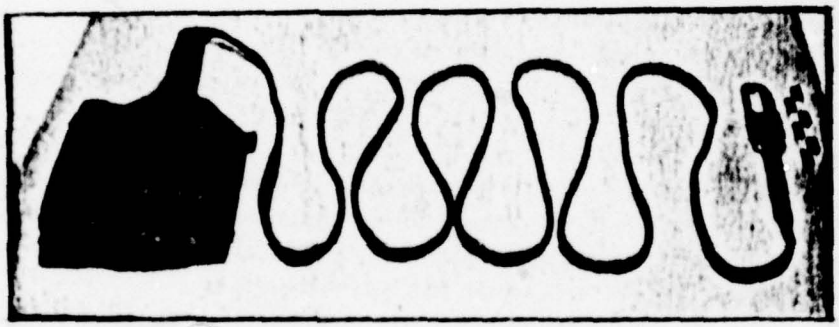
TECHNICAL REPORT T-164
FEA 59069

An Engineering Test of Static Line, Cargo Parachute, G-12, T 59-1 and T 60-2

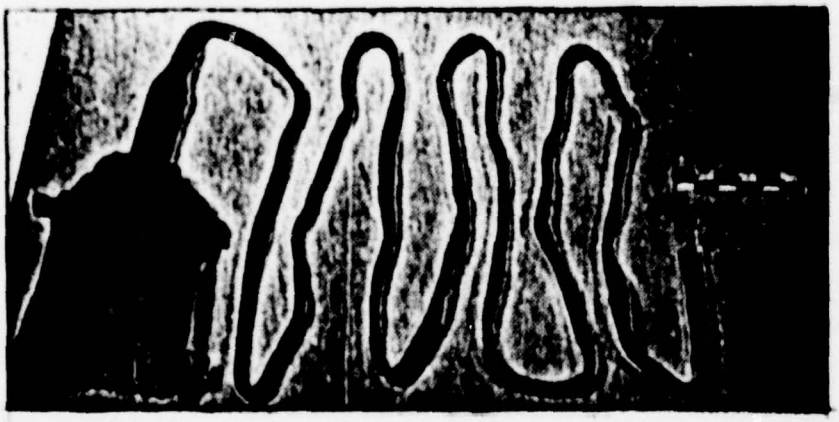
Conducted at Yuma Test Station, Yuma, Arizona

July 1960

Abstract



Static Line, Cargo Parachute, G-12, T 59-1



Static Line, Cargo Parachute, G-12, T 60-2

An engineering test was conducted to determine the functional suitability

of two experimental static lines, the T 59-1 and T 60-2, used for deploying the G-12 cargo parachute. The static line, T 59-1, was a drogue-type designed to deploy the pilot chute of the G-12 cargo parachute and then trail in a stable position in the airstream aft of the cargo compartment of the C-130A aircraft. The static line, T 60-2, was a break-away type. It also was designed to deploy the pilot chute of the G-12 cargo parachute; and, in addition, to break-away from the snap fastener assembly on the anchor line cable of the aircraft and descend with the pilot chute.

The two experimental static lines were evaluated by considering configuration, performance and durability and reliability.

The static line, T 59-1, was tested using A-22 type cargo loads weighing 2,200 pounds, the rated capacity of the G-12 cargo parachute, which were airdropped from C-130A aircraft flying at an indicated airspeed of 130 knots. It was determined to be unsatisfactory because of the unstable characteristics exhibited by the drogue when trailing aft of the cargo compartment of the aircraft. The unstable characteristics were erratic, rotational movements which caused all successive static lines to tangle, and thus presented a hazard to parachutists exiting from the aircraft subsequent to the cargo loads.

