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13. ABSTRACT (Maximum 200 Words) An analysis of U.S. Army special measurement orders for men's dress coat and trousers was made to determine the minimum and maximum sizes needed to fit soldiers. The minimum and maximum measurements were compared to the existing tariff. Statistical analyses were performed to determine an accurate tariff expansion. The project supports the expansion of sizes for dress coats to 52 and to have coat lengths at extra, extra long starting at size 38. The project supports the expansion of sizes for trousers to size 50 with extra, extra long lengths starting at size 30. Pre-altered patterns or pre-altered patterns combined with a partial tariff expansion are alternatives to complete tariff expansion. The majority of special measurement orders were for extra girth and extra length in coat and trousers. These are simple pattern adjustments and alterations that could be computer stored for quick retrieval. Size prediction by weight and garment length prediction by height are possible. Expanded tariff and/or pre-altered patterns would assure a maximum number of soldiers be clothed quickly and with good fit. This project supports customer driven uniform manufacture by tariff expansion and pre-altered pattern making, by improvement of measurement form.				
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**ANALYSIS OF SPECIAL MEASUREMENT ORDERS
FOR
U.S. ARMY MEN'S DRESS COATS AND TROUSERS
FOR
TARIFF EXPANSION
AND/OR
PRE-ALTERED PATTERNS**

**FINAL TECHNICAL REPORT
MPG, DDFG-T1-P4**

Prepared By

**Jacqueline Robeck, Ph.D.
Principal Investigator**

**University of Wisconsin-Stout
320 HE Building
Menomonie, WI 54751**

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1. PURPOSE

The purpose of this document is to report on University of Wisconsin-Stout (UWS) activities in the contracted Design and Development Focus Group (DDFG)-Task 1 (T1)-Project 4 (P4) of Tariff Expansion and Pre-Altered Patterns. A tariff in this discussion is a scheduled size range of garments determined by the U.S. Army. A pre-altered pattern refers to a pattern piece or a set of pattern pieces that is/are stored in a computer and are modifications of existing patterns; these pattern pieces differ from currently stored pattern pieces held by the U.S. Army that are for a set, given and recorded tariff.

UWS determined the range of sizes needed for the United States Army Men's Dress Coat AG489 and Army Men's Dress Trouser AG489 from a sample of special measurement orders obtained from Defense Personnel Support Center (DPSC). UWS analyzed data and forecast the smallest to largest sizes needed for the U.S. Army. The objective of the analysis was to identify common alterations of existing patterns and pattern sets that could be stored in a Computer-aided design (CAD) system allowing for immediate retrieval of complete pattern sets for dress uniforms for a greater soldier population, thereby reducing the need of special measurement garments.

2. INTRODUCTION AND BACKGROUND

A recruit, when inducted at an Army center, is provided clothing from "off the shelf" stock in standardized sizes within the current size tariff. Recruits can fit a standard size perfectly, or simple alterations (such as shortening trousers or sleeve length) can be done at the base for a good fit within hours or a short turn around time. There are some soldiers that cannot fit into a standardized size, even if simple alterations can be done on base. Those recruits not finding a standardized size to fit them are measured by traditional tape measure methods and their body dimensions are recorded on a special measurement order (Form 358); these are referred to as special orders, special measurement orders, special measurements, or specials. The form is sent to DPSC for processing, pattern making, and disbursement to a clothing manufacturer. Each pattern is hand drafted and the garment is custom made for that recruit, guaranteeing customer satisfaction. The process for special measurement garments takes weeks.

This report addresses the analysis of special order body measurements and compares those measurements to the current Army tariff of body measurements and uniform sizes. The assumption is that there are a number of special orders that can be grouped as a pre-alteration group. There are garments that are needed beyond the existing tariff that need common alterations, such as increasing trouser and sleeve length, and other alterations that cannot be made after the garment is constructed (such as increasing the sleeve circumference at the biceps). Patterns for these altered garments can be stored in CAD (Computer-aided design) systems for immediate retrieval and usage, bypassing the true special measurement process, where a pattern is hand drafted for every special order, and saving weeks of time and cost.

Suggestions for an expanded tariff are made that would benefit each recruit center as more soldiers could have uniforms immediately: 1) Recruits could have *off the shelf* uniforms; 2) Recruits could have *pre-altered/expanded tariff* uniforms; 3) Recruits [very few] would have to wait for *special measurement* uniforms.

The pre-altered, expanded tariff patterns and garments would be precursors to full implementation of customer driven uniform manufacturing (CDUM) also commonly known as mass customization. Mass customization is a revolution that will alter the apparel manufacturing world. Mass customization/CDUM is a process where an individual orders a garment to their own specifications and that garment is made in a short amount of time. Mass manufacturing is currently practiced in the U.S.; it is making one style of garment in select sizes in mass quantities in a short amount of time. Mass customization makes it possible for every single recruit to wear a uniform that specifically fits his/her body form. CDUM means

that every single recruit could have their body measured and their garment could be custom made to fit their body, guaranteeing customer satisfaction.

An individual wearing clothing that fits the body is a pleased individual. If you put apparel on the body and the body in an environment, all will work together to affect pleasurable aesthetic experience and consumer satisfaction. This pleased consumer now has an arousal of intense emotion through aesthetic experience which adds zest to life and which guarantees the continuance of life (Fiore, 1997).

Mass customization/CDUM is possible. Technology makes CDUM possible. Technology on the manufacturing floor and in systems can improve quality and speed. Technology can also improve garment quality and speed before the garment is sewn in the pattern making and cutting stage. Pre-altered/tariff expansion, using CAD technology, can assure improved quality, speed and reduced costs. Traditional methods of body measurement, using tape measures, can be used in pattern design; body scanning technology can also be used in pattern design to assure accurate body measurements for quality garment fit and speed.

Government clothing contractors are manufacturing garments to clothe 482,800 Army soldiers (Greider, 1997). Simplification of the manufacturing process could save millions of dollars, and the quality and fit of clothing can also be improved. The psychological well-being of an individual could be measured in non-traditional, economic justification terms.

3. DATA COLLECTION

DPSC provided to UWS special measurement orders representing 10 months of orders from 1996 that were collected and processed through their office. Male measurements were recorded on government form 358; there were two versions of this form. There were:

- 124 special measurement orders for United States Army Men's Dress Coat AG489.
- 44 special measurement orders for United States Army Men's Dress Trouser AG489.

4. LIMITATIONS OF PROJECT

DPSC also receives special orders for ROTC (Reserved Officer Training Company) units throughout the United States. These individuals are not processed for clothing at a recruit center. There are no body restrictions for ROTC individuals. These individuals are teenagers and young adults; their body measurements are sometimes extreme compared to adult soldier body measurements. Seventeen percent of men's coat orders were ROTC (15% High School ROTC; 2% College ROTC). Forty three percent of men's trousers were ROTC (34% High School ROTC; 9% College ROTC).

Analysis of the data revealed that most of the special orders were for individuals that were out of tariff at the long end of the height scale and the large end of the weight scale. Statistical analysis and reporting more directly relates to this group of individuals. There was a limited, small number in the sample, precluding detailed statistical analysis of measurements.

Special orders were received on government forms. There were 2 versions of the special measurement form for men; the forms were not consistent in requiring the same measurements. The forms were ambiguous as to where and how a measurement was to be taken.

Analysis was made comparing measurements from 3 government sources/forms. Measurements obtained on special orders (Form 358) did not coincide with garment and body measurements used to predict (UF-M-1-B-2(H4)) sizes. Measurements obtained on special orders did not coincide with garment and body measurements specifications (MIL-C-44211B) for pattern generation and manufactured garments.

Measurements listed for size prediction of Army coats and trousers did not coincide with specification measurements. Some measurements are of the body, other measurements are of garments.

