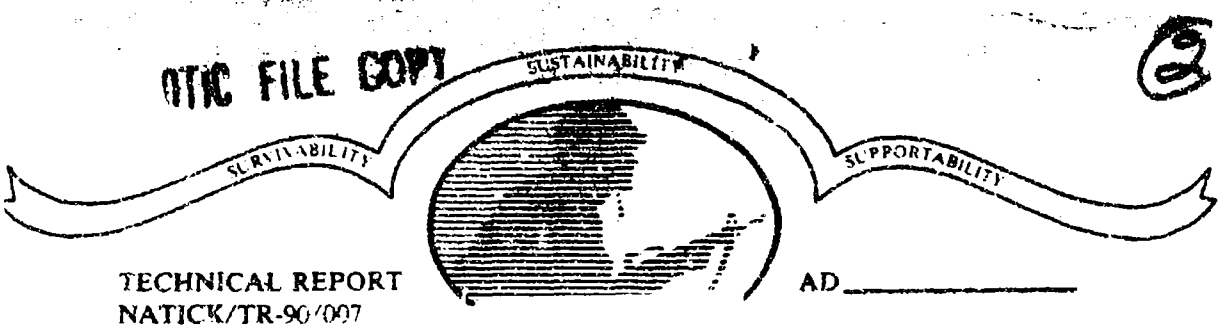

TECHNICAL REPORT
NATICK/TR-90/007

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EVALUATION OF THE INTERIM INTERMEDIATE COLD/WET GLOVE SYSTEM (ICG) FOR COLD WEATHER USE

BY

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UNITED STATES ARMY NATICK
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The U.S. Army Infantry School has identified a requirement for a glove for soldiers who perform their missions in temperatures down to 0°F. Gloves currently in the Army inventory do not provide adequate protection. Since the development of the proposed glove will take a number of years, the CG, AMC, tasked the U.S. Army Natick Research, Development and Engineering Center (Natick) with the development of a glove for the interim which offered an increase in warmth and waterproofing over the standard light duty gloves. The Behavioral Sciences Division (BSD) of Natick conducted an in-house user evaluation of one of the glove candidates, which was a modification of the standard issue glove. The outer leather shell is identical to the standard issue item. However, a waterproof membrane was added along with a thin insulating liner, both of which are permanently attached to the shell. A removable polyester liner of an ambidextrous design in a seamless knit construction was also part of the system. An evaluation was conducted the winter of 1987-1988. At the end of the 90-day evaluation period, BSD personnel collected data on a number of variables - the critical ones being (con't)

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warmth, durability, water resistance, and dexterity. Results revealed that while the modified glove was rated significantly higher than the standard issue glove for all of the major criteria, it still lacked sufficient warmth.

Preface

The objective of the field evaluation reported here was to compare a modified light duty glove to the standard issue light duty glove to determine the modification level of performance in the field. Upon the Individual Protection Directorate's request the evaluation was conducted by the Operational Forces Interface Group (OFIG), whose personnel are assigned to offices in both the Advanced Systems Concepts Directorate (ASCD) and the Science and Advanced Technology Directorate (SATD).

The evaluation, data analysis, and the reporting of results were accomplished in the period from December 1987 to June 1988. Approximately 1000 soldiers were involved in this evaluation which took place at four sites: Ft. Carson, Colorado; Ft. Lewis, Washington; Ft. Drum, New York; and Bamberg, the Federal Republic of Germany.

OFIG personnel are indebted to the individuals from the many units in the four divisions who supported this evaluation - the commanders from the battalions and companies who allowed their men to participate, the sergeants major and first sergeants who were the points of contact for issue of the gloves and data collection efforts, and the soldiers who gave their time and honest opinions of the gloves.

At Natick, many others also gave their time and conscientious efforts to the evaluation, for which we are very grateful. We are especially appreciative of the help and advice lent by statistician Larry Lesher of GEO-CENTERS, INC., Newton Centre, MA, which supports the Behavioral Sciences Division through a contract effort on the scanning system used to read the data, and for his guidance on applicable statistical procedures to be used in the analysis. Another GEO-CENTERS, INC. employee who deserves special mention is Jennifer Grafton, who not only helped with reducing the data, but also beautifully typed the many drafts of this report and carefully kept the sequence of tables and appendixes on track. One more individual who truly stood out in the execution of this evaluation is Charles Greene. He operated in many capacities in this evaluation: questionnaire and interview construction, data reduction, and data analysis and reanalysis; and never lost patience on or diminished in his accuracy despite the volume of work.

The person responsible for the coordination efforts in the evaluation was Mr. David Cheney of ASCD and the evaluation design and analysis was the responsibility of Barbara Jezior of SATD.

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EVALUATION OF THE INTERIM INTERMEDIATE COLD/WET GLOVE SYSTEM (ICG) FOR COLD WEATHER USE

INTRODUCTION

BACKGROUND

The U.S. Army has identified a requirement for a glove to be used by soldiers who perform their missions under harsh environmental conditions in temperatures down to 0°F. These soldiers are required to conduct tactical missions for extended periods of time while exposed to variable cold/wet and cold/dry conditions.

The U.S. Army Infantry School has reported that gloves currently in the Army inventory do not provide adequate protection. None offers enough warmth, dexterity, durability, or outer shell water repellency. The Trigger Finger Mitten provides adequate warmth, but offers little dexterity because of its bulk.

The U.S. Army Natick Research, Development, and Engineering Center (Natick) is now engaged in a research effort to develop handwear that will meet the requirements in the U.S. Army Infantry School's Revised Statement of Need - Clothing and Equipment (SN-CIE) dated 23 June 1988. These requirements detail a glove system* for use in climatic zones III through VII (i.e., temperate winters to extremely cold winters), which provides the maximum amount of warmth, dexterity, water resistance, and durability that can be achieved without use of electrical heating. No existent glove system, commercial or military, has been identified that possesses these properties to an acceptable degree.

As the development of the proposed glove will take a number of years, Natick has been tasked to provide a glove for the interim that offers an increase in warmth and waterproofing over the standard light duty glove. In response to this tasking,

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*Glove system means the glove plus any of its attendant components, such as an insert.

Natick has been conducting laboratory and field evaluations of potential candidates to identify an interim combat glove.*

PURPOSE/SCOPE

This report presents Natick's findings from the field evaluation of a modified light duty glove. This modified glove was evaluated against the standard issue Light Duty Glove to assess its potential as an interim glove. The evaluation was conducted at four Army installations from mid-December 1987 through March 1988. The evaluative criteria were selected from the earlier referenced SN-CIE and were limited to those criteria that could be addressed to any possible extent through user questionnaires, interviews, and visual inspection of the gloves. A list of the SN-CIE criteria is in Appendix A.

METHOD

GLOVE SYSTEMS/NOMENCLATURE

The two glove systems in the evaluation were the Light Duty Glove with insert and a modified Light Duty Glove with insert. (The latter has been recently redesignated as the Intermediate Cold/Wet Glove System.) The user questionnaires referred to the Light Duty Glove as the Standard Issue Glove (SIG) and the modified Light Duty Glove as the Interim Combat Glove (ICG). The gloves will be referred to as the SIG and ICG in this report to prevent confusion when referencing questionnaires or other documents in the Appendices.

Standard Issue Glove with Insert (SIG). The concept of this glove system is that of a light duty work glove with a separate insert for warmth. The glove shell, which can be worn with or without its insert, is issued for use in all climatic categories. The glove shell is either cattlehide or horsehide leather. The

*These evaluations were conducted as part of Natick's in-house product evaluation program. The Test and Evaluation Command (TECOM) is the independent evaluator for the glove that will be considered as an interim glove.

removable insert is wool/nylon. A detailed description with a picture is in Appendix B.

Interim Combat Glove with Insert (ICG). This glove system is a modification of the light duty work glove. The leather glove shell has a permanently attached, waterproof membrane and a thin layer of foam laminated to a nylon tricot liner. The removable insert is made of polyester. A detailed description with a picture is in Appendix C.

SITES

The Army intends to issue the Combat Glove that is ultimately developed under the SN-CIE in Climatic Zones III through VII, and the evaluation sites represented three of those zones, i.e., Zones IV through VI. The evaluation did not include Zone III (which differs from Zone IV only in summer temperatures), and the extreme cold area, Zone VII. The sites were: Ft. Drum, NY (Zone IV); Ft. Carson, CO (Zone V); Bamberg, Federal Republic of Germany (Zone VI); and Ft. Lewis, WA (Zone VI).

Table 1 gives a description of the Army's seven climatic zones established for clothing Basis of Issue (BOI) and the respective evaluation sites, and Figure 1 which follows shows the Army Clothing Allowance Zones.

TABLE 1.
CLIMATIC ZONES USED AS BASIS OF ISSUE (BOI)

Zones	Average Temperature Range in Fahrenheit Degrees: Coldest Month	Warmest Month	Test Site
I. Warm/hot all year	above 68	above 68	
II. Warm/hot summers, mild winters	50 to 68	above 68	
III. Warm/hot summers, cool winters	32 to 50	above 68	
IV. Mild summers, cool winters	32 to 50	50 to 68	Ft. Lewis
V. Warm/hot summers, very cold winters	below 32	above 68	Ft. Carson Ft. Drum
VI. Mild summers, cold winters	14 to 32	50 to 68	Bamberg
VII. Mild summers, very cold winters	below 14	below 68	

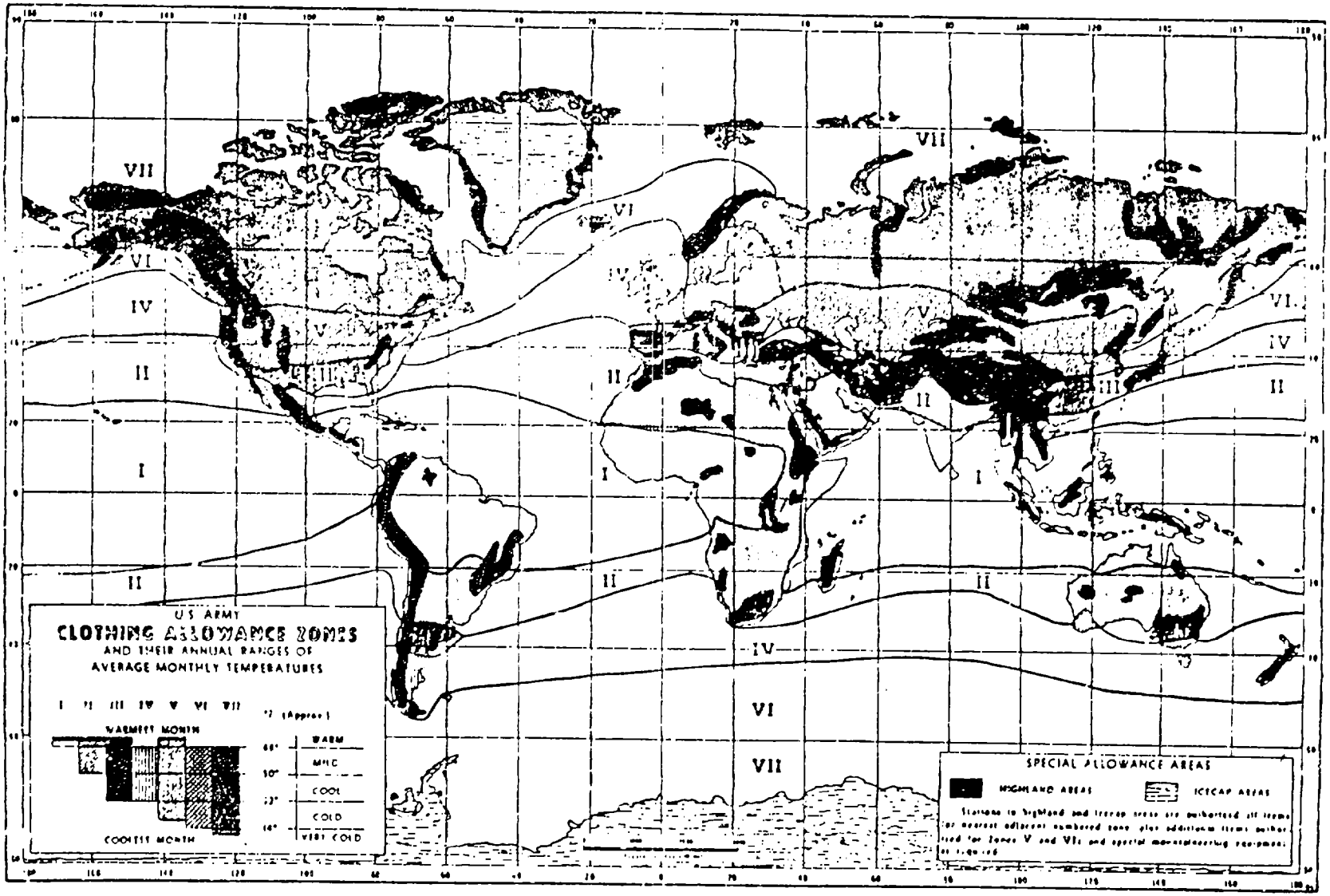


Figure 1. U.S. Army clothing allowance zones.

