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

FINAL REPORT

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APRIL 1966

U S ARMY
GENERAL EQUIPMENT TEST ACTIVITY
FORT LEE, VIRGINIA

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TEST REPORT

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GENERAL EQUIPMENT TEST ACTIVITY
FORT LEE, VIRGINIA

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

USATECOM 8-4-7405-04/05/06

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

Conducted at Fort Lee, Virginia; Morganton, North Carolina;
Fort Stewart, Georgia; and Vieques Island, Puerto Rico

April 1966

Abstract

An Integrated Engineering/Service Test (Intermediate Conditions) 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 intermediate environmental conditions.

The test was conducted by U. S. Army General Equipment Test Activity; U. S. Army Infantry Board; and U. S. Army Airborne, Electronics and Special Warfare Board. The General Equipment Test Activity as executive agency was responsible for the preparation of the test plan, overall conduct of test, and preparation of final report of test with inputs from USAIB and USAAESWBD. The test was conducted during the period August 1965 to February 1966.

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 due to faulty processing of M Packets at the point of manufacture or assembly; and that, with the correction of this deficiency, the M Packet will be suitable for U. S. Army use under intermediate environmental 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 through the Office of The Surgeon General to clarify those Military Characteristics pertaining to nutritional adequacy and physiological effects, and if necessary, to further determine the extent to which the M Packet meets these characteristics.

FOREWORD

Executive responsibility for the test was assigned the U.S. Army General Equipment Test Activity (USAGETA), Fort Lee, Virginia, by paragraph 5 of the test directive (Ref. 7, App. IV). The U.S. Army Infantry Board (USAIB), at Fort Benning, Georgia, and the U.S. Army Airborne, Electronics and Special Warfare Board (USAAESWBD), Fort Bragg, North Carolina, were designated supporting activities. The USAAESWBD, in coordination with USAGETA, planned and conducted air delivery tests of the M Packet and provided the results to USAGETA for inclusion in the final report of the entire test. USAGETA and USAIB jointly planned and conducted the remainder of the test as reported herein.

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SECTION 1 - INTRODUCTION

1.1 BACKGROUND

An In-Process Review on the subject of Combat Feeding Systems was held at USAMC Headquarters on 21 October 1963. Among the agenda items, as a principal objective, was the determination of whether a suitable individual combat food packet could be made available within 1 or 2 years. It was concluded that the Food Packet, Individual, Combat would not be available prior to 1970. USACDC stated a requirement for a packet much sooner. On this basis, it was determined that the military characteristics for the Food Packet, Individual, Combat should be modified so that a substitute might be developed as an interim use item; hence, the M Packet.

The U. S. Army Natick Laboratories was assigned responsibility for developing the M Packet in accordance with decisions made during the In-Process Review and in accordance with the revised Military Characteristics. An Engineering Design Test of the M Packet was conducted by the U. S. Army General Equipment Test Activity during November and December of 1964 (Ref. 20, App. IV). This report covers detailed findings, conclusions, and recommendations of the Engineering/Service Test of the packet conducted during the period August 1965 to February 1966.

1.2 DESCRIPTION OF MATERIEL

The M Packet (Fig. 1) consists of six menus, each containing two flexibly packaged, thermally processed meat components; cereal or dessert or confection components; and coffee, cream (coffee whitener), and sugar. Each menu weighs approximately 18 ounces, has a volume of 46.5 cubic inches, and contains approximately 1200 calories. Components of each menu are shown in Appendix I-S. Identification symbols for M Packets and components are shown in Appendix I-T.

Each of the meat components is heat sealed in a plastic-foil-plastic laminated bag, or pouch, which is overpacked in a protective fiberboard folder. Accessory items (cereal bar, candy, coffee, cream, and sugar) are packed in a plastic-foil-plastic laminated bag but without a protective fiberboard overwrap. Two of the dessert components (fruitcake and date pudding) are packed in individual laminated bags and each is overwrapped in a small fiberboard carton. The components of each of the



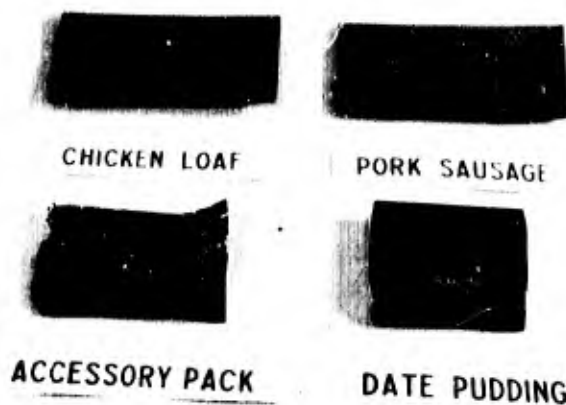
M Packet case w/sleeve.



Twenty-four packets as placed in case.



All menus showing identifying symbols.



MENU NO. 4

Single menu - 2 meats, accessory pack, and dessert.

Figure 1. M Packet identification.

US ARMY
GETA
FORT LEE, VA.

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NEGATIVE 40, 44, 45, 46

six menus are packed in a heat-sealed polyethylene bag. Twenty-four complete packets, four of each menu, are packed in each shipping container, which is made, sealed, and metal-strapped in accordance with Style RCS-SL V2s of PPP-B-636.

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 for the Food Packet, Individual, Combat (App. II), and to determine its suitability for U.S. Army use under intermediate environmental conditions.

1.4 SUMMARY OF RESULTS

a. The extent to which the M Packet met those Military Characteristics pertaining to nutritional adequacy and physiological effects was not fully determined (Par. 2.2.3).

b. The soldier can, if necessary, subsist on one M Packet per day for as much as 7 days, but his feelings regarding his sense of well being and efficiency are adversely affected (Par. 2.2.4).

c. The M Packet satisfactorily met the requirements of all other Military Characteristics (App. II) except as follows:

(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. 2.14).

(2) Shortcomings.

(a) The cereal bar in Menus No. 2 and No. 5 is unacceptable (Par. 2.4.4b and Table VII).

(b) The M Packet is only marginally suitable for freedrop air delivery (Par. 2.10.4.3 and 2.10.4.4).

1.5 CONCLUSIONS

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

b. The safety of the M Packet is limited by the deficiency cited in paragraph 1.4c(1) above.

c. The M Packet will be suitable for U.S. Army use under intermediate environmental conditions when the deficiency is corrected.

1.6 RECOMMENDATIONS

It is recommended that:

a. The M Packet be considered suitable for U.S. Army use 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 those Military Characteristics pertaining to nutritional adequacy and physiological effects, and if necessary, to further determine the extent to which the M Packet meets these characteristics.

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 TEST

2.1 INTRODUCTION

The Engineering/Service Test (Intermediate Conditions) of the M Packet was conducted in both simulated and normal field use environments and under climatic conditions as specified in change 1 of Army Regulation 705-15. Certain of the subtests were completed at Fort Lee, Virginia, utilizing facilities, equipment, and personnel of the U.S. Army General Equipment Test Activity during the period August 1965 through January 1966.

Other subtests were conducted utilizing as test participants troops of the John F. Kennedy Special Warfare Center, Fort Bragg, North Carolina, while undergoing unconventional warfare and counterinsurgency training in the Pisgah National Forest near Morganton, North Carolina, during September and December of 1965 and at Fort Stewart, Georgia, during October of 1965. An additional phase of field testing was completed utilizing three companies of U.S. Marine Corps troops while undergoing normal training involving over-the-beach operations at Vieques Island, Puerto Rico, during January 1966.

2.2 NUTRITIONAL REQUIREMENTS AND PHYSIOLOGICAL EFFECTS

2.2.1 Objectives

a. To determine if one M Packet per day will provide the minimum and if three M Packets per day will provide the maximum caloric and other nutritional values required.

b. To determine if consumption of the M Packet by the soldier for periods up to 7 days will induce detrimental physiological effects which cannot be counteracted by a short period of recuperation without evacuation from the assigned unit.

2.2.2 Method

a. Basic information pertaining to the nutritional and physiological aspects of consuming M Packet foods was obtained from the U.S. Army Natick Laboratories and, through that organization, from the Office of The Surgeon General.

b. Additional data relevant to this subtest were obtained during the field use phases conducted with Army Special Forces troops. These data consisted of relative weight loss among groups subsisting on one, two, and three packets per day; opinions of test participants and command personnel regarding the adequacy of the M Packet; and pertinent observations by members of the test team.

2.2.3 Results

a. Correspondence reflecting the views of the Natick Laboratories and the Office of The Surgeon General as to the nutritional adequacy and to the physiological effects of consuming the M Packet is shown as Appendix I-A. Paragraph 3 of Appendix I-A-4 indicates that on the basis of both past experience and previous studies, the M Packet will adequately meet nutritional requirements set forth in paragraphs 1a (1) through (4) of the revised Military Characteristics for the Food Packet, Individual, Combat (App. II). The extent to which this is true, however, would be limited by several factors among which is the operational efficiency of the total feeding system. It is suggested, for example, that the feeding system must provide for a well-nourished soldier immediately before and after his subsistence on a single M Packet each day (1200 calories) for up to 7 days.

b. Appendix 1-A-6 shows general approval by the Office of The Surgeon General of summary statements made by Natick Laboratories (App. 1-A-4) relating to nutritional requirements for the M Packet. Further significant comments of The Surgeon General's Office (1-A-6) are summarized as follows: (1) Well nourished, healthy young men performing physical activity could suffer significantly decreased performance if required to subsist on 1200 calories per day for much longer than one week, even though no illness or permanent damage will result; (2) In paragraph 1a (1) of the revised Military Characteristics (App. II) the word "optimum" should be substituted for the word "maximum", to allow for the consumption of more than three packets when this is indicated; and (3) In paragraph 2a, omit "- - - 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 2 days may exist."

c. With further regard to effects of M Packet consumption, Tables I and Ia show the frequency distribution and overall average weight losses of individuals who subsisted on one, two, and three packets per

day for 7 days during the Fort Stewart field phase of the test. The tactical situation prevented the collection of similar data during both of the field phases conducted in the Pisgah Forest near Morganton, North Carolina.

d. Table II shows responses to several pertinent questions administered to participants during the field phases at Morganton, Fort Stewart, and Vieques Island. These questions were of course not designed to provide measures of nutritional adequacy or physiological effects of consumption. They are, however, relevant in that they indicate the adequacy of the packet from the standpoint of the user, and they reflect, to some extent, an indication of his own sense of well being as a result of consuming the packet.

2.2.4 Analysis

a. While the weight change data in Table I are based on a small percentage of the total number of test participants, these findings when considered in light of responses to the questions in Table II, indicate that the present minimum requirement for one packet per man per day may be too low, if the soldier is not well nourished at the beginning of the 7-day feeding period.

b. Distributions of responses to the questions regarding adequacy of the quantity of food provided and the effects on efficiency of consuming only one packet per day are in agreement with results of the statistical analysis of average weight losses. Further examination of Table II shows that 61 to 65 percent of the individuals in those groups which actually lived on one packet per day felt they could not do so for 7 days and continue to operate efficiently. Further, approximately 76 percent of these individuals stated that they did not generally get enough to eat from the M Packets issued.

c. Overall, approximately 27 percent of the participants felt that consumption of the M Packet at the rates issued had a deleterious effect on job performance. The most frequent example of this cited

TABLE I
FREQUENCY DISTRIBUTION OF WEIGHT LOSSES OF INDIVIDUALS
 (Fort Stewart Phase)

Weight Loss (lbs)	1 Packet Per Day Feeding		2 Packets Per Day Feeding		3 Packets Per Day Feeding	
	No. Men	Percent	No. Men	Percent	No. Men	Percent
0 - 1.75	5	14.7	8	32.0	6	33.3
2 - 3.75	7	20.6	10	40.0	4	22.2
4 - 5.75	10	29.4	2	8.0	5	27.8
6 - 7.75	5	14.7	1	4.0	2	11.1
8 - 9.75	2	6.0	3	12.0	-	-
10 - 11.75	3	8.8	1	4.0	1	5.6
12 - 13.75	2	2.9	-	-	-	-
14 - 15.75	1	2.9	-	-	-	-
Totals	35	100.0	25	100.0	18	100.0

NOTE: Weights to nearest one-fourth pound.

TABLE Ia
ANALYSIS OF AVERAGE INDIVIDUAL WEIGHT LOSSES
BY TYPE OF FEEDING

Total No. Men	<u>1 Per Day</u> 35	<u>2 Per Day</u> 25	<u>3 Per Day</u> 18
Average Weight Loss (lbs)	<u>5.59</u>	<u>3.40</u>	<u>3.32</u>

NOTE: Those averages which are not included within the same bracket differ significantly at the 5-percent probability level. Those averages included within the same bracket do not differ significantly at the 5-percent probability level.

TABLE II

RESPONSES TO QUESTIONS RELATING TO EFFECTS OF M PACKET
CONSUMPTION ON EFFICIENCY OF SOLDIERS AND MARINES

Question	Response	Morganton No. 1 (Army)			Fort Stewart (Army)			Morganton No. 2 (Army)			Vieques Island (Marines)			Subtotals		
		1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day
Did you generally get enough to eat from M Packets issued?	More than enough	6	11	-	-	2	2	-	4	-	1	5	21	7	22	23
	Enough	18	49	8	20	16	-	99	-	-	30	68	140	56	236	156
	Not enough	61	5	28	4	-	-	24	-	-	114	53	59	203	86	59
Do you feel that you could live on one packet per day for up to 7 days and operate efficiently?	Yes	30	-	-	14	11	12	47	-	-	49	30	88	93	88	100
	No	56	-	-	22	15	5	81	-	-	96	97	133	174	193	138
	If no, how many packets?	16 39 1 - -	- 20 1 - -	- 11 3 - 1	- 20 1 - 1	- 5 - -	- 5 - -	1 56 18 6 -	1 55 41 - -	5 64 60 4 -	1 82 13 - -	1 55 41 - -	5 64 60 4 -	17 141 15 - 1	2 122 62 6 1	5 69 60 4 -
Did eating M Packet foods at rate issued limit you in performance of your assigned duties? In what way?	Yes	-	-	-	21	23	18	27	-	-	40	35	24	61	85	42
	No	-	-	-	14	3	0	100	-	-	105	92	195	119	195	195
	Loss of energy Loss of efficiency Long marches Dizziness Hungry Other	- - - - - -	8 4 3 1 3 -	- 2 - - 1 -	- 4 3 1 3 -	- - - - - -	- - - - - -	26 - - - - 2	22 - - - - -	2 3 - - 4 11	2 3 - - 4 10	22 - - - - -	35 24 195	61 85 195	48 2 - - 1 2	2 3 - - 4 10

was loss of energy. Of a total of 87 individuals who complained 37, or approximately 42 percent, were in the feeding group at Fort Stewart or Vieques Island which received one packet per day. In this connection, it was necessary to start feeding each participant in the first Morganton phase two packets per day after 3 days of subsisting on 1 packet. This was done as a result of complaints of headaches, stomach aches, and dizziness from some individuals.

d. From the above, it appears that most individuals could be expected to subsist for up to 7 days in the field on one packet per day without serious effects. There is, however, evidence that the weight loss for persons on this regimen will be significantly greater than for those who are fed two or three packets per day. There is also some indication that the individual soldier or marine feels that his own performance or efficiency is adversely affected when fed at a rate of one packet per day for a 7-day period.

2.3 DISPERSABILITY AND PORTABILITY

2.3.1 Objectives

a. To determine if the M Packet menus and component packages are suitable for carrying by the individual in combat pack, or similar device, and for carrying by the individual in pockets of the uniform.

b. To determine if the individual can carry on his person sufficient packets to meet minimal nutritional requirements for a period not to exceed 7 days.

2.3.2 Method

a. Initially, portability testing was accomplished using obstacles of the GETA Maneuver Course (App. I-B). Enlisted men carried from 3 to 21 packets while dressed and equipped as combat infantry soldiers. Eight different combinations of uniform, equipment, and load (number of packets carried) were utilized in the experiment (Table III).

b. The basic uniform used in the portability test was based on clothing and equipment requirements for the combat soldier as stipulated in a report prepared by the United States Army Combat Developments

Command, Infantry Agency, Fort Benning, Georgia, dated September 1963 (Ref. 21, App. IV). The weight of clothing and the equipment requirements listed for the year 1963 were used in this test. Similar requirements included in the report were used to determine the basic weight of a loaded M61 Field Pack. Although the rucksack was not reported in the basic fighting and existence loads of the infantry soldier, it was included in this test. The rucksack was the only individual load carrying system available which appeared suitable, to any degree, for carrying both the existence items and a 7-day maximum supply of M Packets. Guidance in making up the existence load for the rucksack was obtained from the Special Warfare Center, at Fort Bragg, North Carolina. Determination of the ability of the soldier to carry 21 packets is based on the concept of providing maximum calories and nutrition at a rate of three packets per day, as stated in Section II, paragraph II 1a of the revised Military Characteristics for the Food Packet, Individual, Combat (App. II). Specific clothing and equipment items used to make up the loads for this test are shown in Appendix I-C.

c. During all of the field use phases, data pertaining to the ease or difficulty of dispersing and carrying the packets while performing normal field or combat duties were obtained by questionnaires from test participants.

2.3.3 Results

Table III shows average performance values obtained for the individuals who participated in the controlled portability test¹. Obstacles shown in this table and in Appendix I-B are representative of activities encountered in normal infantry maneuver operations. The

¹Performance values in Table III were computed from data obtained during this and a previous controlled portability test conducted during December of 1964 (Ref. 20, App. IV) and December of 1965, respectively. Both of these portability tests were conducted at the same time of year, on the same maneuver course, using similar experimental designs and test procedures. Data from both tests were found to be very similar and were thus combined to provide the analysis in Table III.