Statistical analysis used to compare all measurements to better predict out of tariff and pre-altered patterns was limited due to special measurement orders being incomplete, obvious measurement errors, and data reported on various forms differing.

Some charts in this report are renditions of information provided by government sources. They were modified to fit this study.

5. ORGANIZATION OF REPORT

This report is in two parts. The first part reports on men's coat special measurements; the second part reports on men's trousers special measurements. There is a final conclusions and recommendations section at the end of this report.

In each part of the report there is data presentation and/or discussion of:

- Measurements Taken On Form 358
- Measurements as Reported on Form 358
- Existing Tariff
- Measurements Outside Existing Tariff
- Linear Regression Analysis of Special Measurements
- Summary and Suggestions for Tariff Expansion and Pre-Altered Patterns

6. MEN'S DRESS COAT AG489

6.1. Measurements Taken on Form 358

Each male requiring a special measurement order for a dress coat was measured using a standard measuring tape. The soldier's body and/or garment measurements were recorded on Form 358. There were 2 versions of Form 358. On form was issued in 1978 and a second form was issued in 1990. The forms differ in measurements requested and methodology of measuring. (See Appendix A: Form 358, version a, b). Eight measurements were recorded on both versions of Form 358 that could be used for coat pattern making, manufacturing, and fit. The measurements and how they were taken as follows:

- Height.
- Weight.
- Back coat length is a measurement taken (as indicated by a drawing in both forms) from the top edge of the coat collar at center back extended vertically downward to the hemmed edge of the coat, following the center back seam.
- Half back width is a measurement taken (as indicated by a drawing in both forms) from the center back seam of the coat, mid-shoulder back area, horizontally across to the seam where the sleeve is attached to the coat back.
- Sleeve length is a measurement taken (as indicated by a drawing in the 1978 form) from the center back seam of the coat, mid-shoulder back area, horizontally across to the elbow, which is bent upwards at an angle, and around the elbow to the hemmed edge of the coat. Sleeve length on the 1990 form is from the center back at collar edge across the shoulder and down to the wrist, without the elbow bent.
- Chest circumference (breast) is a measurement taken (as indicated by a drawing in both forms) around the body cavity, just under the arms.

- Waist circumference is a measurement taken (as indicated by different drawings in the forms) around the body cavity along the waistband of the trousers.
- Seat circumference is a measurement taken (as indicated by a drawing in both forms) around the body cavity at the lower torso.

The special order measurement form also asks for subjective data. Soldiers are asked what type of shoulder shape and posture they have. There is a section on Form 358 asking the soldier for the reason why an existing tariff coat did not fit.

6.2. Measurements as Reported on Form 358

There were 124 special orders for men's dress coat. Listed below, in Table 1, are the minimum and maximum measurements for each measurement taken for a man's coat as recorded on Form 358.

Table 1. Minimum and Maximum Measurements of Men's Coat

MEASUREMENT TAKEN	MINIMUM MEASUREMENT	MAXIMUM MEASUREMENT
Height	4' 9"	7' 2"
Weight	95 #	350 #
Back Coat Length	19 ½"	42"
Half Back Width	7 ½"	14"
Sleeve Length	20"	41"
Chest	26 ½"	58"
Waist	26"	61"
Seat	32"	60"

6.2.1. Reasons Given Why Existing Tariff Garments Didn't Fit

Form 358 allows for comments regarding why a standard size dress coat doesn't fit. Not every form has a reason listed and some forms have multiple reasons listed. A grouping of the reasons why standard size garments didn't fit is represented in Chart 1. Fifty three percent of the responses for non-fit were because the off the shelf garment was too small or too tight. Thirty eight of the responses were because the garment was too short. Five percent of the responses were because the garment was too big or too loose. Four percent of the responses were because the garment was too long.

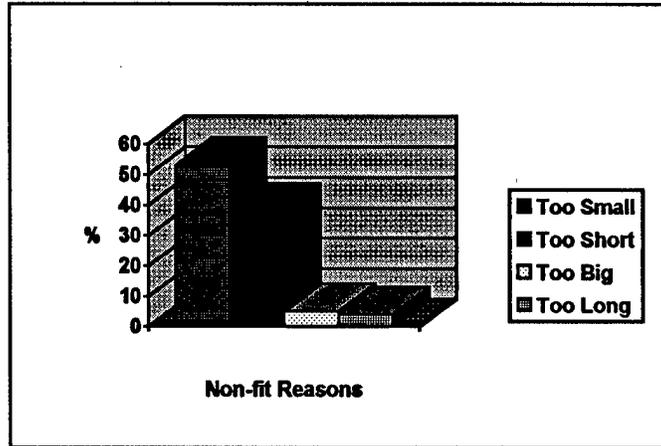


Figure 1. Reasons Given for Non-fit of Stock Coats

6.2.2. Special Measurement Orders Shoulder Shape

Each male requiring a special measurement order for a dress coat was observed from the back by another individual that was measuring. That individual, by observation, was to indicate the shoulder formation of the special measurement soldier. Four choices were offered. Those choices were pictorial representations. The percent of shoulder formation of the group of 124 males is listed in Table 2.

Table 2. Percent of Sample Having Various Shoulder Formations

SHOULDER FORMATION INDICATED	PERCENT OF RESPONSES
Sloping	7%
Regular	40%
Square	26%
High (short neck)	19%
No Indication	9%

6.2.3. Special Measurement Orders Body Posture

Each male requiring a special measurement order for a dress coat was observed from the side by another individual that was measuring. The measuring individual was to indicate the posture of the special measurement soldier. Six choices were offered. Those choices were pictorial representations. The percent of posture type of the group of 124 males is listed in Table 3.

Table 3. Percent of Sample Having Various Posture Types

POSTURE TYPE INDICATED	PERCENT OF RESPONSES
Normal	32%
Erect (chin up, very straight back)	15%
Stooped (head forward, chin to chest)	2%
Half Stout (full, barrel-type chest)	19%
Stout (protruding stomach)	11%
Corpulent (protruding stomach, full body)	12%
Multiple Indications	2%
No Indication	8%

6.3. Existing Tariff

Army document MIL-C-44211B, Table III: Men's Finished Coat Measurements (Rendered in Table 4) specifies 3 measurements for pattern making and garment manufacture: chest circumference, which is a *body measurement* on both versions of Form 358; back coat length, which is a *garment measurement* on both versions of Form 358; and sleeve inseam, which is a *garment measurement* on the 1990 version of Form 358 only.

The Army in UF-M-1-B-21 (H4): Size Prediction Table for Men's Poly/Wool Coat uses 2 measurements to predict size for coat fitting of soldiers: chest circumference and height. Both *body measurements* appear on both versions of Form 358.

The existing tariff is ambiguous depending on which government document is being referred to. Soldiers at bases often refer to the size prediction table and may not be aware of the specification table. It is unclear as to what the current tariff actually is (Moake, 1997). The size prediction table does not specify a 52 coat size, which is listed on the specification table.

MIL-C-44211B states finished measurements for men's coats that are known as standard stock, stock, or off the shelf sizes. Body chest circumference determines coat size. For example a soldier with a chest measurement of 42" would order a size 42 coat and the finished measurement of the coat at the chest would be 45 1/2" (3 1/2" of garment ease is available in every coat, in every size). The size 42 coat is stocked in 5 sleeve inseam lengths (extra short, short, regular, long, extra long; there is no garment ease in sleeve length). Only one version of Form 358 asks for a sleeve inseam measurement. Sleeve inseams are indicated in Table 2. The size 42 coat is stocked in 5 back coat lengths paralleling sleeve inseam lengths (there is no garment ease available in back coat length). Both versions of Form 358 ask for back coat length measurement.

Standard stock sizes range in sizes 30 to 52, based on chest circumference measurement. No coats are stocked sizes 45, 47, 49, nor 51. All sizes, except 45, 47, 49, 51, are available in regular lengths. The smaller end of the size spectrum is not available in all lengths, nor is the larger end of the size spectrum available in all lengths.