SUBJECTS

The subjects were male military personnel who were assigned to combat arms units at the four test sites. A total of 1412 soldiers were initially involved in the evaluation - 717 were issued the ICG and 695 the SIG. The total number of subjects who completed the 90-day evaluation numbered 862 (373 in the SIG group and 489 in the ICG). As a group the subjects completing the evaluation were predominantly enlisted men with 10 years or less of service, and were primarily from combat or combat support Military Occupational Specialties. The majority of the men spent 10 to 30+ days in the field during the evaluation period. In Table 2, the composition of each glove group is presented for each test site and over all test sites by rank, time in service, Military Occupational Speciality, and time spent in the field. The respective Career Management Fields for the various MOS series are listed on Table 2.

While there are some differences among sites in the profiles of the glove groups (Table 2), common characteristics prevail. Table 2 shows that, at each site, at least 74% of each glove group were between the ranks of E-1 and E-6, at least 71% had 10 or fewer years in service, and at least 61% were in MOS's that demand much exposure to the elements.

The differences that do exist among test sites in the compositions of the glove groups, however, caused us to conduct preliminary analyses to determine if any of these factors seriously skewed the findings. For instance, the number of high ranking Noncommissioned Officers and the number of officers were not balanced between the SIG and the ICG groups for each site (which is also reflected in the time in service balances). Also, about one-fifth of each glove group at Ft. Drum had an MOS whose mission allowed far more shelter from the environment, i.e., Military Police.

Two sites, Ft. Drum and Bamberg, also had disparate field time profiles. The groups at Ft. Drum had large percentages with less than 10 days in the field, with the ICG group showing 67.6% and the SIG 43.6%. Conversely, in Bamberg only very small

TABLE 2.
Percentage Profiles of Rank, Time in Service, MOS, and Days Worn by Glove Group and Site

	FORT DRUM		Bamberg		FORT LEWIS		FORT CARSON		OVERALL	
	ICG (N=145)	SIG (N=124)	ICG (N=100)	SIG (N=89)	ICG (N=108)	SIG (N=45)	ICG (N=136)	SIG (N=115)	ICG (N=489)	SIG (N=373)
Rank										
E-1 - E-6	78.6	95.2	86.0	83.0	81.5	97.8	73.6	96.7	79.1	93.1
E-7 - E-9	10.4	1.6	5.0	5.6	6.5	0	16.2	0	10.0	2.4
O-1 - O-3	4.9	2.4	2.0	8.0	9.2	0	7.3	0.9	6.0	3.0
O-4 - O-6	3.5	0	1.0	0	0.9	0	2.2	0.9	2.0	0.3
WO-1 - WO-4	1.4	0	0	0	0	0	0.7	0	0.6	0
Time in Service										
0 - 5 years	65.5	71.8	69.0	71.9	78.7	93.3	55.9	74.8	66.5	75.3
6 - 10 years	14.5	20.0	19.0	16.9	13.0	6.7	14.7	18.3	15.1	17.2
11 - 15 years	8.3	4.0	8.0	7.9	8.3	0	11.8	4.4	9.2	4.6
16 - 20 years	9.0	1.6	3.0	2.3	0	0	15.4	0.9	7.8	1.3
20+ years	2.8	1.6	1.0	1.1	0	0	1.5	0.9	1.4	1.1
MOS Career Management Fields										
CMF 11 - Infantry	0.7	0	71.0	82.0	77.8	88.2	76.5	73.0	53.2	52.0
CMF 12 - Combat Engineering	37.9	66.9	0	0	0	0	1.5	0.9	11.7	22.5
CMF 19 - Armor	0	0	0	0	0	0	1.5	6.1	0.6	1.9
CMF 31 - Communications-Electronics Operations	0.7	0.8	4.0	0	8.3	13.3	0.7	5.2	3.1	3.5
CMF 51 - General Engineering	22.8	0.8	0	0	0	0	0	0	6.5	0
CMF 63 - Mechanical Maintenance	0	0	11.0	12.4	0	0	2.9	5.2	3.3	4.8
CMF 76 - Supply	3.5	4.0	5.0	2.3	0.9	0	5.2	2.6	3.7	2.7
CMF 91 - Medical	3.5	0	1.0	1.1	2.8	2.2	0	0	2.0	0.5
CMF 95 - Law Enforcement	21.4	23.4	2.0	0	0	0	0	0	6.3	7.8
Days Worn										
<10	13.8	8.1	22.0	5.6	38.9	42.2	29.4	11.3	25.4	12.6
10 - 20	17.2	8.1	24.0	11.2	34.3	35.6	27.9	21.7	25.4	16.4
21 - 30	18.6	12.9	14.0	13.5	19.4	4.4	8.8	15.7	15.1	12.9
31 - 40	14.5	13.7	15.0	7.9	4.6	4.4	16.2	12.2	12.9	10.7
41 - 50	8.3	13.7	9.0	7.9	0.9	0	5.2	7.8	5.9	8.9
51 - 60	13.1	11.3	6.0	2.3	0	0	3.7	7.0	6.1	6.4
60+	14.5	32.3	10.0	51.7	1.9	13.3	8.8	24.4	9.2	32.2
Time in Field										
<10 days	67.6	43.6	4.0	1.1	32.4	31.1	19.9	20.9	33.5	24.9
10-20 days	18.6	25.0	21.0	25.8	40.7	46.7	47.8	38.3	32.1	31.9
21-30 days	7.6	23.4	25.0	29.1	14.8	8.9	11.0	21.7	13.7	22.5
30+ days	4.1	7.3	49.0	41.6	10.2	13.3	19.1	16.5	18.8	19.0

percentages spent less than 10 days in the field, while large numbers spent over 20 days in the field, with the ICG group showing 49% and the SIG 41.6%. There were also disparities in the days worn, with Ft. Lewis being conspicuous for the majority of each group wearing their respective glove less than 20 days. Also, percentages generally do not tally to 100% because of rounding procedures or missing data.

Each glove group at each site was examined to determine if any subset of personnel in it (Military Police, officers, etc.) affected the findings of its group as a whole. For example, the responses of the Military Police in each glove group at Ft. Drum were compared to those in the combat MOS's in their respective group to determine if these two subgroups had significantly differing average responses.

These preliminary analyses showed that the officers, high ranking enlisted personnel, and Military Police did skew the data on some variables and their data were dropped from those particular variables. Field time and number of days that the gloves were worn did not apparently skew the data. However, in referencing field time and days w n to make comparisons across sites or to interpret the data in general, extreme caution must be used. Although average time spent in the field is known, exactly when, in terms of dates, is not known. Small numbers for days worn can indicate the glove lacks warmth as easily as it can indicate a glov not being needed because of warmer weather. The handling of the variant factors will be discussed as warranted in the results section of the report. The preliminary analyses themselves will not be included in the report for the sake of brevity, but they can be obtained upon request.

TEST DESIGN/PROCEDURES

1. Unit personnel at each site were briefed on test purpose and protocol, and randomly assigned to either a test (ICG) or a control (SIG) group.

2. Each subject was sized, fitted, and issued a glove system, i.e., one pair of gloves plus inserts. The ICG system

includes two pairs of inserts, while the SIG system includes one. The ICG System has two pairs of inserts because use of this system calls for switching pairs as sweating level dictates.

3. Subjects were told to use their respective systems as they normally would in the field and in garrison for the 90+ days of the evaluation. They were also allowed to wear other gloves (commercial or military) as warranted.

4. The SIG gloves were marked so that they could be differentiated from any already owned.

5. Gloves and inserts from both groups were inspected for damage and wear before testing began and after testing was terminated.

6. Weather data were collected for each site for the evaluation period, mid-December 1987 through March 1988.

7. At the end of the evaluation, all subjects were administered questionnaires and 30 to 40 men were interviewed at each site.

DATA ANALYSIS

The questionnaire data were read by a Century 3000 optical scanner system and then analyzed with SPSS PC+ programs on a Zenith Z-248 personnal computer.

Statistics used to describe the questionnaire data are the mean or average (X), the number of subjects or responses to a variable (N), and the standard deviation (SD), which indicates diversity in the responses -- the higher the value of the standard deviation, the greater the diversity.

Statistical tests included t tests and chi squares (X^2). The t tests were used to test group differences when just two groups were compared and when the data were obtained from rating scales. The chi square tests were conducted on dichotomous (e.g., YES/NO) data. Another statistical technique used was the Analysis of Variance (ANOVA). This test determines if there are differences among groups when more than two groups are being compared. Although an ANOVA indicates whether or not there are differences, it does not indicate which group or groups differ

significantly from the others. For this purpose, post-hoc tests are employed. The post-hoc test used in tnese analyses was the Student-Newman-Keuls (SNK). The minimum criterion level for determining whether any statistical test showed a significant difference was .05. This states that 95 times out of 100 the observed difference is a true difference and not just a chance occurrence.

WEATHER

The U.S. Air Force Environmental Technical Application Center provided the weather data from each test site for the evaluation period - mid-December 1987 through March 1988 - as well as historical weather data. The Bamberg data for the evaluation period were incomplete, so the Nurnberg data were provided. These areas exhibit similar weather patterns and are close geographically. The letter describing data provided by the Air Force is included in Appendix D. The historical data are in monthly averages, and the data for the evaluation start with mid-December, so it is assumed that whole month averages would vary somewhat from those presented. Table 3 contains a weather summary for the evaluation period, and Table 4 contains a summary of the historical data, which were obtained for comparison. It was important to be sure that ratings for the gloves were not reflecting an atypical winter.

The temperatures at each site for the evaluation period were generally consistent with the historical data. Ft. Drum was conspicuously the coldest in both temperature and wind chill. It had far more snow than any other site. The daily data also showed that it was the only site with temperature readings below 0°F during the evaluation period; it had 16 lows recorded below that benchmark with the lowest being -18°F.

Weather for the other three sites did not differ markedly in overall temperature; Ft. Lewis had the most rainfall and Ft. Carson had the least. Ft. Lewis did have, however, average temperatures the last two months of the evaluation that were more moderate and higher than the other three sites.

TABLE 3.
Weather Data for Evaluation Period
Mid-December 1987 to March 1988

	TOTAL PRECIP (IN.)	AVG. MAX.WIND (MPH)	AVG. MAX.TEMP. (°F)	AVG. MIN. TEMP. (°F)	RANGE WIND CHILL	ACCUM. SNOW (IN.)	# OF OBSER.	#OF DAYS W/PRECIP.
Ft. Lewis								
December*	.85	10	37	26	-4 - +29	.5	17	8
January	4.12	14	44	32	-3 - +29	0	31	19
February	1.73	14	49	35	-12 - +30	0	29	15
March	5.84	17	53	34	+3 - +33	0	31	16
Ft. Carson								
December*	.38	18	42	28	-16 - +21	3.8	11	2
January	.18	21	36	23	-20 - +18	2.4	22	6
February	.53	19	41	21	-29 - +9	5.7	24	9
March	.57	27	46	26	-23 - +20	5.9	27	12
Ft. Drum								
December*	1.70	21	27	22	-42 - +8	7.7	12	10
January	2.93	19	27	10	-59 - +30	13.0	23	19
February	4.89	19	29	11	-58 - +12	30.6	22	17
March	1.72	18	39	19	-43 - +11	4.8	24	17
Bamberg								
December*	.99	9	45	35	+13 - +30	0	17	13
January	1.03	11	40	33	+4 - +29	0	31	19
February	1.40	13	40	31	-4 - +29	NA**	29	21
March	2.71	15	43	32	-4 - +25	NA**	31	25

*December figures are for 15-31 December 1987.
**Information not available.