The static line, T 60-2, was tested in a manner similar to the static line, T 59-1. It was determined to be satisfactory in terms of the criteria, and it is concluded that the static line T 60-2 is functionally suitable to submit to the appropriate agencies for service test.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

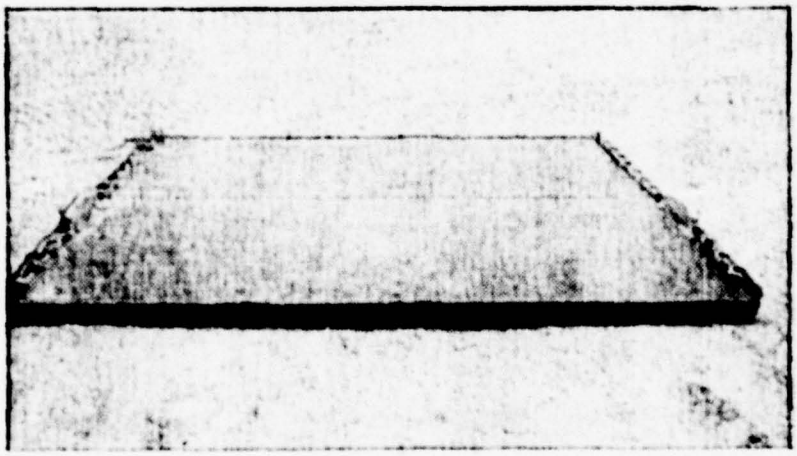
TECHNICAL REPORT T-168
59031-II

Engineering Tests of Low Cost Platform for Air Delivery of Supplies

Conducted at Yuma Test Station, Yuma, Arizona

August 1960

ABSTRACT



Low Cost Platform

Engineering tests were conducted to determine (a) the degree to which the low cost platform-skid conforms with the U.S. Continental Army Command approved Military Characteristics, and (b) the functional suitability of the test item for submission to the appropriate agencies for service testing or type classification. Airdrops were conducted to obtain the necessary engineering data for evaluation.

Nine airdrop tests were made with the prototype test item using representative supplies varying in rigged gross weights from 3,723 to 7,314 pounds.

These test were made from C-130A aircraft. These tests revealed several design deficiencies in the test item of sufficient magnitude to render the item unsatisfactory for service test. The design deficiencies were corrected and the test item, as modified, was returned to this Agency for further engineering tests.

Seven airdrop tests were made on the modified test item with representative items os supply. These tests were also made from a C-130A aircraft.

It was concluded that, within the scope of this test, the modified test item was functionally suitable for the intended purpose and conformed to the approved Military Characteristics to a degree which warranted submission for service test or type classification.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT T-185
FEA 59068

An Engineering Test of Static Line With Release Knife, T 59-1, T 60-2 and T 60-3

Conducted at Yuma Test Station, Yuma, Arizona

January 1961

Abstract

An engineering test was conducted to determine the functional suitability of three experimental static lines with release knife, T 59-1, T 60-2 and T 60-3. The static line, T 59-1, was a drogue-type designed to cut the extraction line connector strap, and then trail in a stable position in the airstream aft of the cargo compartment of the C-130 aircraft. The static lines, T 60-2 and T 60-3, were a break-away type designed to cut the extraction line connector strap, and in addition, to break-away from the retained line on the anchor line cable of the aircraft and descend with the load or extraction parachute. This would eliminate the hazard now existing when parachutists exit from the aircraft after cargo loads.

The three experimental static lines were evaluated by considering configuration, performance and durability and reliability.

The static line, T 59-1, was airdrop tested using vehicle loads, which were airdropped from C-130 aircraft flying at an indicated airspeed of 130 knots. It was determined to be unsatisfactory because of the unstable characteristics exhibited by the drogue when trailing aft of the cargo compartment of the aircraft. The unstable characteristics were erratic, rotational movements which caused all successive static lines to tangle, and, thus, presented a hazard to parachutists exiting from the aircraft after cargo loads.