TABLE III

**AVERAGE PERFORMANCE VALUES OF ENLISTED MEN ON GETA MANEUVER COURSE WHEN EQUIPPED
AS COMBAT INFANTRY SOLDIERS AND CARRYING VARIOUS QUANTITIES OF R PACKETS**

(Averages Based on Groups of 12 to 28 Individuals)

Course Obstacle	Average Performance Values by Uniform/Equipment Combination and Number of Packets Carried										Criterion Measure
	F	B	A	E	C	D	G	H			
1st 50-yard dash	.197	.198	.209	.206	.208	.212	.266	.266			Average time (Hundredths of a minute)
2d 50-yard dash	.248	.252	.253	.260	.260	.272	.322	.368			Average time
Scaling wall	2.25	2.36	2.36	2.37	2.47	2.73	3.50	4.30			Average time
Overhead ladder	6.58	6.57	6.12	5.75	5.21	4.67	3.75	1.62			Average No. rungs completed (Max. of 8 rungs)
Broad jump	101.18	101.08	98.11	97.06	92.06	91.75	75.19	65.56			Average No. of inches
Navy net	1.33	1.34	1.46	1.49	1.60	1.63	2.91	2.99			Average time
Combat crawl	3.41	3.58	3.25	4.08	4.19	4.27	7.22	8.93			Average time

NOTE: A. Basic uniform - No meals C. M61 Pack - No meals E. M61 Pack - 7 meals G. Backpack - No meals
 B. Basic uniform - 3 meals D. M61 Pack - 6 meals F. Basic uniform - 7 meals H. Backpack - 21 meals
 Those averages included in the same bracket are not significantly different at the 5-percent probability level.
 Those averages not included in the same bracket are significantly different at the 5-percent probability level.

course as outlined is part of a larger combat effectiveness course developed to simulate a combat environment suitable for use in the conduct of tests of individual clothing, equipment, and supplies (Ref. 22, App. IV). Responses to pertinent questions administered to participants during the normal use phases at Morganton, Fort Stewart, and Vieques Island are summarized by Phases in Appendixes I-D-1 through D-4. Similar data for all field phases combined are shown in Table IV.

2.3.4 Analysis

a. The statistical analysis of the maneuver course data shows no important changes in overall performance values when participants carried from three to seven meals on their persons while dressed and equipped as combat soldiers. The rucksack with no meals, and the rucksack with 21 meals (17 meals in the pack and 4 in the field jacket pockets), however, produced average performance values which, for most of the course obstacles, differed significantly at the 5-percent probability level from other uniform/load combinations.

b. These data illustrate the inability of the soldier to carry a 7-day maximum supply of 21 packets. Such a task is obviously impossible with the M61 field pack, the present standard individual load carrying system. It is equally impractical when using the rucksack. The Table III data indicate, however, that up to seven packets, i.e. a minimum 7-day supply, may be carried by the soldier provided he is wearing the field jacket with the M61 field pack. In this connection, a preliminary study of the compatibility of the M Packet with uniforms worn by the soldiers under intermediate conditions showed that all individual food packages in the M Packet menus will fit into the pockets of the utility (fatigue) trousers and jacket; field jacket; and OG 33 wool shirt. Although the pockets of the utility jacket could not be buttoned when containing the meat packages, the packages would not fall from the pockets. The preliminary fitting study, like the maneuver-course data in Table III, also indicated that up to seven complete packets can be dispersed on the soldier, without difficulty, when he is wearing a field jacket and carrying a normal field pack.

c. Portability data obtained during each of the field use phases are shown in Appendixes I-D-1 through D-4 and summarized for all phases in Table IV. Results for each of the field phases show that while

TABLE IV

RESPONSES TO PORTABILITY QUESTIONS BY FIELD USE PHASE
AND CARRYING ACCESS PHASE

Question	Response	Response Distribution					Combined	
		Morganton No. 1 (Army)	Fort Stewart (Army)	Morganton No. 2 (Army)	Vicques Island (Marines)	No.	Percent	
Did carrying packets in clothing restrict movements?	Yes, a great deal	0	1	0	3	4	90.7	
	Yes, some	11	16	32	64	121	22.3	
	No	66	59	87	208	413	76.8	
	No answer	8	16	2	7	31	-	
	Total	87	79	121	282	569	100.0	
Did carrying packets in clothing interfere with job performance?	Yes, a great deal	0	1	0	1	2	90.3	
	Yes, some	11	3	22	24	70	12.6	
	No	70	61	99	246	476	86.9	
	No answer	6	16	0	1	21	-	
	Total	87	79	121	282	569	100.0	
Was space in clothing or pack adequate for carrying packets?	More than adequate	32	16	18	28	92	17.3	
	Adequate	62	43	63	212	380	72.0	
	Not adequate	6	7	13	31	57	10.7	
	No answer	7	13	3	11	36	-	
	Total	87	79	121	282	569	100.0	

a few individuals attempted to carry as many as eight packets in their clothing, a great majority of the participants in all phases generally carried two in this manner, with the remainder of any packets issued being kept in their packs. During counterinsurgency and guerilla warfare training of Special Forces personnel at Morganton and Fort Stewart, as well as over-the-beach landings by the marines at Vieques Island, it was normal practice to cache individual packs containing most of the food packets issued. Individuals returned to cache points whenever necessary, or possible, and removed one or two packets which they generally carried in their field jackets, or otherwise in their clothing when the field jacket was not worn.

d. Responses to portability questions as summarized in Table IV show that carrying packets in the clothing restricted to some extent, the movements of approximately 23 percent of those questioned. In spite of this, however, approximately 87 and 89 percent, respectively, stated that carrying packets in the clothing did not interfere significantly with job performance and that overall space in the clothing and pack was adequate for carrying packets issued during the test.

2.4 PALATABILITY

2.4.1 Objectives

a. To determine if menus and components are sufficiently palatable to insure consumption.

b. To determine if menus contain a maximum variety of components consistent with considerations of size, weight, nutritional requirements, and highest acceptability.

2.4.2 Method

a. During each of the field phases, participants were requested to complete a food rating form for each food and complete meal consumed. Ratings on the 9-point hedonic scale were obtained on the meal and generally on the major components (meats) included in each of the six menus.

b. In addition to food ratings, participants were asked to indicate whether each food was heated or unheated when consumed and to provide an estimate of the proportion of each food consumed.

2.4.3 Results

Average ratings for each of the six menus, by test site and combined across test sites, are shown in Table V. Tables VI and VII show similar averages obtained for components of the menus when meat items were consumed in both a heated and an unheated state. Appendix I-E shows the average percent of each item consumed during the test, based on estimates provided by participants as to the amount of each food consumed. As an indication of whether the variety of foods in the menus is adequate (monotony effects), an overall average rating for each of the 7 test days is shown in Table VIII. The extent to which participants remained on a diet of M Packets, or consumed other foods during the test, is shown in Appendix I-F.

2.4.4 Analysis

a. Menus - Table V shows no appreciable differences in the overall averages for the menus. This is true for within test site comparisons and for all test sites combined. Thus, it appears that factors such as differences in ambient temperatures between test sites (App. I-G-1 through I-G-4) and whether participants were soldiers or marines, had no important effect on the averages. Overall, Menu No. 2 received the lowest average rating; however, all of the menus rated at an acceptable level on the hedonic scale.

b. Foods - The least acceptable of the foods were the cereal bar and date pudding, and the pork sausage when consumed cold. Of these three, however, only the cereal bar would be considered unacceptable. All other foods rated at a satisfactory level, whether consumed in a heated or an unheated state, and maintained a very high level of consumption (App. I-E). The unacceptability of the cereal bar is a shortcoming.

c. Food Variety or Monotony - The combined menu averages by test day in Table VIII show no systematic trends or decreases with continued consumption over the 7-day test period. This suggests that the menus and foods were generally as acceptable on the last day of the test as they were initially. This was true at all feeding levels.

2.5 DURABILITY

2.5.1 Objective

To determine if the M Packet is sufficiently durable for carrying on the person for a period of 1 day under stringent combat conditions without detrimental effect upon food components.

TABLE V

AVERAGE HEDONIC RATINGS* FOR M PACKET MENUS

(By Test Site and Combined Across Test Sites)

Menu No.	Morganton No. 1		Fort Stewart		Morganton No. 2		Vieques Island		All Test Sites Combined	
	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating
1	134	7.22	129	7.03	193	7.24	667	6.70	1123	6.89
2	125	6.91	151	6.69	201	6.75	623	6.08	1100	6.38
3	128	7.44	137	7.12	214	7.48	625	6.52	1104	6.89
4	138	7.02	141	6.55	207	6.76	668	6.44	1154	6.58
5	139	7.41	124	7.16	216	7.18	676	6.63	1155	6.88
6	137	7.12	124	7.01	206	7.10	685	6.75	1152	6.89

*9 - Like Extremely; 8 - Like Very Much; 7 - Like Moderately; 6 - Like Slightly; 5 - Neither Like nor Dislike; 4 - Dislike Slightly; 3 - Dislike Moderately; 2 - Dislike Very Much; 1 - Dislike Extremely.

TABLE VI
AVERAGE HEDONIC RATINGS FOR MEAT ITEMS WHEN CONSUMED HEATED
(By Test Sites and Combined Across Test Sites)

Food	Menu in Which Item is Included	Morganton No. 1		Fort Stewart		Morganton No. 2		Vieques Island		Total All Sites	
		No. Men	Avg. Rating	No. Men	Avg. Rating	No. Men	Avg. Rating	No. Men	Avg. Rating	No. Men	Avg. Rating
Frankfurters	1, 6	94	6.84	196	6.46	241	6.84	416	7.27	947	6.95
Beef stew	1	54	6.94	106	7.04	130	7.36	211	6.39	501	6.84
Pork sausage	2, 4	107	6.90	246	6.43	262	6.70	333	6.66	948	6.64
Ground beef	2, 5	100	7.00	232	7.00	268	7.31	331	6.81	931	7.02
Beefsteak	3	43	7.53	122	6.98	147	7.27	160	7.00	472	7.13
Beef slices w/ barbecue sauce	3, 6	93	6.86	213	7.16	274	7.49	345	6.64	925	7.04
Chicken loaf	4, 5	88	7.18	217	6.83	239	6.85	288	6.84	832	6.88

TABLE VII
AVERAGE HEDONIC RATINGS FOR INDIVIDUAL FOODS
WHEN MEAT ITEMS ARE CONSUMED UNHEATED
(By Test Site and Combined Across Test Sites)

Food	Menu in Which Item is Included	Morganton No. 1		Fort Stewart		Morganton No. 2		Vieques Island		All Test Sites Combined	
		No. Men	Avg. Rating	No. Men	Avg. Rating	No. Men	Avg. Rating	No. Men	Avg. Rating	No. Men	Avg. Rating
Frankfurters	1, 6	172	6.43	53	6.77	146	6.26	940	6.75	1311	6.66
Beef stew	1	78	7.02	21	7.09	54	7.09	436	5.96	589	6.25
Pork sausage	2, 4	163	6.22	46	6.41	134	5.84	944	5.46	1287	5.63
Ground beef	2, 5	165	6.92	39	6.90	140	6.87	947	6.35	1291	6.50
Breakfast	3	85	7.35	17	6.22	66	7.27	463	6.05	631	6.33
Beef slices w/barbecue sauce	3, 6	177	7.11	48	7.10	138	7.00	935	6.24	1298	6.47
Chicken loaf	4, 5	199	7.20	48	6.35	171	6.88	1045	6.48	1463	6.62
Jelly bar	1, 6	131	7.76	128	7.45	192	7.50	666	7.41	1117	7.47
Cereal bar	2, 5	117	6.05	146	5.62	192	4.46	615	4.22	1070	4.65
Fruitcake	3	126	7.31	131	6.30	209	6.68	624	6.68	1090	6.70
Date pudding	4	141	6.54	136	5.63	205	5.85	670	5.85	1132	5.91
Choc bar w/almonds	1, 2, 3, 5	142	7.76	122	7.37	211	7.42	675	7.00	1130	7.21
Choc fudge bar	6	135	7.77	121	7.21	205	7.55	692	7.41	1133	7.46

TABLE VIII
AVERAGE MENU RATING BY TEST DAY AND FEEDING LEVEL
(Monotony Effects)

Day	1 Packet Per Day		2 Packets Per Day		3 Packets Per Day		Feeding Levels Combined	
	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating	No. Ratings	Avg. Rating
1	250	6.99	419	6.79	328	6.54	997	6.76
2	253	6.46	203	6.46	299	6.59	755	6.51
3	268	6.91	428	6.84	376	6.65	1072	6.79
4	179	6.82	543	6.94	341	6.51	1063	6.78
5	177	7.00	496	6.93	312	6.71	985	6.87
6	165	7.06	414	6.92	372	6.33	951	6.71
7	85	7.16	167	6.76	367	6.56	619	6.70

2.5.2 Method

A total of 96 packets, 16 of each menu, was evaluated initially during this subtest. Enlisted men carried seven packets (a 1-week minimum supply) while completing five traversals of selected obstacles of the GETA accelerated wear courses (App. I-H and Fig. 2). Additional data regarding packet durability was obtained by observation and through reports of individual test participants during each of the 7-day use phases in the field.

2.5.3 Results

Table IX shows the number of failures of food packages, accessory packs, and packet covers in relation to the total number of each of these items exposed to the GETA accelerated wear course obstacles. In this connection, Appendix I-I shows a breakdown of failures for individual food items and accessory packs similarly subjected to the accelerated wear course in a previous test of the M Packet (Ref. 20, App. IV).

TABLE IX
NUMBER OF M PACKET ITEMS CARRIED AND NOT DAMAGED DURING
A MAXIMUM OF FIVE TRAVERSALS OF SELECTED OBSTACLES OF
GETA ACCELERATED WEAR COURSE

Food	Menu in Which Item is Included	Number of Items NOT Damaged Versus Num- ber Carried
Frankfurters	1, 6	32/32
Beef stew	1	16/16
Pork sausage	2, 4	32/32
Ground beef in sauce	2, 5	31/32
Beefsteak	3	15/16
Beef slices w/barbecue sauce	3, 6	32/32
Chicken loaf	4, 5	30/32
Fruitcake	3	16/16
Date pudding	4	16/16
Accessory pack	ALL	93/96
Packet cover	ALL	64/96



Railroad cinder crawl.



Belgian block embankment.

Figure 2. Durability test (typical accelerated wear course obstacles).

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NEGATIVE 17, 16

2.5.4 Analysis

Results of the controlled durability evaluations conducted during this and the previous tests show little damage of any practical significance to the individual packet items. Based on these data, the performance of the M Packet with respect to durability when carried on the person of the soldier is considered excellent. This is further borne out by the fact that none of the packets carried by participants during any of the four field use phases at Morganton, Fort Stewart, or Vieques Island were reported damaged as a result of being carried.

2.6 GENERAL TROOP AND COMMAND ACCEPTANCE

2.6.1 Objective

To determine the overall troop and command acceptance of the M Packet and whether M Packet foods caused unusual thirst.

2.6.2 Method

Participants in all field phases were questioned during each meal, or at the end of the test, as appropriate, to obtain specific information regarding the utility thirst provoking characteristics, and overall suitability of the M Packet from the individual's standpoint. Command personnel in each test unit were similarly questioned upon completion of the test.

2.6.3 Results

Responses to utility questions administered to test participants are summarized in Tables X and XI. Similar command acceptance data are shown in Table XII.

2.6.4 Analysis

a. Approximately three-fourths of those questioned stated they experienced no difficulty in removing foods from individual packages when eating. Items with a high-liquid content, i.e. beef slices w/barbecue sauce and beef stew, were cited most often. That these items presented no serious problems is further evidenced by the relatively low percentage of comments in Table XI suggesting that a spoon be provided with the M Packet.