TABLE 4.
Historical Weather Data
December to March*

	AVG. PRECIP. (IN.)	AVG. MAX. TEMP. (^{O}F)	AVG. MIN. TEMP. (^{O}F)	AVG. SNOWFALL (IN.)
Ft. Lewis				
December	6.3	45	35	2
January	5.7	43	33	5
February	4.5	49	35	1
March	3.8	52	36	1
Ft. Carson				
December	.2	42	23	4
January	.2	43	23	3
February	.4	47	25	5
March	1.0	51	30	10
Ft. Drum				
December	2.4		26	22
January	2.1		20	24
February	2.2		21	14
March	2.4		33	9
Germany				
December	1.9	37	28	0
January	1.8	36	24	0
February	1.4	40	26	0
March	1.5	48	31	0

Overall Mean Temperature

*Years of historical periods for the sites vary, but all include at least nine consecutive years.

Ft. Carson's drier climate provokes the observation that temperatures and wind being equal, a soldier at Ft. Carson will feel warmer than a soldier at any of the other three sites.

QUESTIONNAIRE AND INTERVIEW RESULTS

Questionnaire and interview data will be presented in two sections - A and B. The distinction in sections is a function of the sample populations, that is, the personnel whose responses were included in the analyses. Copies of the two glove questionnaires and interview questions are in Appendix E.

Section A findings are based on data that were trimmed of responses that the preliminary analyses showed to skew the findings (discussed earlier, see Method section). That is, the data from the officers, high ranking enlisted personnel (E-7 through E-9), and Warrant Officers have been deleted as have those from personnel in MOS's that allowed for considerable protection from the elements. These population segments were not balanced (evenly represented) either within or across glove groups and preliminary analyses conducted on their data showed that they biased (distorted) some of the findings.

Even if these personnel segments had been balanced, they would have been eliminated from the analyses of the more critical variables because it was felt that assessments of the gloves' warmth, water resistance, comfort, durability, and dexterity should reflect those of the combat and combat-related MOS's. The findings for each glove at each test site will be presented in this section, as well as the findings pooled over sites for each glove group. A demographic profile of this modified group can be found in Appendix F.

Section B findings pertain to variables that were judged to be unaffected by mission or environmental exposure, e.g., perceived fit. These findings are based on responses of all personnel involved in the evaluation. Only values for each glove group pooled over test sites will be presented.

SECTION A - FINDINGS BASED ON RESPONSES FROM ENLISTED PERSONNEL IN RANKS E-1 THROUGH E-6 AND IN COMBAT OR COMBAT-RELATED MOS's.

Protection from Cold. The participants were asked to rate how well their gloves with inserts protected them from the cold at their particular site. The scale used and the results follow in Table 5.

TABLE 5.
COLD PROTECTION RATINGS FOR GLOVE SYSTEMS AT EACH SITE AND OVERALL

VERY BAD 1	MODERATELY BAD 2	SLIGHTLY BAD 3	NEITHER BAD NOR GOOD 4	SLIGHTLY GOOD 5	MODERATELY GOOD 6	VERY GOOD 7

		X	SD	N	t	df	p
FT. DRUM	ICG	3.71	1.90	82			
	SIG	1.96	1.43	84	6.67	150.19	**
BAMBERG	ICG	3.42	2.00	84			
	SIG	2.59	1.70	75	2.83	156.64	*
FT. CARSON	ICG	3.75	2.03	91			
	SIG	2.93	1.75	102	2.99	178.91	*
FT. LEWIS	ICG	5.02	1.60	82			
	SIG	2.81	1.63	42	7.21	81.67	**
OVERALL	ICG	3.96	1.99	339			
	SIG	2.56	1.67	303	9.62	640.00	**

*Significant at <.01
**Significant at <.001

While the ratings at every site for either glove were neutral or below, except for the ICG at Ft. Lewis, the ICG was rated better than the SIG at every site. The t tests showed that the difference between glove groups at each site was statistically significant, as was the difference between the two groups over all sites. The differences for Ft. Lewis, Ft. Drum, and over all sites were larger than a scale point, making them distinct practical differences as well. The mean ratings for each type of glove, however, are not consistent across sites.

The mean values across sites were not expected to be the same as climates differed, and one would expect the gloves' warmth ratings to correspond to climate, i.e., the warmer the climate, the higher the warmth rating. With this logic, the expectation would be that Ft. Drum would have the lowest ratings and, if ratings were based on recent weather memory, the ratings for Ft. Lewis would be higher than the ratings for the other sites.

This expectation was realized to some degree in each glove group. An ANOVA conducted on the ICG ratings showed that there were significant site differences in the ratings ($F=11.78$, $df=3,335$, $p<.0001$). The subsequent SNK test showed that the mean for Ft. Lewis was significantly higher than the means of the other three sites, but that the other three did not differ significantly from each other.

An ANOVA conducted on the ratings for the SIG group also showed there were significant differences in the site ratings ($F=5.80$, $df=3,299$, $p<.001$). In this case, the post-hoc SNK tests showed that the mean rating at Ft. Drum was significantly lower than the means at the other three sites, and the remaining three sites did not differ from each other.

Why the differences were not parallel for the two glove groups is a moot issue. What is clear is that the mean ratings for the SIG were in the unacceptable range and that there was only one site, Ft. Lewis, where the ICG had even a marginally acceptable rating.

The soldiers were also asked to distinguish between field and garrison wear when indicating the gloves' warmth. Results follow in Table 6.

TABLE 6.
WARMTH OF THE GLOVE IN GARRISON VS. FIELD

	Ft. Drum		Bamberg		Ft. Carson		Ft. Lewis	
	ICG N=82	SIG N=84	ICG N=84	SIG N=75	ICG N=91	SIG N=102	ICG N=82	SIG N=42
	% REPORTING YES							
Was the glove usually:								
warm enough in garrison?	73%	71%	84%	77%	80%	66%	96%	86%
warm enough in the field?	33%	7%	22%	9%	38%	19%	50%	11%

It is clear from these percentages that the ratings for the gloves' warmth are strongly related to being in the field as opposed to garrison. This is no surprise as time spent in an unprotected environment while in garrison is minimal. The percentages of subjects who felt that their gloves were warm enough for garrison use ranged from 66% to 86% for the SIG group and from 73% to 96% for the ICG group. For the field, the ranges are drastically lower at 7% to 9% for the SIG and 33% to 50% for the ICG.

Water resistance. The scale used and the soldiers' ratings for the water resistance properties of the two gloves are shown in Table 7.

TABLE 7.
WATER RESISTANCE RATINGS FOR GLOVE SYSTEMS AT EACH SITE AND OVERALL

VERY BAD 1	MODERATELY BAD 2	SLIGHTLY BAD 3	NEITHER BAD NOR GOOD 4	SLIGHTLY GOOD 5	MODERATELY GOOD 6	VERY GOOD 7

		X	SD	N	t	df	p
FT. DRUM	ICG	4.58	1.67	79			
	SIG	2.16	1.39	82	9.99	151.89	*
BAMBERG	ICG	4.45	4.45	86			
	SIG	2.15	2.15	75	7.96	154.98	*
FT. CARSON	ICG	4.92	1.77	89			
	SIG	2.77	1.74	102	8.44	184.74	*
FT. LEWIS	ICG	5.13	1.42	83			
	SIG	1.90	1.17	42	13.56	98.17	*
OVERALL	ICG	4.77	1.78	337			
	SIG	2.33	1.56	301	18.38	636	*

*Significant at <.001

These water resistance ratings show the ICG performing better than the SIG at every site and overall, with all site ratings between 4.45 and 5.13. The t tests conducted on the differences between glove groups at each site and overall are statistically significant and of practical import as well. The ANOVAs conducted on the ratings for each glove showed no significant differences among sites in the ICG group, but did yield significant differences in the SIG group. A SNK test on the SIG means showed Ft. Carson to be significantly higher than the other three sites. The reason for that difference is not clear.

The SIG ratings for water resistance are all very low. It should be noted that the glove was never intended to be water resistant. The ICG's performance, though a distinct improvement, was still marginal, with Ft. Lewis having the highest rating of 5.13.

A question related to water resistance asked if the inserts ever became wet from rain or snow seepage. The percentages reporting yes at each site for each glove group are in Table 8.

TABLE 8.
PERCENTAGES OF THOSE WHO REPORTED INSERTS GETTING WET FROM SNOW, RAIN

Ft. Drum		Bamberg		Ft. Carson		Ft. Lewis		Overall	
ICG	SIG	ICG	SIG	ICG	SIG	ICG	SIG	ICG	SIG
N=83	N=84	N=86	N=75	N=86	N=44	N=93	N=105	N=348	N=308
Percent Reporting Yes									
50%	93%	60%	97%	47%	76%	68%	100%	47%	76%

The figures in Table 8 cannot indicate glove performance in any absolute sense given the unknowns of the variables involved (lengths of exposure, intensity of rainfall, etc.). Assuming that factors are fairly constant within sites for the glove groups, the figures can be looked at in a relative sense, and they show the ICG to be a much better performer. The reports of rain and snow seepage through to the insert are lower for the ICG at each site and consequently overall as well.

Dexterity. Dexterity ratings for the glove alone, the insert alone, and the total system are presented in Table 9 for both glove groups.

TABLE 9.
DEXTERITY RATINGS FOR GLOVE SHELLS, INSERTS, AND GLOVE W/INSERT AT EACH SITE AND OVERALL

VERY BAD	MODERATELY BAD	SLIGHTLY BAD	NEITHER BAD NOR GOOD	SLIGHTLY GOOD	MODERATELY GOOD	VERY GOOD
1	2	3	4	5	6	7

		X	SD	N	t	df	p
GLOVE SHELL							
FT. DRUM	ICG	4.08	1.76	75			
	SIG	3.15	1.83	79	3.65	153.17	***
BAMBERG	ICG	4.36	1.66	81			
	SIG	3.09	1.78	56	4.21	139.94	**
FT. CARSON	ICG	4.40	1.86	84			
	SIG	3.70	1.61	86	2.65	163.51	**
FT. LEWIS	ICG	4.66	1.79	82			
	SIG	3.75	1.74	40	2.69	79.49	**
OVERALL	ICG	4.38	1.77	322			
	SIG	3.41	1.75	261	6.62	581.00	***
INSERT							
FT. DRUM	ICG	4.54	1.56	80			
	SIG	3.36	1.65	80	3.05	157.44	**
BAMBERG	ICG	4.63	2.23	76			
	SIG	3.68	1.74	63	2.85	157.10	**
FT. CARSON	ICG	4.93	1.94	86			
	SIG	3.94	1.82	89	3.46	171.43	***
FT. LEWIS	ICG	5.61	1.92	79			
	SIG	4.98	1.35	42	2.10	109.65	*
OVERALL	ICG	4.93	2.07	320			
	SIG	3.87	1.86	275	6.59	592.00	***

*Significant at <.05
**Significant at <.01
***Significant at <.001

TABLE 9. (CONT'D)
DEXTERITY RATINGS FOR GLOVE SHELLS, INSERTS, AND GLOVE W/INSERT AT EACH SITE AND OVERALL

VERY BAD 1	MODERATELY BAD 2	SLIGHTLY BAD 3	NEITHER BAD NOR GOOD 4	SLIGHTLY GOOD 5	MODERATELY GOOD 6	VERY GOOD 7

		X	SD	N	t	df	p
GLOVE W/INSERT							
FT. DRUM	ICG	4.13	1.73	79			
	SIG	3.26	1.55	82	3.36	155.83	***
BAMBERG	ICG	4.26	1.61	80			
	SIG	3.45	1.54	64	3.07	137.51	**
FT. CARSON	ICG	4.38	1.70	84			
	SIG	3.65	1.68	89	2.84	170.26	**
FT. LEWIS	ICG	4.27	1.67	79			
	SIG	2.98	1.55	42	4.27	88.71	***
OVERALL	ICG	4.26	1.67	324			
	SIG	3.39	1.69	277	6.59	592	***

*Significant at <.05
**Significant at <.01
***Significant at <.001

In all cases, for the glove shell, the insert, and the glove with insert, the ICG outperformed the SIG on dexterity, although neither glove group had any rating that exceeded 5.0 except for the ICG insert at Ft. Lewis, which was rated 5.6. The differences between glove groups at each site were statistically significant, and some were of practical merit, i.e., differing by a scale point or more, notably the ratings for the glove shell and the ratings for the insert.