Table 4. Listing of Stock Coat Sizes With Corresponding Sleeve and Back Coat Lengths

CHEST SIZE *	EXTRA SHORT (15" INSEAM)	EXTRA SHORT BACK COAT LENGTH	SHORT (16" INSEAM)	SHORT BACK COAT LENGTH	REGULAR (17" INSEAM)	REGULAR BACK COAT LENGTH	LONG (18 1/4" INSEAM)	LONG BACK COAT LENGTH	EXTRA LONG (19 1/4" INSEAM)	EXTRA LONG BACK COAT LENGTH
30					x	29 3/4				
31					x	29 3/8				
32			x	28 3/4	x	30				
33			x	28 7/8	x	30 1/8	x	31 5/8		
34	x	27 1/2	x	29	x	30 1/4	x	31 3/4		
35	x	27 5/8	x	29 1/8	x	30 3/8	x	31 7/8		
36	x	27 3/4	x	29 1/4	x	30 1/2	x	32	x	33 3/4
37	x	27 7/8	x	29 3/8	x	30 5/8	x	32 1/8	x	33 7/8
38	x	28	x	29 1/2	x	30 3/4	x	32 1/4	x	34
39	x	28 1/8	x	29 5/8	x	30 7/8	x	32 3/8	x	34 1/8
40	x	28 1/4	x	29 3/4	x	31	x	32 1/2	x	34 1/4
41	x	28 3/8	x	29 7/8	x	31 1/8	x	32 5/8	x	34 3/8
42	x	28 1/2	x	30	x	31 1/4	x	32 3/4	x	34 1/2
43	x	28 5/8	x	30 1/8	x	31 3/4	x	32 7/8	x	34 5/8
44			x	30 1/4	x	31 1/2	x	33	x	34 3/4
45										
46			x	30 1/2	x	31 3/4	x	33 1/4	x	35
47										
48			x	30 3/4	x	32	x	33 1/2	x	35 1/4
49										
50			x	31	x	32 1/4	x	33 3/4		
51										
52					x	32 3/8				

Source: Army MIL-C-44211B
 * All measurements in inches

6.4. Measurements Outside Existing Tariff

6.4.1. Analysis of Out of Tariff Sizes Due to Garment Being "Too Small"

Of reasons given for standard stock non-fit of men's coats, 53% responded that the garment did not fit because the coat was too small. Less than 1% of the special measurement orders were for individuals needing coats smaller than the smallest stock size of 30". Twenty percent of the orders were for individuals needing coats larger than the largest stock size of 52". This section will discuss those individuals' measurements at the larger end of the tariff spectrum.

The sample was analyzed and 18 individuals (16% of the sample) had a chest circumference of 52" or greater. Weight of these 18 individuals ranged from 237 pounds to 350 pounds. Waist measurements ranged from 45" - 61".

The body measurements of individuals with chest size 52 and over were compared to Army MIL-C-44211B measurements. All individuals with a 52" chest measurement also had a long, extra long, or even longer back coat length, which could account for the special measurement order.

Twenty two percent of the size 52 or greater were size 52. The Army stocks size 52 coats in regular lengths. The size 52 special orders needed extra, extra long lengths. This group's garments could have been accommodated by pre-altered patterns or an expanded tariff. Drop of 52 size individuals was 8-12". (Drop refers to the difference in inches between chest and waist circumference measurements. The garment industry standard for men's coat drop is 8". Pre-altered patterns could be available for coat drops greater than 8".

Of the remaining "out of tariff" individuals with coat size greater than 52", back coat lengths ranged from 28" (extra short) to 39" (beyond extra long). These individuals could have used a pre-altered pattern that had extra girth and length, if necessary. Drops for this group of individuals was 0"-11". Individuals with drops less than 6" and greater than 10" might be considered good candidates for true special orders. There is also the possibility of creating a pre-altered pattern with various drops. Those individuals falling in the 7"-9" drop range might be pre-altered pattern candidates.

6.4.2. Analysis of Out of Tariff Sizes Due to Garment Being "Too Short"

Of reasons given for standard stock non-fit of men's coats, 38% responded that the garment didn't fit because the coat was too short. Less than 1% of the special measurement orders were for individuals needing coats with a length shorter than the shortest stock size of extra short in a given size. No special order was for a coat where the back coat length was shorter than stocked in a given size. Eighty two percent of the orders were for individuals needing longer sleeve lengths than are stocked. Thirty percent of the orders were for individuals needing longer back coat lengths than are stocked. This section will discuss those individuals' measurements at the longer end of the tariff spectrum.

Coats are stocked in extra short (for suggested heights 5'-5'4"), short (heights 5'5"-5'7"), regular (heights 5'8"-5'10"), long (heights 5'11"-6'1") and extra long (heights 6'2"+) lengths. Coat sizes stocked, range from 30 to 52, but not in all lengths; there are no sizes 45, 47, 49, nor 51 in any length.

Fifty percent (58 individuals) of the valid sample was 6' 3" or taller (up to 7' 2"). Forty nine percent of the valid sample was 6'3", 6'4", 6'5", or 6'6" in height. An analysis of the 6' 3" to 6' 6" group was made to determine commonalities in body measurements that would suggest a pre-altered pattern or an expanded tariff. Height alone would not determine whether a garment was too short for an individual, but an analysis of upper torso measurements might indicate where the extra length was needed (body length or arm length)

In the sample of "out of tariff" individuals, based on heights greater than 6'2", the following observations were made:

- 7% were 6'3". Chest sizes ranged from 40 to 55. Back coat lengths ranged from 33 to 36".
- 10% were 6'4". Chest sizes ranged from 48 to 54. Back coat lengths ranged from 33 to 37".
- 10% were 6'5". Chest sizes ranged from 41 to 55. Back coat lengths ranged from 34 to 37".
- 11% were 6'6". Chest sizes ranged from 37 to 53. Back coat lengths ranged from 34 to 40".

- 4% were 6'7". Chest sizes ranged from 36 to 50. Back coat lengths ranged from 35 to 37".
- 4% were 6'8". Chest sizes ranged from 39 to 48. Back coat lengths ranged from 34 to 36".
- 4% were 6'9". Chest sizes ranged from 39 to 53. Back coat lengths ranged from 35 to 42".
- One individual was 6'10", with chest size 46 and back coat length of 38".
- One individual was 7'2", with chest size 49 and back coat length of 39".

In analyzing each special order of this group over 6'3" and comparing their body measurements to Army MIL-C-44211B, 4 of the 58 soldiers should seemingly fit into existing standard size long length coats and another 7 (of 58) should fit into existing standard size extra long length coats, based on their chest and body length measurements; perhaps sleeve length was the reason for the garment non-fit of "too short." If so, a pre-altered pattern for extra sleeve length is an easy pattern alteration.

Three of the 58 individuals would need an extra long length, which the Army stocks, but not in sizes larger than 48. Thirty nine of the 58 (67%) individuals clearly needed an extra, extra long length, which the Army does not stock. A pre-altered pattern for extra body length and/or extra sleeve length is an easy pattern alteration. The remaining 5 (of 58) individuals were of extreme proportions in either chest size or body length and could not be grouped into a pattern set. (For example, one individual had a chest size of 38, with a back coat length of 42; this might indeed be a "true" special order garment.)

6.5. Linear Regression Analysis of Measurements

The data was analyzed for frequencies of individual body and garment measurements; the data was further analyzed for frequencies in groupings of body and garment measurements. Analyses indicated that the majority of special measurement orders or out of tariff sizes were clustering at the tall and large end of the existing tariff.