TABLE X
 RESPONSES TO GENERAL SUITABILITY QUESTIONS
 (All Test Phases Combined)

Question	Response	Frequency	Remarks	
			(Most Frequently Mentioned Items)	No. Percent
Did you have trouble getting the foods out of individual packages when eating?	Yes	172	Beef slices w/barbecue sauce	46 22.3
	No	596	Beef stew	34 16.5
Did any of the foods in the M Packet make you unusually thirsty?	Percent "No"	77.6	Chicken loaf	23 11.2
			Ground beef	26 12.6
Considering all factors, rate the overall suitability of the M Packet for use by the (soldier) (marine).			Fruitcake	18 8.7
			Other	59 28.7
			Total	206 100.0
			(Most Frequently Mentioned Items)	No. Percent
	Yes	552	Sausage	122 20.2
	No	236	All foods	105 17.4
	Percent "Yes"	70.0	Cereal bar	76 12.6
			Chicken loaf	58 9.6
			Candy	49 8.1
			Beef slices w/barbecue sauce	43 7.2
			Fruitcake	34 5.6
			Other	116 19.3
			Total	603 100.0
			Overall Average Rating	4.34
	(5) Very Suitable	398		
	(4) Slightly Suitable	274		
	(3) Neither Suitable nor Unsuitable	55		
	(2) Slightly Unsuitable	22		
	(1) Very Unsuitable	14		

TABLE XI

SUMMARY OF FINAL COMMENTS OF PARTICIPANTS BY FEEDING GROUP
(Combined Across Test Sites)

Comment	Frequency of Comments by Feeding Group and Combined				All Groups Combined	
	1 Packet Per Day (256 Men)	2 Packets Per Day (325 Men)	3 Packets Per Day (239 Men)	No.	Percent	
(1) Need toilet tissue	36	40	59	135	13.9	
(2) Good	69	20	21	110	11.4	
(3) Need cigarettes	27	21	61	109	11.3	
(4) Need bread	32	54	22	108	11.2	
(5) Cereal bar not good	29	34	13	76	7.8	
(6) Need matches	27	18	24	69	7.1	
(7) Not enough to eat	27	36	7	70	7.2	
(8) Need spoon	29	7	30	66	6.8	
(9) Chicken bad	33	13	0	46	4.8	
(10) Monotonous	9	13	20	42	4.3	
(11) Need fruit	1	2	32	35	3.6	
(12) Sausage greasy/bad	18	12	3	33	3.4	
(13) Thirsty	1	5	18	24	2.5	
(14) Salty	6	7	10	23	2.4	
(15) Need more coffee	13	7	2	22	2.3	
Total No. Comments	357	289	322	968	100.0	

TABLE XII

COMMAND ACCEPTANCE DATA

Question	Answer Category	Distribution of Responses						Most Frequent Reasons for Adverse Effects
		Officer		E-6 and Above		Combined		
		Yes	No	Yes	No	Yes	No	
Did use of M Packet have adverse effects on mission?	Army Marines Totals	1	4	6	20	7	24	Not enough to eat (1 per day feeding) More water required Lack of energy (1 per day feeding)
		4	12	1	19	5	31	
		5	16	7	39	12	55	
Did use of M Packet have adverse effects on troop morale and general efficiency?	Army Marines Totals	1	4	10	16	11	20	More water required Need accessory items Cigarettes Toilet tissue Fruit Hungry Slight effect on morale
		9	7	6	14	15	21	
		10	11	16	30	26	41	
Did use of M Packet have adverse effects on mobility of unit or individuals?	Army Marines Totals	1	4	3	23	4	27	
		3	13	2	17	5	30	
		4	17	5	40	9	57	
Did use of M Packet present any logistical or supply problems?	Army Marines Totals	0	4	3	23	3	27	
		2	14	0	21	2	35	
		2	18	3	44	5	62	
Rate the overall suitability of the M Packet for use by the (soldier) (marine).	(4)Very Suitable (3)Suitable (2)Unsuitable (1)Very Unsuitable Average Rating	Army		Marines		Combined		
		17		61		78		
		11		44		55		
		1		3		4		
		1		1		2		
		3.47		3.51		3.50		

b. A majority of participants also said that foods in the menus made them unusually thirsty. While the sausage, apparently because of its grease and salt content, was commented on most often, all of the major foods in the menus were cited as causing thirst. Again the overall comments in Table XI show this to be a relatively unimportant factor in the final evaluation of the packet by participants. In this connection, most of the comments regarding thirst were obtained during the field use phase conducted at Vieques Island where daily temperature and relative humidity averaged 78°F. and 78 percent, respectively. This factor alone would generate a large number of complaints regarding thirst, regardless of the type of ration being fed. For this reason and because most of the comments provided by participants are fairly evenly distributed across all foods, the performance of the M Packet is considered satisfactory for these climatic conditions.

c. A majority of command personnel interviewed (Table XII) felt that the use of the M Packet had no important adverse effect on mission, morale, and general efficiency of the unit, nor did it present important logistical or supply problems.

d. Comments provided by both command personnel and test participants stress the general desire for the addition of accessory type items, such as toilet paper and cigarettes. While there was, no doubt, a genuine need for such items during the test, these requests reflect a tendency on the part of individuals to lose sight of the purpose and of the austere nature of the M Packet. There was a tendency during all field phases to think of the M Packet with reference to the Meal, Combat, Individual (C-Ration) and to compare the M Packet to this ration.

e. In spite of specific complaints or suggestions for changes as reported, the favorable attitude of both command and other user personnel toward the M Packet is illustrated by the high "Overall Suitability" ratings provided in Tables X and XII. A substantial majority of both command and other user personnel rated the packet very suitable for use by the soldier or marine.

2.7 CBR PROTECTION

2.7.1 Objective

To determine if the M Packet will provide CBR protection to food components for a period of 1 day.

2.7.2 Method

Information pertaining to the adequacy of the M Packet from the standpoint of CBR protection was obtained from the U.S. Army Natick Laboratories (App. I-A-1).

2.7.3 Results

The Natick statement indicates that adequate CBR protection to food components is provided if package integrity is preserved. Contract research in progress has confirmed that the materials comprising the flexible packaging used in the M Packet are the best available for protection against Chemical Warfare agents. Past studies and current investigation by Natick Laboratories under a no-cost agreement with an industrial laboratory, have confirmed the capability of properly made flexible packages to prevent penetration by bacteria. Past studies have also shown protection from fallout. If the package is damaged, however, these protective characteristics will obviously be affected.

2.7.4 Analysis

Information provided by the Natick Laboratories is a general summation of developmental and other related work of a continuing nature conducted over a long period. For purposes of this report no additional testing or evaluation of the CBR resistance of the M Packet was considered necessary. Statements provided by the developer take into account the current state of the art and are a suitable basis for judging the M Packet. The CBR properties of the packet are considered adequate to meet the specific requirement of the pertinent Military Characteristic (App. II) provided the flexible packaging is properly sealed and the integrity of the package is maintained. (See paragraphs 2.14.3 and 2.14.4 for related discussion on safety.)

2.8 WATER, INSECT, AND RODENT RESISTANCE

2.8.1 Objective

To determine the water, insect, and rodent resistance of the M Packet in the shipping case.

2.8.2 Method

a. To determine water resistance, 16 cases of packets were placed on the USAGETA Rain Course and exposed to a 1-inch per hour rainfall. One case was removed every 1/2 hour and the case and packets examined for any sign of water penetration. An additional 16 cases were similarly placed on the course for a total of 7 hours before removal. All such cases were allowed to dry and the dried cases and contents were thoroughly examined after 24 hours.

b. While there is no specific requirement for such, a further determination was made as to the capability of the M Packet in the case to withstand caching in water for 24 and 48 hours. During the first field use phase, four cases of packets were placed in Lake James near Morganton, North Carolina. The cases were secured so that they could float but would not touch the shoreline. Two cases were removed from the lake after 24 and 48 hours. The cases were examined to determine the extent to which they were floating, the condition of the fiberboard and sleeve, and extent of penetration of water through the packaging materials of the M Packets. Packets in which water penetrated the outer clear plastic bag were selected for further examination. Four packets containing the most water were chosen from each case, and the pouches in each packet were opened. Water in excess of the normal amount in the package and the presence of a hole in the packaging material were the criteria used to determine water penetration of the pouches.

c. Data pertaining to insect and rodent resistance of the packets in their cases were obtained from the Natick Laboratories.

2.8.3 Results

a. None of the 16 cases and contents subjected to the USAGETA Rain Course and inspected at a rate of one each 1/2 hour over a 7-hour period showed signs of water penetration. Neither did the additional 16 cases and contents subjected to continuous rainfall for 7 hours before examination show evidence of water penetration. Also, after drying for 24 hours these cases were found to have retained their rigidity. Slight curling of the edges of some of the container sleeves was noted.

b. All cases tested for water resistance during the field use phase at Morganton were capable of floating in water for 24 and 48 hours.

The clear plastic bags which served as an outer covering for the M Packet menus leaked in many instances. The fiberboard covers on the food pouches maintained characteristic firmness for up to 24 hours. The fiberboard sleeve covering the case was found to be necessary if the case is to be cached in water. Failure of glue to hold the bottom of the case when submerged for 48 hours illustrates the importance of the metal banding and fiberboard sleeve to the integrity of the case. All of the thermally processed food pouches examined were found to be water resistant.

c. Based on information provided by the Natick Laboratories (App. I-A-2), resistance of the entire pack to water penetration is excellent as evidenced by the fact that the flexible unit pouches are capable of withstanding retorting and are subjected to post-process tests involving immersion in water. Insect protection of the pack is good except against boring types. Contract effort is being initiated to study the effectiveness of different treatments in preventing penetration by borers. Rodent protection is not complete. In this respect, attention is invited to the fact that much of the protection afforded past and present standard rations against penetration by rodents and boring insects is attributable to packaging in hermetically sealed metal cans. Previous standard rations which were not entirely based on rigid metal packaging (e.g., the K Ration) were, thus, not afforded complete protection. Insect and rodent resistance of the prototype packets is, however, considered as good as the present state of the art permits.

2.8.4 Analysis

On the basis of the rain course tests performed at USAGETA the water resistance of the M Packet both in and out of the case is excellent. Further testing at Morganton, North Carolina, indicated that the M Packet case containing 24 packets and bound by a fiberboard sleeve and metal band is suitable for caching in water for up to 48 hours. The insect and rodent resistance of the M Packet in the case, while not completely adequate, is as good as can be accomplished at the present time.

2.9 TRANSPORTATION AND HANDLING

2.9.1 Objectives

a. To determine if food packets in the shipping case are capable of withstanding military handling during transportation and storage prior to use.

b. To determine if case, menu, and component packaging are suitable for transport by all available means.

2.9.2 Method

a. Approximately 2,200 cases of packets to be used in the test were divided and initially shipped from Minneapolis, Minnesota, to the General Equipment Test Activity, Fort Lee, Virginia; to the Infantry Board, Fort Benning, Georgia; to the Airborne, Electronics and Special Warfare Board, Fort Bragg, North Carolina; and to the Marine Corps Landing Force Development Center, Quantico, Virginia. Methods of transportation used for these shipments were commercial air, rail freight, and commercial truck. At Fort Lee and Fort Benning a detailed inspection was performed upon receipt of each shipment at these installations. An analysis of all obviously damaged cases and contents was made on arrival. Also at each installation a random sample of 20 to 32 additional cases, which appeared to be undamaged, was selected and a 100-percent damage analysis made on all cases and packets in the sample.

b. Additional shipments of packets initially received at Fort Lee were made by motor-freight or rail to either Fort Bragg, North Carolina, and/or Morganton, North Carolina, the latter point being proximate to the Pisgah Forest where two of the field phases were conducted with Special Forces personnel. Movement of packets from these points to test troops in the field was accomplished via military truck. An additional shipment by military truck was made from Fort Benning, Georgia, to Fort Stewart, Georgia, a distance of some 200 miles, where the packets were used in a field phase by Special Forces troops. At all destinations a 100-percent inspection and damage analysis was made of cases and packets prior to issue to using troop units.

c. In the final transportation and handling evaluation, 575 cases of packets at Fort Lee and Quantico were shipped by rail, or military truck, to the 2nd Marine Division, Camp Lejeune, North Carolina. At this point they were palletized and shipped by truck to the Cherry Point Air Station, North Carolina. From this point they were shipped by Marine Aircraft (C-130) to Vieques Island, Puerto Rico, for use in a further troop evaluation. Handling at this location included loading and unloading of packets to and from a ship by helicopter, and beach landings by helicopter and marine landing craft (Fig. 3). A 100-percent inspection and damage analysis was made on all cases and packets prior to issue to marines during the 7-day phase at Vieques Island.



Pallets of M Packets being loaded aboard C-130 at Cherry Point, N. C. for delivery to Vieques Island.



Marine helicopter aboard USS Guam used to transport pallets of M Packets from ship to Vieques Island using cargo sling.



Marines off-loading cases of M Packets from military vehicle for issue and consumption.

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Figure 3. Transportation and handling.

2.9.3 Results

2.9.3.1 Shipping Case Damage

a. An examination of all of the 750 M Packet cases shipped by rail-freight from Minneapolis to Fort Lee showed 8, or approximately 1.06 percent, of the cases to be damaged. The major failure incurred was crushing on both the corners and the sides of these containers. There was also a scoreline failure on two of the crushed shipping cases. While it appeared that three of the damaged cases had been subjected to severe handling, most of the case failures were of a minor nature.

b. An additional 50 cases of packets shipped by commercial air from Minneapolis to Richmond, Virginia, showed no container damage whatsoever. These cases were shipped in planes with pressurized cargo areas with connecting flights between Chicago, Washington, and Richmond. Altitudes averaged from 6,000 to 31,000 feet.

c. Of 700 cases shipped initially to Fort Benning by motor-freight, two were found to be damaged. Damage noted was slight and consisted of a 1 1/2-inch hole in the side of one case to a depth of approximately one-eighth inch. The second case showed a crushed corner approximately three-fourths of an inch in depth, 4 inches long, and 2 inches wide.

d. Subsequent shipments as specified in subparagraphs 2.9.2b and c above resulted in no failures of practical significance to any of the total of 860 shipping cases transported by commercial and military means to the Pisgah Forest near Morganton, North Carolina; Fort Stewart, Georgia; or Vieques Island, Puerto Rico.

2.9.3.2 Packet Damage

a. A 100-percent inspection of all M Packets in the eight shipping cases damaged during the initial shipment from Minneapolis to Fort Lee, and the two cases damaged in a similar shipment from Minneapolis to Fort Benning showed only two individual food packets with failures of any importance. These were a packet of frankfurters and pork sausage, each of which had a slight seal failure.

b. In addition to the above 32 undamaged cases of packets selected at random from among the 800 shipped to Fort Lee, and 20 cases

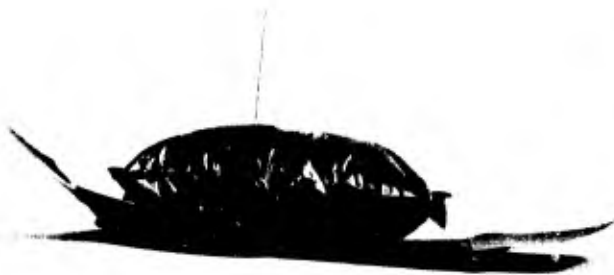
selected from the 700 shipped to Fort Benning were given a 100-percent inspection of major component packages in each M Packet. The analysis of the Fort Benning motor-freight shipment showed only one individual meat packet with a definite failure. This was a beefsteak package in Menu No. 3, which showed a puncture in the wall of the packet of sufficient magnitude to cause excessive leakage of the contents. An additional beefsteak packet was found to be moldy but with no apparent evidence of a seal, wall, or other similar failure. Other discrepancies of a minor nature, noted during the damage analysis of the Fort Benning shipment, are summarized in Appendix I-J.

c. Results of the inspection of the contents of five undamaged shipping cases from air shipment and 27 undamaged cases from rail shipment to Fort Lee are summarized in Appendices I-K-1 and I-K-2. Appendices I-K-3 through I-K-6 similarly show results of a 100-percent inspection of all major component (meat) packages in 688 cases of M Packets shipped to Morganton, North Carolina; Fort Stewart, Georgia; or Vieques Island from either Fort Lee or Quantico, Virginia. These inspections were conducted on all packets to be used in the field use phases and immediately prior to initiation of these phases.

d. To facilitate evaluation, all failures to individual packets, as shown by food items and menus in Appendices I-K-1 through I-K-6, have been summarized by type of failure in Table XIII. Also shown is the total percent of damaged items, in relation to the total number of M Packet meat components, inspected from the initial shipments and from those shipments to test sites during the field use phases. Typical packet failures are shown in Figure 4.

2.9.4 Analysis

a. The criteria for judging packet performance in the shipping evaluations and at test sites are defined in Appendix I-L. Results of inspections performed on shipments showed that damages incurred were not in all instances due to the shipments. It appears that many of the damages summarized in Table XIII are more a result of faulty processing than to conditions or hazards generated by the shipping environment. The best example of this among the failures cited is the large number of packages with crimped seals. Seventy-one, or approximately 23 percent, of the damaged items were in this category. Many of the damaged packets



Sweller (gas formation).



Sweller and seal failure.



Seal failure.

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Figure 4. Typical packet failures.

shown as swellers and slight seal failures no doubt occurred during, or as a result of, the process of assembling the M Packets rather than during the shipments. The possible effect of damage of this type on the safety aspects of the M Packet is discussed in paragraph 2.14 of this report.

TABLE XIII
SUMMARY OF PACKET COMPONENT FAILURES BY TYPE
(APPENDICES I-K-1 THROUGH I-K-6)
(BASED ON EXAMINATION OF 33, 972 INDIVIDUAL MEAT PACKAGES)

<u>Type of Failure</u>	<u>Number</u>
Strained seal	4
Seal failure (slight leakage)	56
Seal failure (moderate leakage)	13
Seal failure (excessive leakage)	5
Crimped seal	73
Sweller (gas formation)	69
Wall puncture (slight leakage)	58
Wall puncture (moderate leakage)	12
Wall puncture (excessive leakage)	2
Abrasion	21

TOTAL Number Damaged: 313

Percent Damaged: 0.9

b. Based on data generated in this subtest, the performance of the M Packet cases and food packet was extremely good. This is further borne out by the overall percent of damaged items, as shown in Table XIII of 0.9 percent, which includes damage due to both shipping hazards and preshipment processing. By removing from the tabulations the 71 items with crimped seals (none of which could have been due to shipping), the overall percent failure is reduced to approximately 0.7. The low-failure rate for the major component packaging and the minor failures noted in other components and shipping cases show the M Packet container system to be highly satisfactory from the standpoint of transportation and handling during typical military and commercial air, rail, and truck shipments.

2.10 AIR DELIVERY

Service (air delivery) tests of the M Packet, as described below, were conducted by Captain H. D. Guenther and other members of the U. S. Army Airborne, Electronics and Special Warfare Board at Fort Bragg, North Carolina. These tests were conducted during the period August through November 1965.