The static lines, T 60-2 and T 60-3, are identical except for the webbing used in fabrication. These two experimental static lines were tested in a manner similar to that of the static line, T 59-1. It was determined that both of these lines were difficult to inspect prior to re-use because of the length of the sleeve and release line. The T 60-3 item uses a nylon webbing for the static line. It was found to be unsatisfactory because the nylon line was readily frayed from friction burns and the elastic characteristic of the nylon line made it difficult to determine the amount of slack to leave in the release line between the upper opening of the sleeve and the connector link. The T 60-2 item, using a cotton webbing for the static line, was determined to be satisfactory in terms of the test criteria.

It was recommended that the static line, T 60-2, when modified to allow for more convenient inspection, be submitted to the appropriate agencies for service test.

Airborne

Interim Letter Report Submitted During

FY 1961

Applications Engineering Program

FEA ABN No.	Title
	December
59068	Tentative Evaluation, Engineer Test of Static Line with Release Knife, Combat Expendable Platform, T 60-2 and T 60-3

PART IV

METHODS RESEARCH PROGRAM

Abstracts of Final Reports

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT R-7
FEA MRS 6002

Development of Suitable Psychometric Techniques for Valid, Reliable, and Efficient Measurement of Subjective Reactions of Troops Using QM Items in Field Test Conditions

Conducted at Fort Lee, Virginia

September 1960

Abstract

A research investigation was carried out by the Psychometric Laboratory of the University of North Carolina under a contract monitored by the Quartermaster Research and Engineering Field Evaluation Agency. The purpose of the investigation was to determine the relative importance of various features of certain Quartermaster clothing items in relationship to over-all acceptability.

The research investigation was carried out at Fort Lee, Virginia, during the period 15 October 1959 - 30 July 1960. The major findings were as follows:

1. Knowledge of the judged importance of item features does not predict preference for leather gloves or poplin shirt. For the leather boot and the steel helmet importance ratings for selected item features predict expressed preference to a slight but significant extent.

2. Judgments of feature adequacy predict preference for the poplin shirt and the leather boots. Knowledge of the rated adequacy of appearance and comfort features predict expressed preference for these two articles of clothing. Multiple correlations between .40 and .50 were obtained.

3. The optimal equation for predicting expressed preference for a given article of clothing involves a weighted sum of the individual adequacy ratings for each of a small set of selected item features. Judged importance

of the item features does not appear to add significantly to prediction of preference. The leather boot and the steel helmet are possible exceptions to this finding.

4. For the leather boot five features are judged to be important and not quite adequate. These five features were among the seven features previously found to identify a factor interpreted as a protection factor. Improvement of these features might be expected to increase user satisfaction with the leather boot.

5. Scaling of the category means by the method of successive intervals for the leather boot data was done for both adequacy ratings and importance ratings. The results demonstrate that the category descriptions are correctly ordered and that they are rather uniformly spaced. There is some tendency for the category means to be more widely separated at the ends of the scale than at the middle.

6. The successive category rating forms used in this and the previous research yield reliable results for this type of rating. Prediction of preference for the leather boot is dependent upon the same item features for both research studies. Although "halo" effects are not so well controlled, the use of the rating form format in which all features appear on the same page seems to produce results that are quite acceptable.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT R-8
FEA MRS 59-7L

An investigation of an Objective Method for Determining Moisture Penetration and Absorption Properties of End Items of Leather Footwear Under Dynamic Field Test Conditions

Conducted at Fort Lee, Virginia

November 1960

ABSTRACT

The purpose of this Methods Research study was to develop a more refined, objective, and reliable method for determining, on a continuing basis, the instant and location of leak and the amount of moisture penetration and absorption in leather footwear under dynamic or field conditions.

Testing was conducted utilizing Agency facilities at Fort Lee, Virginia.

In addition to testing an 8-circuit, pilot model detector constructed by a commerical firm, the Agency designed, constructed, and evaluated a less complex experimental model detector. The Agency-developed detector incorporated an audible indicator signal and provided 8 parallel circuits, 4 for each foot. This model, designated Aquatek, is worn clipped to the trousers belt.