To determine if further predictions could be made regarding coat sizes for soldiers, a series of linear regression analyses were performed on the data. Specifically, there was a search for predicting that soldiers with certain heights and/or given weights would need coats of certain sizes. In the regression analyses, weight and height were held as the independent variables and other select body or garment measurements were analyzed individually as dependent variables.

6.5.1. Weight and Girth Measurements

There were two measurements that were significantly correlated to weight: chest circumference and waist circumference. These positive correlations were reasonable as body mass is conventionally associated with other body girth measurements (See Table 5). The regressions analysis supports the statement that the more a person weighs, the larger the chest and waist measurement of that person.

Table 5. Regression Analysis of Girth Measurements of Men's Coats

INDEPENDENT VARIABLE	PEARSON CORRELATION COEFFICIENT	F VALUE	LEVEL OF SIGNIFICANCE
Dependent Variable Chest	.804*	205.446**	.0000
Dependent Variable Waist	.798*	196.490**	.0000

* $p < .01$ (112df)=.254

** $p < .01$ (1,112df)=6.90

Given this set of data and using the algebraic formula of,

$$(y = m x + b)$$

where y = chest size

where m = slope of weight to chest regression

where x = weight of soldier

where b = beta constant of the weight to chest regression

a prediction of coat size could be made.

If:

m = slope (.09)

x = weight of soldier

b = constant (25.37)

Then:

y = chest measurement or coat size of soldier

With r^2 reliability (64.72%) [as given in regression analysis].

For example, if a soldier were 200 pounds, then with 65% assurance, the predicted size of coat to fit the soldier would be a size 43.

Using the same formula, and changing the slope (.12) and constant (13.44) to reflect weight to waist correlation, then the soldier who weighed 200 pounds would (with 64% reliability) have a waist size of 37.

6.5.2. Height and Length Measurements

There were two measurements that were significantly correlated to height: back waist length (measurement from cervical to waist line at center back) and sleeve length (measurement from cervical to wrist bone). Again, this was reasonable for body length to be correlated to other body parts' length (See Table 6). The regression analysis supports the statement that the taller a person, the longer the back waist length and sleeve length of that person.

Table 6. Regression Analysis of Length Measurements of Men's Coats

INDEPENDENT VARIABLE	PEARSON CORRELATION CO-EFFICIENT	F VALUE	LEVEL OF SIGNIFICANCE
HEIGHT			
Dependent Variable Back Waist Length	.264*	6.738***	.0110
Dependent Variable Sleeve Length	.683**	95.505****	.0000

* $p \leq .05(90df) = .205$
 ** $p \leq .01(109df) = .254$
 *** $p \leq .05(1,90df) = 3.95$
 **** $p \leq .01(1,109df) = 6.90$

Given this set of data and using the algebraic formula of,

$$(y = m x + b)$$

where y = back waist length

where m = slope of height to back waist length regression

where x = height of soldier

where b = *beta* constant of the height to back waist length regression

a prediction of coat length could be made.

If:

m = slope (.23)

x = height of soldier

b = constant (3.45)

Then:

y = back waist length measurement of soldier (indicating back coat length)

With r^2 reliability (6.97%) [as given in regression analysis].

For example, if a soldier were 6'4", then with 7% assurance, the predicted back waist length of the soldier would be 21".

Using the same formula, and changing the slope (.53) and constant (-3.67) to reflect height to sleeve length, then a soldier who was 6'4" would (with 47% reliability) have a sleeve length of 37".

6.5.3. Weight and Height Measurements

There were no significant correlations between weight (girth) and height (length) measurements. One cannot predict the weight or any girth measurement, given height or any other body length measurements. One cannot predict the height or any body length measurement, given the weight or any other girth measurement.

Given this set of data, there was no significant association of height of a soldier predicting what size coat would be needed for fit.

6.6. Summary and Suggestions for Tariff Expansion and Pre-altered Patterns

To accommodate every soldier, the Army would have to have a range of coat sizes of 27 to 58 (based on the special measurement orders received in a ten month period of time). However, most soldiers could be fitted in a coat if the tariff were expanded to size 54 with extra, extra long lengths starting at size 38. This expanded tariff would accommodate 76% of the special orders.

Without expanding the tariff, pre-altered patterns could be stored for extreme length (length beyond extra long) for many soldiers. Length is needed in the body of the coat and at the sleeves. There were very, very few soldiers needing shorter coats and shorter sleeve lengths.

Without expanding the tariff, pre-altered patterns could be stored for extra girth (circumference beyond the existing tariff accommodating chest size of 52). In addition, pre-altered patterns could be stored for individuals with drops greater than 8".

Given a soldier's weight, predictions could be made as to the size of coat needed for fit. Given a soldier's height, predictions could be made as to the length of coat needed for fit. Pre-altered patterns could be stored for quick retrieval, shortening the time needed to clothe soldiers.

7. MEN'S DRESS TROUSERS AG489

7.1. Measurements Taken on Form 358

Each male requiring a special measurement order for a pair of dress trousers was measured using a standard measuring tape. The soldier's body and garment measurements were recorded on Form 358. Both versions of the form contained the same trousers measurements. Eight numerical measurements were recorded that could be used for trousers pattern making, manufacturing and fit. The measurements and how they were taken follows:

- Height.
- Weight.
- Outseam is a measurement taken (as indicated by a drawing in the form) from the top of the hipbone to the top of the heel.
- Inseam is a measurement taken (as indicated by a drawing in the form) snug up in the crotch to the top of the heel.
- Waist circumference is a measurement taken (as indicated by a drawing in the form) around the body cavity along the waistband of the trousers.
- Knee is a measurement taken (as indicated by a drawing in the form) around the knee to the exact width desired.
- Bottom Width is a measurement taken (as indicated by a drawing in the form) at the trouser edge to the exact bottom width desired.

- Seat circumference is a measurement taken (as indicated by a drawing in the form) around the body cavity circumference at the lower torso.

The special order form also ask the reason why an existing tariff trousers did not fit.

7.2. Measurements as Reported on Form 358

There were 44 special orders for men's trousers. Listed below, in Table 7, are the minimum and maximum measurements for each measurement taken for a man's trousers as recorded on Form 358.

Table 1. Minimum and Maximum Measurements of Men's Trousers

MEASUREMENT TAKEN	MINIMUM MEASUREMENT	MAXIMUM MEASUREMENT
Height	5' 3"	6' 11"
Weight	180 #	350 #
Outseam	34 ½"	51"
Inseam	25 ½"	46 ½"
Waist	26"	60"
Seat	29"	60"

7.2.1. Reasons Given Why Existing Tariff Garments Didn't Fit

Form 358 allows for comments regarding why a standard size of dress trousers doesn't fit. Not every form has a reason listed and some forms have multiple reasons listed. A grouping of the reasons why standard size garments didn't fit fell into two categories as represented in Chart 2. Sixty five percent of the responses for non-fit were because the stock size trousers were too small. Thirty five percent of the responses for non-fit were because the trousers were too short.

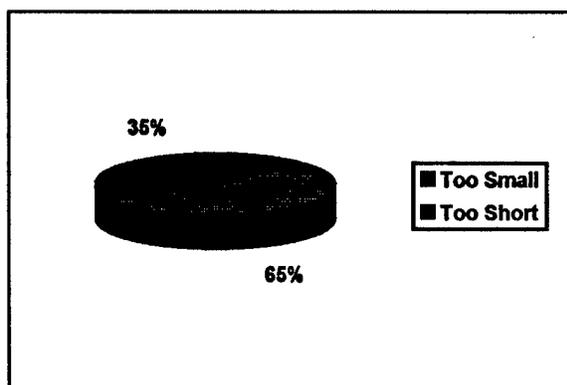


Figure 2. Reasons Given for Non-fit of Stock Trousers

7.3. Existing Tariff

Army document MIL-T-43957D(GL), Table III: Men's Finished Trousers Measurements (Rendered in Table 8) specifies 6 measurements for pattern making and garment manufacturing: waist circumference, seat circumference, inseam and outseam, knee width and bottom of leg width, which are all body or garment measurements on Form 358.