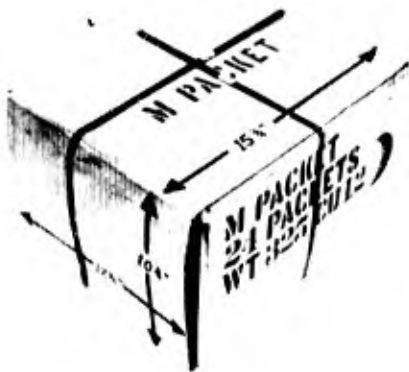
2.10.1 Test No. 1 - Adaptability for Airdrop

2.10.1.1 Objective. To determine the adaptability of the test item for rigging for airdrop based on the following criteria:

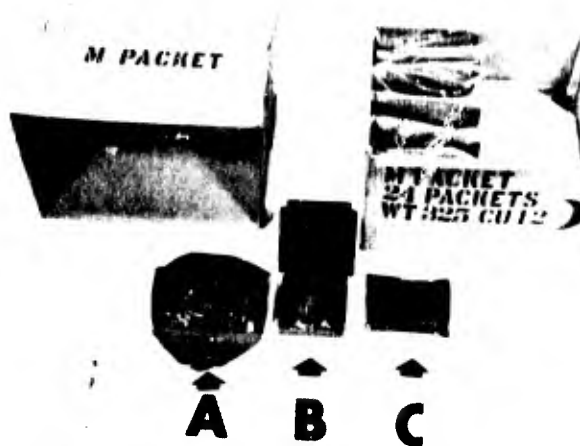
- a. The test item shall be suitable for airdrop.
- b. The test item when rigged on standard airdrop platforms shall conform to the weights and dimensions of appropriate aircraft.
- c. The test item shall conform to the weights and dimensions necessary for airdrop as a door bundle.
- d. The test item shall be designed to accommodate energy dissipators currently in use.

2.10.1.2 Method. The test item was examined, measured, weighed, and photographed. Technical data were reviewed. Physical characteristics of the test item were compared with cargo limitations of equipment containers and airdrop platforms used for airdrop from U.S. Air Force and U.S. Army aircraft.

2.10.1.3 Results. Comparison of physical characteristics of the test item with cargo limitations of equipment containers used for airdrop from U.S. Air Force and U.S. Army aircraft indicates that the test item is adaptable for rigging for airdrop in various devices. These devices include the A-7A cargo sling, A-21 cargo bag, and A-22 cargo bag. The test item is also suitable for drop as a mass load on airdrop platforms in accordance with current procedures and techniques (TM's 10-500, 10-500-6, 10-500-12, and 10-500-55). Based upon its configuration, the test item will also accommodate paperboard honeycomb energy dissipators. Photographs are shown in Figure 5.



Test item.



Opened test item showing protective sleeve and M Packets in shipping container. Contents of M Packet: A. Meat packet, B. Dessert packet, C. Accessory packet.



Twelve test items rigged in an A-7A cargo sling after static drop from 12.6 feet on a concrete impact surface.



Damaged test item after static drop from 12.6 feet on a concrete impact surface.

Figure 5. Service test: airdrop phase for M Packet (food packet, individual, combat).

US ARMY
GETA
FORT LEE, VA.

TECOM 8-4-7405-04/05/06

NEGATIVE _____

2.10.1.4 Analysis. The criteria were met.

2.10.2 Test No. 2 - Impact Test

2.10.2.1 Objective. To determine trial airdrop kits and rigging techniques for the test item based on the following criterion: The test item shall be capable of being delivered by parachute with the use of standard energy dissipators.

2.10.2.2 Method. The results of tests performed as described in 2.10.1 above were evaluated. The test items were then rigged in two representative airdrop configurations using standard procedures as follows: Twelve cases of M Packets were rigged in an A-7A cargo sling. No energy dissipators were used. Twelve additional cases of M Packets were rigged in an A-21 cargo bag. One layer of paperboard honeycomb was used as an energy dissipator. Each configuration was dropped once from a height of 12.6 feet onto a concrete surface. The test items were inspected for damage after each drop. Motion pictures were taken and evaluated.

2.10.2.3 Results. The 12 cases of M Packets rigged in an A-7A cargo sling (rigged weight: 398 pounds) were damaged as follows: Sixty-two of the 288 polyethylene bags were punctured and two of the 576 meat packets were broken open along the seal. No accessory or dessert packets were damaged. The 12 cases of packets rigged in an A-21 cargo bag (rigged weight: 431 pounds) were damaged as follows: Sixty of the 288 polyethylene bags were punctured and one of the 576 meat packets was broken open along the seal. No accessory or dessert packets were damaged.

2.10.2.4 Analysis. The criterion was met.

2.10.3 Test No. 3 - Airdrop Test

2.10.3.1 Objectives. To determine the suitability of the M Packet for airdrop, and to determine suitable airdrop kits and rigging techniques based on the following criterion: The test item shall be capable of being delivered by parachute with the use of standard energy dissipators.

2.10.3.2 Method. The results of tests performed as described in 2.10.1 and 2.10.2 above were evaluated. Test loads were rigged as indicated in Appendix I-M. Drops 1 through 14 were made as indicated in

Appendix I-N. The test loads were derigged and those that had been dropped previously and those that had received significant damage were inspected after each drop. Motion pictures were taken and analyzed.

2. 10. 3. 3 Results. The following damage resulted to test packages (54 inspected of 400 dropped) delivered by parachute on Drops 2 through 14: Sixty-nine of 2,592 meat packets burst. No accessory or dessert packets were damaged. The impact shock damage to the test items was most severe in the lower layer of the load (rigged configuration). For detailed results, see Appendices I-O and I-P.

2. 10. 3. 4 Analysis. Test results indicate that standard rigging techniques and procedures are suitable.

2. 10. 4 Test No. 4 - Suitability for Freedrop

2. 10. 4. 1 Objectives. To determine the suitability of the test item to withstand the shocks incurred when landed by freedrop, and suitable freedrop kits and rigging techniques, based on the following criterion: The test item should be capable of withstanding forces incurred when free dropped.

2. 10. 4. 2 Method. Four cases of packets were rigged as shown in configuration No. 1 (App. I-M) and free dropped. The test configuration was derigged and 100 percent of the test items were inspected for damage after the drop. A case of packets was also free dropped. The test item was inspected for damage after the drop. For detailed data, see Appendices I-M and I-N.

2. 10. 4. 3 Results. The shipping containers in the free fall configuration burst on impact. Individual food packets were strewn over an area of 20-foot radius. The shipping container of the single item dropped (Drop No. 16, App. I-N) burst on impact. Individual food packets were strewn over an area of 12-foot radius. The average percent of damage to the food packets was: Meat packets, 74.41 percent; Dessert packets, 7.50 percent; and Accessory packets, 12.68 percent. Detailed damage data are contained in Appendices I-Q and I-R.

2. 10. 4. 4 Analysis. The M Packet (Food Packet, Individual, Combat) can be free dropped using standard procedures and techniques; however, this method of air delivery is marginal because of the high percent of damage which will result. This is a shortcoming.

2.11 STORAGE STABILITY

2.11.1 Objective

To determine if the M Packet in the shipping case will withstand storage without refrigeration for a minimum of 2 years without spoilage or significant decrease in nutrition or palatability.

2.11.2 Method

Information pertaining to the storage stability of the M Packet was obtained from the U.S. Army Natick Laboratories (App. I-A-2).

2.11.3 Results

a. The fiberboard shipping case used for the M Packet is made, sealed, and metal-strapped in accordance with Style RCS-SL V2s of PPP-B-636. This is the standard shipping container which past experimental work and shipping experience have shown to be most suitable for meeting the requirement of the Military Characteristics (App. II). Extensive experimentation with handling of packed cases and storage of separate component items has shown that this characteristic will be met where adequate processing has been assured and package integrity maintained.

b. Although storage evaluations of the current prototype will not be completed before the fourth quarter of FY 66, studies of predecessor experimental components have shown no significant decreases in initial palatability as the result of unrefrigerated storage. Storage properties appear to be similar to those of canned foods. It is anticipated that, where package integrity is maintained, nutrient retention during storage will be similar to that of conventionally canned items. Fortification in carriers of known stability has been employed to assure retention of Vitamin A, thiamine, and ascorbic acid, while riboflavin and niacin are known to be stable.

2.11.4 Analysis

Information as provided above is considered adequate to determine the suitability of the M Packet from the standpoint of storage

stability. Since storage evaluations of the current prototype are not complete at this time, the results of previous evaluations, the similarity of M Packet foods to canned foods, and the known history and performance of these items, justify the presumption that the M Packet is satisfactory in this respect, so long as initial processing of the foods is adequate and the package remains in tact. See paragraph 2.14 for related discussion on safety.

2.12 HUMAN FACTORS

2.12.1 Objective

To determine whether the M Packet conforms to applicable principles of human factors engineering.

2.12.2 Method

Man-item relationships were observed and evaluated during all phases of the test.

2.12.3 Results

Of particular importance from the standpoint of human factors is the effect on the individual of dispersing and carrying packets on his person while performing normal combat tasks. Results of relevant subtests (Par. 2.3.3 and Table III and IV) generally show that the soldier can perform required physical activities while carrying up to seven packets in his clothing and pack in spite of some discomfort and restriction of movement. There were a few instances, during the field use phases, in which individuals complained that the corners of individual food package covers caused some discomfort when bending over with the packets in the lower field jacket pockets or in the side trouser pockets.

2.12.4 Analysis

Overall, the M Packet is considered satisfactory from a human factors standpoint. A continuing purpose in food packet development however, should be to make changes in size and shape which will make the item more suitable for use by the soldier. Thus possible reductions in excess packaging materiel in the food and accessory package, as suggested in paragraph 2.13 below, could also improve the portability characteristics of the M Packet.

2.13 VALUE ANALYSIS

2.13.1 Objective

To determine whether the M Packet has any unnecessary, costly, or nice-to-have features which can be eliminated without adverse effects on essential performance, reliability, quality, and safety.

2.13.2 Method

Observations regarding possible value improvement were made initially and during all other subtests.

2.13.3 Results

The general design of the M Packet was found to be adequate. Materials used in construction of the packet were of high quality and great durability as evidenced by performance in the test. There appears to be, however, excess packaging materiel both in the laminated plastic-foil-plastic food pouches, and the fiberboard overwrap, or cover, for the meat components. It is recognized that packaging should not conform to the specific size and shape of the food components. Visual inspection and measurements obtained, however, indicate that the length of some of the packaging for food pouches and the accessory packets might be reduced. This would allow for a reduction in the size of the fiberboard overwrap on the meat components, and consequently reduce the volume of the entire packet. Since determination of the specific configuration of the packet is the responsibility of the developing agency, no attempt is made here to specify the extent to which reduction in packaging materiel may or may not be accomplished.

2.13.4 Analysis

Design features presently incorporated in the M Packet are considered essential to its performance, reliability, quality, and safety. However, the amount of packaging materiel used in the laminated food pouches and meat package covers may possibly be reduced with a resultant decrease in the volume of the entire M Packet.

2. 14 SAFETY

2. 14. 1 Objective

To evaluate the safety characteristics of the M Packet.

2. 14. 2 Method

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

2. 14. 3 Results

a. From the standpoint of safe handling by the soldier in the field, the design and the construction of the M Packet were highly satisfactory, and they provided no safety hazards to the user.

b. Also related to the safety of the packet, however, are the results of inspections performed following the transportation and handling tests, and on all packets immediately prior to their use during each of the four field use phases (Par. 2. 9). These inspections revealed damages which apparently resulted during assembly of the packets (Table XIII). 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. 14. 4 Analysis

Previous tests of flexibly packaged foods conducted in conjunction with the Natick Laboratories over a period of several years by USAGETA have shown no major problems in maintaining package integrity either prior to or during the tests. Packets received have been well constructed, and they have proven to be highly durable when exposed to severe punishment in testing. Experience with faulty packages during this test, however, suggests a safety hazard to the user if inspection and processing techniques at the point of assembly should be inadequate. This potential safety hazard is a deficiency.

2. 15 PHYSICAL CHARACTERISTICS AND SECURITY

2. 15. 1 Objective

To determine whether the M Packet menus, components, and packaging, as appropriate, meet the following Military Characteristics (App. II):

- a. Shall have flexible packaging
- b. All components (other than coffee) shall be suitable for consumption in their original state.
- c. All packaging shall be dull, non-reflecting, easily disposable material.
- d. The gross weight per packet shall not exceed 1 pound 2 ounces.
- e. Shall require no preparation except to add cold water to the beverage.
- f. Service identification numbers and manufacturer's codes shall be placed on the shipping case only
- g. Configuration of the packet shall be flat.
- h. Components of the 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 or 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.
- i. Food packets shall be compatible with established camouflage requirements.
- j. The date of pack will be placed on the case.

2. 15. 2 Method

Generally, the extent to which the M Packet met the characteristics cited could be determined simply by examination of the physical characteristics of the packet or case, as appropriate. Gross weight per

packet was determined by recording the weight to the nearest ounce of all packets in a typical case and then computing an average weight per packet per case.

2. 15. 3 Results

The M Packet met all of the Military Characteristics cited with the exception of the gross weight per packet. The average weight per packet for all packets in the case measured was 17.9 ounces, which is within the gross weight restriction of 18 ounces per packet. The range of weights for individual packets was from a low of 15 ounces for Menu No. 2 to a high of 21 ounces for Menu No. 3, the latter item being slightly in excess of the restriction imposed by the Military Characteristics. With regard to security, menus and components of test M Packets were identified with a set of symbols (App. I-T), which were marked on each packet, and also on packages of individual components within each packet (Fig. 1). The system of identification was adequate from the standpoint of security, and it created no problems with the test participants in recognizing the foods. Although, in general, the packaging met camouflage requirements, the outer clear polyethylene bag, the white paper sugar and cream envelopes, and the silver foil fruit tablet wrapper tended to reflect light.

2. 15. 4 Analysis

a. The slight overage in gross weight encountered for Menu No. 3 is not considered of practical significance, since it is not of sufficient magnitude to cause major problems in use by the soldier. Overall, the M Packet is satisfactory from the standpoint of these Military Characteristics, including weight per packet and conformance of the M Packet and the case to specified security requirements.

b. There is a question as to the actual value of the identification system as specified in the Military Characteristics. Even though the identification of items does not depend on the use of the English language, it would appear that the enemy with the most unsophisticated intelligence system could eventually determine the country of origin and disseminate such information to his troops through normal channels. Thus, once the enemy has obtained possession of the packet, any advantage of the symbols in concealing either the identity of the country in which the M Packet was produced, or the presence of soldiers who are using the packet within enemy territory, will probably be short lived.

c. The camouflage characteristics of the outer polyethylene bag, the sugar and cream envelopes, and the fruit tablet wrapper could be improved.

SECTION 3. APPENDICES

APPENDIX I - TEST DATA

- A Correspondence between Natick Laboratories and the OTSG pertaining to Nutritional and Physiological Aspects of Consuming the M Packet**
- B Maneuver Course Obstacles**
- C Uniform and Load Configurations - Portability Tests**
- D-1 Responses to Portability Questions - Morganton Phase No. 1**
- D-2 Responses to Portability Questions - Fort Stewart Phase**
- D-3 Responses to Portability Questions - Morganton Phase No. 2**
- D-4 Responses to Portability Questions - Vieques Phase**
- E Average Percent of Each Food Consumed**
- F Extent of Consumption of M Packet Foods During Test**
- G-1 Weather Data - 1st Morganton Phase**
- G-2 Weather Data - Fort Stewart Phase**
- G-3 Weather Data - 2nd Morganton Phase**
- G-4 Weather Data - Vieques Phase**
- H Obstacles of Accelerated Wear Course**
- I Results of Previous Durability Test**
- J Minor Discrepancies in Fort Benning Shipment**
- K-1 Packet Damage - Commercial Shipment - Minneapolis to Fort Lee**
- K-2 Packet Damage - Rail Shipment - Minneapolis to Fort Lee**
- K-3 Packet Damage - Motor Shipment to Morganton, North Carolina**
- K-4 Packet Damage - Military Truck Shipment - Fort Benning to Fort Stewart**
- K-5 Packet Damage - Motor Shipment - Fort Lee to Morganton, North Carolina**
- K-6 Packet Damage - Truck and Air Shipment to Vieques Island, Puerto Rico**

- L Criteria for Judging Packet Performance
(Damage Analysis)
- M Test Configuration (Air Delivery)
- N Airdrop Data
- O Test Results (Low-Velocity Airdrops)
- P Test Results (High-Velocity Airdrop - Drop
No. 14)
- Q Test Results (Freedrop - Drop No. 15)
- R Test Results (Freedrop - Drop No. 16)
- S Menu Components
- T Identifying Symbols for M Packets and
Components

APPENDIX II - FINDINGS

APPENDIX III - DEFICIENCIES AND SHORTCOMINGS

APPENDIX IV - REFERENCES

APPENDIX V - DISTRIBUTION LIST

APPENDIX I - TEST DATA
I-A

AMXRE-FPC

SUBJECT: Integrated Engineering Service Test of "M" Packet (Food Packet, Individual, Combat) USATECOM Project 8-4-7405

TO: Commanding Officer
U.S. Army General Equipment Test Activity
Fort Lee, Virginia 23801

1. References:

- a. Letter, STEGE-ET, subject as above, dated 18 June 1965.
- b. Letter, AMXRE-FPC, subject as above, dated August 1965.
- c. Letter, AMXRE-FPC, subject: "M" Packet (Food Packet, Individual, Combat), 6 August 1965, and 1st Indorsement, MEDPS-PM (6 August 1965), dated 8 September 1965 (Inclosure).

