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RDT&E PROJECT NO. 1M643303D54817

USATECOM PROJECT NO. 8-4-7405-02/03

INTEGRATED ENGINEERING/SERVICE TEST, ARCTIC, OF M PACKET (FOOD PACKET, INDIVIDUAL, COMBAT)

FINAL REPORT

BY

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1st Lieutenant, TC
USAATC

MAY 1966

U S ARMY
GENERAL EQUIPMENT TEST ACTIVITY
FORT LEE, VIRGINIA

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DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

AMSTE-BC

7 JUN 1966

SUBJECT: Final Report, Integrated Engineering/Service Test, Arctic, of M Packet (Food Packet, Individual, Combat), USATECOM Project Nos. 8-4-7405-02/03, RDT&E Project No. 1M643303D54817

TO: Commanding General, US Army Materiel Command, ATTN: AMCRD-DM-E, Washington, D. C. 20315
Commanding General, US Army Combat Developments Command, ATTN: CDC Liaison Officer, USATECOM, Aberdeen Proving Ground, Maryland 21005

1. Reference letter, AMSTE-BC, Hq, USATECOM, subj: Final Report, Integrated Engineering/Service Test (Intermediate Conditions) of M Packet (Food Packet Individual Combat), USATECOM Project Nos. 8-4-7405-04/05/06, RDT&E Project No. 1M643303D54817, 27 May 1966 with report inclosure.

2. The subject report has been approved by this headquarters. Copies are forwarded for comment or concurrence.

3. As indicated in the referenced letter, the results and conclusions of arctic testing of the M Packet are in essential agreement with those contained in the report covering intermediate conditions.

4. In addition to the deficiency and shortcoming reported in reference, the following shortcomings were encountered in arctic tests:

a. The level of average rating for pork sausage (Menus 2 and 4) shows the acceptability of this item to be questionable.

b. The dry cream substitute formed lumps which would not dissolve in cold water.

5. Recommendations: It is recommended that:

a. The M Packet be considered suitable for US Army use when the deficiency and as many as feasible of the shortcomings are corrected.

AMSTE-BC 7 JUN 1966

SUBJECT: Final Report, Integrated Engineering/Service Test, Arctic, of M Packet (Food Packet, Individual, Combat), USATECOM Project Nos. 8-4-7405-02/03, RDT&E Project No. 1M643303D54817

b. A random sample of modified M Packets from initial production quantities be provided to USATECOM for Confirmatory Test (Type I) to insure that the deficiency has been corrected.

c. Action be taken to incorporate recommendations of the Office of the Surgeon General regarding nutritional aspects and water requirements in the Military Characteristics and Concept of Use for the M Packet.

FOR THE COMMANDER:

Austin Triplett Jr

AUSTIN TRIPLETT, Jr.
Colonel GS
Dir, Inf Mat Test

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RDT&E PROJECT NO. 1M643303D54817

USATECOM PROJECT NO. 8-4-7405-02/03

INTEGRATED ENGINEERING/SERVICE TEST, ARCTIC, OF M PACKET (FOOD PACKET, INDIVIDUAL, COMBAT)

TEST REPORT

BY

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MAY 1966

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U.S. ARMY
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FORT LEE, VIRGINIA

U.S. ARMY GENERAL EQUIPMENT TEST ACTIVITY
FORT LEE, VIRGINIA

USATECOM 8-4-7405-02/03

Final Report of Integrated Engineering/Service Test, Arctic, of M Packet (Food Packet, Individual, Combat)

Conducted at Fort Greely, Alaska

May 1966

Abstract

An Integrated Engineering/Service Test, Arctic, of the M Packet (Food Packet, Individual, Combat) was conducted to determine the technical performance and safety characteristics of the M Packet and the extent to which it meets the revised Military Characteristics for the Food Packet, Individual, Combat and to determine its suitability for U.S. Army use under arctic winter conditions.

The test was conducted from 1 November 1965 to 9 February 1966 by U.S. Army Arctic Test Center, Fort Greely, Alaska, with necessary technical assistance from USAGETA. USAGETA was responsible for preparing the test plan and the final report of test with inputs from USAATC.

It was concluded that the operational performance characteristics of the M Packet are satisfactory for its intended purpose; that a possible safety hazard to the user exists because of faulty processing of M Packets at point of manufacture or assembly; and that, with correction of this deficiency, the M Packet will be suitable for U.S. Army use under arctic winter conditions.

It was recommended that necessary modifications of the M Packet be accomplished to correct the deficiency and as many as possible of the shortcomings described in the report. It was further recommended that action be taken to clarify those Military Characteristics pertaining to caloric and nutritional requirements as they are related to the use of the M Packet under arctic winter conditions.

FOREWORD

The U.S. Army General Equipment Test Activity, Fort Lee, Virginia, was designated the Executive and Task Agency under Project No. 8-4-7405-03. USAGETA, with input from the U.S. Army Arctic Test Center, prepared the plan of test and the report of test for Integrated Engineering/Service Test, Arctic, Project No. 8-4-7405-02/03. The U.S. Army Arctic Test Center, Fort Greely, Alaska, was designated the Task Agency under Project No. 8-4-7405-02. USAATC conducted the Integrated Engineering/Service Test, Arctic.

This test was conducted in accordance with the following:

Letter, AMSTE-BC, Headquarters, USATECOM, 5 May 1965, subject: "Test Directive, Integrated Engineering Service Test and Integrated ET/ST, Arctic, USATECOM Project No. 8-4-7405, DA Project 1M643303D54817."

Letter, AMSTE-BC, Headquarters, USATECOM, 19 May 1965, subject: "Test Directive Amendment."

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SECTION 1. INTRODUCTION

1.1 BACKGROUND

The Food Packet, Individual, Combat, as described in CDOG 1439 F(17) and in Military Characteristics, Item 6 QMCTC Mtg 2.62, would be an extremely lightweight, compact food packet for use in any combat type operations which preclude planned resupply for periods up to 10 days but under circumstances in which no special water restriction would be expected. Each food packet would provide approximately 500 calories from fabricated food components with a maximum weight of 5 ounces and two packets per day, without supplementation, would be sufficient to maintain combat effectiveness without irreversible physiological damage. No preparation except opening packages and adding water to the coffee component would be required. Successful development of a packet with these characteristics is contingent upon exploratory development studies to complete establishment of new food fabrication techniques.

During an In-Process Review held at U.S. Army Materiel Command Headquarters on 21 October 1963, it was concluded that the Food Packet, Individual, Combat, could not be ready before 1970. U.S. Army Combat Developments Command stated a requirement for a packet much sooner; therefore, it was concluded that the Military Characteristics should be modified so that a substitute could be developed as an interim item. The M Packet was proposed as the best candidate under that rationale.

The U.S. Army Natick Laboratories was assigned responsibilities for developing the M Packet in accordance with the decisions of the In-Process Review and with the revised Military Characteristics. An Engineering Design Test of the M Packet was conducted by USAGETA during November and December 1964 (Ref. 1, App. IV).

Four hundred cases of M Packets were received at the U.S. Army Arctic Test Center for testing on 20 August 1965. The test was conducted by USAATC at Fort Greely, Alaska, during the period 1 November 1965 to 9 February 1966.

1.2 DESCRIPTION OF MATERIEL

The M Packet, an interim food packet for the Food Packet, Individual, Combat, is a lightweight, flexibly packaged feeding unit. It is

provided in six menus with each containing two flexibly packaged, heat-processed meat components, either a cereal, a dessert, or confection components, and coffee, cream, and sugar. Each menu weighs approximately 18 ounces, has a volume of 46.5 cubic inches, and contains approximately 1200 calories.

Each meat component is heat sealed in a plastic-foil-plastic laminated bag and overpacked in a unit protective fiberboard folder. The two dessert components, fruitcake and date pudding, are also packaged in plastic-foil-plastic laminated bags and overpacked in a fiberboard carton. The accessory items (candy, cereal bar, coffee, sugar and cream) are packaged in a plastic-foil-plastic laminated bag. The M Packet container is a heat-sealed polyethylene bag. Twenty-four M Packets, four of each menu, are packed in each shipping container. Identification views of the test item are shown in Figures 1 and 2.

1.3 TEST OBJECTIVES

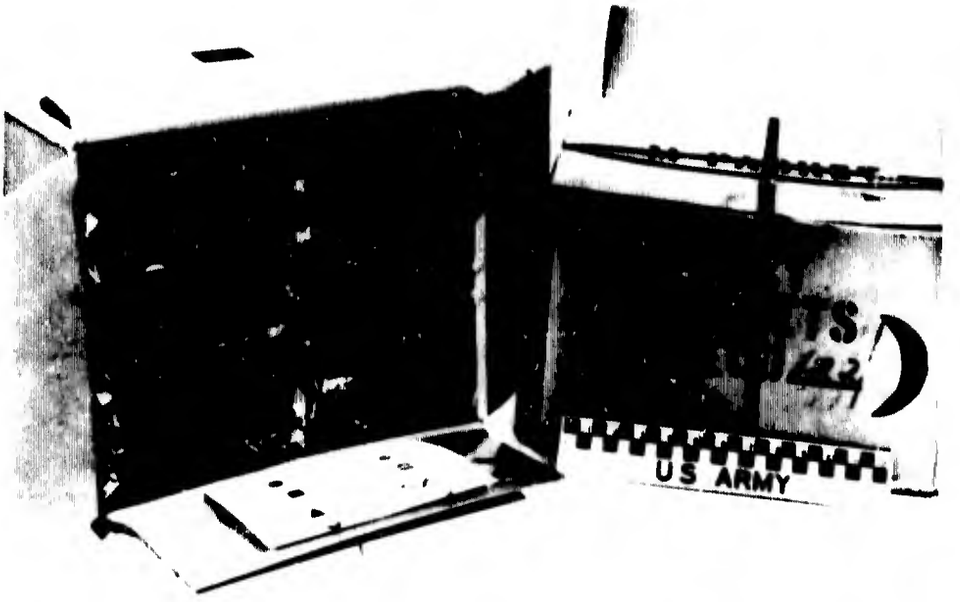
To determine the technical performance and safety characteristics of the M Packet and the extent to which it meets the revised Military Characteristics (App. II), and to determine its suitability for U.S. Army use under arctic winter conditions.