The Army in UF-M-1-B-2(H4): Size Prediction Table for Men's Poly/Wool Trousers uses 3 measurements to predict size for trousers fitting of soldiers: waist, seat, and height. The 3 measurements appear on Form 358.

The existing tariff is ambiguous depending on which government document is being referred to. Soldiers at bases often refer to the size prediction table and may not be aware of the specification table. The size prediction table itemizes fewer measurements than does Form 358. It is unclear as to what the current tariff actually is (Moake, 1997)

MIL-T-43957D(GL) states finished measurements for men's trousers that are known as standard stock, stock, or off the shelf sizes. Waist circumference determines trousers size. For example a soldier with a waist measurement of 36" would order a size 36 trousers and the corresponding seat measurement would be 28". Trousers are stocked in various trouser lengths as indicated in Table 8. Corresponding seat measurements and rise are given for each size. Rise is the difference in inches between the outseam and inseam measurement.

Table 8. Listing of Stock Trousers Sizes With Corresponding Seat, Inseam and Rise Measurement

WAIST *	SEAT	EXTRA SHORT 27" INSEAM	SHORT 29" INSEAM	REGULAR 31" INSEAM	LONG 33" INSEAM	EXTRA LONG 35" INSEAM
23	31			8 ¼		
24	32			8 3/8	8 7/8	
25	33			8 ½	9	
26	34	7 5/8	8 1/8	8 5/8	9 1/8	9 5/8
27	36	7 ¾	8 ¼	8 ¾	9 ¼	9 ¾
28	37	7 7/8	8 3/8	8 7/8	9 3/8	9 7/8
29	37	8	8 ½	9	9 ½	10
30	38	8 1/8	8 5/8	9 1/8	9 5/8	10 1/8
31	39	8 ¼	8 ¾	9 ¼	9 ¾	10 ¼
32	40	8 3/8	8 7/8	9 3/8	8 7/8	10 3/8
33	41	8 ½	9	9 ½	10	10 ½
34	42	8 5/8	9 1/8	9 5/8	10 1/8	10 5/8
35	43	8 ¾	9 ¼	9 ¾	10 ¼	10 ¾
36	44	8 7/8	9 3/8	9 7/8	10 3/8	10 7/8
37	45	9	9 ½	10	10 ½	11
38	46	9 1/8	9 5/8	10 1/8	10 5/8	11 1/8
39	47	9 ¼	9 ¾	10 ¼	10 ¾	11 ¼
40	48	9 3/8	9 7/8	10 3/8	10 7/8	11 3/8
41	49	9 ½	10	10 ½	11	11 ½
42	50	9 5/8	10 1/8	10 5/8	11 1/8	11 5/8
43	51	9 ¾	10 ¼	10 ¾	11 ¼	11 ¾
44	52	9 7/8	10 3/8	10 7/8	11 3/8	11 7/8
45	53	10	10 ½	11	11 ½	12
46	54	10 1/8	10 5/8	11 1/8	11 5/8	12 1/8

Source: MIL-T-43957D(GL)

*All Measurements in inches

7.4. Measurements Outside Existing Tariff

7.4.1. Analysis of Out of Tariff Sizes Due to Garment Being "Too Small"

Of reasons given for standard stock non-fit of men's trousers, 65% responded that the garment did not fit because the trousers were too small. Less than 2% of the special measurement orders were for individuals needing trousers smaller than the smallest stock size with regard to the seat measurement (the waist size would fit, but the seat was too large). There were no special orders for sizes smaller than the stocked size of 23. Fifty seven percent (25 of the 44 special orders) of the orders were for individuals needing trousers larger than the largest stock size of 46. This section will discuss those individuals' measurements at the larger end of the tariff spectrum.

The greater than 46 waist measurement group was analyzed. Seat measurements ranged from 47"- 60". Inseams ranged from 29"-33".

Five of the individuals (20 % of the greater than 46 waist measurement group) had waist measurements of 47". These individuals had inseams at either short, regular, or long lengths. Seat measurements clustered around 53". The tariff could easily be expanded to size 47, with short, regular, and long inseams, to accommodate these individuals. Pre-altered patterns could be available. An alteration of increasing waist size by 1" and trousers' length are easy alterations.

Another 20% of the group had a waist measurement of 51". Inseams for this group were either short, regular, or long lengths. Seat measurements were not excessive compared to waist measurements. Again, pre-altered patterns could be available for this group; the alterations would be simple.

Waist sizes of the group were continuous from 47 to 56, with multiple orders at each waist size. Inseams for this group ranged from extra short to extra long and beyond. Tariff expansion or pre-altered patterns would accommodate most of this group, as their waist to seat measurements were not extraordinary.

There were single orders for waist size 59 and 60. These individuals might best be clothed via a special order.

7.4.2. Analysis of Out of Tariff Sizes Due to Garment Being "Too Short"

Of reasons given for non-fit of men's trousers, 35% responded that the garment didn't fit because the trousers were too short. Eighteen percent of the entire sample had outseams greater than the stocked size of extra long (47 1/8"). Of those individuals the majority needed 49" outseams. This would be an additional 1 5/8" in trouser length, or the equivalent to an extra, extra long trouser, as the length increment between trousers lengths of inseam (and outseam) is 2". Less than 2% of the special orders were for individuals needing trousers with a length shorter than the extra short inseams stocked.

Trousers are stocked in extra short (for suggested heights 5'-5'4"), short (heights 5'5"-5'7"), regular (heights 5'8"-5'10"), long (heights 5'11"-6'1"), and extra long (heights 6'2"+) lengths. Trousers are stocked in all lengths from 26-46 waist sizes. Sizes 23, 24, and 25 are not stocked in all lengths.

Forty three percent (18 of the 44 orders) of the special measurements were for individuals of heights 6'3" or taller (up to 7'2"). Heights were continuous from 6'3" to 6'9". There was one individual at 6'11" and one individual at 7'2".

Most of the orders of the group 6'3" or taller were for individuals at the height of 6'4". Half of the group had waist measurements within tariff. Inseams were all long and extra long length range. Pre-altered patterns to increase trousers length would be a simple solution to clothe these soldiers if the tariff weren't expanded.

Individuals with heights 6'5" or taller had inseam lengths of extra long or beyond. Seventy five percent of this group had waist measurements within tariff. Trousers length would be a simple solution to clothe these soldiers.

7.5. Linear Regression Analysis of Measurements

The data was analyzed for frequencies of individual body and garment measurements; the data was further analyzed for frequencies in groupings of body and garment measurements. Analyses indicated that the majority of special measurement orders or out of tariff sizes were clustering at the large and tall end of the existing tariff.

To determine if further predictions could be made regarding trousers sizes for soldiers, a series of linear regression analyses were performed on the data. Specifically, there was a search for predicting that soldiers with certain heights and/or given weights would need trousers of certain sizes. In the regression analyses, weight and height were held as the independent variables and other select body or garment measurements were analyzed individually as dependent variables.

7.5.1. Weight and Girth Measurements

There were two measurements that were significantly correlated to weight: waist and seat circumference. These positive correlations were reasonable as body mass is conventionally associated with other body girth measurements (See Table 9). The regression analysis supports the statement that the more a person weigh, the larger the waist and seat measurement.

Table 9. Regression Analysis of Girth Measurements of Men's Trousers

INDEPENDENT VARIABLE	PEARSON CORRELATION COEFFICIENT	F VALUE	LEVEL OF SIGNIFICANCE
Dependent Variable Waist	.692*	34.842***	.0000
Dependent Variable Seat	.611**	21.436****	.0000

* $p \leq .01$ (36df)=.418
 ** $p \leq .01$ (38df)=.418
 *** $p \leq .01$ (1,38df)=7.35
 **** $p \leq .01$ (1,36df)=7.39

Given this set of data and using the algebraic formula of,

$$(y = m x + b)$$

where y = waist size

where m= slope of weight to waist regression

where x = weight of soldier

where b = *beta* constant of the weight to waist regression

a prediction of coat length could be made.