The dexterity differences for the insert are supported by soldier comments. Soldiers reported that the polyester, while somewhat slippery, is very thin and adheres closely to the skin. They were of the opinion that it allowed for some activities, such as writing or some mechanical tasks, that the wool insert does not. The higher dexterity ratings for the ICG shell, which is slightly bulkier because of its extra layers, may be explainable as a perceptual phenomenon; it is a tighter glove

because of its extra layers and may give a greater feeling of control.

The ANOVAs conducted on the ICG ratings showed no differences among test sites for the glove with insert or for the glove shell, but did yield significant differences for the insert ($F=4.39$, $df=3,316$, $p<.01$). A SNK test showed that Ft. Lewis subjects rated the insert of the ICG significantly higher than did the subjects at the other test sites. This might partially be explained by warmth. A warmer hand has more dexterity, and since the soldiers at Ft. Lewis felt warmer in the ICG glove system, they may have perceived the insert as having greater dexterity.

The ANOVAs conducted on the SIG group likewise showed no differences for the glove with insert and the glove shell, but did for the insert ($F=7.83$; $df=3,271$; $p<.0001$). The SNK test again showed that Ft. Lewis subjects rated the insert significantly higher than did the subjects at the other three sites.

Durability. The ratings for the durability of the glove shell and the insert for both glove groups are presented in Table 10.

TABLE 10.
DURABILITY RATINGS FOR GLOVE SHELLS AND INSERTS
AT EACH SITE AND OVERALL

VERY BAD 1	MODERATELY BAD 2	SLIGHTLY BAD 3	NEITHER BAD NOR GOOD 4	SLIGHTLY GOOD 5	MODERATELY GOOD 6	VERY GOOD 7

DURABILITY

		X	SD	N	t	df	p
GLOVE SHELL							
FT. DRUM	ICG	5.32	1.49	77			
	SIG	3.81	1.73	81	5.89	154.61	**
BAMBERG	ICG	5.16	1.61	85			
	SIG	4.11	1.77	73	3.90	137.51	*
FT. CARSON	ICG	5.30	1.69	90			
	SIG	4.38	1.86	102	3.58	189.82	**
FT. LEWIS	ICG	5.59	1.76	78			
	SIG	5.19	1.55	45	1.46	73.16	NS
OVERALL	ICG	5.34	1.53	330			
	SIG	4.28	1.80	229	7.98	627.00	**
INSERT							
FT. DRUM	ICG	3.75	1.86	76			
	SIG	3.95	1.86	82	0.68	155.04	NS
BAMBERG	ICG	3.28	1.98	88			
	SIG	4.39	1.60	72	3.87	152.26	**
FT. CARSON	ICG	4.23	1.98	90			
	SIG	4.48	1.90	103	0.87	185.24	NS
FT. LEWIS	ICG	4.17	2.00	80			
	SIG	4.49	1.70	43	0.92	98.85	NS
OVERALL	ICG	3.87	1.99	329			
	SIG	4.31	1.80	300	2.95	627.00	*

*Significant at <.01
**Significant at <.001

The durability ratings for the glove shells showed the ICG to be higher than the SIG at all sites. The ratings for the ICG ranged from 5.16 to 5.59 with an overall rating of 5.34. The SIG

groups' ratings for the shell ranged from 3.81 to 5.19, with an overall rating of 4.28. The higher overall rating for the ICG glove shell was significantly and practically different from the rating for the SIG shell. The individual site ratings of the shell were also significantly different for the two glove groups, except at Ft. Lewis.

The ANOVAs showed no significant differences in the ICG ratings for the shell among sites, but did show a difference in the SIG ratings. A SNK test showed that ratings given at Ft. Lewis for the SIG shell were significantly higher than the ratings for the SIG shell at the other three sites. The reasons for this distinction are not clear and other questionnaire data and soldier comments do not shed any light on the issue.

The durability ratings for the inserts showed slightly better performance for the SIG. While the differences between glove groups were significant only for the Bamberg ratings, with the SIG insert rated higher, the overall ratings still showed a significantly higher rating for the SIG insert. Unfortunately neither insert performed well - all mean ratings were in the 3 to 4 range for both types. Also, although statistically different, the overall ratings of the inserts are less than one-half of a scale point apart.

Soldier comments and visual inspections of shell and insert damage support the durability findings. There were higher percentages of the ICG insert getting a hole/unraveling (32% vs. 26%) and the stitching on the fingertips coming undone (14% vs. 9%). The ICG glove shell however showed lower percentages than the SIG for the leather getting a hole (5% vs. 32%) or ripping (4% vs. 19%).

Damage to both gloves and inserts was attributed chiefly to normal wear and tear. Accidental damage that occurred was primarily due to wire and nails; there was very little attributed to petrolum, oil, and lubricant (POL) products. This was true for both glove groups.

The ANOVAs conducted on the durability ratings for the two insert groups showed no differences among test sites in the SIG group, but did in the ICG group. The post-hoc SNK tests showed the means for both Ft. Lewis and Ft. Carson to be significantly higher than the mean for Bamberg. The reason for the distinctions are not clear.

Preference. The soldiers in the ICG group were asked whether they preferred the ICG or the Standard Issue Glove (that they had from previous unit issues). The ICG was preferred by a margin of 72% to 28%.

SECTION B - FINDINGS BASED ON RESPONSES FROM ALL PERSONNEL PARTICIPATING IN THE EVALUATION.

Glove Compatibility with Jacket Sleeve. The soldiers scaled how often their wrists were exposed to the cold when they were working. The results follow in Table 11.

TABLE 11.
FREQUENCY OF WRIST EXPOSURE WHEN WORKING WITH GLOVES ON

	ICG N=489 % Reporting	SIG N=363 % Reporting
Almost Never	25%	21%
Sometimes	41%	38%
Often	25%	22%
Almost Always	12%	16%

A chi square test revealed no significant differences for the frequency distributions for the two glove groups. Both groups, though, had a total of better than 35% reporting that their wrists were often to almost always exposed when working.

Ease or Difficulty of Performing Various Tasks. Table 12 contains the scale used and the results obtained when the soldiers were asked to rate how easy or difficult it was to

perform mission-related or logistical tasks when wearing their respective gloves.

TABLE 12.
RATINGS FOR EASE/DIFFICULTY OF PERFORMING VARIOUS TASKS

EXTREMELY DIFFICULT 1	MODERATELY DIFFICULT 2	SLIGHTLY DIFFICULT 3	NEITHER EASY NOR DIFFICULT 4	SLIGHTLY EASY 5	MODERATELY EASY 6	EXTREMELY EASY 7

	ICG			SIG					
	X	SD	N	X	SD	N	t	df	p
OPERATE THE:									
.45 pistol	3.31	1.72	69	2.78	1.55	87	2.02	138.49	*
9mm pistol	3.38	1.84	70	2.95	1.76	67	1.40	135.00	NS
M-16 rifle	4.11	1.61	336	3.58	1.64	305	4.16	630.80	***
M-60 machine gun	4.35	1.77	164	3.60	1.73	181	4.72	338.26	***
M-249 machine gun	3.93	1.80	102	3.35	1.86	101	2.28	200.64	*
M-203 grenade launcher	4.27	1.71	134	3.71	1.62	147	2.78	273.26	**
.50 caliber	5.01	1.63	109	4.69	1.73	115	1.84	222.00	NS
PUT ON:									
M-17A2 gas mask	2.58	1.59	177	2.02	1.35	231	3.76	343.75	***
M-25 gas mask	2.94	1.70	67	2.00	1.33	54	3.42	118.93	***
OPERATE:									
Wheeled vehicle	5.47	1.47	253	5.14	1.62	229	2.30	462.33	*
Tracked vehicle	5.62	1.51	159	5.05	1.75	152	3.07	298.37	**
MAINTAIN:									
Wheeled vehicle	4.07	1.86	195	3.35	1.81	190	3.82	383.00	***
Tracked vehicle	3.99	1.92	172	3.20	1.75	169	3.98	337.15	***
Refuel a vehicle	5.42	1.58	270	5.11	1.67	237	2.19	488.36	*
MRE (Meal, Ready to Eat):									
Open	2.58	1.65	318	1.82	1.25	290	6.43	587.08	**
Prepare	2.71	1.63	309	2.09	1.44	285	4.93	591.08	***
Eat	3.21	1.76	298	2.80	1.73	282	2.83	577.19	**

*Significant at <.05
**Significant at <.01
***Significant at <.001

The above ratings reinforce the poor to marginal ratings for dexterity given by subjects in both glove groups, which were discussed in Section A. In these specific tasks listed in Table 12, the ICG does outperform the SIG in every case, but there is only one task where the difference in means is close to a full scale point - ease of putting on the M-25 mask - and the ratings for both gloves are very low. There were only four tasks that had ratings on the easy side of the scale and those were operating a .50 caliber machine gun, a wheeled vehicle, and a tracked vehicle, as well as refueling a vehicle. These ratings apply to both gloves and all fall only into the slightly easy (5) category, except for operating a tracked vehicle with the ICG, which is on the lower boundary of the moderately easy (6) category.

The weapons as a group had ratings at the neutral point or below (except for the above-mentioned .50 caliber machine gun). The soldiers commented that the biggest problem with weapons like the .45 pistol or the M-16 rifle was that the gloved trigger finger did not fit into the trigger space, or well. Also breaking down a weapon or cleaning it could generally not be accomplished with gloves.

Operating vehicles is easier than maintaining them - an obvious function of the finer dexterity required for many maintenance procedures. The ratings for operation are between slightly (5) and moderately (6) easy and in an acceptable range for both gloves, whereas the maintenance ratings are neutral for the ICG and in the slightly difficult range for the SIG.

The worst ratings in terms of types of tasks were for gas mask and MRE use. All of these ratings ranged between 1.82 (opening the MRE with the SIG) and 3.21 (eating the MRE with the ICG). Opening the MRE was a distinct problem for both glove groups. As opening the MRE with bare hands is known to be difficult, these ratings were not surprising.

Fit.* The overall ratings for fit of the gloves with inserts were in the slightly good range at 4.95 for the ICG (N=484) and in the neutral range at 4.21 for the SIG (N=363). A t test on these means showed that the difference between glove groups was significant ($t=6.71$, $df=795$, $p<.05$).

Soldiers also indicated the quality of fit for specific areas on the hand. The findings are presented in Table 13.

TABLE 13.
QUALITY OF GLOVE FIT FOR SPECIFIC HAND AREAS
(ICG N=484; SIG N=363)

	% REPORTING									
	Just Right		Too Long		Too Short		Too Wide		Too Narrow	
	ICG	SIG	ICG	SIG	ICG	SIG	ICG	SIG	ICG	SIG
Thumb	67%	56%	18%	29%	4%	4%	7%	7%	6%	6%
Fingers	59%	49%	20%	32%	8%	7%	5%	7%	10%	9%
Wrist	67%	61%	2%	4%	10%	8%	15%	22%	3%	2%
Palm	78%	72%	2%	4%	3%	3%	12%	9%	7%	5%
Knuckles/ Back of hand	71%	67%	2%	4%	5%	5%	9%	9%	10%	12%

The salient problem areas for fit are the thumb and fingers (too long) and the wrist (too wide). These areas cited for fit problems apply to each glove, although the percentages of subjects reporting fit problems are less in each case for the ICG than for the SIG, except for the "too short" category for the wrist and the "too narrow" category for the fingers. Chi square tests conducted on these percentages for the three fit areas showed the ICG to be significantly better than the SIG (Thumb: $X^2=13.9$, $df=1$, $p<.05$; Fingers: $X^2=14.7$, $df=1$, $p<.05$; Wrist: $X^2=5.8$, $df=1$, $p<.05$).