1.4 SUMMARY OF RESULTS

a. The extent to which the M Packet met those Military Characteristics pertaining to physiological effects; CBR protection; water, insect, and rodent resistance; and long-term storage effects were not tested. Results pertaining to these characteristics are included in the Final Report of USATECOM Project 8-4-7405-04/05/06 (Ref. 2, App. IV).

b. The extent to which the M Packet met those Military Characteristics pertaining to caloric and nutritional values were not fully determined. The caloric and the nutritional adequacy of the M Packet were evaluated only at the three- and two-packet per day feeding level rather than a maximum of three packets and a minimum of one packet per day.

c. The M Packet satisfactorily met the requirements of all other Military Characteristics and is otherwise suitable for U.S. Army use under arctic winter conditions, except as follows:



M Packet case opened with symbol sheet.

M Packet case banded.

Figure 1. M Packet cases.

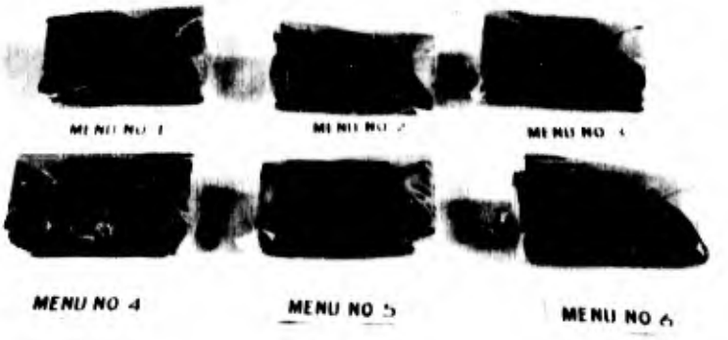


Figure 2. M Packet menus.

US ARMY
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TECOM 8-4-7405-02/03

NEGATIVE 2, 04-46

(1) Deficiency

A possible safety hazard to the user, i.e., food spoilage, exists because of faulty processing of M Packets at the point of manufacture or assembly (Par. 2.2 and 2.11).

(2) Shortcomings

(a) The dry coffee cream substitute formed lumps which would not dissolve in cold water (Par. 2.3.4 and App. III).

(b) The levels of the average ratings for pork sausage and for cereal bars show the acceptability of these items to be questionable (Par. 2.3.3).

(c) A high packet failure rate can be expected when using the freedrop, without honeycomb, air delivery method (Par. 2.6.3).

1.5 CONCLUSIONS

It is concluded that:

a. The operational performance characteristics of the M Packet are considered satisfactory for its intended purpose.

b. Upon correction of the deficiency cited in paragraph 1.4c(1) above, the M Packet (Food Packet, Individual, Combat) will be suitable for U.S. Army use under arctic winter conditions.

1.6 RECOMMENDATIONS

It is recommended that:

a. The M Packet be considered suitable for use under arctic winter conditions when the deficiency and as many as possible of the shortcomings are corrected.

b. Action be taken through the Office of the Surgeon General to clarify the caloric and nutritional requirements as they are related to the use of the M Packet under arctic winter conditions.

c. The modified M Packet be returned for Confirmatory Test (Type I) to insure that the deficiency and shortcomings have been corrected.

SECTION 2. DETAILS OF TESTS

2.1 INTRODUCTION

Tests were conducted at Fort Greely, Alaska, from 1 November 1965 to 9 February 1966 under the supervision of 1st Lieutenant Paul H. May, Transportation Corps, of the Infantry, Airborne, and Individual Equipment Test Division, U.S. Army Arctic Test Center. Participants in the test included soldiers assigned to the Arctic Test Center and two different provisional infantry platoons on TDY from U.S. Army Alaska units.

The extent to which the M Packet meets the Military Characteristics, pertaining to the general areas of nutritional requirements; physiological effects; water, insect, and rodent resistance; CBR protection; and long-term storage stability, was not determined during the arctic test because an evaluation of these factors was included in USATECOM Project 8-4-7405-04/05/06, test of M Packet (Food Packet, Individual, Combat) Intermediate Conditions. Also, the time covered by this test was too short to evaluate these areas.

During the arctic test, evaluations of shipping and handling, acceptability, portability, durability, and air delivery capabilities of the M Packet were made. Food ratings, food consumption estimates, personal observations and interviews, medical examination, participants, and group administered questionnaires were utilized to collect data and as a basis for evaluation.

All testing was conducted at ambient air temperatures between +43°F. and -55°F. The daily maximum and minimum ambient air temperatures during the test period are shown in Appendix I-A.

Soldiers participating in the test were representative of those who would use the M Packet under actual combat conditions. They wore the arctic winter clothing and carried a rucksack and other equipment as appropriate. Two different provisional platoons participated in the test because of a redeployment of U.S. Army Alaska (USARAL) units during the test period. The first group participated 1 November 1965 through 22 December 1965; the second participated 12 January 1966 through 9

February 1966. Each group was given a detailed orientation by the test officer covering the background and general purpose of the test, test procedures, pertinent data sheets, and, in general, what was expected of the individual participant.

2.2 PREOPERATIONAL INSPECTION AND PHYSICAL CHARACTERISTICS

2.2.1 Objective

To determine the effects of transportation, handling, and storage on the M Packet cases, packaging, and foods, and to determine that the M Packets were in proper condition for testing.

2.2.2 Method

Twenty cases (24 M Packets per case) of a shipment of 400 cases were randomly selected and inspected upon arrival at the Arctic Test Center. Shipment was by motor express from Minneapolis, Minnesota, to Fort Wainwright, Alaska, and by military vehicle (semitrailer, stake and platform, 2-wheel, 12-ton) from Fort Wainwright, Alaska, to Fort Greely, Alaska. Each component of each M Packet, each M Packet overpackage, and each shipping case of the 20 cases were thoroughly inspected for manufacturing defects and for damage incurred in handling and shipping.

Personnel from U.S. Army Natick Laboratories and U.S. Army General Equipment Test Activity performed a 100-percent inspection of 108 cases of M Packets which were utilized during the acceptability subtest. All defects and damages were recorded.

An additional 15 cases were placed in outdoor storage and cold-soaked under arctic conditions. Five cases were subjected to each of the following conditions: ambient air temperatures between -10°F. and -48°F. for a period of 72 hours; ambient air temperatures between -43°F. and -50°F. for a period of 72 hours; ambient air temperatures between -43°F. and -55°F. for a period of 101 days. In all instances, the exterior of each individual food packet was inspected prior to the cold-soak period. Likewise, the exterior and the contents of each individual food packet were inspected upon completion of the cold-soak period to determine effects of storage on the items under arctic winter conditions.

2.2.3 Results

Examination of the 20 cases randomly selected from the total shipment of 400 cases revealed that one band was missing from each of two cases and there was a slight bulge in each of two other cases due to the banding. Inspection of the contents of these 20 cases showed a total of 14 failures in individual components; however, there was no positive evidence that these failures were directly related to shipping and handling. Indications were that the failures resulted from defective seals and puncture or tears (pinholes) in the packaging material. In addition, the unit protective folders of 4 packets (2 each of menus No. 1 and 3) were covered with mildew. No puncture could be found in the polyethylene cover. The mildew had not penetrated through the plastic-foil-plastic laminated bag and the menu components were not spoiled. While not listed as a failure, there were noted small tears (one-sixteenth to seven-eights inch in diameter) in the corners of the polyethylene covers of 136 packets. Views of typical packet defects are shown in Figures 3 and 4.

Shown in Table I is a summary of the failures by type, component, and menu that were found in 108 cases during the 100-percent inspection of packets for the troop acceptability phase. No failures or defects were noted at the completion of any of the three cold-soak storage periods.

Shown in Appendix I-B are the total packet failures and defects by type for this and other subtests. Equipment Failure Reports were submitted for all types of failures and defects listed.

2.2.4 Analysis

Failure of packets included some categories, crimped seal for instance, which definitely were not directly related to shipping and handling. Therefore, it is evident that many of the packet failures resulted from faulty processing rather than shipping and handling conditions. Overall, results show little damage of practical significance to the test item due to shipping and handling. On this basis, the M Packet container system is capable of withstanding handling during transportation and storage prior to use.

Figure 3. Mildew on the unit protective folder of M Packet meat components.