If:

m = slope (.11)

x = weight of soldier

b = constant (18.83)

Then:

y = waist measurement or trousers size of soldier

With r² reliability (47.83%) [as given in regression analysis].

For example, if a soldier were 200 pounds, then with 48% assurance, the predicted size of trousers to fit the soldier would be a size 41. (The sample size of trousers was only 44; although weight to waist was significantly correlated, the group of special orders, by its very nature are individuals that don't fit into the existing tariff; additionally, the weight of a 200 pound man might be distributed onto a short or tall body, or even at the waistline.)

Using the same formula, and changing the slope (.08) and constant (28.41) to reflect weight to seat correlation, then the soldier who weighed 200 pounds would probably (with 37% reliability) have a seat measurement of 44.

7.5.2. Height and Length Measurements

There were two measurements that were significantly correlated to height: inseam and outseam. Again, this was reasonable for body length to be correlated to other body parts' length (See Table 10). The regression analysis supports the statement that the taller a person, the longer the legs, hence the inseam and outseam would be longer.

Table 10. Regression Analysis of Length Measurements of Men's Trousers

INDEPENDENT VARIABLE	PEARSON CORRELATION CO-EFFICIENT	F VALUE	LEVEL OF SIGNIFICANCE
HEIGHT			
Dependent Variable Outseam Length	.555*	17.363**	.0002
Dependent Variable Inseam Length	.540*	16.07292**	.0003

*p ≤ .01(39df)=.418

**p ≤ .01 (1,39df)=7.33

Given this set of data and using the algebraic formula of,

$$(y = m x + b)$$

where y = waist size

where m = slope of weight to waist regression

where x = weight of soldier

where b = beta constant of the weight to waist regression

a prediction of coat length could be made.

If:

m = slope (.48)

x = height of soldier

b = constant (7.18)

Then:

y = outseam length of trousers

With r^2 reliability (30.81%) [as given in regression analysis].

For example, if a soldier were 6'4", then with 31% assurance, the predicted outseam length of trousers to fit the soldier would be 44".

Using the same formula, and changing the slope (.42) and constant (.50) to reflect height to inseam length, then a soldier who was 6'4" would (with 29% reliability) have an inseam length of 33".

7.5.3. Weight and Height Measurements

There were no significant correlations between weight (girth) and height (length) measurements. One cannot predict the weight or any girth measurement, given height or any other body length measurements. One cannot predict the height or any body length measurement, given the weight or any other girth measurement.

Given this set of data, there was no significant association of height of a soldier predicting what size coat would be needed for fit.

7.6. Summary and Suggestions for Tariff Expansion and Pre-altered Patterns

To accommodate every soldier in the special order group, the Army would have to have a range of trousers sizes of 23 to 60 (based on the special measurement orders received in a ten month period of time). However, most soldiers could be fitted in trousers if the tariff were expanded to size 50 with extra extra long lengths starting at size 30. This expanded tariff would accommodate 60% of the special orders regarding waist sizes outside the existing tariff of size 46, and it would accommodate 85% of the special orders regarding trousers length outside the existing tariff of extra long

Without expanding the tariff, pre-altered patterns could be stored for extreme length (length beyond extra long) for many soldiers. Length is needed in the trousers at the inseam and outseam. There were very few soldiers needing shorter trousers lengths.

Without expanding the tariff, pre-altered patterns could be stored for extra girth (circumference beyond the existing tariff accommodating waist measurements of 50").

Given a soldier's weight, predictions could be made as to the size of the trousers needed for fit. Given a soldier's height, predictions could be made as to the length of trousers needed for fit. Pre-altered patterns could be stored for quick retrieval, shortening the time needed to clothe soldiers.

8. CONCLUSIONS AND RECOMMENDATIONS

An analysis of 10 months of special orders for Army men's coats and trousers revealed that the majority of the orders were out of tariff at the large and tall end of the tariff table. Special orders were for individuals that were of greater body mass and greater height than currently accommodated by Army tariff.

If the tariff for men's coats and trousers were expanded to include larger sizes and longer lengths, there would be a reduced number of special orders. With more sizes stocked, more soldiers could be clothed at induction.

An alternative to expanding the tariff would be pre-altered patterns. Most of the special orders could be accommodated by having readily available on CAD systems men's coats with greater circumference bodies, with drops greater than the industry average, and with longer body lengths and sleeve lengths. Men's trousers patterns could be stored as pre-altered patterns by including greater circumference in waist and seat, and with longer leg lengths.

Another alternative would be to expand the tariff by a few sizes and lengths and also have pre-altered patterns stored. The majority of all the special orders could be accommodated by increasing sizes and lengths in the existing tariff.

With the expansion of tariff and pre-altered patterns, the Army would move towards Customer Driven Uniform Manufacture. A greater number of soldiers could be clothed immediately or within a very short period of time. Very few would have to wait for true special orders.

A final recommendation would be to improve the measurement Form 358. There should be only one version; it should be clear and concise in a minimum number of measurements to be taken that would directly correspond and relate to Army size prediction, fit, and specification tables. Ambiguity in the form should be eliminated; if not eliminated, measurement data will continue to be confusing to the analyst and most importantly the garment manufacturer. Like measurements should be taken that relate to measurements needed to predict size, to aid the garment manufacturer, and to fit the uniform to the soldier. Given better tools, the Army can best move toward CDUM and customer satisfaction.

End. P4techrept.997.

REFERENCES

Fiore, Ann Marie. (1997). *Understanding Aesthetics for the Merchandising and Design Professional*. NY: Fairchild Pub.

Greider, William. (1997). "Fortress America," *Rolling Stone*, 764/765: 66-73, 136-138 (July).

Moake, Chris. (1997). *Interview*. Ft. McCoy, WI. (May).

APPENDIX A:

Version a, 1978 issue of Form 358

1141

ARMED FORCES MEASUREMENT BLANK (SPECIAL SIZED CLOTHING FOR MEN)

(USE SEPARATE BLANK FOR EACH ITEM OF CLOTHING)

PERSON TO BE FITTED (Last Name, First, Middle Initial) [REDACTED] SOCIAL SECURITY NUMBER [REDACTED] GRADE, RATE OR RANK [REDACTED]

ORGANIZATION [REDACTED] INSTALLATION [REDACTED]

MILSTRIP REQUISITION NO. [REDACTED] NOMENCLATURE [REDACTED] CLOTHING TO BE ORDERED QUANTITY UNIT COST TOTAL COST

INSTRUCTIONS: ENTER EXACT MEASUREMENTS OF MAN, NOT OF AN OLD GARMENT. HOLD TAPE FIRMLY, NEVER LOOSELY. IF ANY MEASUREMENTS ARE ABNORMAL, PLACE "OK" BESIDE MEASUREMENT.

1. DESCRIBE SHOULDERS (Check appropriate box.) HEIGHT 6'5" WEIGHT 285

<input type="checkbox"/> SLOPING LONG NECK	<input type="checkbox"/> REGULAR REGULAR NECK	<input checked="" type="checkbox"/> SQUARE MEDIUM NECK	<input type="checkbox"/> HIGH SHORT NECK

REMARKS (For use by manufacturer only)

2. DESCRIBE POSTURE (Check appropriate boxes.)

<input type="checkbox"/> NORMAL	<input type="checkbox"/> ERECT	<input checked="" type="checkbox"/> FORWARD OR STOOPED	<input type="checkbox"/> HALF-STOUT	<input type="checkbox"/> STOUT	<input type="checkbox"/> CORPULENT

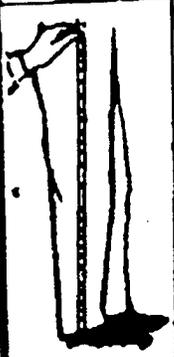
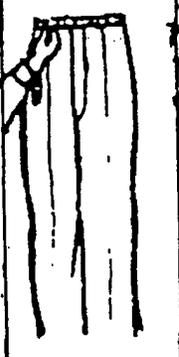
3. OVERCOAT, TOPCOAT, RAINCOAT, COAT AND SHIRT (Take all snug, not tight measurements over dress shirt.)