2. Information on the extent to which subject packet meets the military characteristics cited in reference 1a is summarized below. Paragraph identifications refer to Section II, Revised Military Characteristics for subject packet. As indicated in paragraph 3, reference 1b, this information is based entirely upon present knowledge and the present state of the art.

a. Subparagraphs 1a(1) through 1a(4): Reference 1c (inclosed) provides the information and concurrence requested. It should be noted that OTSG has proposed one change in the statement (Inclosure 3 to reference 1c) prepared by NLABS and has suggested two changes in the Revised Military Characteristics (1st Indorsement to reference 1c).

b. Subparagraph 2d(1)(a)(3): Available information indicates adequate CBR protection to food components if package integrity is preserved. Contract research in progress has confirmed that the materials comprising the flexible packages are the best available for protection against CW agents. Past studies, as well as current investigation under a no-cost agreement with an industrial laboratory have confirmed the capability of properly made flexible packages to prevent penetration by bacteria. Past studies have also shown protection from fallout. If the package is damaged, however, these protective characteristics will obviously be affected.

APPENDIX I-A

AMKRE-FPC

SUBJECT: Integrated Engineering Service Test of "M" Packet (Food Packet, Individual, Combat) USATECOM Project 8-4-7405

c. Subparagraph 2d(2)(a)(2): The fiberboard shipping case used for the "M" Packet is made, sealed and metal strapped in accordance with style RCS-SL V2s of PPP-B-636. This is the standard shipping container which past experimental work and shipping experience have shown to be most suitable for meeting the requirement stated under the first sentence of this characteristic. Extensive experimentation with handling of packed cases and storage of separate component items has shown that this characteristic will be met where adequate processing has been assured and unit package integrity maintained. Although storage evaluations of the current prototype will not be completed before 4Q66, studies of predecessor experimental components have shown no significant decreases in initial palatability as the result of unrefrigerated storage. Storage properties appear to be similar to those of canned foods. It is anticipated that, where package integrity is maintained, nutrient retention during storage will be similar to that of conventionally canned items. Fortification in carriers of known stability has been employed to assure retention of vitamin A, thiamine, and ascorbic acid, while riboflavin and niacin are known to be stable.

d. Subparagraph 2d(2)(a)(4): See above, under 2a(2)(a)(2). Resistance of the entire pack to water penetration is excellent as evidenced by the fact that the flexible unit pouches are capable of withstanding retorting and are subjected to post-process tests involving immersion in water. Insect protection of the pack is good except against boring types; contract effort is being initiated to study the effectiveness of different treatments in preventing penetration by borers. Rodent protection is not complete. In this respect, attention is invited to the fact that much of the protection afforded past and present standard rations against penetration by rodents and boring insects is attributable to packaging in hermetically sealed metal cans. Previous standard rations, which were not entirely based on rigid metal packaging (e.g., the K Ration) were, thus, not afforded complete protection. Insect and rodent resistance of the prototype packs is, however, considered as good as the present state of the art permits.

FOR THE COMMANDER:

2 Incls:

1. Cy ltr 6 Aug 65
2. 1st Ind 8 Sep 65
from OTSG

GERALD C. MACDONALD
Chief,
Quality Assurance Office

APPENDIX I-A

U.S. ARMY NATICK LABORATORIES
Natick, Massachusetts

In Reply Refer To
AMKRE-FPC

6 August 1965

SUBJECT: "M" Packet (Food Packet, Individual, Combat)

TO: The Surgeon General
Department of the Army
ATTN: MEDPS-PM
Washington, D.C. 20315

1. References:

a. Revised Military Characteristics for Food Packet, Individual, Combat (See II) (Inclosure 1).

b. Letter dated 18 June 1965 from USAGETA, subject: Integrated Engineering/Service Test of "M" Packet (Food Packet, Individual, Combat) USATECOM Project 8-4-7405.

c. Telephone conversation with Colonel Boaz, your office, 6 August 1965, and correspondence discussed therein (Inclosure 2).

2. To assist in evaluating subject packet, U.S. Army General Equipment Test Activity has requested NLABS to furnish information on the extent to which subject packet meets certain characteristics set forth in reference 1a. USAGETA has further requested that information provided include specific data and reference to specific evaluations conducted by OTS and NLABS, and that statements regarding "nutritional adequacy, physiological effects and other related factors" (subparagraphs 1a(1) through 1a(4) of reference 1a) have the formal concurrence of your Office. As indicated in reference 1c, USAGETA has been informed that, in view of engineering development regulations and the time frame established, approval of subject packet by your Office - like development of it by NLABS - was based on available knowledge. A proposed summary thereof, as relevant to MC paragraphs (1) through (4), is furnished in duplicate as Inclosure 3.

3. Your concurrence in, comments on, and/or expansion of Inclosure 3 at an early date will be appreciated.

FOR THE COMMANDER:

3 Incl
as

/s/Hubert B. Hollender
for FERDINAND P. MEHRlich
Director
Food Division

I-A-3

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APPENDIX I-A

NUTRITIONAL REQUIREMENTS FOR "M" PACKET (Food Packet, Individual, Combat)

1. Paragraph 2a, AR 30-40, defines a ration as "food for the subsistence of one person for one day." Paragraph 2b, AR 30-40, defines food packets as follows:

. . . consist of precooked foods which may be eaten hot or cold. Specific packets are prepared for use during specific phases of operations. The primary factors considered in their design are maintaining minimum weight and cubage while attaining the maximum in nutrition, palatability, and utility. Food packets do not constitute a ration with- in the meaning of a above.

2. Paragraph 32, AR 40-5, sets forth basic dietary standards for rations as defined in AR 30-40. No dietary standards have yet been established for food packets. Criteria for determining "maximum" and "minimum" caloric and other nutritional values under stressful conditions precluding resupply for periods up to 7 days, in terms of which the "M" Packet has been approved, are thus based on actual, though uncontrolled, field experience during World War II, nutrition surveys during World War II, and a limited number of field and research studies under controlled conditions. Generally, these have indicated that, where a normal supply of water is available, previously well nourished, healthy young men performing physical activity have suffered no illness or significantly decreased performance as the result (a) of dietary levels significantly below that prescribed by AR 40-5, or calorically below that furnished by one "M" Packet per day, for periods in excess of 7 days, or (b) of even total absence from the diet of vitamins and trace minerals for as long as two weeks; but have also shown that no single index of "nutritional status" in respect to conduct of military operations has yet been established and that the impact of emotional factors cannot be discounted in such assessments.

3. The "maximum" (3600 calories/man/day) and "minimum" (1200 calories/man/day for not more than 7 days) nutritional values furnished by subject packet therefore, as indicated in Inclosure 3 to Inclosure 1, represent a compromise among requirements of the operational situation, the urgency of those requirements, the adequacy of available knowledge to meet them within the time frame required, and the total feeding system expected to be in practice at the time subject packet is issued to troops. The feeding system, for example, should be adequate to assure that the man is in a well nourished state before he goes into a situation which may require him to subsist on one "M" Packet a day for as long as 7 days with a normal supply of water, and it should be adequate to assure that he will be given a nutritionally complete ration when the 7-day period is over. Past experience and studies show that under such conditions the "M" Packet will adequately meet the nutritional requirements set forth in paragraphs 1a(1) through 1a(4) of the revised military characteristics.

APPENDIX I-A

4. Specific data and evaluations pertinent to the foregoing are set forth in the following:

a. Nutrition and Performance Capacity, University of Minnesota, Reports 1 through 13, 1 June 1953 - 31 May 1958, Contract No. DA44-109-qm-1526, co-sponsored by OTSG and QMF&CIAF.

b. Johnson, Robert E. and Kark, Robert M., "Feeding Problems in Man as Related to Environment, An Analysis of U.S. and Canadian Army Ration Trials and Surveys, 1941-1946" (USAMRNL and QMR&CIAF), April 1947.

c. USAMR&NL report of 1964, Fort Bragg patrol field feeding studies (in preparation).

MEDPS-PM (6 Aug 65) 1st Ind
SUBJECT: "M" Packet (Food Packet, Individual, Combat)

HQ, DA, OTSG, Washington, D.C., 20315

8 Sep 1965

TO: Commanding General, U.S. Army Natick Laboratories, ATTN: AMXRE-FPC,
Natick, Massachusetts 01762

1. Approval is given to the statements on available knowledge concerning nutritional requirements for the "M" Packet (Food Packet, Individual, Combat), attached as Inclosure 3. Attention is invited to what must be a typographical error on line 13 of paragraph 2 of this inclosure, in which the word "not" has apparently been omitted after the words "for periods." It is expected that well nourished, healthy young men performing physical activity could suffer significantly decreased performance if required to subsist on only 1200 calories per day for much longer than one week, even though no illness or permanent damage will result.
2. Although this Office previously concurred in the Revised Military Characteristics for the Food Packet, Individual, Combat, further consideration indicates the desirability of one minor and one major change in them. In paragraph 1a(1), the word "optimum" should be substituted for "maximum," to allow for the consumption of more than three "M" Packets per day when this is indicated. In paragraph 2a, the following words should be omitted: "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."
3. Situations can be imagined in which there is a requirement for more than 3600 calories per day, with sufficient "M" Packets available to provide each man with an additional packet instead of a maximum of three. When this occurs, there should be issue of four packets to avoid a caloric deficit during the period of increased need.
4. The inclusion of statements supposing severe water restriction with statements relating to rations is unwarranted because such statements are apt to be misleading, and are usually unrealistic. An adequate supply of water, no matter what the ration situation, is essential to the health and well-being of troops. Water in sufficient amounts must be provided, according to climatic conditions and the amount of physical exertion, if heat casualties are to be avoided. Men cannot be trained to exist on less water than that needed by their bodies to satisfy the laws of physics and of physiology.

FOR THE SURGEON GENERAL:

3 Incl
nc

/s/Herschel E. Griffin
/t/HERSCHEL E. GRIFFIN
Colonel, MC
Executive

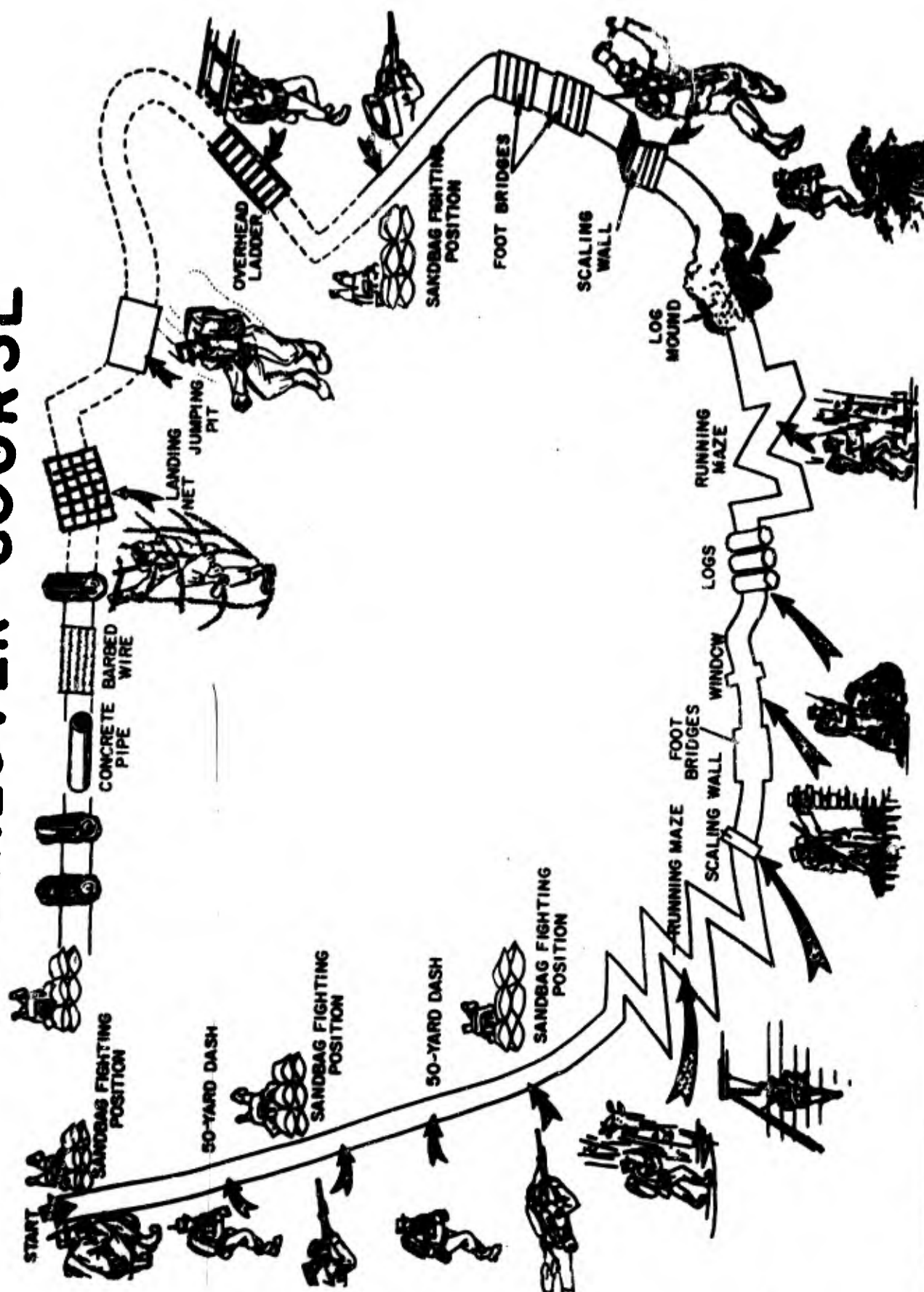
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54

I-A-6

APPENDIX I-B

MANEUVER COURSE



I-B

APPENDIX I-C

UNIFORM AND LOAD CONFIGURATIONS

<u>Item</u>	<u>Weight*</u>	
	<u>Lb</u>	<u>Oz</u>
<u>Basic Uniform - (Fighting Load)</u>		
Clothing		
Helmet w/liner	3	0
Trousers and jacket, utility	2	9
Underwear (winter) and socks	2	6
Field Jacket	2	2
Boots	4	0
Poncho, carried on pistol belt (weight differed from Inf. study.)	2	2
Subtotal	16	3
Equipment		
Rifle w/sling, M-14	9	8
Rifle - 20rd magazines w/ammo	7	14
Used M-1		
Simulated weight with 18 empty M1 shell clips, carried on pistol belt		
Two ammo pouches)	1	8
Canteen (filled w/cup and carrier)	3	9
Belt M-14 - First aid pouch)	2	0
Intrenching tool w/carrier)	4	0
Carried on pistol belt		
Bayonet w/scabbard)	1	1
Subtotal	29	8
Total	45	11

*Weight requirements for basic uniform and M61 pack are as given in A Study To Conserve The Energy of The Combat Infantryman, Report, United States Army Combat Developments Command, Infantry Agency, Fort Benning, Georgia, September 1963. Weight requirements for the rucksack were determined in consultation with personnel of the Special Warfare Center, Fort Bragg, N.C.

APPENDIX I-C

Item	Weight	
	Lb	Oz
<u>Existence Load - (w/o Rations)</u>		
M61 pack		
Basic uniform	4	3
	45	11
Weight of M61 pack and basic uniform		
	49	14
Rucksack		
Basic uniform	30	0
	45	11
Weight of rucksack and basic uniform		
	75	11
<u>Weight and Distribution of M Packets</u>		
Basic uniform w/packets		
Three packets in field jacket pockets		
@ 1 lb 1 oz	3	3
Existence Load - M61 pack		
Four packets in field jacket pockets		
@ 1 lb 1.5 oz	4	6
Two packets in pack @ 1 lb 1.5 oz	2	3
Subtotal	6	9
Existence Load - rucksack		
Four packets in field jacket pockets		
@ 1 lb	4	0
Seventeen packets in rucksack		
(Less weight of field trousers (2 lb 4 oz)	17	0
removed to make room for packets.)		
	18	12
<u>Total Weight - by Type of Uniform w/Packets</u>		
Basic uniform		
M61 pack	48	14
Rucksack	56	7
	94	7

APPENDIX I-D

DISTRIBUTION OF RESPONSES TO PORTABILITY QUESTIONS
(Army - Morganton Phase No. 1 - September 1965)

Question	Response	Number of Men Carrying Various Numbers of Packets							
		1 Pkt	2 Pkts	3 Pkts	4 Pkts	5 Pkts	6 Pkts	7 Pkts	8 Pkts
How many men carried various numbers of packets in	Pockets or clothing	29	38	8	5	-	1	-	-
	Pack	-	7	6	18	7	7	14	2
Did carrying packets in clothing restrict movements?	Yes, a great deal	-	-	-	-	-	-	-	-
	Yes, some	2	4	2	2	-	-	-	-
	No	26	34	6	2	-	1	-	-
	No answer	1	-	-	1	-	-	-	-
Did carrying packets in clothing interfere with job performance?	Yes, a great deal	-	-	-	-	-	-	-	-
	Yes, some	5	5	1	-	-	-	-	-
	No	24	33	7	5	-	1	-	-
	No answer	-	-	-	-	-	-	-	-
Was space in clothing and/or pack adequate for carrying packets?	More than adequate	9	15	5	2	-	1	-	-
	Adequate	19	18	3	2	-	-	-	-
	Not adequate	1	4	-	1	-	-	-	-
	No answer	-	1	-	-	-	-	-	-

NOTE: Clothing Worn Included - Jacket & Trousers, Utility w/o Field Jacket
Load Carrying Device - Rucksack

APPENDIX I-D

DISTRIBUTION OF RESPONSES TO PORTABILITY QUESTIONS (Army - Fort Stewart Phase - October 1965)