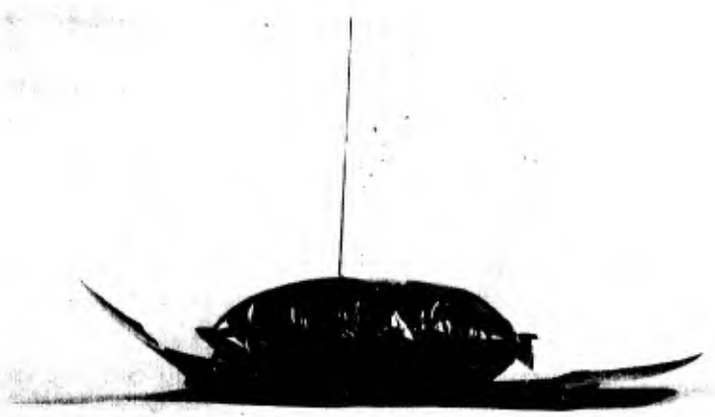

Figure 4. Packet failure due to gas (sweller).

TABLE I

SUMMARY OF FAILURES BY TYPE, COMPONENT, AND MENU
FOUND DURING INSPECTION OF PACKETS FOR THE TROOP ACCEPTABILITY PHASE

Item	Menu No.	Type of Failure and Number of Packet Failures							Total Packets Inspected	Percent Failure
		Seal Failure (Leakage)	Puncture or Tear (Leakage)	Abrasions	Crimped Seal	Gas	Moldy	Total Failures		
Frankfurter	1,6	2	2	1	1	0	0	6	864	0.69
Beef stew	1	12	2	0	0	3	1	18	432	4.17
Pork sausage	2,4	1	3	0	1	0	1	6	864	0.69
Beefsteak	3	3	4	0	0	0	0	7	432	1.62
Beef slices w/ barbecue sauce	3,6	5	3	2	4	1	0	15	864	1.74
Chicken loaf	4,5	1	6	2	1	0	0	10	864	1.16
Ground beef w/ sauce	2,5	1	7	0	0	1	0	9	864	1.04

Total number packets inspected 5,184 (108 cases)

Total number of packet failures 71

Percent failure (overall) 1.37

2.3 ACCEPTABILITY

2.3.1 Objective

To determine the acceptability of the six menus of the M Packet when consumed for a period of 7 days by soldiers of an infantry platoon living in the field and participating in field exercises under arctic winter conditions.

2.3.2 Method

Soldiers of two provisional infantry platoons subsisted on the M Packet for a period of 7 days each. Feeding levels of three packets and two packets per man per day, respectively, were tested. The soldiers lived under field conditions while participating in field exercises designed to provide physical activity normally experienced during maneuvers under arctic winter conditions. A brief description of the field exercises participated in by each platoon is shown in Appendices I-C and I-D, respectively. The arctic full field load as carried by each individual is shown in Appendix I-E.

The distribution of meals was arranged so that individuals did not receive the same menu twice on the same day. Isolated-area, inspection and continuous observation of test participants were used so that no food other than the M Packet was available to the soldiers. To provide unfrozen food, the M Packet was dispersed and carried in the clothing of each soldier prior to eating. All components of the M Packet were consumed unheated. Food ratings, using the 9-point hedonic scale, were obtained on each menu and the major components included in each of the six menus. Each participant marked the food rating form to show the portion of each major food consumed. In addition, each participant completed a final acceptability questionnaire designed to obtain his overall evaluation of the M Packet.

The soldiers were given general physical examinations by a medical officer to determine their overall physical condition. This included weighing the individual without clothing immediately before and after each phase of this subtest. Further, the medical officer inspected the soldiers once each day during this subtest. Only soldiers in good physical condition were selected for, or allowed to continue in, the testing. During and at

the end of each phase of this subtest, recorded observations were made by the medical officer and test observers to detect any observable changes in the physical condition or weight of each soldier.

2.3.3 Results

The average ratings for major food components and for each of the 6 menus by feeding level and combined across feeding levels are shown in Tables II and III, respectively. The average percent of selected major food items consumed during the test is shown in Appendix I-F. Shown in Table IV is the overall average rating for each day of the 7-day period by feeding level and combined across feeding levels. Data pertaining to the weight loss of the test participants by feeding level are shown in Table V. Responses to pertinent questions administered to participants as part of the final acceptability questionnaire are summarized in Table VI. Summary of comments of participants pertaining to all menus obtained during this phase is shown in Appendix I-G.

2.3.4 Analysis

The combined average ratings for all major food components, except pork sausage and cereal bar, were sufficiently high for items to be considered acceptable. The average ratings for the pork sausage (5.48) and cereal bar (5.22) approach the neutral point on the hedonic rating scale which indicates that the acceptance of these items as individual food components is questionable and an improvement in these components is desirable. However, the overall ratings for the menus in which these items are included were in an acceptable range. Examination of the average rating for each menu (Table III) shows no important differences between the menus and indicates that all menus were acceptable. Also, there appears to be a high positive correlation between the amount of a food consumed and the average rating for that item (Table II and App. I-G). Examination of the overall daily average rating for the 7-day period by feeding levels and combined across levels (Table IV) shows no systematic trends or monotony effects resulting from the continuous consumption of the M Packet for 7 days. This suggests that the menus and components were generally as acceptable at the end of the period as at the beginning.

There were no observed ill-effects on the health of the test participants due to the consumption of the M Packet; however, two participants were

TABLE II

AVERAGE HEDONIC SCALE RATING FOR EACH MAJOR COMPONENT BY FEEDING LEVEL AND COMBINED ACROSS FEEDING LEVELS

Food	2 Packets Per Day		3 Packets Per Day		Combined Across Feeding Levels	
	Number Ratings	Average Rating	Number Ratings	Average Rating	Number Ratings	Average Rating
Frankfurter	255	6.69	340	5.58	595	6.06
Pork sausage	254	6.37	346	4.83	600	5.48
Beefsteak	51	7.15	194	6.05	245	6.28
Chicken loaf	255	6.63	293	6.25	548	6.43
Beef stew	101	6.30	189	5.92	290	6.05
Ground beef w/sauce	203	6.96	347	6.20	550	6.48
Beef slices w/barbecue sauce	205	7.14	343	5.98	548	6.42
Starch jelly bar	102	7.75	191	7.46	293	7.56
Cereal bar	101	5.09	198	5.29	299	5.22
Fruitcake	51	7.65	194	7.04	245	7.17
Date pudding	153	6.55	144	6.66	297	6.60
Chocolate bar w/almonds	102	7.76	147	7.27	249	7.47
Chocolate fudge bar	153	7.90	149	7.35	302	7.63

TABLE III

AVERAGE HEDONIC SCALE RATING OF M PACKETS BY MENU FOR EACH FEEDING LEVEL AND COMBINED ACROSS FEEDING LEVELS

Menu No.	2 Packets Per Day		3 Packets Per Day		Combined Across Feeding Levels	
	Number Ratings	Average Rating	Number Ratings	Average Rating	Number Ratings	Average Rating
1	102	6.89	186	6.18	288	6.43
2	101	6.56	199	6.50	300	6.52
3	51	7.16	195	6.29	246	6.47
4	153	6.72	147	6.12	300	6.43
5	102	7.11	148	6.52	250	6.76
6	154	7.21	150	6.20	304	6.71

TABLE IV

AVERAGE HEDONIC SCALE RATINGS BY DAY FOR EACH FEEDING LEVEL AND COMBINED ACROSS FEEDING LEVELS

Feeding Level	1st Day	2nd Day	3rd Day	4th Day	5th Day	6th Day	7th Day
2 packets per day	6.72	7.22	6.44	6.93	6.98	6.93	7.04
3 packets per day	6.17	6.59	6.12	6.32	5.85	6.03	5.84
Combined across feeding levels	6.46	6.85	6.20	6.57	6.31	6.40	6.33

withdrawn from the test for medical reasons unrelated to the diet of the soldiers. Examination of Table V shows the average weight loss for individuals in the platoon subsisting on two packets and on three packets per day to be 5.7 and 2.6 pounds, respectively. While this data would suggest a caloric insufficiency, the weight loss shown cannot be attributed solely to a difference in the consumption rate since individuals in each group were from two separate platoons which participated at different times and under somewhat different environmental conditions.

TABLE V

FREQUENCY DISTRIBUTION OF WEIGHT LOSSES OF INDIVIDUAL

Weight Loss (lbs)	2 Packets Per Day		3 Packets Per Day	
	Number Men	Percent	Number Men	Percent
Less than 2	9	18	21	42
3 - 4	8	16	18	36
5 - 6	18	36	8	16
7 - 8	8	16	3	6
9 - 10	3	6	0	0
11 - 12	1	2	0	0
13 - 14	2	4	0	0
15 - 16	1	2	0	0
TOTAL	50	100	50	100

Average weight loss:
2 packets per day - 5.7 pounds
3 packets per day - 2.6 pounds

Data in Table VI show that most of the test participants found the individual packages easy to open. Also, the majority of the test participants

had no trouble in eating the foods out of the individual packages. Approximately 70 percent of the responses showed that the use of the M Packet did not limit in any way the performance of duty of the soldiers. Those who responded that their performance of duty was limited listed lack of energy most frequently as the contributing factor. With regard to the minimum daily requirements, approximately 44 percent of the test participants indicated three packets per day while 43 percent indicated four or more packets per day. This suggests that the minimum daily issue factor for use under arctic winter conditions is three or more packets per day. An overall favorable attitude on the part of test participants toward the M Packet is confirmed in that approximately 87 percent of the responses showed it to be suitable for use under arctic winter conditions.