Chi square tests were also conducted on each of those problem areas in each glove group to determine if any problems were related to any particular size of a glove. For example, did wearing a size 4 mean that the perceived finger fit was more of a

*Fit here refers to the soldiers' perceptions of the gloves' fit, and not to anthropometric-based fit.

problem than wearing a size 5? The tests did not show any significant differences as a function of size.

Adjustment Straps. The soldiers did use the adjustment strap feature; 89% of the ICG group reported doing so, as did 92% of the SIG group. Most of the ICG group did not find it difficult to adjust the strap while wearing the gloves (85%), nor did a majority of the SIG group (75%). That 10% difference supports the slightly greater dexterity reported for the ICG.

There were cases of the gloves getting snagged or caught by the adjustment strap when worn. Fifteen percent of the ICG group stated that this had happened, as did 41% of the SIG group. This disparity is assumed to be a result of the SIG group reporting occurrences of this nature with previously owned SIG gloves. Soldiers were requested to bring any damaged gloves for our inspection at the end of the evaluation, and although not everyone did, our observations did not support the reported disparity. Also, the straps are in every way identical in terms of size and placement.

Insert Use. Some of the soldiers reported using inserts other than those provided for the evaluation. In the SIG group, 10% did so, and the types of inserts varied. There were not enough data for any type to make any statements about their effectiveness.

In the ICG group however, approximately one-fifth used other inserts, with most (N=80) using the standard issue wool insert, and the remainder using a variety of commercial ones. Half of those using the wool insert felt it worked better than the polyester insert, 15% felt it did not work as well as the polyester, 3% found no difference, and the remainder had no opinion.

The inserts for the two gloves behave differently when the glove shell is removed. When the ICG shell is removed, the insert stays on the hand; 63% of the ICG group liked this

feature, 35% did not. When the SIG glove shell is removed, the insert stays in the glove; 82% of the SIG group liked this feature, 16% did not. The SIG group however never had experienced the "stay on" feature of the polyester insert, while the ICG group had had prior experience with the wool insert.

There are probably a number of factors that influence the opinions, pro and con, for either group. Soldiers' comments have indicated that an insert staying in the glove means that it stays"stashed" there, and doesn'thave to be put in a pocket or somewhere else. There is an advantage to having the insert stay on the hand when the insert affords dexterity to do a task that the glove shell does not. For example, Military Police commented that they could take off the glove shell and write with the insert on.

It was feared that the polyester insert would be easier to lose than the wool because it has to be removed separately and because it crumples into a tiny ball that could easily come out of a pocket when withdrawing other items. The insert loss figures, however, while higher for the ICG group than for the SIG group, are not very different - 14% of the SIG group lost one or more inserts, while 22% of the ICG group did. (Loss of one or more glove shells was 17% for the ICG group and 13% for the SIG group.)

DISCUSSION

Two observations about the ratings are in order. The ICG was a new item, and the soldiers who rated it were rating it based on experience with it only during the evaluation. That is obviously not the case with the SIG. The soldiers had had previous experience with it and the ratings may reflect that past experience, to the glove's detriment.

Also, it is strange that so many of the Ft. Lewis ratings for either glove are higher than the ratings from the other sites. While it is true that ratings at Ft. Lewis are not always

significantly higher than those for the same glove group at the other sites, there is nonetheless a remarkable consistency that cannot be totally attributed to a milder climate. One hypothesis is that the soldiers at Ft. Lewis were in a Ranger unit characterized by high morale and esprit. Their attitudes may have influenced their ratings.

CONCLUSION

All site and overall ratings for the ICG were significantly and, in most cases, practically higher than the SIG on cold protection, water resistance, and dexterity. For durability, the ICG had significantly higher overall ratings for the glove shell, but the insert of the SIG was rated significantly higher overall. The ICG's overall ratings ranged from 3.96 (warmth) to 5.43 (durability) on a 7-point scale (7=very good).

The data obtained from these soldiers leave no doubt as to the better performance of the ICG, and this conclusion is corroborated by almost three-fourths of the ICG group who stated they preferred this glove to the SIG, with which they were, of course, familiar.

The ICG, however, while an improvement over the SIG, is not going to provide the desired level of performance on warmth. It had only one marginally acceptable site rating of 5.02 on this variable at Ft. Lewis, located in a temperate zone.

APPENDIX A

23 Jun 88

STATEMENT OF NEED

CLOTHING AND INDIVIDUAL EQUIPMENT (SN-CIE)

Part I-Combat Developer Statements/Requirements.

1. Title.

a. Intermediate Cold-Wet Glove.

b. Action Control Number: 73680.

2. Need.

a. As stated in the Close Combat Light Mission Area Analysis, a need exists to "increase warmth characteristics of individual clothing while decreasing bulk."

b. Gloves currently in the Army inventory do not meet the needs of soldiers in category I and II units who perform their mission under harsh environmental conditions in temperatures down to zero degrees Fahrenheit. Light and Heavy Duty Work Gloves (LIN J63269)(LIN J68064) with inserts (LIN J62858) have limitations in warmth, dexterity, durability, and outer shell water repellency. The Trigger Finger Mitten (LIN M53240) with inserts (LIN M52555) provides warmth but is too bulky and lacks sufficient dexterity.

c. A five-fingered glove is required to provide protection to the soldier performing his mission in the intermediate cold/wet range of 0 degrees to 40 degrees Fahrenheit.

d. Priority of need for the major characteristics of the glove are as follows:

(1) Cold protection.

(2) Wet protection.

(3) Dexterity.

(4) Durability.

e. The intermediate cold-wet glove is required to be available for issue as soon as possible.

3. Projected Use/Basis of Issue. Each individual assigned to a category I and II unit in climatic zones III through VII, or with contingency or training mission in these zones, will receive one pair of gloves (and additional inserts as required) as organizational issue IAN CTA 690-900. Individuals in category

III Table of Organization and Equipment and Table of Distribution and Allowances units will be authorized issue only when required for training or mission performance.

4. Description.

a. The glove will have removable inserts.

b. The glove will provide environmental protection better than the standard light duty glove to a properly clothed sedentary soldier in temperatures down to 0 degrees Fahrenheit for an extended period of time. Four hours of protection without supplemental warming is desired.

c. The glove's shell will be waterproof to the extent that the insulation quality is not significantly degraded. It is desired that water does not penetrate through the glove to the hand.

d. The glove must have dexterity necessary to fire the following weapons: .45 caliber pistol, 9mm pistol, M16 rifle, M60 machine gun, M249, and the M203 grenade launcher.

e. It is desired that the glove have sufficient dexterity to enable the user to don and doff the M17 series, M24 series, and M40 series protective masks and to activate the ripcord handle of the reserve parachute.

f. Durability shall be equal to or better than the current Light Duty Glove. Minimum service life of 120 field days is desired.

g. A method of attaching the glove(s) to the uniform will be utilized to prevent loss, e.g., an attaching ring, strap, loop, or clip.

h. The glove(s) will be sized to fit the 5th percentile female through the 95th percentile male soldier. The design will provide for an adjustable, secure fit.

i. It will have a minimum shelf life of 5 years.

j. The glove shell will be black. Insert coloration will be compatible with the camouflage characteristics of the temperate battle dress uniform.

k. The glove will resist mold and fungus growth.

l. The glove will resist degradation by inadvertent exposure to small amounts of POL products.

m. It will require only limited user maintenance (drying and cleaning IAW recommended methods).

n. MANPRINT considerations will be limited to safety and health hazard assessments and compliance with applicable human engineering design criteria.

o. The glove shall be compatible with standard and developmental field coats and jackets.

p. The glove is not required to be nuclear, biological, chemical (NBC)-contamination survivable.

5. Operational/Organizational Concept.

a. The glove will be worn by soldiers whose mission is in cold and wet environments down to 0 degrees fahrenheit. The glove system may be required to be worn for periods of 12-18 hours or more per day under cold conditions. Soldiers will be provided the opportunity to effect supplemental handwarming within the context and limitations of the tactical mission. Guidelines for the prevention of cold weather injuries are provided in U.S. Army Publication TC 21-3.

b. The glove will be worn with all existing and developmental temperate and extreme cold weather uniform items. In an NBC or chemical scenario, the battle dress overgarment will be worn with the NBC tactile glove.

c. When cold/wet conditions are anticipated, the glove will be worn in lieu of light duty gloves. When weather conditions are not severe enough for the glove to be worn, the glove will be carried with the soldier's existence load items or as directed by the commander's standard operating procedures. This glove is not intended to replace any glove currently in the system.

APPENDIX B

Description of Standard Issue - Glove

Item Name: Gloves, Men's and Women's, Light Duty

Climatic Category According To QSTAG 360 Within Which The Item Is Intended To Be Used: All climatic categories

Concept Of Use: The gloves are worn to protect the hands of personnel performing light work. When required, they may also be worn for mosquito protection and may be worn over the chemical protective (CP) gloves to protect the CP gloves from abrasion and cuts. The light duty gloves may be worn alone or, for additional warmth under cold conditions, may be worn with the wool inserts covered by MIL-G-835.

Description Of Item: The gloves are an unlined Gunn-cut design made of leather with a continuous thumb inseamed all around and a leather welt inserted in the thumb seam. The seam at the base of the fingers incorporates a reinforcing leather welt turned up to cover the stitching. For wrist closure, an adjustable strap and buckle is provided on the back of the glove. The back of the gloves may be pieced.

Materials Used: The gloves may be constructed of either cattlehide or horsehide leather which has a water resistant finish.

Color: Black

Weight: 181.2 g (6.4 oz) per pair

Size: 1 through 5

Cost: $7.05 per pair

Additional Remarks: Specification - MIL-G-822

NSN: size 1, 8415-00-634-4794
size 2, 8415-00-634-4793
size 3, 8415-00-269-5700
size 4, 8415-00-269-5701
size 5, 8415-00-269-5702

Item Name: Glove Inserts, Cold Weather

Climatic Category According To QSTAG 360 Within Which The Item Is Intended To Be Used: C-0, C-1, C-2, C-3, and C-4

Concept Of Use: The glove inserts are worn under other handwear to provide environmental protection to the hands.

Description Of Item: The glove inserts are made of knitted fabric and have an ambidextrous design. The hand, fingers, and thumb are knit seamless with a plain stitch. The cuff is a rib knit.

Materials Used: The knitting yarn is a blend of approximately 70% wool and 30% nylon.