Question	Response	Number of Men Carrying Various Numbers of Packets							
		1 Pkt	2 Pkts	3 Pkts	4 Pkts	5 Pkts	6 Pkts	7 Pkts	8 Pkts
How many men carried various numbers of packets in	Pockets or clothing	34	24	3	4	-	1	-	1
	Pack	-	-	3	3	9	16	13	11
Did carrying packets in clothing restrict movements?	Yes, a great deal	-	-	-	-	-	1	-	-
	Yes, some	2	7	1	4	-	-	-	-
	No	31	17	1	-	-	-	-	-
	No answer	1	-	1	-	-	-	-	-
Did carrying packets in clothing interfere with job performance?	Yes, a great deal	-	1	-	-	-	-	-	-
	Yes, some	1	-	-	1	-	1	-	-
	No	32	22	3	3	-	-	-	1
	No answer	1	1	-	-	-	-	-	-
Was space in clothing and/or pack adequate for carrying packets?	More than adequate	8	4	1	1	-	-	-	-
	Adequate	21	17	2	3	-	1	-	-
	Not adequate	5	2	-	-	-	-	-	1
	No answer	-	1	-	-	-	-	-	-

NOTE: Clothing Worn Included - Jacket & Trousers, Utility w/Field Jacket
Load Carrying Device - Rucksack

APPENDIX I-D

DISTRIBUTION OF RESPONSES TO PORTABILITY QUESTIONS
(Army - Morganton Phase No. 2 - November 1965)

Question	Response	Number of Men Carrying Various Numbers of Packets							
		1 Pkt	2 Pkts	3 Pkts	4 Pkts	5 Pkts	6 Pkts	7 Pkts	8 Pkts
How many men carried various numbers of packets in	Pockets or clothing	29	77	5	6	1	-	-	3
	Pack	-	1	-	7	6	74	25	9
Did carrying packets in clothing restrict movements?	Yes, a great deal	-	-	-	-	-	-	-	-
	Yes, some	8	16	2	3	-	-	-	-
	No	21	59	3	3	1	-	-	3
	No answer	-	2	-	-	-	-	-	-
Did carrying packets in clothing interfere with job performance?	Yes, a great deal	-	-	-	-	-	-	-	-
	Yes, some	5	13	1	1	-	-	-	-
	No	24	64	4	5	1	-	-	2
	No answer	-	-	-	-	-	-	-	1
Was space in clothing and/or pack adequate for carrying packets?	More than adequate	6	11	-	1	-	-	-	-
	Adequate	20	56	5	3	-	-	-	-
	Not adequate	2	6	-	2	1	-	-	1
	No answer	1	4	-	-	-	-	-	2

NOTE: Clothing Worn Included - Jacket & Trousers, Utility w/Field Jacket
Load Carrying Device - Rucksack

APPENDIX I-D

DISTRIBUTION OF RESPONSES TO PORTABILITY QUESTIONS (Marine Corps Phase - Vieques Island - January 1966)

Question	Response	Number of Men Carrying Various Numbers of Packets			
		1 Pkt	2 Pkts	3 Pkts	4 Pkts
How many men carried various numbers of packets in	Pockets or clothing	192	64	5	21
	Pack	2	47	94	250
Did carrying packets in clothing restrict movements?	Yes, a great deal	-	1	2	-
	Yes, some	34	19	1	10
	No	153	44	2	9
	No answer	5	-	-	2
Did carrying packets in clothing interfere with job performance?	Yes, a great deal	-	1	-	-
	Yes, some	23	8	2	1
	No	169	55	3	19
	No answer	-	-	-	1
Was space in clothing and/or pack adequate for carrying packets?	More than adequate	20	6	-	2
	Adequate	144	48	4	16
	Not adequate	21	6	1	3
	No answer	7	4	-	-

NOTE: Clothing Worn Included - Jacket & Trousers, Utility w/o Field Jacket
Load Carrying Device - Standard Marine Pack (Haversack + Knapsack).

APPENDIX I-E

AVERAGE PERCENT OF EACH FOOD CONSUMED
(By Test Site and Combined Across Test Sites)

Food	Menu in which item is included	Morganton No. 1		Fort Stewart		Morganton No. 2		Vieques		All Test Sites Combined	
		No. Meals	Average Percent	No. Meals	Average Percent	No. Meals	Average Percent	No. Meals	Average Percent	No. Meals	Average Percent
Frankfurters	1, 6	238	98	246	97	393	99	1,246	95	2,123	96
Beef stew	1	127	99	127	97	188	98	584	86	1,026	91
Pork sausage	2, 4	225	96	293	95	402	95	1,116	86	2,036	90
Ground beef	2, 5	224	99	276	96	404	98	1,160	90	2,064	93
Beefsteak	3	106	98	135	97	209	98	563	89	1,013	93
Beef slices w/barbecue sauce	3, 6	216	98	256	99	414	99	1,163	89	2,049	93
Chicken loaf	4, 5	238	98	263	97	409	97	1,201	90	2,111	93
Jelly bar	1, 6	125	99	124	98	185	99	601	97	1,035	98
Cereal bar	2, 5	101	87	126	91	177	83	475	73	879	79
Fruitcake	3	107	99	126	95	199	95	560	92	1,002	94
Date pudding	4	120	91	129	93	200	91	658	85	1,007	88
Choc bar w/almonds	1, 2, 3, 5	118	99	116	97	207	98	603	94	1,044	96
Choc fudge bar	6	110	98	117	97	201	99	622	97	1,050	98

APPENDIX I-F

DISTRIBUTIONS OF INDIVIDUALS WHO CONSUMED FROM 40 TO 100 PERCENT M PACKET FOODS
(By Test Site and Feeding Group, and Combined Across Test Sites and Groups)

Question	Response (Percent of M Packet Foods)	Morganton No. 1 (Army)			Fort Stewart (Army)			Morganton No. 2 (Army)			Vieques Island (Marines)			Subtotals (All Test Groups Combined)			TOTALS All Feeding Groups (Combined)	
		1 Per Day*	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	1 Per Day	2 Per Day	3 Per Day	No.	Percent
What percent of M Packet foods did you consume?	100	18	33	26	12	12		60			114	57	171	165	143	183	491	63.7
	90	59	2	0	2	2		54			29	48	32	90	102	34	226	29.5
	80	3	0	0	0	0		13			1	10	4	4	23	4	31	0.0
	70	4	0	0	0	2		0			0	4	3	4	4	5	13	0.17
	60	0	0	0	0	0		1			1	0	0	1	1	0	2	0.2
	50	1	0	0	0	0		0			0	1	3	1	1	3	5	0.4
	40	0	1	0	0	0		0			0	1	2	1	1	2	4	0.5

*This group was also on two packets per man per day after the first 3 days of testing.

APPENDIX I-G

WEATHER OBSERVATIONS Pisgah Forest, Morganton, N.C. 1st Field Use Phase September 1965

Date	Time	Temperature (°F)	Humidity (Percent)	Weather Conditions	Wind Speed (mph)
11 Sep	0800	72	96	Cloudy	1
	1200	*			*
	1800	79	72	Cloudy	1
12 Sep	0800	75	98	Cloudy-Rain	2
	1200	75	94	Cloudy-Rain	0
	1800	72	100	Cloudy-Rain	0
13 Sep	0800	69	100	Cloudy-Foggy	1
	1200	79	98	Cloudy	½
	1800	86	75	Cloudy	0
14 Sep	0800	69	93	Hazy	½
	1200	*			*
	1800	*			*
15 Sep	0800	68	100	Clear	½
	1200	85	58	Clear	7
	1800	78	75	Clear	½
16 Sep	0800	73	87	Clear	0
	1200	85	70	Clear	1
	1800	80	61	Clear	2
17 Sep	0800	71	100	Hazy	0
	1200	80	61	Clear	0
	1800	79	54	Cloudy	0
18 Sep	0800	72	100	Cloudy-Overcast	0
	1200	78	69	Clear	0
	1800	73	56	Clear	1
Average		76	82		

* No record made.

APPENDIX I-G

Fort Stewart, Georgia
2nd Field Use Phase
October 1965

Date	Time	Temperature (°F)	Humidity (Percent)	Weather Conditions	Wind Speed (mph)
8 Oct	0800	63	85	Clear	11.6
	1200	77	60	Clear	16.2
	1800	73	64	Hazy	4.6
9 Oct	0800	66	89	Rain	8.1
	1200	81	55	Sunny-Clear	13.9
	1800	77	60	Sunny-Clear	2.3
10 Oct	0800	63	73	Sunny-Clear	3.4
	1200	71	66	Sunny-Clear	11.6
	1800	71	72	Sunny-Clear	0
11 Oct	0800	60	84	Clear	0
	1200	77	52	Sunny-Clear	0
	1800	69	74	Sunny-Clear	0
12 Oct	0800	63	85	Sunny-Clear	0
	1200	79	67	Sunny-Clear	3.4
	1800	80	50	Sunny-Clear	2.3
13 Oct	0800	66	88	Hazy	0
	1200	77	58	Hazy	0
	1800	71	76	Sunny-Clear	4.6
14 Oct	0800	66	90	Sunny-Clear	2.3
	1200	81	60	Rain	13.9
	1800	73	78	Sunny-Clear	0
15 Oct	0800	69	83	Sunny-Clear	0
	1200	79	70	Sunny-Clear	0
	1800	73	70	Sunny-Clear	0
Average		72	71		

APPENDIX I-G

Pisgah Forest, Morganton, N.C.
3rd Field Use Phase
December 1965

Date	Time	Temperature (°F)	Humidity (Percent)	Weather Condition	Wind Speed (mph)
4 Dec	1200	35	34	Clear	30
	1800	42	40	Overcast	6
	2200	42	42	Clear	0
5 Dec	0800	38	40	Clear	5
	1200	55	30	Clear	5
	1800	41	34	Clear	8
6 Dec	0800	53	31	Clear	11
	1200	56	45	Clear	5
	1800	39	42	Cloudy	5
7 Dec	0800	19	34	Clear	3
	1200	43	32	Clear	4
	1800	37	39	Clear	7
8 Dec	0800	19	29	Clear	2
	1200	54	37	Clear	5
	1800	46	41	Clear	2
9 Dec	0800	25	100	Clear	4
	1200	57	34	Clear	0
	1800	44	40	Clear	8
10 Dec	0800	28	64	Clear	2
	1200	54	31	Clear	6
	1800	49	57	Clear	6
Average		42	63		

APPENDIX I-G

Official Weather Report
Obtained from
Roosevelt Roads, Naval Station, Puerto Rico
January 1966

Date	Time	Dry Bulb	Wet Bulb	Relative Humidity (Percent)	Precipitation (inches)	Wind Speed (Knots)
22 Jan	0052	72	69	87	0	00
	0452	72	69	84	0	00
	0852	81	75	74	0	00
	1252	84	74	63	0	00
	1652	82	74	67	0	00
	2052	76	71	76	0	00
23 Jan	0052	75	70	79	0	02
	0452	74	70	82	0	03
	0852	82	74	69	0	05
	1252	86	75	59	0	09
	1652	83	73	61	0	08
	2052	72	67	79	0	00
24 Jan	0052	69	66	84	0	00
	0452	69	67	90	0	00
	0852	86	73	72	0	00
	1252	86	75	59	0	07
	1652	84	73	59	0	06
	2052	70	72	84	0	00
25 Jan	0052	72	70	90	0	00
	0452	71	70	93	0	00
	0852	79	78	97	0	03
	1252	84	75	67	0	06
	1652	82	75	72	0	06
	2052	77	73	82	0	02
26 Jan	0052	73	70	87	0	00
	0452	76	72	82	0	03
	0852	81	74	72	0	04
	1252	82	75	72	0	06
	1652	83	75	70	0	06
	2052	78	74	82	0	05
27 Jan	0052	76	72	85	0	03
	0452	74	71	87	0	00
	0852	81	75	77	0	06
	1252	85	75	63	0	08
	1652	83	75	67	0	08
	2052	74	70	82	0	00
28 Jan	0052	70	67	87	0	00
	0452	70	67	87	0	00
	0852	76	74	90	0	04
	1252	78	73	79	.01	10
	1652	74	73	93	0	06
	2052	76	73	87	.10	12
Average		78		78		

APPENDIX I-H

OBSTACLES OF DESIGN AND FABRIC COURSES IN SEQUENCE USED

1. Sand prones
2. Railroad cinder crawl
3. Belgian block embankment
4. Sand prones
5. Slit trench
6. Monkey climb
7. Sand prones
8. Gravel crawl
9. Road block
10. Rock parapet
11. Sand prones
12. Wooden slide
13. Wooden slide
14. Tank trap
15. Up and over boxes
16. Twenty-five-yard combat crawl

APPENDIX I-I

NUMBER OF M PACKET ITEMS CARRIED AND DAMAGED DURING A MAXIMUM OF FIVE TRAVERSALS OF SELECTED OBSTACLES OF GETA DESIGN AND FABRIC COURSES (Engineer-Design Test Conducted November-December 1964)

Food	Number	Number of Packages Carried	Type of Damage and Number of Packages Damaged				
			Crushing of Contents (Minor)	Pinholes in Package Wall (Minor)	Puncture or Tear in Wall or Seal w/Slight Damage or Leakage (Minor)	Puncture or Tear in Wall or Seal w/Moderate or Excessive Damage or Leakage (Major)	
						No.	Percent
Frankfurters	1,3,6	108	1	-	-	-	-
Beef stew	1	36	-	-	1	2	5.6
Link sausage	2,4	72	-	1	-	2	2.8
Ground beef in sauce	2,5	72	1	1	3	5	6.9
Beefsteak	3	36	-	-	-	-	-
Chicken loaf	4,5	72	-	1	3	1	1.4
Barbecued beef	6	36	-	1	3	-	-
Fruitcake	3	36	11	1	5	-	-
Date pudding	4	36	9	-	2	1	2.8
Accessory pack	ALL	216	3	8	24	20	9.2

APPENDIX I-J

MINOR DISCREPANCIES NOTED DURING DAMAGE ANALYSIS OF 22 CASES (OF 700 CASES) OF M PACKETS SHIPPED FROM MINNEAPOLIS, MINNE- SOTA TO FORT BENNING, GEORGIA, BY MOTOR FREIGHT

There were 49 unmarked Menu components in 11 cases of 22 cases in-
spected.

One case contained five components of Menu No. 4 and three of Menu
No. 5.

In a total of 7 cases, 22 M Packet covers were not sealed.

In a total of 7 cases, 20 M Packet covers were punctured.

Identifying symbols were not printed on individual packages of cream,
sugar, or coffee. These packages were not camouflage color.

APPENDIX I-K

PACKET DAMAGE
SHIPMENT FROM MINNEAPOLIS TO FORT LEE
BY COMMERCIAL AIR
(100-Percent Inspection of Five Randomly Selected
Shipping Cases Showing No Exterior Damage)

Item	Menu in which Item is Included	Total Number Inspected	Type of Damage and No. of Items Damaged			
			Crimped Seal No Leakage	Abrasion	Sweller	Well Punctured Excessive
Frankfurters	1,6	40	4	1	-	-
Beefstew	1	20	1	-	-	-
Pork sausage	2,4	40	4	-	-	-
Ground beef w/sauce	2,5	40	2	-	1	-
Beefsteak	3	20	-	-	-	1
Beef slices w/ barbecue sauce	3,6	40	2	-	-	-
Chicken loaf	4,5	40	3	2	-	-
TOTAL		240	16	3	1	1

Overall Percent Damaged: 8.7

Note: None of a total of 50 cases shipped by commercial air showed evidence of exterior shipping damage.

APPENDIX I-K

SHIPMENT FROM MINNEAPOLIS TO FORT LEE
BY RAIL FREIGHT
(100-Percent Inspection of 27 Randomly Selected
Shipping Cases Showing No Exterior Damage)

Item	Menu in which Item is Included	Total Number Inspected	Type of Damage and Number of Items Damaged			
			Crimped Seal	Wall Puncture w/Slight Leakage	Wall Puncture w/Moderate Leakage	Sweller
Frankfurters	1,6	216	7	1	-	-
Beef stew	1	108	3	-	1	1
Pork sausage	2,4	216	8	-	-	-
Ground beef w/sauce	2,5	216	3	1	-	-
Beefsteak	3	108	-	-	-	-
Beef slices w/ barbecue sauce	3,6	216	3	-	-	-
Chicken loaf	4,5	216	-	-	-	-
TOTAL		1,296	24	2	1	1

Overall Percent Damaged: 1.6

Note: In addition to the above, eight of 750 cases examined showed shipping damage to the case. A 100-percent inspection of the contents of these cases, however, showed only two items to be damaged. These were one packet of frankfurters and one packet of pork sausage, each of which had a crimped seal.