Examination of the comments of test participants (Appendix I-G) showed 27 percent of the comments pertained to food components causing thirst. Pork sausage was mentioned most frequently as causing thirst; however, all components were mentioned. Of a total of 1,352 comments made by test participants, 568 or 42 percent pertained to cold coffee being rejected or unacceptable to those who consumed it. Observation indicated that test participants showed a preference for beverages which are normally consumed cold. In this connection, it was found that the dry coffee cream substitute formed lumps which would not dissolve in cold water. This made the coffee less acceptable. In spite of the complaints shown in Appendix I-H, the test participants apparently considered these to be relatively unimportant since the average ratings show all menus to be acceptable, and the majority of the test participants rated the M Packet suitable for use under arctic winter conditions.

2.4 PORTABILITY

2.4.1 Objectives

To determine:

a. The ease of dispersing and carrying the M Packet in the soldier's clothing and rucksack while performing field exercises under arctic winter conditions.

b. Whether the soldier can carry a minimum 7-day supply of M Packets, at both feeding levels, in his clothing, rucksack, or similar device, while performing field exercises under arctic winter conditions.

TABLE VI

SUMMARY OF RESPONSES BY TEST PARTICIPANTS
TO SPECIFIC QUESTIONS PERTAINING TO TROOP ACCEPTANCE

Question	Response and Distribution
1. Were the various packages in the M Packet easy or difficult to open? Meat packet Cake packet Accessory packet	<u>Easy to open</u> <u>Difficult to open</u> 92 5 90 7 94 3
2. Did you have any trouble eating the foods out of the individual packages?	Yes 20 No 78
3. Was your performance of duty limited in any way due to the use of M Packets?	Yes 29 No 69
4. What is the minimum number of packets that should be issued each day?	2 packets 11 3 packets 37 4 packets 17 5 packets 10 6 packets 9 No answer 14
5. How do you rate the overall suitability of the M Packet for use under arctic winter conditions?	Very suitable 44 Slightly suitable 41 Neither suitable nor unsuitable 4 Slightly unsuitable 7 Very unsuitable 2

2.4.2 Method

The soldiers in each of four squads (12 men per squad) of one participating platoon dispersed and carried the M Packets as shown in Table VII for a full day while participating in field exercises which included squad and platoon tactical training, running, crawling, creeping, snowshoeing, skiing, and riding in an M116 tracked vehicle at ambient air temperatures between -35°F. and -48°F.

TABLE VII

DESIGN FOR PORTABILITY PHASE

Squad	Number of Packets	How Carried
1	3	In clothing
2	6	In clothing
3	9	In clothing and rucksack
4	21	In clothing and rucksack

Packets were dispersed as complete packets by one-half of each squad, except that the packet consumed at the noon meal was carried next to the body as separate components. The other half of each squad carried all packets dispersed as separate components. In addition to determining the maximum number of packets that could be carried, the optimum number was also determined. Primary consideration was given to the capability of the soldier to disperse and carry the packets in such a manner as to insure that contents are suitable for consumption when needed and that the soldier is able to perform normal tactical maneuvers and tasks. All packets and components, other than the one packet consumed for the noon meal, were turned in to the test observer, counted, and examined for packaging failures and effects of freezing on components.

During the 7-day acceptability test at the feeding level of two packets per man per day referred to in paragraph 2.3, each soldier carried 14 packets in his clothing, rucksack, and the squad ahkio (snow sled). Twelve

packets were dispersed and carried as complete packets and two as separate components. Packets were carried and handled in the same manner as that used for similar items under arctic winter conditions. Primary consideration was given to the capability of the soldier to disperse and carry the number of packets for that feeding level and to carry them in such a manner as to insure that the contents of packets were suitable for consumption. All packets and components carried in the test were turned in to the test observer and examined for packaging failures and effects of freezing on components. Ambient air temperatures for this phase of the subtest are shown in Appendix I-D.

2.4.3 Results

Prior to the beginning of the portability phase, it was established through trial-and-error method that the maximum number of packets which could be dispersed in the soldier's clothing and rucksack were 6 and 15 packets, respectively, for a total of 21 packets. However, during the 1-day portability exercise when this was evaluated it was found that the added weight and bulk of 21 packets in the soldiers' clothing and rucksack greatly restricted his movements, restricted the circulation of blood in his arms, and reduced his overall efficiency to such an extent that it was considered unreasonable to expect him to carry this number of packets in his clothing and rucksack. From this evaluation, it was determined that the optimum number of packets which could be satisfactorily dispersed and carried in the soldier's clothing and rucksack were 4 and 6 packets, respectively, for a total of 10 packets. Therefore, if the soldier is to carry 21 packets, the only other means available to him for carrying the other 11 packets is the squad ahkio (snow sled). Attempts were made to carry the balance of the packets for a squad (approx. 6 cases) in the squad ahkio in addition to the normal load of items (tentage, stove, fuel, water, etc.) presently carried which are essential to survival in the field under arctic winter conditions (Fig. 5 and 6). This proved to be futile as the added weight made the ahkio difficult to pull, and the added volume resulted in an unbalanced load which caused it to turn over easily. It was established that a maximum of three cases and an optimum of two cases of M Packets could be satisfactorily carried in the squad ahkio in addition to the normal load. Overall, it was determined that the number of packets the individual soldier can satisfactorily carry are as follows: in his clothing - 4; in the rucksack - 6; and in the squad ahkio - 4; for a total of 14 packets. During

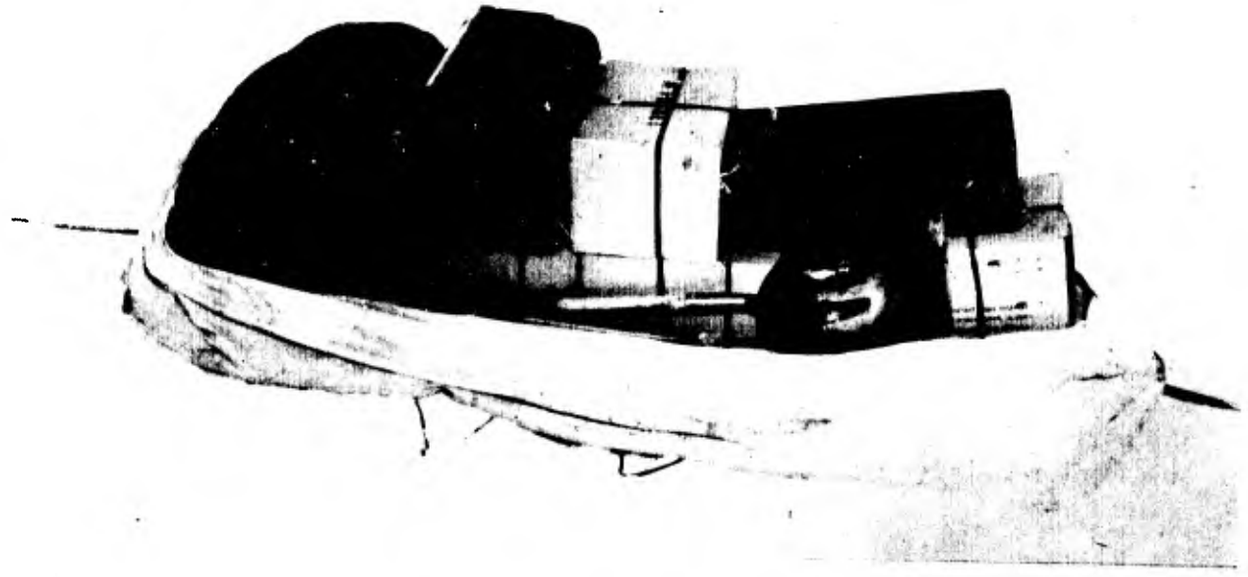

Figure 5. Squad ahkio with 10-man tent, tentpole, ax, shovel, Yukon stove, 5 gallons diesel fuel, 5 gallons water, and 6 cases of M Packets.