Color: Olive Green 208

Weight: 67.7 g (2.4 oz) per pair

Size: 1 through 5

Cost: $1.30 per pair

Additional Remarks: Specification - MIL-G-835

NSN: 8415-00-682-6673 (a)

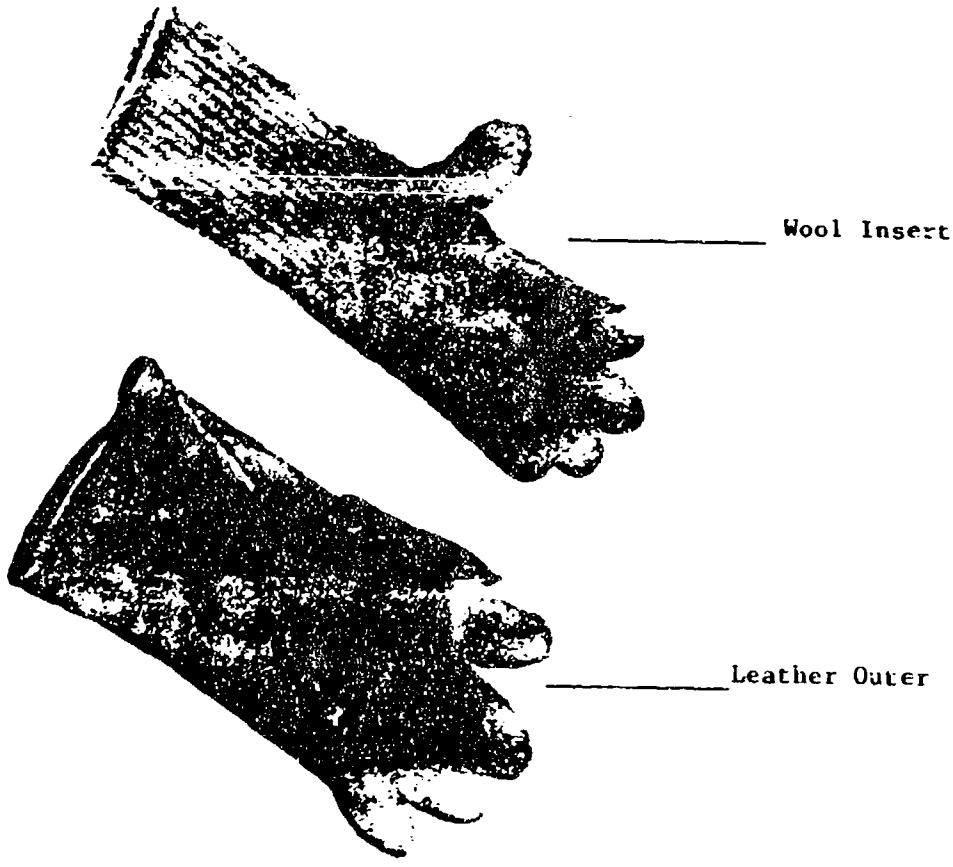


Figure B-1. Gloves, Men's and Women's, Light Duty.

APPENDIX C

Description of Intermediate Cold/Wet Glove System

Item Name: Intermediate Cold/Wet Glove System

Climatic Category According To QSTAG 360 Within Which The Item Is Intended To Be Used: C-0, C-1, C-2, C-3, and C-4

Concept Of Use: The intermediate cold/wet glove system is worn in moderately cold and wet climates (approximately 0 to 40 degrees Fahrenheit temperature range) to provide environmental protection while also providing dexterity and durability suitable for combat duties.

Description Of Item: The glove system currently under evaluation is a modification of the light duty work glove covered by MIL-G-822. The leather outer shell of the prototype is identical to the MIL-G-822 glove. The leather shell has been modified by the addition of a waterproof membrane and a thin insulating lining, both of which are permanently attached to the shell. A removable comfort/insulating liner of an ambidextrous design in a seamless knit construction is also part of the system.

Materials Used: The outer layer of the glove shell may be constructed of either cattlehide or horsehide leather which has a water resistant finish. The waterproof membrane may be one of three types under consideration, either a microporous polytetrafluoroethylene film, a monolithic elastomeric polyurethane film, or a polyether urethane film. The insulating layer attached to the outer shell is polyurethane foam laminated to nylon tricot. The removable liner is made of hollow-core polyester fiber.

Color: The glove shell is black; the removable liner is olive green.

Weight: 259.3 g (9.1 oz) per pair (shell and insert)

Size: 2 through 6

Cost: Approximately $30.00 per pair

Additional Remarks: The glove system described here is intended to be a quick-fix, interim solution item, and does not meet all desired requirements for an intermediate cold/wet glove system. A comprehensive development program is also ongoing to investigate a full range of potential technologies and material concepts in order to achieve the full solution.

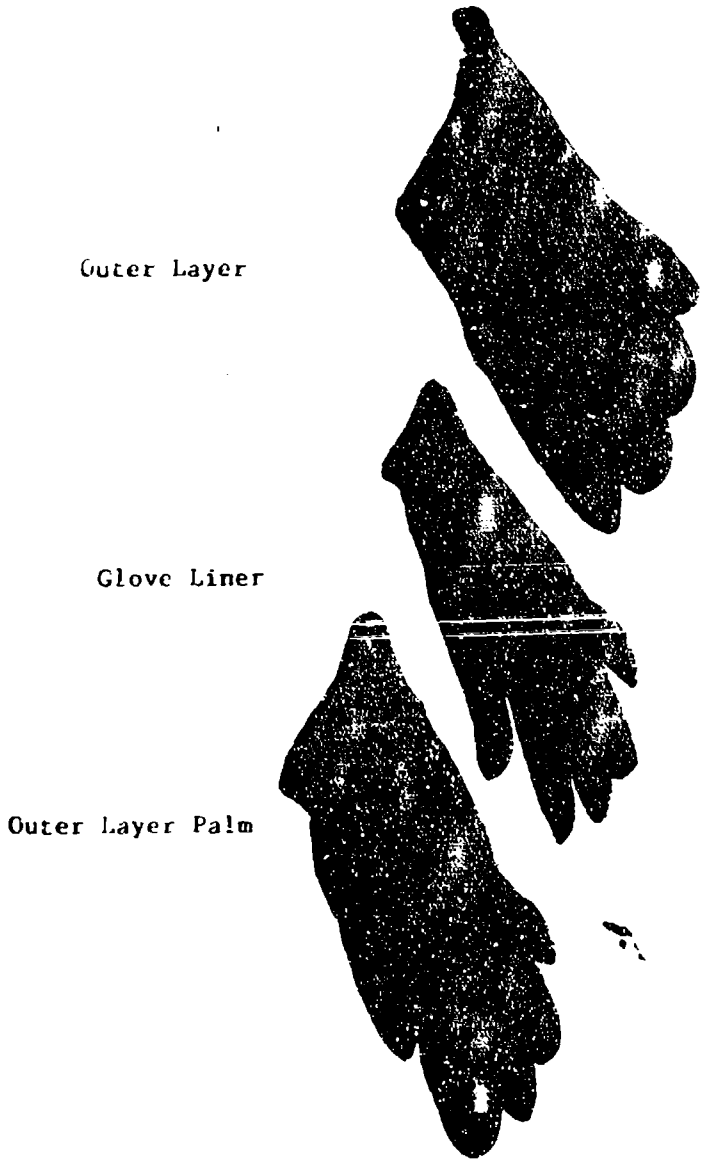


Figure 13-2, Intermediate Cold/Wet Glove System

DEPARTMENT OF THE AIR FORCE
OL-A, USAF ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER (MAC)
FEDERAL BUILDING, ASHEVILLE, NORTH CAROLINA 28801-2723

28 APR 1988

CAC (Mr Fountain)

Weather Data for Combat Glove Evaluation (Your ltr, 6 Apr 88)

US Army Troop Support Command
STRNC-YBF (Ms Jezior)
Natick Research, Development, and Engineer Center
Natick, MA 01760-5020

1. Attached are tables of climatic data for Ft Lewis WA, Ft Carson CO, Ft Drum NY, Bamberg Fed Rep Germany (FRG), and Nurnberg FRG. Nurnberg data are included because Bamberg does not report 24-hours per day nor all days of the month. Additionally, the type and amount of precipitation was frequently unavailable for Bamberg. Nurnberg should be considered a viable substitute since it is only 32 miles distance in the same river valley. The data are much more complete for Nurnberg and should provide more realistic results for your study.

2. The tables contain precipitation data; type and amount if known, otherwise "yes" for occurrence of precip or missing (MSG) if data were unavailable; the maximum wind occurring for the day; maximum and minimum temperatures, when available; and a "wind chill" value. This latter value is a worst case value - the lowest possible value - computed using the minimum temperature for a day with the maximum wind for that day. (Wind chill is nominally an instataneous value based on the wind and temperature at a given time.)

3. This completes your request. However, if you have any questions, please contact Mr Mac Fountain at AUTOVON 697-8358

Henry M. Fountain

HENRY M. FOUNTAIN
Supervisor, Climatic Applications Section

1 Atch
Clim Tables

cc: USAFETAC/DO wo atch

APPENDIX E

1. STANDARD ISSUE BLACK LEATHER GLOVE EVALUATION

U.S. Army Natick Research Development and Engineering Center is evaluating handwear with the goal of providing you with a warm, practical glove suitable for a moderately cold climate. Your answers on this questionnaire will help decide which glove the U.S. Army will provide for you, so please read all instructions carefully and answer as accurately as you can.

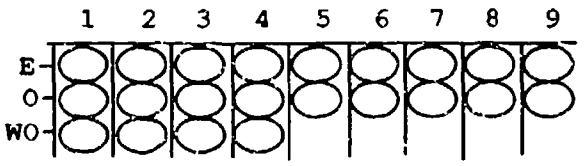
To keep your answers confidential, we have not asked for your name or social security number. The information you provide us will be used only for this evaluation. If you have any questions regarding this form, or the evaluation in general, feel free to ask the Natick representatives present.

USE A #2 PENCIL AND ERASE ALL MISTAKES COMPLETELY

CORRECT MARK

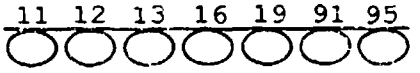
INCORRECT MARKS

What is your rank or grade?



What unit are you in? _____

What is your MOS series?



Other _____

What is your sex? Male ◯ Female ◯

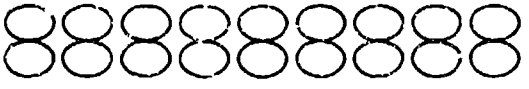
How long have you been in the U.S. Army? Fill in one answer.

- ◯ 0-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ More than 20 years

How many days have you spent in the field during this glove evaluation? Fill in one answer.

- ◯ Less than 10 days
- ◯ 10-20 days
- ◯ 21-30 days
- ◯ More than 30 days

DO NOT MARK BELOW THIS LINE!



What size glove were you issued for the evaluation?

2 ○ 3 ○ 4 ○ 5 ○ 6 ○ Not Sure ○

BASE YOUR ANSWERS TO THE FOLLOWING QUESTIONS ONLY ON THE GLOVE SHELL AND INSERTS THAT WERE PROVIDED FOR THE EVALUATION, THE STANDARD ISSUE BLACK LEATHER GLOVE WITH INSERTS

1. Please estimate the number of DAYS you wore the gloves with inserts.

- ○ Less than 10 days
- ○ 10-20 days
- ○ 21-30 days
- ○ 31-40 days
- ○ 41-50 days
- ○ 51-60 days
- ○ More than 60 days

2. Please estimate the average number of HOURS per DAY you wore them.

- ○ 0-2 hours
- ○ 3-5 hours
- ○ 6-8 hours
- ○ 9 or more hours

3. Please rate how well the gloves with insert fit in the following places on your hand. Mark ALL that apply for each location.

	JUST RIGHT	TOO LONG	TOO SHORT	TOO WIDE	TOO NARROW
a. Thumb	○	○	○	○	○
b. Fingers	○	○	○	○	○
c. Wrist	○	○	○	○	○
d. Palm	○	○	○	○	○
e. Knuckles/back of hand	○	○	○	○	○

4. We want to know how well the sleeve of your jacket joined with your glove. Please tell us how often your wrist is exposed to the cold when you are working. Mark one answer.

- ○ Almost never
- ○ Sometimes
- ○ Often
- ○ Almost always

5. Using the scale below, please rate the glove with inserts on the factors listed. Mark one number for each, or mark "N/A" (not applicable if you cannot rate a particular factor.

N/A	VERY BAD 1	MODERATELY BAD 2	SLIGHTLY BAD 3	NEITHER BAD NOR GOOD 4	SLIGHTLY GOOD 5	MODERATELY GOOD 6	VERY GOOD 7

	N/A	1	2	3	4	5	6	7
a. Cold protection (At this duty station)	○	○	○	○	○	○	○	○
b. Rain protection	○	○	○	○	○	○	○	○
c. Dexterity	○	○	○	○	○	○	○	○
d. Durability of glove	○	○	○	○	○	○	○	○
e. Durability of insert	○	○	○	○	○	○	○	○
f. Dexterity when wearing just glove	○	○	○	○	○	○	○	○
g. Dexterity when wearing just insert	○	○	○	○	○	○	○	○

6. Were the gloves or inserts damaged in any way? YES ○ NO ○

6a. If YES, what happened? Mark all that apply for each item.