APPENDIX I-K

SHIPMENT FROM FORT LEE TO FORT BRAGG AND MORGANTON, N.C.
 BY MOTOR EXPRESS AND MILITARY TRUCK
 (100-Percent Inspection of 50 Cases of Packets - September 1965)

Item	Menu in which Item is Included	Total No. Inspected	Type of Damage and Number of Items Damaged				
			Wall Puncture Slight	Strained Seal	Crimped Seal	Sweller	Abrasion
Frankfurters	1,6	400	1	-	-	-	-
Beef stew	1	200	-	4	-	3	-
Pork sausage	2,4	400	6	-	-	3	2
Ground beef w/sauce	2,5	400	2	-	-	-	1
Beefsteak	3	200	1	-	5	-	-
Beef slices w/ barbecue sauce	3,6	400	1	-	1	3	3
Chicken loaf	4,5	400	1	-	-	1	3
TOTAL		2,400	12	4	6	10	9

Overall Percent Damaged: 1.7

APPENDIX I-K

SHIPMENT FROM FORT BENNING, GA. TO FORT STEWART, GA.
BY MILITARY TRUCK
(100-Percent Inspection of 88 Cases of M Packets - October 1965)

Item	Menu in which Item is Included	Total No. Inspected	Type of Damage and Number of Items Damaged			
			Seal Failure (Slight Leakage)	Wall Punc- ture Slight	Wall Punc- ture Moderate	Sweller Abrasion
Frankfurters	1,6	704	4	1	-	8
Beef stew	1	352	3	-	1	1
Pork sausage	2,4	704	1	3	-	2
Ground beef w/sauce	2,5	704	-	3	-	-
Beefsteak	3	352	-	-	-	1
Beef slices w/ barbecue sauce	3,6	704	1	2	-	6
Chicken loaf	4,5	704	1	3	-	3
TOTAL		4,224	10	12	1	21

Overall Percent Damaged: 1.1

APPENDIX I-K

SHIPMENT FROM FORT LEE TO MORGANTON, N.C.
 BY MOTOR FREIGHT AND MILITARY TRUCK
 (100-Percent Inspection of 147 Cases of M Packets - December 1965)

Item	Menu in which Item is Included	Total No. Inspected	Type of Damage and Number of Items Damaged			
			Seal Failure Slight Leakage	Crimped Seal	Sweller	Wall Puncture Slight Moderate
Frankfurters	1,6	1,176	1	-	-	-
Beef stew	1	588	4	-	12	2
Pork sausage	2,4	1,176	5	-	3	1
Ground beef w/sauce	2,5	1,176	-	1	1	-
Beefsteak	3	588	1	2	-	-
Beef Slices w/ barbecue sauce	3,6	1,176	2	1	1	1
Chicken loaf	4,5	588	6	-	-	1
TOTAL		6,468	19	4	17	4 2

Overall Percent Damaged: 0.7

APPENDIX I-K

SHIPMENT FROM FORT LEE AND QUANTICO, VA., TO CAMP LEJEUNE
AND CHERRY POINT, N.C. AND TO VIEQUES ISLAND, PUERTO RICO
METHODS OF SHIPMENT: COMMERCIAL AND MILITARY TRUCK AND MILITARY AIR
(100-Percent Inspection of 403 Cases of M Packets - January 1966)

Item	Menu in which Item is Included	Total No. Inspected	Type of Damage and Number of Items Damaged									
			Seal Failure (Slight Leakage)	Seal Failure (Moderate Leakage)	Seal Failure (Excess Leakage)	Wall Puncture (Slight)	Wall Puncture (Moderate)	Wall Puncture (Excessive)	Crimped Seal	Sweller (Gas Formation)	Abrasion	
Frankfurters	1,6	3,224	3	-	1	1	1	-	-	9	-	-
Beef stew	1	1,612	9	4	4	1	1	-	-	-	7	-
Pork sausage	2,4	3,224	2	-	-	7	1	-	-	1	5	1
Ground beef w/sauce	2,5	3,224	2	4	-	4	-	-	-	-	-	1
Beefsteak	3	1,612	1	-	-	1	-	-	-	-	-	-
Beef slices w/ barbecue sauce	3,6	3,224	4	5	-	7	3	-	-	6	-	-
Chicken loaf	4,5	3,224	6	-	-	7	2	1	-	5	2	3
TOTAL		19,344	27	13	5	28	8	1	-	21	19	6

Overall Percent Damaged: 0.7

APPENDIX I-L

CRITERIA FOR JUDGING PACKET PERFORMANCE

(Damage Analysis)

- Abrasion - Scars or gouging in packet surface (but not all the way through); deep scratches or pinhole sized pockmarks (not punctured all the way through).
- Wrinkled Seals - Seals which have not adhered uniformly all along the sealing edge; ridges or undulated surfaces present. However, wrinkled seals are not leaking seals.
- Dirty Packages - Packages to which various colored stains have adhered during retorting.
- Strained Seals - Seals the inner portion of which have separated, allowing product to seep in between the upper and lower layers of the seal. However, the product had not, in any such case, pushed through the seal and leaked out.
- Gas Formation - Swollen package.

APPENDIX I-M
TEST CONFIGURATIONS
(Air Delivery)

Configuration Number	Type Container(s)	Skid	Energy Dissipator	Load Spreader
1	A-7A	None	None	None
2	A-7A	None	Two layers of honeycomb	None
3	A-21	None	None	None
4	A-21	3/4"-plywood, 30"x36"	Base layer of three 3"x36" strips of honeycomb	3/4"-plywood 30"x36"
5	A-21	3/4"-plywood, 30"x36"	Six layers of cellulose wadding under each layer of test items	None
6	A-22	3/4"-plywood, 48"x48"	None	None
7	A-22	3/4"-plywood, 48"x48"	Three layers of felt sheeting under each layer of test items	None
8	Two A-22's	8-ft combat expendable platform	Two layers of honeycomb between platform and test items	None
9	None	8-ft aluminum modular load bearing platform	Two layers of honeycomb between platform and test items	None

APPENDIX I-N

AIRDROP DATA

Drop No.	Type Acft	Air Speed (knots)	Ord Wind (knots)	Altitude (feet)	Configuration (Table I)	Load (No. Test Items)	Rigged Weight (lbs)	Type Parachute	Impact Surface	Remarks
1	C-130E	130	4-6	1500	6	36	1389	G-12D	Sand	Malfunction occurred resulting in free fall.
2	CV-7A	110	7	1500	6	60	2189	G-12D	Sand	
3	CV-7A	110	5-7	1500	6	60	2189	G-12D	Sand	
4	CV-7A	110	8-10	1500	6	36	1409	G-12D	Sand	
5	CV-7A	110	5-8	1500	4	12	488	G-13	Sand	
6	CV-7A	110	4-6	1500	2	12	487	G-13	Sand	
7	CV-7A	110	5	1500	5	12	485	G-13	Sand	
8	CV-7A	85	2-4	15	8	36	1528	15' Extr.	Unpaved Runway	LOLEX*
9	C-130E	130	6-8	1500	7	27	1097	G-12D	Sand	
10	C-130E	130	4-7	1500	1	12	443	G-13	Sand	
11	C-141A	130	4-6	1500	9	90	3503	G-11	Sand	
12	UH-1B	70	3-5	1000	6	27	1097	G-12D	Sand	Sling loaded
13	UH-1B	70	3-5	1000	1	12	443	G-13	Sand	
14	UH-1B	70	3-5	1000	2	4	186	68" Pilot	Sand	High velocity airdrop
15	UH-1B	60	3-5	100	1	4	138	None	Sand	Free fall
16	UH-1B	60	3-5	100	None	1	32.5	None	Sand	Free fall

* Low-level extraction.

APPENDIX I-O

TEST RESULTS
(Low-Velocity Airdrops)

Drop No.	No. of Damaged Cases Inspected	No. of Ruptured Meat Packets	No. of Ruptured Dessert and Accessory Packets	No. of Punctured Polyethylene Bags
1	36 (Malfunction drop, 2 cases inspected showed 100-percent failure of meat packets, dessert, and accessory packets and polyethylene bags)			
2	5	2	0	69
3	5	1	0	76
4	4	0	0	55
5	2	1	0	27
6	2	0	0	28
7	4	2	0	49
8	4	2	0	68
9	2	1	0	25
10	3	0	0	41
11	6	2	0	81
12	9	0	0	0
13	4	0	0	0

APPENDIX I-P

TEST RESULTS (High-Velocity Airdrop - Drop No. 14)

Item	No. of Items	Number Undamaged	Failures		Number of Items Damaged		
			Number	Percent	Seal Failure	Wall Failure	Seal and Wall Failure
Frankfurters	32	21	11	34	8	2	1
Beef stew	16	7	9	56	7	1	1
Pork sausage	32	29	3	9	2	0	1
Ground beef in sauce	32	15	17	53	7	1	9
Beefsteak	16	16	0	0	0	0	0
Beef slices w/ barbecue sauce	32	11	21	66	17	2	2
Chicken loaf	32	24	8	25	3	2	3
Date pudding	16	16	0	0	0	0	0
Fruitcake	16	16	0	0	0	0	0
Accessory pack	96	96	0	0	0	0	0

APPENDIX I-Q
TEST RESULTS
(Freedrop - Drop No. 15)

Item	No. of Items	Number Undamaged	Failures		Number of Items Damaged		
			Number	Percent	Seal Failure	Wall Failure	Seal and Wall Failure
Frankfurters	32	4	28	87	10	8	10
Beef stew	16	3	13	81	5	1	7
Pork sausage	32	15	17	53	7	3	7
Ground beef in sauce	32	6	26	81	8	8	10
Beefsteak	16	6	10	63	4	4	2
Beef slices w/ barbecue sauce	32	4	28	87	6	6	16
Chicken loaf	32	14	18	56	6	5	7
Date pudding	16	13	3	19	1	1	1
Fruitcake	16	16	0	0	0	0	0
Accessory pack	96	82	14	15	13	1	0

APPENDIX I-R

TEST RESULTS (Freedrop - Drop No. 16)

Item	No. of Items	Number Damaged	Failures			Number of Items Damaged		
			Number	Percent		Seal Failure	Wall Failure	Seal and Wall Failure
Frankfurters	8	2	6	75		1	2	3
Beef stew	4	1	3	75		1	1	1
Pork sausage	8	2	6	75		0	1	5
Ground beef in sauce	8	0	8	100		0	0	8
Beefsteak	4	0	4	100		0	0	4
Beef slices w/ barbecue sauce	8	2	6	75		1	1	4
Chicken loaf	8	0	8	100		0	0	8
Date pudding	4	4	0	0		0	0	0
Fruitcake	4	4	0	0		0	0	0
Accessory pack	24	23	1	4		0	1	0

APPENDIX I-S

M PACKET MENUS AND COMPONENTS

<u>Menu No. 1</u>	<u>Net Wt /unit (oz)</u>	<u>No. units /menu</u>	<u>Menu No. 4</u>	<u>Net Wt /unit (oz)</u>	<u>No. units /menu</u>
Frankfurters	4.50	1	Chicken loaf	4.50	1
Beef stew	4.50	1	Pork sausage	4.25	1
Choc bar/ almonds	1.00	2	Date pudding	3.50	1
Starch jelly bar	2.00	1	Fruit tablets	1.00	1
Fruit tablets	1.00	1	Coffee	0.09	1
Coffee	0.09	1	Cream sub, dry	0.14	1
Cream sub, dry	0.14	1	Sugar	0.21	1
Sugar	0.21	1			
<u>Menu No. 2</u>			<u>Menu No. 5</u>		
Pork sausage	4.25	1	Chicken loaf	4.50	1
Gr beef/sauce	4.50	1	Gr beef/sauce	4.50	1
Fruit cereal bars	1.50	2	Fruit cereal bars	1.50	2
Choc bar/ almonds	1.00	1	Choc bar/ almonds	1.00	1
Coffee	0.09	1	Coffee	0.09	1
Cream sub, dry	0.14	1	Cream sub, dry	0.14	1
Sugar	0.21	1	Sugar	0.21	1
<u>Menu No. 3</u>			<u>Menu No. 6</u>		
Beefsteak	4.50	1	Frankfurters	4.50	1
Beef slices/ barb sauce	4.50	1	Beef slices w/ barb sauce	4.50	1
Fruitcake	3.50	1	Choc Fudge bar	1.75	1
Choc bar/ almonds	1.00	2	Starch jelly bar	2.00	1
Fruit tablets	1.00	1	Fruit tablets	1.00	1
Coffee	0.09	1	Coffee	0.09	1
Cream sub, dry	0.14	1	Cream sub, dry	0.14	1
Sugar	0.21	1	Sugar	0.21	1

APPENDIX I-T

IDENTIFYING SYMBOLS FOR M PACKETS AND COMPONENTS



BEEF STEAK



FRUIT CAKE



BEEF STEW



DATE PUDDING



BEEF SLICES IN
BARBECUE FLAVORED
SAUCE



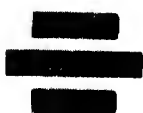
ACCESSORY
PACKETS



CHICKEN LOAF



COFFEE



FRANKFURTERS



COFFEE CREAM



SAUCE WITH
GROUND BEEF



SUGAR



PORK SAUSAGE

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 (II. 1. a. (1)).	Not fully determined (Par. 2.2.3).
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 (II. 1. a. (2)).	Requirement met provided field jacket and pack are worn. Otherwise a maximum of two packets can be carried (Par. 2.3.4).
3. "(Essential) Shall not induce detrimental physiological effects that cannot be counteracted by a short period of recuperation without evacuation from assigned unit (II. 1. a. (3)).	Not fully determined (Par. 2.2.3).
4. "(Essential) Shall not cause unacceptable loss of efficiency; shall not interfere with satisfactory performance of the missions cited in the Operational Concept (II. 1. a. (4)).	Requirement met (Par. 2.3.4 d).
5. "(Essential) Shall be sufficiently palatable to assure consumption (II. 1. a. (5)).	Requirement met except that acceptability of cereal bar is low (Par. 2.4.4 b and Tables V through VIII).
6. "(Essential) Shall not contain unduly thirst provoking components (II. 1. a. (6)).	Requirement met (Par. 2.6.4 and Tables X and XI).

APPENDIX II

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Military Characteristics	Findings
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 (II. 2. a.).	Requirement met (unlimited water supply provided).
8. "(Essential) Shall have flexible packaging; the food packet size shall be the smallest possible, commensurate with other requirements (II. 2. a. (1) (a)).	Requirement met (Par. 2.3.4 and 2.15.4). However, see paragraphs 2.13.3 and 2.13.4.
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 (II. 2. a. (1) (b)).	Requirement met (Par. 2.3.4).
10. "(Essential) Shall have maximum variety of components consistent with considerations of size, weight, nutritional requirements and highest acceptability (II. 2. a. (1) (c)).	Requirement met (Par. 2.4.4 c and Table VIII).
11. "(Essential) Shall contain a stimulating coffee-type beverage base suitable for consumption hot or cold (II. 2. a. (1) (d)).	Requirement met (Par. 2.15).
12. "(Essential) All components (other than coffee-type) shall be suitable for consumption in their original state (II. 2. a. (1) (e)).	Requirement met (Par. 2.15).

APPENDIX II

Military Characteristics	Findings
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 (II. 2. a. (1) (f)).	Requirement met with regard to intermediate conditions (Par. 2.4.4).
14. "(Essential) All packaging shall be of dull, non-reflecting, easily disposable material (II. 2. a. (1) (g)).	Requirement met. However, camouflage characteristics of some items could be improved (Par. 2.15).
15. "(Essential) Components shall be non-perishable in nature (II. 2. a. (1) (h)).	Requirement met (Par. 2.11).
16. "(Essential) Gross weight per packet shall not exceed one pound two ounces (II. 2. b. (1)).	Requirement met (Par. 2.15.3).
17. "(Essential) Shall require no preparation except to add cold water to beverage components (II. 2. c. (1)).	Requirement met (Par. 2.15).
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 (II. 2. d. (1) (a) (1)).	Requirement met (Par. 2.5.4).
19. "(Essential) Configuration of the food packet shall be flat so that it can easily be carried on the person (II. 2. d. (1) (a) (2)).	Requirement met (Par. 2.3.4 b and 2.15.3).

APPENDIX II

Military Characteristics		Findings
20. "(Essential) Shall provide CBR protection to the food components for a period of one day (II. 2. d. (1) (a) (3)).		Requirement met (Par. 2.7.4).
21. "(Essential) Shall be suitable for transport by all available means including delivery by air (II. 2. d. (2) (a) (1)).		Requirement met. However, the free-fall method of air delivery is marginal due to high rate of failure (Par. 2.10.4.3 and 2.10.4.4).
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 (II. 2. d. (2) (b) (2)).		Requirement met (Par. 2.11.3, 2.11.4, and 2.15.3).
23. "(Essential) Shall be capable of withstanding military handling during transportation and storage prior to use (II. 2. d. (2) (a) (3)).		Requirement met (Par. 2.9.4).
24. "(Essential) Shall provide water, insect and rodent resistance (II. 2. d. (2) (a) (4)).		Requirement met (Par. 2.8.4).
25. "(Essential) Food packets shall be compatible with established camouflage requirements (II. 2. e. (1) (a)).		Requirement met (Par. 2.15).
26. "(Essential) Service identification and manufacturer's codes shall be placed on the shipping cases only (II. 2. e. (1) (b)).		Requirement met (Par. 2.15).