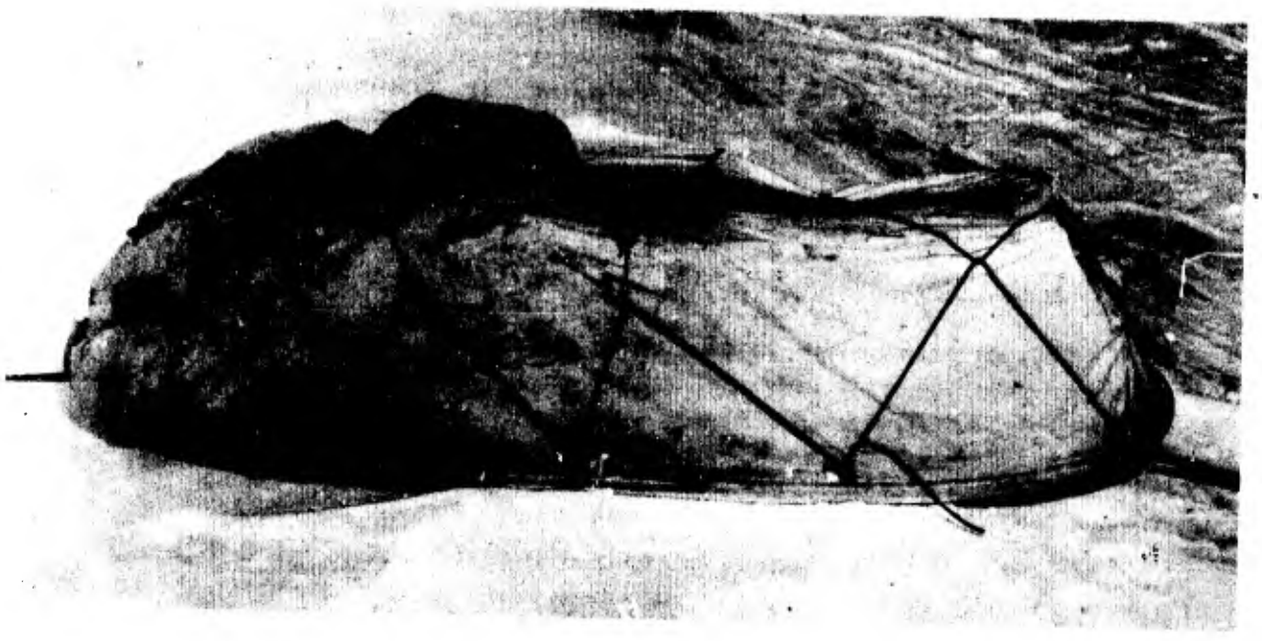

Figure 6. Identical ahkio lashed for towing.

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the two packets per day feeding phase, no difficulty was encountered in dispersing and carrying 14 packets in the soldier's clothing, rucksack, and squad ahkio. Packets were easily dispersed either as complete packets or as separate components.

Examination of the packets and components revealed that the food items were frozen in all instances except when the items were carried between the body and the inner layers of clothing. No adverse effects on the components were observed as a result of freezing. There was only one packet failure (seal failure) during this phase. While eating a packet, one soldier found a small piece of black rubber in a chocolate bar with almonds.

2.4.4 Analysis

The M Packet, in quantities not to exceed 14 packets per individual, is suitable for dispersing and carrying in the soldier's clothing, rucksack, and the squad ahkio while performing field exercises under arctic winter conditions. The packets can be carried in such a manner that the contents will be suitable for consumption when needed. An individual or unit cannot carry 21 packets using only manpower without serious reduction in combat capability and effectiveness.

2.5 DURABILITY

2.5.1 Objective

To determine the durability of the packaging of M Packets when carried in the soldier's clothing and/or rucksack while performing field exercises under arctic winter conditions.

2.5.2 Method

Soldiers of an infantry platoon dispersed and carried three M Packets in their clothing and/or rucksack while participating in the following type training:

a. Squad and platoon tactical exercises for 4 hours.

b. Cross-country marches on snowshoes and skis for 2 hours.

c. Clearing of snowshoe and ski trails with machetes for 2 hours.

This exercise was repeated on three separate days. New packets were issued and evaluated each day. One-half the soldiers carried the packets as separate components and the other half carried the packets as complete packets dispersed in their clothing and/or rucksack. An equal number of each of the six menus was evaluated as complete packets and as separate components during each of the three days. Prior to the beginning of the subtest, each packet and its components used in this phase of the test were inspected and marked for identification. After each day, each packet and its components were examined by the test observer and all damages by type, location, and condition of the components were recorded.

2.5.3 Results

Seven individual components were damaged out of a total of 300 packets carried during this phase. A detailed breakdown of the results is shown in Appendix I-H.

2.5.4 Analysis

The data (App. I-H) show that factors such as location where packets were dispersed and carried, conditions of components (i.e. frozen or unfrozen), ambient air temperature, and carrying of complete or separate components had no noticeable effect on the damage rate for individual items. Overall results show little damage of any practical significance to the test item. Based on the above, the durability of the M Packet when carried in the soldier's clothing and equipment during field exercises under arctic winter conditions is considered excellent. The M Packet meets the durability requirements of the Military Characteristics.

2.6 AIR DELIVERY

2.6.1 Objectives

To determine:

a. The capability of the M Packet to withstand freedrop and low- and high-velocity airdrops under arctic winter conditions.

b. The suitability of the M Packet for airdrop in the clothing and equipment of a parachutist under arctic winter conditions.

2.6.2 Method

Four cases of frozen M Packets (96 packets) were rigged in honeycomb (Fig. 7) for freedrop and dropped from an altitude of 100 feet by a CV-2B (Caribou) aircraft at an airspeed of 75 knots; the ambient air temperature was -12°F. In addition, two cases of frozen packets were free dropped individually by the same aircraft under the same conditions; and two cases of unfrozen packets were free dropped individually from a U-1A (Otter) aircraft under similar conditions when the ambient air temperature was -10°F.

Eight cases of frozen M Packets (192 packets) were rigged in an A-21 Container (Fig. 8) for a low-velocity drop and dropped from a CV-2B (Caribou) aircraft at an airspeed of 75 knots from an altitude of 1,500 feet utilizing an exit ramp and a G-13 cargo parachute; ambient air temperature was -12°F.

Eight cases of frozen M Packets (192 packets) were rigged in an A-7A Container (Fig. 9), for a high-velocity airdrop and dropped from a U-1A (Otter) aircraft at an airspeed of 75 knots from an altitude of 400 feet utilizing a 12-foot low-cost parachute with a breakaway static line; ambient air temperature was -10°F.

The M Packet was dispersed in the clothing and rucksack of each of three parachutists. This exercise was performed twice; once from an altitude of 1,250 feet at an ambient air temperature of -12°F. with each parachutist carrying six packets, and once from an altitude of 1,500 feet at an ambient air temperature of -10°F. with each carrying nine packets.

2.6.3 Results

There was no packet or case damage during either the low- or high-velocity drop in which 32 of each of the six menus were dropped. In the freedrop phase, when the four cases were rigged in honeycomb, the only damage incurred was the bursting of two packets out of a total of 96 packets dropped. On the other hand, damages to cases and packets were incurred in the four cases which were free dropped individually without honeycomb. There was no difference in the performance of the cases and packets when free dropped in a frozen and unfrozen condition. Overall, two of these four cases burst upon impact and there were damages to a total of 48 or 25 percent of the individual meat component packages.

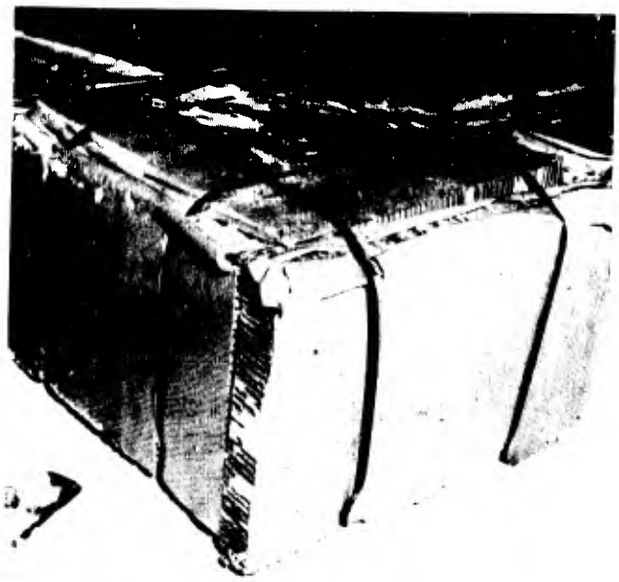

Figure 7. Four cases of M Packets rigged in honeycomb for freedrop.

Figure 8. Eight cases of M Packets rigged in A-21 container for low-velocity airdrop.

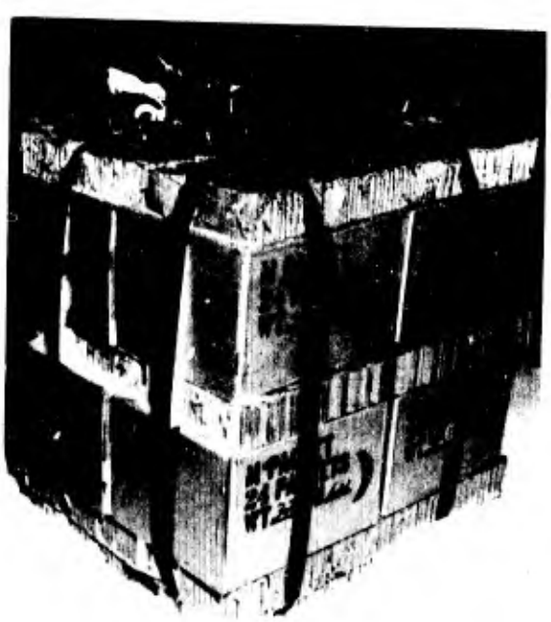

Figure 9. Eight cases of M Packets rigged in A-7A container for high-velocity airdrop.

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There were no packet damages nor were any problems encountered during the two exercises participated in by the parachutists. Distribution of responses to specific questions regarding the use of the M Packets by parachutists are shown in Table VIII.