LENGTH	ARMY - SEE TM 700-6400-1 NAVY - MIDLINER LENGTH 14" FROM GROUND AIR FORCE - AFM 38-10 USMC - CH-8, MCM	OVERCOAT	TOPCOAT	RAINCOAT
MEASUREMENT	BACK WIDTH 10 1/2	SLEEVE LENGTH 38	BREAST 52	WAIST 44 SEAT 51
COAT LENGTH 33	FROM COLLAR SEAM (where collar joins neck) TO WAISTLINE THEN EXACT LENGTH DESIRED	FROM MIDDLE OF BACK TO ARMHOLE SEAM	FROM MIDDLE OF BACK AROUND ELBOW TO WRIST	PLACE TAPE HIGH UP UNDER ARM OVER BLADES IN BACK
WAIST LENGTH 20 1/2	FROM MIDDLE OF BACK TO ARMHOLE SEAM	FROM MIDDLE OF BACK AROUND ELBOW TO WRIST	PLACE TAPE HIGH UP UNDER ARM OVER BLADES IN BACK	AROUND WAISTLINE. FOR SEAT MEASURE SNUGLY NOT TIGHTLY

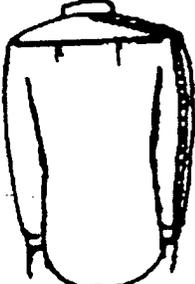
70315

8000133

TROUSERS (Take waist measurement over shirt, not top of trousers.)

OUTSEAM 48	INSEAM 36	WAIST 44	BROOMEN 51	THIGH 31	SEAT 50	KNEE 21	BOTTOM 19
TOP OF HIP-BONE TO TOP OF HEEL	SNUG UP IN CROTCH TO TOP OF HEEL	BELT OFF, AROUND WAIST-LINE SNUG NOT TIGHT	FOR STOUTS ONLY	FOR STOUTS ONLY	SNUG NOT TIGHT	EXACT WIDTH DESIRED	EXACT BOTTOM WIDTH DESIRED
							

SHIRT DRESS COAT, UTILITY COAT

	SHIRT COLLAR SIZE 19"	SLEEVE LENGTH 38	6. HEADWEAR COMMERCIAL SIZE (If known)
	<p>ARMS MUST NOT BE BENT, BUT STRAIGHT DOWN AT SIDES AND WITH COAT OFF. START THE TAPE AT THE CENTER OF THE BACK OF THE NECK (Measure total cross shoulder distance and divide by two.) AND PASS THE TAPE SQUARELY OVER THE TOP OF THE SHOULDER (not to front or back), THEN STRAIGHT DOWN THE ARM TO THE LENGTH DESIRED. THE LENGTH DESIRED BY MOST MEN IS ABOUT ONE INCH BELOW THE CENTER OF THE WRIST.</p>		

LIST ITEMS REQUIRED (This is not a requisition but is required for manufacturer's information.)

QUANTITY	DESCRIPTION OF ITEMS REQUIRED	NEAREST FEDERAL SUPPLY CATALOG SIZE	DEFICIENCIES OF STOCK SIZES
	<p>CUSTOMER REGULAR SUIT SIZE 54 XL</p>		<p>70315.</p>

(If more space is needed, continue on blank 8" x 10 1/2" paper.)

I CERTIFY THAT THIS MAN CANNOT BE PROPERLY FITTED FROM EXISTING STOCK SIZES

INDIVIDUAL TAKING MEASUREMENTS G. STAMPS	SIGNATURE OF CLOTHING OFFICER	TYPED OR PRINTED NAME & GRADE	DATE 8-5-96
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APPENDIX A

Version b, 1990 issue of Form 358

ARMED FORCES MEASUREMENT BLANK - SPECIAL SIZED CLOTHING FOR MEN
(Use a separate form for each item.)

102

Privacy Act Statement

AUTHORITY: 10 USC 9832. 37 USC 418, and EO 9397.

PRINCIPAL PURPOSE(S): Use of Social Security Number is necessary to make positive identification of the individual and records associated with obtaining special measurement uniform clothing.

ROUTINE USE(S): Used to record individual member's measurements which are required to process special orders of uniform clothing for individuals who cannot be fitted with normal catalog sizes or alterations thereto. Information contained hereon is routinely disclosed to the Defense Personnel Support Center for each clothing item required and may be disclosed to any DOD component and, upon request, to other Federal, State, and local agencies in pursuit of their official duties. It may be used for other lawful purposes including law enforcement and litigation.

DISCLOSURE: Voluntary; however, failure to provide the information would preclude the orderly maintenance of property accounts or prevent the issuance of clothing items otherwise authorized under the Armed Forces Clothing Monetary Allowance Policies and Regulations.

1. PERSON TO BE FITTED

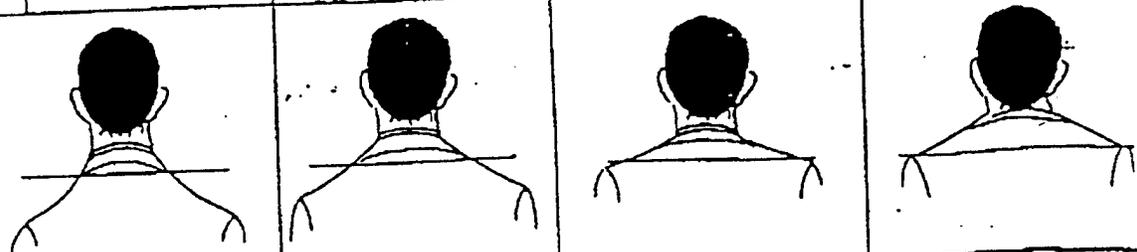
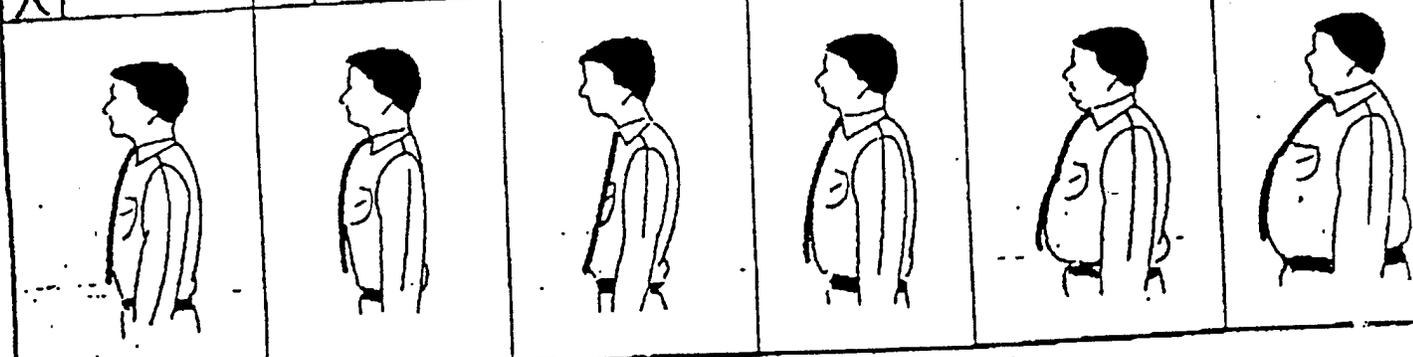
a. NAME (Last, First, Middle Initial)	b. SOCIAL SECURITY NO.	c. RANK / GRADE
[REDACTED]	[REDACTED]	[REDACTED]
d. ORGANIZATION	e. INSTALLATION	f. AGE
[REDACTED]	[REDACTED]	[REDACTED]