APPENDIX II

Military Characteristics	Findings
<p>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 packets components, if required, shall be available in each shipping case, but not within or on the encased items. (II. 2. e. (1) (c)).</p>	<p>Requirement met (Par. 2.15).</p>

APPENDIX III. DEFICIENCIES AND SHORTCOMINGS

1. DEFICIENCIES

<u>Deficiency</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
1.1 Experience during test suggests a possible safety hazard to the user due to faulty processing of M Packets at the point of manufacture or assembly (Par. 2.2.3).	Bring about those improvements or refinements in processing methods and techniques which are necessary to assure provision of M Packets for delivery to the user which are as free from material and processing defects as present knowledge and the current state-of-the-art will permit. Also, provide specific instructions, or a device, with the M Packet which will enable the user to detect packets which may contain spoiled food.	None

2. SHORTCOMINGS

<u>Shortcoming</u>	<u>Suggested Corrective Action</u>	<u>Remarks</u>
2.1 The cereal bar in Menu No. 2 and No. 5 is unacceptable (Par. 2.4.4b and Table VII).	Substitute a more acceptable item or improve the palatability of the cereal bar, if possible.	None
2.2 The M Packet is only marginally suitable for freedrop air delivery (Par. 2.10).	None.	None

APPENDIX IV. REFERENCES

1. Section II, Revised Military Characteristics for Food Packet, Individual, Combat (M Packet).
2. Minutes of In-Process Review - Combat Feeding Systems, dated 23 March 1964.
3. Letter, U.S. Army Natick Laboratories, AMXRE-FPC, 6 August 1965, subject: "Integrated Engineering/Service Test of M Packet (Food Packet, Individual, Combat) USATECOM Project 8-4-7405."
4. Letter, U.S. Army Natick Laboratories, AMXRE-FPC, 7 August 1964, subject: M Packet (Food Packet, Individual, Combat); 1st Indorsement, Headquarters, Office of The Surgeon General, MED-PE, 21 August 1964; 2d Indorsement, U.S. Army Natick Laboratories, AMXRE-FPC, 22 December 1964, and 3rd Indorsement with 3 inclosures, Office of The Surgeon General, MED-PS-PE, 5 January 1965.
5. Letter, U.S. Army Natick Laboratories, AMXRE-FPC, February 1966, subject: "Integrated Engineering/Service Test of M Packet (Food Packet, Individual, Combat) USATECOM Project 8-4-7405."
6. Letter, U.S. Army General Equipment Test Activity, STEGE-ET, 10 September 1965, subject: "Safety Release Information - M Packet (Food Packet, Individual, Combat), USATECOM Project 8-4-7405."
7. Letter, U.S. Army Test and Evaluation Command, AMSTE-BC, 5 May 1965, subject: "Test Directive, Integrated Engineering/Service Test and Integrated ET/ST, Arctic, USATECOM Project No. 8-4-7405, DA Project 1M643303D54817."
8. Letter, U.S. Army Test and Evaluation Command, AMSTE-BG, 19 May 1965, subject: "Test Directive Amendment."
9. Plan of Test of M Packet (Food Packet, Individual, Combat), Integrated Engineering/Service Test, Intermediate Conditions, USATECOM Project No. 8-4-7405-04/05/06, U.S. Army General Equipment Test Activity, Fort Lee, Virginia, August 1965.

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10. Letter, U.S. Army General Equipment Test Activity, STEGE-ET, 8 October 1965, subject: "Changes to Plan of Test for Engineering/Service Test of M Packet (Food Packet, Individual, Combat) Intermediate Conditions, USATECOM Project No. 8-4-7405, D/A Project 1M643303D548."
11. Memo for Record, CDCSWA-MR/1083, U.S. Army Combat Developments Command, 28 June 1965, subject: "Plan of Service Test for Food Packet, Individual, Combat (M-Packet)."
12. Revised Military Characteristics for Food Packet, Individual, Combat, Section II, Item 2414/10-64.
13. Military Standard 669, "Air Delivery Loading Environment and Related Requirements for Military Materiel," 2 November 1961.
14. Army Regulation 705-35, "Criteria for Air Portability and Air Drop Materiel," 15 June 1964.
15. TM 10-500, "Airdrop of Supplies and Equipment: General," 7 May 1965.
16. TM 10-500-3, "Rigging Supplies and Equipment for Low Level Extraction (LOLEX) from the CV-2B (Caribou) Army Airplane," 14 May 1965.
17. TM 10-500-6, "Airdrop of Supplies and Equipment from Army Aircraft 0-1E, U-6A, U-1A, UH-19D, CH-21C, CH-34A, and CH-37A," 6 January 1964.
18. TM 10-500-12, "Airdrop of Supplies and Equipment: Rigging Typical Supply Loads," 21 October 1965.
19. TM 10-500-55, "Air Delivery of Supplies and Equipment: Rigging Typical Mass Loads of POL and Rations for High Velocity Drop," 24 October 1961.
20. Burt, Thomas B., Final Report of Engineer Design Test of M Packet (Food Packet, Individual, Combat) Technical Report, USATECOM Project No. 8-4-7405-01K, U.S. Army General Equipment Test Activity, Fort Lee, Virginia, February 1965.

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21. A Study to Conserve the Energy of the Combat Infantryman, Report, United States Army Combat Developments Command, Infantry Agency, Fort Benning, Georgia, September 1963.
22. Gruber, Alin et al, Development of A Methodology for Measuring Infantry Performance in Maneuverability, Fourth Partial Report of USATECOM Project No. 8-3-7700-0IE, Phase II, U.S. Army General Equipment Test Activity, Fort Lee, Virginia.

APPENDIX V. DISTRIBUTION LIST

USATECOM PROJECT 8-4-7405-04/05/06

<u>Agency</u>	<u>Test Plan</u>	<u>Nonfinal Reports</u>	<u>Final Reports</u>
Commanding General U.S. Army Materiel Command ATTN: AMCRD-DM-E Washington, D.C. 20315	5*		5* 3*
Commanding General U.S. Army Natick Laboratories ATTN: Review & Analysis Division Natick, Massachusetts 01762	5	2	20
Commanding Officer U.S. Army Human Engineering Laboratories Aberdeen Proving Ground, Maryland 21005			1
Commanding General U.S. Army Supply & Maintenance Command ATTN: AMSSM-MR Washington, D.C. 20315	1	1	1
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Commanding General U.S. Army Test & Evaluation Command Aberdeen Proving Ground, Maryland 21005	30	13	30
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APPENDIX V

<u>Agency</u>	<u>Test Plan</u>	<u>Nonfinal Reports</u>	<u>Final Reports</u>
President U.S. Army Infantry Board Fort Benning, Georgia 31905	1	1	1
President U.S. Army Airborne, Electronics and Special Warfare Board Fort Bragg, North Carolina 28307	1	1	1
Commanding Officer U.S. Army Tropic Test Center P.O. Drawer 942 Fort Clayton, Canal Zone	1	1	1
Commandant U.S. Army Infantry School ATTN: AJIIS-M Fort Benning, Georgia 31905			1
Commanding General U.S. Continental Army Command Fort Monroe, Virginia 23351			1
Commanding General U.S. Continental Army Command ATTN: DCSIT-SCH-PD Fort Monroe, Virginia 23351			4
Commanding General U.S. Strike Command MacDill Air Force Base, Florida 33608			1
Commanding General U.S. Army Alaska APO Seattle 98749			1

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Director Marine Corps Landing Force Development Center Quantico, Virginia 22134	1	1	1
Commander Defense Documentation Center for Scientific & Technical Information ATTN: Document Service Center Cameron Station, Alexandria, Virginia 22313			20
British Liaison Officer, USATECOM c/o Director of Munitions British Embassy 3100 Massachusetts Avenue, N.W. Washington, D.C. 20315	6		6
Canadian Liaison Officer c/o Commanding General U.S. Army Materiel Command Washington, D.C. 20315	2		5
U.S. Army Standardization Group, U.K. ATTN: Inf/Abn Box 65, Navy 100 FPO N.Y. New York, New York			1
Office of Military Attache Australian Embassy 1735 I Street Washington, D.C. 20006			5

<p>AD</p> <p>U.S. Army General Equipment Test Activity, Fort Lee, Virginia</p> <p>UNCLASSIFIED</p> <p>1. Food 2. Rations (Military) I. Title II. Burt, Thomas B. Bouda, John A., Major Magill, Wm. F., Captain TECOM Project No. 8-4-7405-04/05/06 IV. M Packet</p>	<p>Accession No.</p> <p>U.S. Army General Equipment Test Activity, Fort Lee, Virginia</p> <p>FINAL REPORT OF INTEGRATED ENGINEERING/SERVICE TEST (INTERMEDIATE CONDITIONS) OF M PACKET (FOOD PACKET, INDIVIDUAL, COMBAT), by Thomas B. Burt, John A. Bouda, and William F. Magill, April 1966, 101p., tables, -illus., 5 Appendices p47-101. (TECOM Proj. No. 8-4-7405-04/05/06) Unclassified Report</p> <p>An Integrated Engineering/Service Test (Intermediate Conditions) 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 intermediate environmental conditions.</p> <p>The test was conducted by U.S. Army General Equipment Test Activity, U.S. Army Infantry Board, and U.S. Army Airborne, Electronics and Special Warfare Board. The General Equipment Test Activity as executive agency was responsible for the preparation of the test plan, overall conduct of test, and preparation of final report of test with inputs from USAIB and USAAESWBD. The test was conducted during the period August 1965 to February 1966.</p>	<p>UNCLASSIFIED</p> <p>1. Food 2. Rations (Military) I. Title II. Burt, Thomas B. Bouda, John A., Major Magill, Wm. F., Captain TECOM Project No. 8-4-7405-04/05/06 IV. M Packet</p>
<p>AD</p> <p>U.S. Army General Equipment Test Activity, Fort Lee, Virginia</p> <p>UNCLASSIFIED</p> <p>1. Food 2. Rations (Military) I. Title II. Burt, Thomas B. Bouda, John A., Major Magill, Wm. F., Captain TECOM Project No. 8-4-7405-04/05/06 IV. M Packet</p>	<p>Accession No.</p> <p>U.S. Army General Equipment Test Activity, Fort Lee, Virginia</p> <p>FINAL REPORT OF INTEGRATED ENGINEERING/SERVICE TEST (INTERMEDIATE CONDITIONS) OF M PACKET (FOOD PACKET, INDIVIDUAL, COMBAT), by Thomas B. Burt, John A. Bouda, and William F. Magill, April 1966, 101p., tables, -illus., 5 Appendices p47-101. (TECOM Proj. No. 8-4-7405-04/05/06) Unclassified Report</p> <p>An Integrated Engineering/Service Test (Intermediate Conditions) 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 intermediate environmental conditions.</p> <p>The test was conducted by U.S. Army General Equipment Test Activity, U.S. Army Infantry Board, and U.S. Army Airborne, Electronics and Special Warfare Board. The General Equipment Test Activity as executive agency was responsible for the preparation of the test plan, overall conduct of test, and preparation of final report of test with inputs from USAIB and USAAESWBD. The test was conducted during the period August 1965 to February 1966.</p>	<p>UNCLASSIFIED</p> <p>1. Food 2. Rations (Military) I. Title II. Burt, Thomas B. Bouda, John A., Major Magill, Wm. F., Captain TECOM Project No. 8-4-7405-04/05/06 IV. M Packet</p>

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 due to faulty processing of M Packets at the point of manufacture or assembly; and that, with the correction of this deficiency, the M Packet will be suitable for U.S. Army use under intermediate environmental 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 through the Office of The Surgeon General to clarify those Military Characteristics pertaining to nutritional adequacy and physiological effects, and if necessary, to further determine the extent to which the M Packet meets these characteristics.

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 due to faulty processing of M Packets at the point of manufacture or assembly; and that, with the correction of this deficiency, the M Packet will be suitable for U.S. Army use under intermediate environmental conditions.

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<p>AD</p> <p>U.S. Army General Equipment Test Activity, Fort Lee, Virginia</p> <p>Accession No.</p> <p>FINAL REPORT OF INTEGRATED ENGINEERING/SERVICE TEST (INTERMEDIATE CONDITIONS) OF M PCKET (FOOD PACKET, INDIVIDUAL, COMBAT), by Thomas B. Burt, John A. Boudo, and William F. Magill, April 1964, 181p. -tablas. -illus. 5 Appendices p47-101. (TECOM Proj. No. 8-4-7405-04/05/06) Unclassified Report</p> <p>An Integrated Engineering/Service Test (Intermediate Conditions) of the M Pcket (Food Packet, Individual, Combat) was conducted to determine the technical performance and safety characteristics of the M Pcket 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 intermediate environmental conditions.</p> <p>The test was conducted by U.S. Army General Equipment Test Activity, U.S. Army Infantry Board, and U.S. Army Airborne, Electronics and Special Warfare Board. The General Equipment Test Activity as executive agency was responsible for the preparation of the test plan, overall conduct of test, and preparation of final report of test with inputs from USAIB and USAAESWB. The test was conducted during the period August 1965 to February 1966.</p> <p>UNCLASSIFIED</p> <ol style="list-style-type: none"> 1. Food 2. Rations (Military) 1. Title II. Burt, Thomas B. Boudo, John A., Major Magill, Wm. F., Captain III. Tecom Project No. 8-4-7405-04/05/06 IV. M Pcket 	<p>AD</p> <p>U.S. Army General Equipment Test Activity, Fort Lee, Virginia</p> <p>Accession No.</p> <p>FINAL REPORT OF INTEGRATED ENGINEERING/SERVICE TEST (INTERMEDIATE CONDITIONS) OF M PCKET (FOOD PACKET, INDIVIDUAL, COMBAT), by Thomas B. Burt, John A. Boudo, and William F. Magill, April 1964, 181p. -tablas. -illus. 5 Appendices p47-101. (TECOM Proj. No. 8-4-7405-04/05/06) Unclassified Report</p> <p>An Integrated Engineering/Service Test (Intermediate Conditions) of the M Pcket (Food Packet, Individual, Combat) was conducted to determine the technical performance and safety characteristics of the M Pcket 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 intermediate environmental conditions.</p> <p>The test was conducted by U.S. Army General Equipment Test Activity, U.S. Army Infantry Board, and U.S. Army Airborne, Electronics and Special Warfare Board. The General Equipment Test Activity as executive agency was responsible for the preparation of the test plan, overall conduct of test, and preparation of final report of test with inputs from USAIB and USAAESWB. The test was conducted during the period August 1965 to February 1966.</p> <p>UNCLASSIFIED</p> <ol style="list-style-type: none"> 1. Food 2. Rations (Military) 1. Title II. Burt, Thomas B. Boudo, John A., Major Magill, Wm. F., Captain III. Tecom Project No. 8-4-7405-04/05/06 IV. M Pcket
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Security Classification

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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report			
5. AUTHOR(S) (Last name, first name, initial) Burt, Thomas B.; Bounds, John A., Major, QMC, USAIB; and Magill, William F., Captain, Infantry			
6. REPORT DATE April 1966	7a. TOTAL NO. OF PAGES 101	7b. NO. OF REFS 22	
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11. SUPPLEMENTARY NOTES None		12. SPONSORING MILITARY ACTIVITY U. S. Army Natick Laboratories, Natick, Massachusetts	
13. ABSTRACT An Integrated Engineering/Service Test (Intermediate Conditions) 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 intermediate environmental conditions. The test was conducted by U. S. Army General Equipment Test Activity; U. S. Army Infantry Board; and U. S. Army Airborne, Electronics and Special Warfare Board. The General Equipment Test Activity as executive agency was responsible for the preparation of the test plan, overall conduct of test, and preparation of final report of test with inputs from USAIB and USAAESWBD. The test was conducted during the period August 1965 to February 1966. 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 due to faulty processing of M Packets at the point of manufacture or assembly; and that, with the correction of this deficiency, the M Packet will be suitable for U. S. Army use under intermediate environmental conditions. (Cont'd)			

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

AMSTE-BC

27 MAY 1966

SUBJECT: Final Report, Integrated Engineering/Service Test
(Intermediate Conditions) of M Packet (Food Packet,
Individual Combat), USATECOM Project No. 8-4-7405-04/
05/06, RDT&E Project No. 1M643303D54817

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

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

2. Test Results and Conclusions:

a. In evaluation of the extent to which the M Packet met applicable Military Characteristics the results of tests conducted under USATECOM auspices and the results of tests and evaluations by Office of the Surgeon General and US Army Natick Labs were utilized.

b. Evaluation of the statements of the Office of the Surgeon General regarding the M Packet indicates approval of the M Packet and revised Military Characteristics when,

(1) Three M Packets per day are considered to provide optimum rather than maximum caloric and other nutritional requirements to cover situations where requirement for more than 3600 calories per day exists.

(2) Reference to any restriction of daily water supply for the individual is removed.

c. One deficiency and one shortcoming were encountered:

(1) During pre-issue inspection of M Packets packaging damage (crimped seal, seal failure, gas formation) was noted. While this occurred with less than one percent of the items it was considered a deficiency because it presents a safety hazard to troops.

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(2) Because of low troop acceptance rating, the cereal bar in menus No. 2 and No. 5 was judged unacceptable (shortcoming).

d. Except as indicated in preceding paragraphs, the M Packet met all other Military Characteristics.

e. Based on qualitative data of this test, it is considered that the soldier can, if necessary, subsist on one M Packet per day for up to seven days with adequate water supply. However, in the soldier's opinion, efficiency and sense of well being are adversely affected.

f. A high percent of damage occurred during freedrop air delivery. The M Packet therefore has a marginal capability for freedrop air delivery. This is considered a shortcoming in the report. This headquarters, however, does not consider it to be significant in view of the M Packet's overall air delivery capability.

3. Discussion:

a. While no field tests were conducted under tropic environment, results of evaluation of water, insect and rodent resistance during this test when coupled with results of Natick Laboratories' long term storage tests on storage stability will provide sufficient evaluation of tropic effects.

b. Arctic tests were conducted on the M Packet. The report of those tests is in the final stages of preparation. Results of arctic testing will lead to conclusions and recommendations similar to those of this report of Intermediate Conditions testing.

c. Based on the number of voluntary comments of test participants, it appears that toilet tissue is an accessory item desired in operational type food packets. Further consideration of this seems warranted.

27 MAY 1968

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4. Recommendations: It is recommended that:

a. The M Packet be considered suitable for US Army use when the deficiency and the shortcoming are corrected.

b. A random sample of modified M Packets from initial production quantities be returned 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 in the Military Characteristics and concept of use for the M Packet.

FOR THE COMMANDER:

1 Incl
as (AMC, 5 cys; CDC,
10 cys)

Austin Triplett
AUSTIN TRIPLETT, Jr.
Colonel
DA/1st MAJ 7461

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