TABLE VIII

DISTRIBUTION OF RESPONSES TO SUITABILITY
M PACKET FOR USE BY PARACHUTISTS

Question	Response	Distribution
How adequate was the space in your clothing and equipment for dispersing and carrying M Packets?	More than adequate Adequate Not adequate	5 1 0
Did carrying M Packets restrict your movements?	Yes, a great deal Yes, some No, did not restrict movements	0 0 6
Did carrying packets in your clothing and equipment result in any safety hazards?	Yes No	0 6
Rate the suitability of the M Packet for carrying by parachutists under arctic winter conditions.	Very suitable Slightly suitable Neither suitable nor unsuitable Slightly unsuitable Very unsuitable	4 2 0 0 0

2.6.4 Analysis

Based on the results of this test, the M Packet is suitable for air delivery using standard method and techniques; however, in the free-drop without honeycomb method, a high rate of packet failures can be expected. Further, the M Packet is suitable for airdrop in the clothing and equipment of parachutists.

2.7 COMMAND ACCEPTANCE

2.7.1 Objective

To obtain the overall command acceptance of the M Packet when used under arctic winter conditions.

2.7.2 Method

Test Officers, NCOs, observers, and platoon and squad leaders participating in the test evaluated the utility and overall suitability of the M Packet from a command viewpoint. This was accomplished upon the completion of the first phase of the acceptability test (feeding level of three packets per man per day) and at the end of the test since there was a change in the participating units. Evaluation included effects on tactical capability, troop morale, and overall ability to accomplish the assigned mission.

2.7.3 Results

Shown in Table IX is a combined summary of responses to specific questions pertaining to command acceptance of the M Packet.

2.7.4 Analysis

Responses to questions number 1, 3, and 4 (Table IX) show that the majority of the command personnel felt that the use of the M Packet did not have any adverse effects on the ability of the unit to accomplish its mission, neither did it have any adverse effect on the mobility of the unit or of the individual soldier, nor did it present any major logistical problems. Adverse comments received from command personnel in response to questions number 1 and 3 pertained to some soldiers appearing

TABLE IX

SUMMARY OF RESPONSES TO COMMAND ACCEPTANCE QUESTIONNAIRE

Question	Response	Distribution*
1. Did use have any effects on your ability to accomplish your mission?	Yes No	8 20
2. Did use have any adverse effects on troop morale and general efficiency?	Yes No	12 16
3. Did use have any adverse effects on mobility of the unit or of the individual?	Yes No	8 20
4. Did use present any logistical problem?	Yes No	3 25
5. What do you think is the smallest number of packets the soldier should be issued each day as his only source of food?	1 per day 2 per day 3 per day 4 per day 5 per day 6 per day	1 6 12 5 2 2
6. Considering all factors, rate the overall suitability of the M Packet for use under arctic winter conditions.	Very suitable Moderately suitable Moderately unsuitable Very unsuitable	7 15 6 0

*Includes responses by seven test team personnel who completed the questionnaire in both instances.

to be weak after consuming the M Packet for 3 to 4 days in the field thereby decreasing the mobility and effectiveness of the individual and unit. The test officer estimated that up to 15 percent of the soldiers became weak. This was attributed to the restricted intake of food, physical exertion of the individual soldier, and the added weight in carrying a 7-day supply of packets, or a combination of all these factors. Adverse comments to question number 4 pertained to problems involved in carrying a 7-day supply of packets and the increased requirement for water for drinking purposes. Responses to question number 2 show that a majority of the command personnel felt that the use of the M Packets did not have any adverse effects on troop morale and efficiency; however, approximately 43 percent of the respondents felt that it did. Adverse comments of command personnel pertained to complaints of troops being hungry and weak and having stomach pains after 3 days, lack of a variety of meat components, a specific meat component being used in more than one menu, and no hot food for 7 continuous days under arctic winter conditions. Similar comments were received during both feeding levels of the acceptability phase. As to the minimum number of packets the soldier should be issued in the arctic (question number 5), 43 percent of the respondents indicated a minimum issue factor of three packets per day and 75 percent of the responses showed a minimum daily issue factor of three or more packets.

Other adverse comments, of a general nature, pertained to the lack of toilet paper, too many pineapple candy (charms) and cereal bars, too greasy and/or salty pork sausage, lack of bread or crackers, and an increase in water intake. In spite of criticisms however, 80 percent of the command personnel felt that the M Packet was suitable for use under arctic winter conditions.

2.8 SECURITY

2.8.1 Objective

To determine if the M Packet meets essential security and camouflage requirements under arctic winter conditions.

2.8.2 Method

Cases and packets were examined initially and observations made throughout the test to determine conformance to essential security and

camouflage requirements. This included ascertaining that the service identification and manufacturer's codes are placed on the shipping case only; components of food packets are identified by symbols only; nothing that would identify the nation of origin is placed on the contents or packets; and that packaging is of dull, nonreflecting, easily disposable material, and is otherwise compatible with established camouflage requirements.

2.8.3 Results

Although the cases were brown, they were easily camouflaged by storing them under the low-hanging limbs of pine trees and in areas where there were bushes and stunted birch trees.

The service identification and manufacturer's codes were placed on the shipping case only. The components of the food packets were identified only by symbol, and nothing that would identify the nation of origin was placed on the components or packets.

All packaging was dull, nonreflecting, and easily disposable material but the camouflage was missing from the inside of the unit protective folders of one pork sausage component and two ground beef with sauce components.

2.8.4 Analysis

The M Packet meets essential security and camouflage requirements under arctic winter conditions.

2.9 HUMAN FACTORS EVALUATION

2.9.1 Objective

To determine if the M Packet is designed in conformance with human use factors.

2.9.2 Method

During the conduct of all subtests, general observations were made to determine whether features or characteristics of the M Packet menus were incompatible with human use factors.

2.9.3 Results

There were minor complaints by some soldiers that some discomfort was experienced because the corners of the unit protective folders of the meat components rubbed their legs when packets were carried in their trouser pocket. Also, there were some comments regarding the difficulty in opening the polyethylene cover of the packet under arctic winter conditions. However, data obtained during the test and observations by the test team show that the overall features and characteristics of the M Packet menus provided man-materiel compatibility.

2.9.4 Analysis

The M Packet contains no features or characteristics which cause man-materiel incompatibility in arctic winter operations.

2.10 VALUE ANALYSIS

2.10.1 Objective

To determine whether there are features in the design, materiels, or general configuration of the M Packet which were not essential to its proper performance under arctic winter conditions.

2.10.2 Method

During the conduct of all subtests, observations were made to determine whether the M Packet menus incorporated any features which could be eliminated without compromising their acceptability, utility, and general performance.

2.10.3 Results

Observation and use revealed no features which can be eliminated without compromising acceptability, utility, or general performance.

2.10.4 Analysis

There are no unnecessary features included in the M Packet.

2.11 SAFETY

2.11.1 Objective

To evaluate the safety characteristics of the M Packet.

2.11.2 Method

The safety of the M Packet was determined by initial evaluation of its design and construction characteristics, and through inspection and observations made during the conduct of various subtests.

2.11.3 Results

The design and the construction of the M Packet were highly satisfactory and provided no safety hazards to the user from the standpoint of safe handling of the item by the soldier in the field. However, one important point of consideration related to safety of the packet is the results of inspections performed on packets during the preoperational inspection phase (Par. 2.2). These inspections revealed damage which apparently resulted during assembly of the M Packets. Improper processing can obviously have a direct bearing on the integrity of the package with the resultant risk of food spoilage during subsequent handling, shipment, and storage.

2.11.4 Analysis

In previous tests of flexibly packaged foods conducted by the U.S. Army General Equipment Test Activity (Ref. 1, App. IV), results have shown no major problem in maintaining package integrity either prior to or during the tests. Packets received have been well constructed and have proven to be highly durable when exposed to severe treatment in testing. Experience with some faulty packages during this test, however, suggests the possibility of a safety hazard to the user if processing techniques and quality control measures at the point of assembly should be inadequate.

SECTION 3. APPENDICES

APPENDIX I - TEST DATA

- A Ambient Air Temperature Data.
- B Summary of Individual Food Packet Failures and Defects Obtained During all Test Phases.
- C Field Exercise - Three packets per day.
- D Field Exercise - Two packets per day.
- E Arctic Full Field Load.
- F Consumption Percentages for Major Food Components.
- G Summary of Comments of Test Participants Pertaining to Menus.
- H Detail Breakdown of Packet Durability Test.

APPENDIX II - FINDINGS

APPENDIX III - DEFICIENCIES AND SHORTCOMINGS

APPENDIX IV - REFERENCES

APPENDIX 1. TEST DATA

APPENDIX I-A

AMBIENT AIR TEMPERATURE DATA

Date	November		December		January		February	
	High	Low	High	Low	High	Low	High	Low
1	-4	-24	-5	-15	-34	-55	15	-3
2	-2	-31	-2	-20	-45	-55	10	-3
3	-7	-33	-15	-27	-36	-44	15	-1
4	-6	-30	-4	-25	-24	-49	-4	-23
5	-1	-28	5	-20	-21	-50	6	-23
6	5	-17	-15	-20	-21	-46	13	-16
7	5	-16	1	-21	-21	-33	8	-12
8	4	-16	14	-27	-33	-37	4	-16
9	9	-16	25	10	-14	-36	30	-15
10	5	-12	32	8	-12	-21		
11	18	-13	36	15	-12	-42		
12	22	-4	40	16	-42	-46		
13	33	9	23	9	-40	-44		
14	43	24	25	19	-38	-43		
15	31	15	17	-14	-33	-38		
16	26	4	-6	-43	-22	-33		
17	15	-2	-43	-48	-33	-42		
18	11	-12	-1	-47	-8	-40		
19	3	12	0	-12	-1	-8		
20	19	3	1	-25	1	-1		
21	14	4	-26	-38	-1	-29		
22	3	-30	-36	-50	4	-3		
23	6	-35	-46	-50	7	-4		
24	10	6	-44	-47	3	-20		
25	12	8	-19	-46	2	-21		
26	34	-7	5	-17	1	-14		
27	18	-3	28	7	2	-19		
28	3	-5	23	12	-12	-25		
29	36	4	12	-27	-19	-32		
30	-5	-12	1	-33	-3	-34		
31			-7	-30	12	2		

Note: All temperatures are expressed in degrees Fahrenheit.