2. CLOTHING OFFICER. I certify that the man identified above cannot be properly fitted from existing stock sizes.

a. SIGNATURE Raye H. Robbins	b. ORGANIZATION CIIP, SUP & SVC DIV, DOL FT JACKSON, SC 29207	c. GRADE GS-04	d. DATE (YYMMDD) 960723
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INSTRUCTIONS

- DOC #: W37HFX62056304
- FOR BODY MEASUREMENTS** - Enter exact measurements of man, not of an old garment. Hold tape firmly, never loosely. If any measurements are abnormal, place "OK" beside measurement.
 - FOR COATS** - Take all snug, not tight measurements over dress shirt.
 - FOR SLEEVES** - Arms must not be bent, but straight down at sides and with coat off. Start the tape at the center of the back of the neck (measure total cross shoulder distance and divide by two) and pass the tape squarely over the top of the shoulder (not to front or back), then straight down the arm to the length desired. The length desired by most men is about one inch below the center of the wrist.
 - FOR TROUSERS** - Take waist measurement over shirt, not top of trousers.
 - FOR GLOVES** - Include an outline drawing both of the right and left hand with notations as to fitting problems such as short or long fingers, thick palms, etc.
 - FOR HEADWEAR** - Using measurements taken, measure across top of temple continuing in a straight line around head.
 - FOR WEIGHTLIFTERS** - Measure shoulders, underarm to top of shoulder, biceps, and forearm.

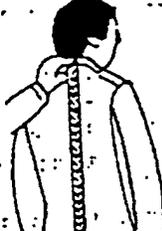
HEIGHT 6'11"	WEIGHT 180	SHOULDERS (X appropriate block)			HIGH (Short neck)
HEADWEAR 		SLOPING (Long neck)	REGULAR (Regular neck)	SQUARE (Medium-neck)	
COMMERCIAL SIZE (if known)					
INCHES					
POSTURE (X appropriate block)					
<input checked="" type="checkbox"/> NORMAL	ERECT	FORWARD OR STOOPED	HALF-STOUT	STOUT	CORPULENT
					

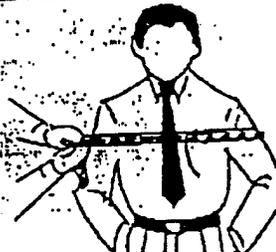
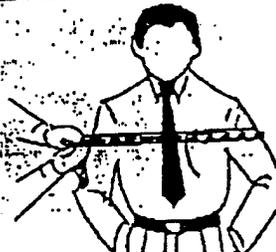
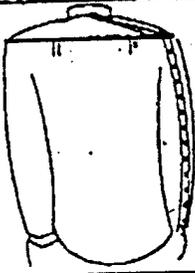
3. INDIVIDUAL TAKING MEASUREMENTS		b. TELEPHONE (include area code)		c. AUTOVON		4. DATE MEASUREMENTS TAKEN (YYMMDD) 960718	
a. NAME (Last, First, Middle Initial)		[REDACTED]		[REDACTED]			
5. CLOTHING TO BE ORDERED		b. NOMENCLATURE Poly-Wool AG 489		c. QUANTITY 1EA		d. UNIT COST \$28.05	
a. MILSTRIP REQUISITION NO. W32BFX62656304		TROUSERS, ARMY DRESS GREEN				e. TOTAL COST \$28.05	

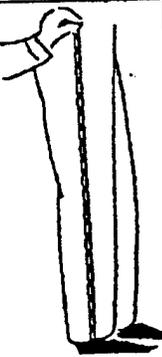
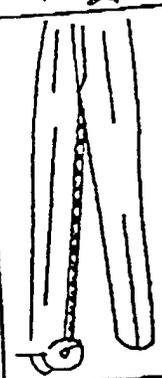
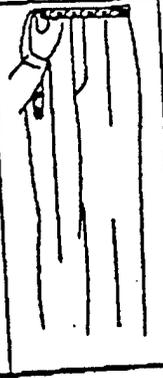
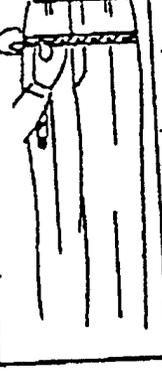
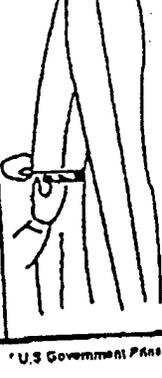
6. LIST ITEMS REQUIRED (This is not a requisition, but is required for manufacturer's information.)			
a. QUANTITY	b. DESCRIPTION OF ITEMS REQUIRED AND NSN SERIES	c. NEAREST FEDERAL SUPPLY CATALOG SIZE	d. DEFICIENCIES OF STOCK SIZES
1EA	TROUSERS, ARMY DRESS GREEN Poly-Wool AG 489	33XL	Add 4 1/4" TO LENGTH OF TROUSERS
			71793.

SOLDIER: [REDACTED] (If more space is needed, continue on blank 8 1/2" x 11" paper.)

MEASUREMENTS FOR FINISHED GARMENTS (Record as applicable)

OVERCOAT, TOPCOAT, RAINCOAT, COAT AND-SHIRT			
REGULATION LENGTH: ARMY - See TM 700-8-30-1; NAVY - Hipline length 14" from ground; AIR FORCE - AFM 35-10; USMC - CH49, MCM	COAT LENGTH 35 1/2	WAIST LENGTH 21	BACK WIDTH (From middle of back to armhole seam) 8 1/2
OVERCOAT	 <p>(From collar seam (where collar joins coat) to waistline then exact length desired).</p>		SLEEVE LENGTH INSEAM 20 1/2
TOPCOAT			 <p>(From armpit to 1" above top knuckle of thumb)</p>
RAINCOAT			

BREAST (Place tape high up under arms over blades in back) 38	WAIST (Around waistline) 33	SEAT (Measure snugly, not tightly) 36	OVER SHOULDER (Measure around largest part of back and front including arms) 58	SHIRT, DRESS COAT, UTILITY COAT SHIRT COLLAR SIZE 15 1/2	SLEEVE LENGTH 38
					

TROUSERS							
OUTSEAM (Top of hipbone to top of heel. Measure bottom of waistband) 51	INSEAM (Snug up in crotch to top of heel) 46 1/2	WAIST (Belt off, around waistline, snug, not tight) 33	ABDOMEN (For Slacks only) to	THIGH (For Slacks only) to	SEAT (Snug, not tight) 34 1/2	KNEE (Exact width desired) to	BOTTOM (Exact bottom width desired) to
							

DLA-ARN Short-Term Project Report

for
US Defense Logistics Agency
on
Tariff Expansion and Storage of Pre-Altered Patterns
(DDFG-T1-P4)

Contract Number	SP0100-95-D-1009
Contractor	University of Wisconsin-Stout
Delivery Order #	0002
Delivery Order Title	DDFG-T1-P4: Tariff Expansion and Storage of Pre-Altered Patterns
CDRL #	A005
CDRL Title	Final Technical Report
Reporting Period	August 1, 1996-July 31, 1997
Report Date	September 18, 1997
Name of PI	Dr. Jacqueline Robeck
E-mail	robeckj@uwstout.edu
Phone	715/232-2536
Fax	715/232-5042
Address	320 HE Bldg., UW-Stout, Menomonie, WI 54751

UW-Stout
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#244-4-541014

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