GLOVES

- ○ Leather got a hole in it
- ○ Leather ripped
- ○ Seams came apart
- ○ Adjusting strap tore off glove
- ○ Glove lining tore
- ○ Other

INSERTS

- ○ Stitching on fingertips came undone
- ○ Fabric got a hole/unraveled
- ○ Other

6b. Which of the following describe(s) how damage occurred to your gloves or inserts? Mark all that apply.

GLOVES

- ○ Normal wear and tear
- ○ Caught on wire, nails, etc.
- ○ Gas/oil products got on them
- ○ Acid(s) got on them
- ○ Other

INSERTS

- ○ Normal wear and tear
- ○ Caught on wire, nails, etc.
- ○ Gas/oil products got on them
- ○ Acid(s) got on them
- ○ Laundering
- ○ Other

7. Please rate how easy or difficult it was to do each of the following while wearing the glove and inserts. Mark "N/A" for any activity you never tried.

N/A	EXTREMELY DIFFICULT 1	MODERATELY DIFFICULT 2	SLIGHTLY DIFFICULT 3	NEUTRAL 4	SLIGHTLY EASY 5	MODERATELY EASY 6	EXTREMELY EASY 7

	N/A	1	2	3	4	5	6	7
OPERATE THE:								
.45 caliber pistol	○	○	○	○	○	○	○	○
9mm pistol	○	○	○	○	○	○	○	○
M-16 rifle	○	○	○	○	○	○	○	○
M-60 machine gun	○	○	○	○	○	○	○	○
M-249 machine gun (SAW)	○	○	○	○	○	○	○	○
M-203 grenade launcher	○	○	○	○	○	○	○	○
.50 caliber	○	○	○	○	○	○	○	○
PUT ON:	N/A	1	2	3	4	5	6	7
M-17A2 gas mask	○	○	○	○	○	○	○	○
M-24 gas mask	○	○	○	○	○	○	○	○
M-40 gas mask	○	○	○	○	○	○	○	○
Open an MRE package	○	○	○	○	○	○	○	○
Prepare the MRE (mix with water, heat, etc.)	○	○	○	○	○	○	○	○
Eat the MRE	○	○	○	○	○	○	○	○
Operate a wheeled vehicle	○	○	○	○	○	○	○	○
Operate a tracked vehicle	○	○	○	○	○	○	○	○
Do maintenance on a wheeled vehicle	○	○	○	○	○	○	○	○
Do maintenance on a tracked vehicle	○	○	○	○	○	○	○	○
Refuel a vehicle	○	○	○	○	○	○	○	○

8. Did the weather ever get warm enough that you didn't need the glove with inserts?

YES ○ NO ○

8a. If YES, at what temperatures (approximately) did you find you did not need them? Fill in one answer.

- Below 40 degrees ○
- Between 40 and 49 ○
- Between 50 and 59 ○
- 60 and over ○

9. Please rate the glove with inserts on the following characteristics using the scale below. Mark one number for each.

VERY BAD	MODERATELY BAD	SLIGHTLY BAD	NEITHER BAD NOR GOOD	SLIGHTLY GOOD	MODERATELY GOOD	VERY GOOD
1	2	3	4	5	6	7

STANDARD ISSUE GLOVE WITH INSERTS

	1	2	3	4	5	6	7
COMFORT	○	○	○	○	○	○	○
WARMTH	○	○	○	○	○	○	○
WATERPROOFING	○	○	○	○	○	○	○
FIT (Overall)	○	○	○	○	○	○	○
DEXTERITY (Overall)	○	○	○	○	○	○	○
DURABILITY (Overall)	○	○	○	○	○	○	○
GLOVE (Overall)	○	○	○	○	○	○	○

10. Did you use the adjustment straps on the gloves?

YES ○ NO ○

10a. If YES, was it difficult to adjust the straps while wearing the gloves?

YES ○ NO ○

11. Did your adjustment strap ever get caught or snagged on anything while you were wearing the glove?

YES ○ NO ○

12. Have you ever washed the inserts? YES ○ NO ○

12a. If YES, about how many times?

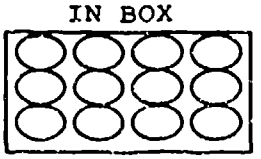
Once or twice ○
Three to five times ○
More than five times ○

13. Did you use any other type of insert than that provided?

YES ○ NO ○

13a. If YES, what was it and how well did it work?

DO NOT WRITE IN BOX



14. Do you like the fact that the insert stays in your glove when you remove the glove?

YES ○ NO ○

15. Did the INSERT ever get wet because of rain or snow?

YES ◯ NO ◯

16. Was the glove with insert usually warm anough:

	YES	NO
In garrison	◯	◯
In the field	◯	◯

16a. If you answered NO to one or both of the above, what did you USUALLY wear when it was not warm enough? Mark one answer.

- ◯ Wore glove with inserts anyway, just had cold hands
- ◯ Added extra inserts to gloves
- ◯ Wore Interim Combat Glove with commercial insert
- ◯ Wore my commercial glove
- ◯ Wore my commercial glove with Army insert
- ◯ Wore my commercial gloves with commercial insert
- ◯ Other

17. Did you lose either glove? NO ◯ Lost 1 glove ◯ Lost both ◯

18. Did you lose any of the inserts? NO ◯ Lost 1 ◯ Lost 2 ◯ Lost 3 ◯ Lost all ◯

19. Did you ever have to change the insert because it was wet from sweat?

YES ◯ NO ◯

19a If YES, did this happen when you were physically active? YES ◯ NO ◯

20. Do you own a commercial glove that you use in the field or in garrison?

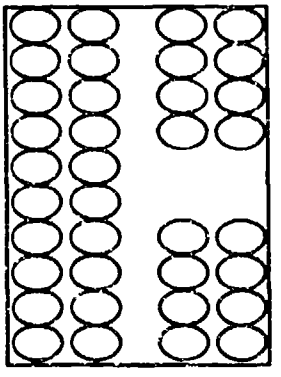
YES ◯ NO ◯ ——→ SKIP TO QUESTION 26

↓

CONTINUE

21. Please describe your commercial glove.

DO NOT WRITE IN BOX



COST _____

MATERIAL _____

MANUFACTURER _____

22. Tell us where you wear your commercial glove. Mark one answer.

- In the field ◯
- In garrison ◯
- Both of the above ◯

23. Which glove is better for:

	COMMERCIAL	STANDARD ISSUE
Warmth?	◯	◯
Dexterity?	◯	◯
Durability?	◯	◯
Water resistance?	◯	◯

24. What was your biggest reason for buying commercial gloves? Mark one answer.

- ◯ Warmth
- ◯ Dexterity
- ◯ Durability
- ◯ Water resistance

25. Are there any duties you perform for which you take off your commercial gloves and put on your Army gloves, such as vehicle maintenance, digging, working with concertina, etc.?

YES ◯ NO ◯

25a. If YES, do you do this because: (Mark all that apply.)

- ◯ Don't want to rip or tear commercial glove
- ◯ Don't want to get commercial glove wet
- ◯ Don't want to get commercial glove dirty/stained
- ◯ Commercial glove is clumsy/awkward to work in
- ◯ Othe

26. Do you have another pair of standard issue Black Leather Gloves with wool inserts that were issued before the evaluation?

YES ◯ NO ◯

27. What size standard issue glove do you usually wear?

1 2 3 4 5 Not Sure

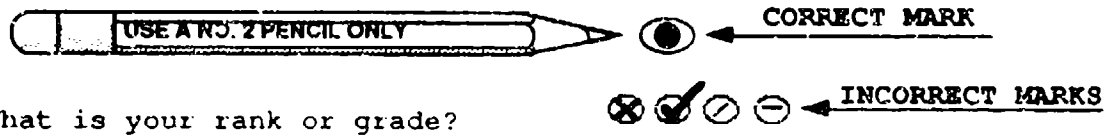
28. Do you have any comments on the glove? Use the space provided below, but please DO NOT write on the back of this page.

2. INTERIM COMBAT GLOVE EVALUATION

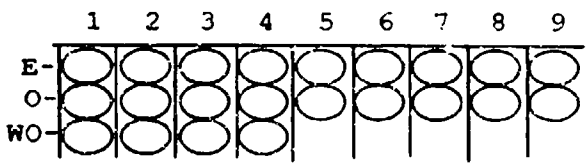
U.S. Army Natick Research Development and Engineering Center is evaluating handwear with the goal of providing you with a warm, practical glove suitable for a moderately cold climate. Your answers on this questionnaire will help decide which glove the U.S. Army will provide for you, so please read all instructions carefully and answer as accurately as you can.

To keep your answers confidential, we have not asked for your name or social security number. The information you provide us will be used only for this evaluation. If you have any questions regarding this form, or the evaluation in general, feel free to ask the Natick representatives present.

USE A #2 PENCIL AND ERASE ALL MISTAKES COMPLETELY



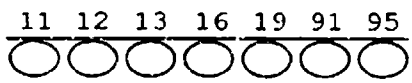
What is your rank or grade?



What unit are you in?

_____

What is your MOS series?



Other _____

What is your sex? Male ◯ Female ◯

How long have you been in the U.S. Army? Fill in one answer.

- ◯ 0-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ More than 20 years

How many days have you spent in the field during this glove evaluation? Fill in one answer.

- ◯ Less than 10 days
- ◯ 10-20 days
- ◯ 21-30 days
- ◯ More than 30 days

DO NOT MARK BELOW THIS LINE!

What size glove were you issued for the evaluation?

2 ○ 3 ○ 4 ○ 5 ○ 6 ○ Not Sure ○

BASE YOUR ANSWERS TO THE FOLLOWING QUESTIONS ONLY ON THE GLOVE SHELL AND INSERTS THAT WERE PROVIDED FOR THE EVALUATION, THE INTERIM COMBAT GLOVE WITH INSERTS

1. Please estimate the number of DAYS you wore the gloves with inserts.

- ○ Less than 10 days
- ○ 10-20 days
- ○ 21-30 days
- ○ 31-40 days
- ○ 41-50 days
- ○ 51-60 days
- ○ More than 60 days

2. Please estimate the average number of HOURS per DAY you wore them.

- ○ 0-2 hours
- ○ 3-5 hours
- ○ 6-8 hours
- ○ 9 or more hours

3. Please rate how well the gloves with insert fit in the following places on your hand. Mark ALL that apply for each location.

	JUST RIGHT	TOO LONG	TOO SHORT	TOO WIDE	TOO NARROW
a Thumb	○	○	○	○	○
b. Fingers	○	○	○	○	○
c. Wrist	○	○	○	○	○
d. Palm	○	○	○	○	○
e. Knuckles/back of hand	○	○	○	○	○

4. We want to know how well the sleeve of your jacket joined with your glove. Please tell us how often your wrist is exposed to the cold when you are working. Mark one answer.

- ○ Almost never
- ○ Sometimes
- ○ Often
- ○ Almost always

5. Using the scale below, please rate the glove with inserts on the factors listed. Mark one number for each, or mark "N/A" (not applicable if you cannot rate a particular factor.

N/A	VERY BAD 1	MODERATELY BAD 2	SLIGHTLY BAD 3	NEITHER BAD NOR GOOD 4	SLIGHTLY GOOD 5	MODERATELY GOOD 6	VERY GOOD 7

	N/A	1	2	3	4	5	6	7
a. Cold protection (At this duty station)	○	○	○	○	○	○	○	○
b. Rain protection	○	○	○	○	○	○	○	○
c. Dexterity	○	○	○	○	○	○	○	○
d. Durability of glove	○	○	○	○	○	○	○	○
e. Durability of insert	○	○	○	○	○	○	○	○
f. Dexterity when wearing just glove	○	○	○	○	○	○	○	○
g. Dexterity when wearing just insert	○	○	○	○	○	○	○	○

6. Were the gloves or inserts damaged in any way? YES ○ NO ○

6a. If YES, what happened? Mark all that apply for each item.