APPENDIX I-B

SUMMARY OF INDIVIDUAL FOOD PACKET FAILURES AND DEFECTS OBSERVED DURING ALL TEST PHASES

Type of Failure or Defect	No. Individual Packets
Defective seal (crimped, etc.) (No leakage)	18
Seal failure (Leakage)	44
Puncture or tear (No leakage)	3
Puncture or tear (Leakage)	66
Gas (sweller)	5
Moldy	6
Abrasion	5
Camouflage missing from unit protective folder	3
Foreign material (rubber) in chocolate bar	1
Total	151

APPENDIX I-C

FIELD EXERCISES CONDUCTED DURING 7-DAY ACCEPTABILITY TEST AT FEEDING LEVEL OF THREE PACKETS PER MAN PER DAY

1st Day — 1 Dec 65 — Temperature -15° to -5°F.

3.5-mile road march carrying arctic full field load (Appendix I-D) in rucksack and pulling squad ahkios. 4-mile cross-country snowshoe march with all equipment listed above to bivouac area.

Prepared bivouac area, including clearing brush, erecting 10-man tents, and cutting pine and spruce boughs to cover the floor of all tents.

2nd Day — 2 Dec 65 — Temperature -20° to -2°F.

Improved bivouac area by camouflaging all equipment, erecting latrine tent, and adding pine and spruce boughs to the floor of all tents.

3rd Day — 3 Dec 65 — Temperature -24° to -16°F.

3-mile cross-country snowshoe march carring arctic full field load in rucksack.

4th Day — 4 Dec 65 — Temperature -26° to -9°F.

Broke camp and departed bivouac area. 3-mile road march carrying arctic full field load in rucksack and pulling squad ahkios with 10-man tent, tent pole, ax, Yukon stove, 5 gallons of diesel fuel, and 5 gallons of water in each ahkio. Prepared new bivouac area.

5th Day — 5 Dec 65 — Temperature -20° to -15°F.

4-mile cross-country snowshoe march without rucksacks.

6th Day — 6 Dec 65 — Temperature -22° to -5°F.

Broke camp and departed bivouac area. 5-mile road march carrying arctic full field load in rucksack and pulling squad ahkios with the same equipment in each ahkio that was in it during the road march on the 4th day. Prepared new bivouac area.

7th Day — 7 Dec 65 — Temperature -23° to 0°F.

3-mile cross-country snowshoe march carrying arctic full field load in rucksack. Broke camp and returned to post by truck.

APPENDIX I-D

FIELD EXERCISES CONDUCTED DURING 7-DAY ACCEPTABILITY TEST AT FEEDING LEVEL OF TWO PACKETS PER MAN PER DAY

1st Day — 22 Jan 66 — Temperature -13° to 1°F.

6-mile road march carrying arctic full field load in rucksack and pulling squad ahkios with 10-man tent, tent pole, ax, shovel, and Yukon stove in each ahkio, plus 14 M Packets per man in the rucksack, clothing, and/or squad ahkio in accordance with the portability subtest. Prepared bivouac area including clearing brush, erecting 10-man tents, and cutting pine and spruce boughs to cover the floor of the tent.

2nd Day — 23 Jan 66 — Temperature -18° to -2°F.

2 hours of squad tactical exercises; 2 hours of platoon tactical exercises; 3-mile cross-country snowshoe march. Remainder of day was spent in cleaning weapons and attending religious services in the field.

3rd Day — 24 Jan 66 — Temperature -23° to -11°F.

14-mile cross-country snowshoe march carring arctic full field load in the rucksack.

4th Day — 25 Jan 66 — Temperature -28° to -10°F.

Broke camp and departed bivouac area. 6-mile road march carrying arctic full field load in rucksack and pulling squad ahkios with the same equipment as the first day. Prepared new bivouac area.

5th Day — 26 Jan 66 — Temperature -27° to -8°F.

5-mile cross-country snowshoe march carrying arctic full field load in the rucksack.

6th Day — 27 Jan 66 — Temperature -20° to -14°F.

Broke camp and departed bivouac area. 7-mile road march carrying arctic full field load in rucksack and pulling squad ahkios with the same equipment as the first day. Prepared new bivouac area.

7th Day — 28 Jan 66 — Temperature -44° to -25°F.

5-mile cross-country snowshoe march carrying arctic full field load in the rucksack. Broke camp and returned to post via a 3-mile cross-country snowshoe march without rucksacks or squad ahkios. Arctic full field load and squad ahkios were returned by truck.

APPENDIX I-E

ARCTIC FULL FIELD LOAD
(Approximate weight: 45-50 pounds)

Arctic sleeping bag (two mountain sleeping bags) w/cover and waterproof bag	1 each
Inflatable sleeping pad (air mattress)	1 each
Poncho	1 each
Cushion sole socks	2 pair
Winter underwear	1 set
Mess kit w/knife, fork, and spoon	1 each
Toilet kit (razor blades, shaving cream, tooth brush, toothpaste, comb, washcloth, towel, and soap)	1 each
Handkerchief	2 each
Foot powder	1 each
Steel helmet w/liner (w/o sweatband)	1 each
Chap stick	1 each
Wool OG shirt	1 each
Field trousers	1 each
Arctic canteen w/cup and cover	1 each
First aid pouch w/packet	1 each
Mountain brush (for brushing snow from clothing)	1 each
Entrenching tool	1 each
Machete w/sheath or bayonet w/scabbard	1 each
Emergency thong (40-inch rawhide cord)	1 each
Arctic mitten set or trigger finger mittens (depending on which is being worn)	1 each
Waterproof match case w/matches	1 each
Overwhites	1 set
Wool muffler	1 each

Note: The pistol belt is not worn.
Ammunition magazines are carried in the pockets of outer garments; in addition each individual carried an M14 rifle.

APPENDIX I-F

CONSUMPTION PERCENTAGE FOR MAJOR FOOD COMPONENTS BY FEEDING LEVEL AND COMBINED ACROSS FEEDING LEVELS

Food	2 Packets Per Day	3 Packets Per Day	Combined Across Feeding Levels
Frankfurter	92	85	88
Pork sausage	85	73	78
Beefsteak	94	87	88
Chicken loaf	88	88	88
Beef stew	81	86	84
Ground beef w/ sauce	91	90	90
Beef slices w/ barbecue sauce	95	86	89
Starch jelly bar	93	95	94
Cereal bar	60	73	69
Fruitcake	95	93	94
Date pudding	89	90	89
Choc. bar w/almond	98	93	95
Choc. fudge bar	97	96	96

APPENDIX I-G

SUMMARY OF COMMENTS OF PARTICIPANTS PERTAINING TO ALL MENUS OBTAINED DURING THE ACCEPTABILITY PHASE

Comment	No. Comments	Percent
Not enough food	35	2.59
Frankfurters - bad	10	.74
Sausage - not good	11	.81
Need salt	11	.81
Need bread	87	6.43
Greasy food	70	5.18
Chicken Loaf bad	18	1.33
Too much sauce	21	1.55
Would be better heated	19	1.40
Coffee	67	4.96
Too much candy	9	.67
Date pudding dry	5	.37
Food salty	32	2.37
Not enough accessories	12	.89
Not enough variety	7	.52
Causes thirst	370	27.37
Cold coffee unacceptable	77	5.69
Did not drink coffee	491	36.32
TOTALS	1352	100.0

APPENDIX I-H

DETAILED BREAKDOWN OF PACKET DURABILITY TEST

Menu No.	No. of Each Menu Carried	Location where Carried	Condition of Components	No. and Type Damage	Item Damaged	Ambient Air Temp. at which Packet was Carried
		COMPLETE PACKETS				
1,2,3	81	Between clothing & body Shirt pockets Trouser pockets Field jacket pockets Parka pockets Rucksack	Frozen and Unfrozen	1 - puncture or tear (slight) 1 - seal failure (slight)	Ground beef w/ sauce Beefsteak	0° to 36°F. -6° to -14°F.
4,5,6	84	Between clothing & body Trouser pockets Field jacket pockets Parka pockets Rucksack	Frozen and Unfrozen	1 - seal failure (slight)	Beef stew	0° to -36°F.
		SEPARATE COMPONENTS				
1,2,3	63	Between clothing & body Shirt pockets Trouser pockets Parka pockets Field jacket pockets Rucksack	Frozen Unfrozen	1 - seal failure (slight) 1 - seal failure (moderate)	Ground beef w/ sauce Beef slices w/ barbecue sauce	-36° to -46°F. -36° to -46°F.
4,5,6	72	Shirt pockets Trouser pockets Field jacket pockets Parka pockets Rucksack	Frozen	1 - seal failure (slight) 1 - puncture or tear (slight)	Ground beef w/ sauce Pork sausage	-36° to -46°F. -6° to -36°F.