The Agency developed and tested a sensing element for use in conjunction with a multi-circuit detecting instrument. This element incorporates a detection principle involving electrical resistance and resultant changes in resistance activated by water penetration.

Based on dynamic field tests conducted by the Agency, the Aquatek detecting instrument proved more satisfactory and completely met the test objectives.

QUARTERMASTER FIELD EVALUATION AGENCY, U.S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT R-9
FEA MRS 58-7m

Development of an Objective Method for Determining Fabric Wear in Field Tests Through Use of Radioactive Isotope Techniques

December 1960

ABSTRACT

Durability of experimental fabrics is customarily determined by subjecting the fabrics to accelerated wear on Quartermaster Research and Engineering Field Evaluation Agency fabric wear courses and by making subjective evaluations of the amounts of wear sustained. While this test method has been favorably received by military and industrial technologists, its subjective nature leaves something to be desired. Accordingly, a program has been undertaken by the Field Evaluation Agency, in collaboration with the School of Textile, North Carolina State College, Raleigh, North Carolina, to devise a faster, more objective means of measuring fabric durability by means of a radioactive isotope technique. The portion of the project covered by this report was conducted at Fort Lee, Virginia, and at North Carolina State College.

A beta gauge activated by 400 millicuries of krypton 85 was used in making objective measurements of wear sustained by fabrics worn on the Agency's fabric wear courses. Results indicated that the beta gauge is at least as effective as the subjective method of determining fabric wear, and that the future potential of the beta gauge appears to be much greater than that of the subjective method.

The Agency is continuing in-house research on application of radioactive isotopes in the evaluation of fabric wear sustained on fabric wear and durability. Reports on this additional work will be published subsequently.

QUARTERMASTER FIELD EVALUATION AGENCY, U. S. ARMY
QUARTERMASTER RESEARCH AND ENGINEERING COMMAND
FORT LEE, VIRGINIA

TECHNICAL REPORT R-10
FEA MRS 58-7h

Application of Non-Destructive Testing Techniques To Field Testing of Military Footwear

Conducted at Fort Lee, Virginia; Fort Benning, Georgia; Fort Bragg, North Carolina; Camp Lejeune, North Carolina; and Yuma Test Station, Yuma, Arizona

April 1961

ABSTRACT

Visual inspection of test footwear is not adequate to detect internal defects which might adversely affect the comfort and durability of the item. This methods research study was conducted to ascertain the practicability of non-destructive inspection techniques, such as fluoroscopy and radiography, to detect internal defects and evaluate their effects on the comfort and durability of various types of military footwear undergoing field test conditions.

Test sites for this investigation were Fort Lee, Virginia; Fort Benning, Georgia; Fort Bragg, North Carolina; Camp Lejeune, North Carolina; and, Yuma Test Station, Yuma, Arizona. The types of footwear included in this test were low quarter dress oxfords, leather combat boots, tropical combat boots, and insulated rubber combat boots. In addition to visual and fluoroscopic inspections, radiographs were made of footwear with defects which were considered serious enough to possibly affect comfort or durability during wear.

At the end of each test, the defective items were again fluoroscoped to detect additional defects or possible effect of the original defects upon the durability of the items. Soldiers who wore the defective boots were interviewed periodically to determine the possible effect of the defect on the comfort of the item. No difficulties were experienced in the operation, maintenance, or transportation of either inspection unit.

Based on inspection of 1,608 items of military footwear, it was determined that both the mobile X-ray subsistence inspection van and the portable X-ray footwear inspection unit are suitable for non-destructive examination of military footwear under field test conditions. The frequency and nature of internal defects found in new and worn footwear items, and the possible effect of such defects upon other characteristics of footwear, warrants the non-destructive inspection of all footwear items, plus the standard visual inspection method, before, during and after test wear. The types of internal defects which are most likely to affect the comfort of durability of footwear are unclinched nails in the sole or heel area and filler voids between the outsole components.

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