GLOVES

- ○ Leather got a hole in it
- ○ Leather ripped
- ○ Seams came apart
- ○ Adjusting strap tore off glove
- ○ Glove lining tore
- ○ Other

INSERTS

- ○ Stitching on fingertips came undone
- ○ Fabric got a hole/unraveled
- ○ Other

6b. Which of the following describe(s) how damage occurred to your gloves or inserts? Mark all that apply.

GLOVES

- ○ Normal wear and tear
- ○ Caught on wire, nails, etc.
- ○ Gas/oil products got on them
- ○ Acid(s) got on them
- ○ Other

INSERTS

- ○ Normal wear and tear
- ○ Caught on wire, nails, etc.
- ○ Gas/oil products got on them
- ○ Acid(s) got on them
- ○ Laundering
- ○ Other

7. Please rate how easy or difficult it was to do each of the following while wearing the glove and inserts. Mark "N/A" for any activity you never tried.

N/A	EXTREMELY DIFFICULT	MODERATELY DIFFICULT	SLIGHTLY DIFFICULT	NEUTRAL	SLIGHTLY EASY	MODERATELY EASY	EXTREMELY EASY
	1	2	3	4	5	6	7

	N/A	1	2	3	4	5	6	7
OPERATE THE:								
.45 caliber pistol	○	○	○	○	○	○	○	○
9mm pistol	○	○	○	○	○	○	○	○
M-16 rifle	○	○	○	○	○	○	○	○
M-60 machine gun	○	○	○	○	○	○	○	○
M-249 machine gun (SAW)	○	○	○	○	○	○	○	○
M-203 grenade launcher	○	○	○	○	○	○	○	○
.50 caliber machine gun	○	○	○	○	○	○	○	○
PUT ON:								
M-17A2 gas mask	○	○	○	○	○	○	○	○
M-25 gas mask	○	○	○	○	○	○	○	○
M-40 gas mask	○	○	○	○	○	○	○	○
Open an MRE package	○	○	○	○	○	○	○	○
Prepare the MRE (mix with water, heat, etc.)	○	○	○	○	○	○	○	○
Eat the MRE	○	○	○	○	○	○	○	○
Operate a wheeled vehicle	○	○	○	○	○	○	○	○
Operate a tracked vehicle	○	○	○	○	○	○	○	○
Do maintenance on a wheeled vehicle	○	○	○	○	○	○	○	○
Do maintenance on a tracked vehicle	○	○	○	○	○	○	○	○
Refuel a vehicle	○	○	○	○	○	○	○	○

8. Did the weather ever get warm enough that you didn't need the glove with inserts?

YES ○ NO ○

8a. If YES, at what temperatures (approximately) did you find you did not need them? Fill in one answer.

- Below 40 degrees ○
- Between 40 and 49 ○
- Between 50 and 59 ○
- 60 and over ○

9. Please rate the glove with inserts on the following characteristics using the scale below. Mark one number for each.

VERY BAD	MODERATELY BAD	SLIGHTLY BAD	NEITHER BAD NOR GOOD	SLIGHTLY GOOD	MODERATELY GOOD	VERY GOOD
1	2	3	4	5	6	7

INTERIM COMBAT GLOVE WITH INSERTS

	1	2	3	4	5	6	7
COMFORT	○	○	○	○	○	○	○
WARMTH	○	○	○	○	○	○	○
WATERPROOFING	○	○	○	○	○	○	○
FIT (Overall)	○	○	○	○	○	○	○
DEXTERITY (Overall)	○	○	○	○	○	○	○
DURABILITY (Overall)	○	○	○	○	○	○	○
GLOVE (Overall)	○	○	○	○	○	○	○

10. Did you use the adjustment straps on the gloves?

YES ○ NO ○

10a. If YES, was it difficult to adjust the straps while wearing the gloves?

YES ○ NO ○

11. Did your adjustment strap ever get caught or snagged on anything while you were wearing the glove?

YES ○ NO ○

12. Have you ever washed the inserts? YES ○ NO ○

12a. If YES, about how many times?

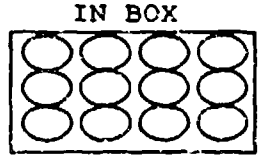
Once or twice ○
Three to five times ○
More than five times ○

13. Did you use any other type of insert than that provided?

YES ○ NO ○

13a. If YES, what was it and how well did it work?

DO NOT WRITE IN BOX



14. Do you like the fact that the insert stays on your hand when you remove the glove?

YES ○ NO ○

15. Did the INSERT ever get wet because of rain or snow?

YES ◯ NO ◯

16. Was the glove with insert usually warm enough:

	YES	NO
In garrison	◯	◯
In the field	◯	◯

16a. If you answered NO to one or both of the above, what did you USUALLY wear when it was not warm enough? Mark one answer.

- ◯ Wore glove with inserts anyway, just had cold hands
- ◯ Added extra inserts to gloves
- ◯ Wore Interim Combat Glove with commercial insert
- ◯ Wore my commercial glove
- ◯ Wore my commercial glove with Army insert
- ◯ Wore my commercial gloves with commercial insert
- ◯ Other

17. Did you lose either glove? NO ◯ Lost 1 glove ◯ Lost both ◯

18. Did you lose any of the inserts? NO ◯ Lost 1 ◯ Lost 2 ◯ Lost 3 ◯ Lost all ◯

19. Did you ever have to change the insert because it was wet from sweat?

YES ◯ NO ◯

19a If YES, did this happen when you were physically active? YES ◯ NO ◯

20. Do you own a commercial glove that you use in the field or in garrison?

YES ◯ NO ◯ ⟶ SKIP TO QUESTION 26

↓

CONTINUE

21. Please describe your commercial glove.

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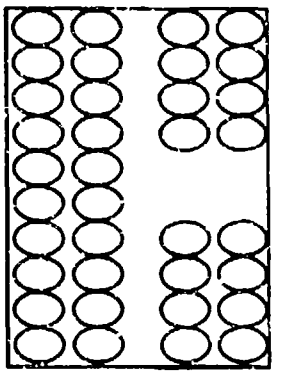

COST _____

MATERIAL _____

MANUFACTURER _____

22. Tell us where you wear your commercial glove. Mark one answer.

- In the field
- In garrison
- Both of the above

23. Which glove is better for:

	COMMERCIAL	INTERIM COMBAT
Warmth?		
Dexterity?		
Durability?		
Water resistance?		

24. What was your biggest reason for buying commercial gloves? Mark one answer.

- Warmth
- Dexterity
- Durability
- Water resistance

25. Are there any duties you perform for which you take off your commercial gloves and put on your Army gloves, such as vehicle maintenance, digging, working with concertina, etc.?

YES NO

25a. If YES, do you do this because: (Mark all that apply.)

- Don't want to rip or tear commercial glove
- Don't want to get commercial glove wet
- Don't want to get commercial glove dirty/stained
- Commercial glove is clumsy/awkward to work in
- Other

26. Do you currently own a standard issue Black Leather Glove with wool inserts?

YES NO

2106 4904

27. What size standard issue glove do you usually wear?

1 2 3 4 5 Not Sure

28. Do you have any comments on the glove? Use the space provided below, but please DO NOT write on the back of this page.

3. INTERVIEW

_____INTERIM GLOVE

_____STANDARD GLOVE

What do you like about the glove and insert?

Glove

Insert

What do you dislike about them?

Glove

Insert

What is your MOS?____ What are your most common tasks in the field?

Are you able to do them with gloves on? YES NO

(Which can't you?)

Where is having cold hands your biggest problem in trying to do your job?

__Don't have a problem

___Vehicle Maintenance ___Working with metal/wire

__Bivouac activities

___Using weapons

___Pumping Fuel

___Guard duty

Other_____

Did you have any problems using any weapons while wearing the gloves and inserts? YES NO

Which weapon(s)?

What problem(s)?

Do you ever wear just the inserts to do any kinds of tasks? YES NO

If YES, what?

If no, why?

Did you often have a problem with the gloves getting wet (soaking through)?

YES NO

If YES, was it because of sweat or rain/snow or both?

Sweat Rain/snow Both

Do you ever change inserts? YES NO

Did it help? YES NO

If NO, why not?

Do you feel the glove is adequate as a work glove? YES NO

If NO, why not?

Can you wear gloves and put on and take off your MOPP mask? YES NO

__ Don't know, never tried

__No, it's impossible Mask_____

__Yes, but difficult

Difficulty:

Where do you usually stow your gloves and inserts in the field when not wearing them?

___ Ruck Pockets of_____

Other_____

Does the ridge of material at the palm cause any problems? YES NO

If YES, what?

APPENDIX F

Demographics for Reduced Group (in Percentages)

	FORT DRUM		GERMANY		FORT LEWIS		FORT CARSON		OVERALL	
	ICG N=83	SIG N=84	ICG N=86	SIG N=75	ICG N=86	SIG N=44	ICG N=93	SIG N=105	ICG N=348	SIG N=308
Rank										
E-1	2.5	1.2	2.5	1.4	0	2.3	1.1	1.0	1.5	1.3
E-2	2.5	2.4	3.8	4.2	6.0	2.3	7.5	5.7	5.0	4.0
E-3	34.5	54.2	28.8	41.7	20.2	20.9	26.9	35.2	27.5	39.9
E-4	33.3	16.9	40.0	31.9	32.1	37.2	25.9	32.4	32.5	28.7
E-5	17.2	14.5	18.8	13.9	27.4	27.9	25.8	17.1	22.5	17.2
E-6	9.9	10.8	6.3	6.9	14.3	9.3	12.9	8.6	10.9	8.9
MOS										
11	0	0	76.7	84.0	80.2	84.1	87.1	77.1	62.1	58.8
12	54.2	97.6	0	0	0	0	1.1	1.0	13.2	27.0
19	0	0	0	0	0	0	2.2	6.7	0.6	2.3
31	1.2	1.2	4.7	0	10.5	13.6	1.1	5.7	4.3	4.2
62	37.4	0	0	0	0	0	0	0	8.9	0
63	1.2	1.2	12.8	14.7	0	0	2.2	4.8	4.0	5.5
91	3.6	0	2.3	0	3.5	2.3	0	0	2.3	0.3
Time in Service										
1 year	78.3	75.0	75.6	77.3	88.4	95.5	73.9	76.0	79.0	78.8
2 years	15.7	22.6	18.6	16.0	10.5	4.5	17.4	20.2	15.6	17.6
3 years	4.8	2.4	5.8	5.3	1.2	0	6.5	2.9	4.6	2.9
4 years	1.2	0	0	1.3	0	0	1.1	1.0	0.6	0.7
5 years	0	0	0	0	0	0	1.1	0	0.3	0
Time in Field										
1 day	65.9	32.5	4.7	1.4	27.4	29.6	16.5	20.1	28.1	20.5
2 days	18.3	27.7	21.2	28.8	47.6	47.7	49.5	39.2	34.5	34.8
3 days	12.2	31.3	22.4	28.8	15.5	9.1	14.3	22.6	16.1	24.5
4 days	3.7	8.4	51.8	41.1	9.5	13.6	19.8	17.7	21.4	20.2
Days Worn										
1 day	12.1	6.0	22.1	4.0	37.2	40.1	26.9	10.5	24.7	12.0
2 days	25.3	4.8	23.3	12.0	36.1	36.4	29.0	21.9	28.5	16.9
3 days	16.9	11.9	12.8	13.3	18.6	4.6	10.8	15.2	14.7	12.3
4 days	7.2	10.7	15.1	9.3	5.8	4.6	18.3	13.3	11.8	10.4
5 days	8.4	14.3	9.3	6.7	0	0	3.2	7.6	5.2	8.1
6 days	13.3	14.3	7.0	2.7	0	0	3.2	5.7	5.8	6.5
7 days	16.9	38.1	10.5	52.0	2.3	13.6	8.6	25.7	9.5	33.8