NOTE: Packets and components carried other than between clothing and body were frozen. In addition, a total of 615 packets were carried during the acceptability phase with only one packet reported as being damaged.

APPENDIX II. FINDINGS

MILITARY CHARACTERISTICS	FINDINGS
1. "(Essential) Three food packets per day shall provide the maximum and one food packet per day shall provide the minimum caloric and other nutritional values consistent with the other operational characteristics.	Requirement partially met with regard to three packets in that test participants did not suffer any noticeable ill effects due to consumption of the M Packets during a 7-day period. This is not to be construed as meaning that three packets per day will provide the maximum caloric and other nutritional values consistent with other operational characteristics under arctic winter conditions as these aspects were not tested. No attempt was made with regard to one packet per day because medical authorities state a requirement for a higher caloric intake for bare survival in the arctic (Par. 2.3).
2. "(Essential) The design and weight of the food packet shall enable the individual to carry on his person sufficient packets to meet minimal nutritional requirements for a period (normally) not to exceed seven days.	Requirement met based on the assumption that two food packets per day will provide the minimal nutritional requirements for a period of 7 days and that the individual will be able to carry a portion of the food packets in the squad ahkio (Par. 2.4).
3. "(Essential) Shall not induce detrimental physiological effects that cannot be counteracted by a short period of recuperation without evacuation from assigned unit.	Not tested. See reference 2, Appendix IV.
4. "(Essential) Shall not cause unacceptable loss of efficiency; shall not interfere with satisfactory performance of the missions cited in the Operational Concept.	Requirement met (Par. 2.4 and 2.7).

APPENDIX II

MILITARY CHARACTERISTICS	FINDINGS
5. "(Essential) Shall be sufficiently palatable to assure consumption.	Requirement met (Par. 2.3).
6. "(Essential) Shall not contain unduly thirst provoking components.	Requirement met (Par. 2.3).
7. "Design Assumptions: That an average supply of water of at least two quarts per man per day is available throughout the period of use, and that a possible occurrence of a restriction in water supply of one pint per man for one day and one quart per man for two days may exist.	Requirement met in that an unlimited supply of water was available.
8. "(Essential) Shall have flexible packaging; the food packet size shall be the smallest possible, commensurate with other requirements.	Requirement met.
9. "(Essential) Shall be suitable for carrying by the individual in combat pack or similar device; components shall be suitable for carrying by the individual in pockets.	Requirement met (Par. 2.4).
10. "(Essential) Shall have maximum variety of components consistent with considerations of size, weight, nutritional requirements and highest acceptability.	Requirement met (Par. 2.3 and App. I-H). However, command personnel felt that a specific meat component should not appear in more than one menu in order to provide greater variety (Par. 2.7).

APPENDIX II

MILITARY CHARACTERISTICS	FINDINGS
11. "(Essential) Shall contain a stimulating coffee-type beverage base suitable for consumption hot or cold.	Requirement partially met as cold coffee was generally rejected. Also the cream substitute for the coffee would not dissolve in cold water (Par. 2.3 and App. I-G).
12. "(Essential) All components (other than coffee-type) shall be suitable for consumption in their original state.	Requirement met (Par. 2.3).
13. "(Essential) Components shall be suitable for consumption under all climatic conditions; under extreme cold, components shall be suitable for consumption if the individual carries them close to his body prior to consumption.	Requirement met with regard to extreme cold (Par. 2.3).
14. "(Essential) All packaging shall be of dull, non-reflecting, easily disposable material.	Requirement met (Par. 2.8).
15. "(Essential) Components shall be non-perishable in nature.	Requirement met.
16. "(Essential) Gross weight per packet shall not exceed one pound two ounces.	Requirement met.
17. "(Essential) Shall require no preparation except to add cold water to beverage components.	Requirement met.

APPENDIX II

MILITARY CHARACTERISTICS	FINDINGS
18. "(Essential) Shall be sufficiently durable and waterproof for carrying on the person for a period of one day under stringent combat and extreme environmental conditions without detrimental effect upon the food components packed therein.	Requirement met (Par. 2.5).
19. "(Essential) Configuration of the food packet shall be flat so that it can easily be carried on the person.	Requirement met (Par. 2.4).
20. "(Essential) Shall provide CBR protection to the food components for a period of one day.	Not tested. See reference 2, Appendix IV.
21. "(Essential) Shall be suitable for transport by all available means including delivery by air.	Requirement met. Item may be free dropped if a high damaged rate can be tolerated (Par. 2.6).
22. "(Essential) Shall permit storage without refrigeration for a minimum of two years without spoilage or significant decrease in nutritional value or palatability. Date of pack shall be placed on the case.	Storage requirement not tested. See reference 2, Appendix IV. Date of pack markings on case was met.
23. "(Essential) Shall be capable of withstanding military handling during transportation and storage prior to use.	Requirement met (Par. 2.2).

MILITARY CHARACTERISTICS	FINDINGS
24. "(Essential) Shall provide water, insect and rodent resistance.	Not tested. See reference 2, Appendix IV.
25. "(Essential) Food packets shall be compatible with established camouflage requirements.	Requirement met (Par. 2.8).
26. "(Essential) Service identification and manufacturer's codes shall be placed on the shipping cases only.	Requirement met (Par. 2.8).
27. "(Essential) Components of food packets shall be identified only by picture, color, number, or similar means. Nothing that would identify the nation of origin shall be placed on the contents of packets. Instructions for identification of food packet components, if required, shall be available in each shipping case, but not within or on the encased items.	Requirement met (Par. 2.8).

APPENDIX III. DEFICIENCIES AND SHORTCOMINGS

1. DEFICIENCIES

	Deficiency	Suggested Corrective Action	Remarks
1.1	Experience during test suggests a possible safety hazard to the user due to faulty processing of the M Packets at the point of manufacture or assembly.	Improvements or refinements in processing techniques and quality control which are necessary to assure that M Packets for delivery to user are as free from materiel and processing defects as present knowledge and the current state-of-the-art will permit.	None

2. SHORTCOMINGS

	Shortcoming	Suggested Corrective Action	Remarks
2.1	The coffee cream substitute formed lumps which would not dissolve in cold water (Par. 2.3).	Corrective action cannot be determined.	None
2.2	The levels of the average ratings for pork sausage and cereal bars indicate that the acceptability of these items is questionable (Par. 2.3).	Improve the palatability of these items or replace them with more acceptable components.	None
2.3	A high packet failure rate was obtained when using the freedrop, without honeycomb, air delivery method (Par. 2.6).	Corrective action cannot be determined.	None

APPENDIX III

3. CORRECTED DEFICIENCIES AND SHORTCOMINGS

	Deficiency/Shortcoming	Corrective Action	Remarks
3.1	None	None	None

APPENDIX IV. REFERENCES

1. Burt, Thomas B., Engineer Design Test of M Packet (Food Packet, Individual, Combat), Report of USATECOM Project No. 8-4-7405-01K, USA General Equipment Test Activity, Fort Lee, Virginia, February 1965.

2. Burt, Thomas B., Integrated Engineering/Service Test of M Packet (Food Packet, Individual, Combat) Intermediate Conditions, Report of USATECOM Project No. 8-4-7405-04/05/06, USA General Equipment Test Activity, Fort Lee, Virginia, April 1966.

3. Plan of Test of "M" Packet (Food Packet, Individual, Combat), Integrated Engineering/Service Test, Arctic, USATECOM Project No. 8-4-7405-02/03, USA General Equipment Test Activity, Fort Lee, Virginia, October 1965.

4. Letter, STEGE-ET, USAGETA, 7 December 1965, subject: "Change to Plan of Test of M Packet (Food Packet, Individual, Combat) Integrated Engineering/ Service Test, Arctic, USATECOM Project No. 8-4-7405-02/03, DA Project 1M643303D54817."

5. Letter, AMSTE-BC, Headquarters, USATECOM, 5 May 1965, subject: "Test Directive, Integrated Engineering Service Test and Integrated ET/ST, Arctic, USATECOM Project No. 8-4-7405, DA Project 1M643303D54817."

6. Letter, AMSTE-BC, Headquarters, USATECOM, 19 May 1965, subject: "Test Directive Amendment."

7. Revised Military Characteristics for Food Packet, Individual, Combat.

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III. TECOM Project No. 8-4-7504-02/03
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Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*
Department of the Army
U.S. Army General Equipment Test Activity
Fort Lee, Virginia 23801

2a. REPORT SECURITY CLASSIFICATION
Unclassified

2b GROUP

3. REPORT TITLE
Integrated Engineering/Service Test, Arctic, of M Packet (Food Packet, Individual, Combat)

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*
Final Report

5. AUTHOR(S) *(Last name, first name, initial)*
Paschall, Hunter H. and May, Paul H., 1st Lt., TC, USAATC

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1966	53	7

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. USATECOM 8-4-7405-02/03	
c.	9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*
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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
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DD FORM 1 JAN 64 1473

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