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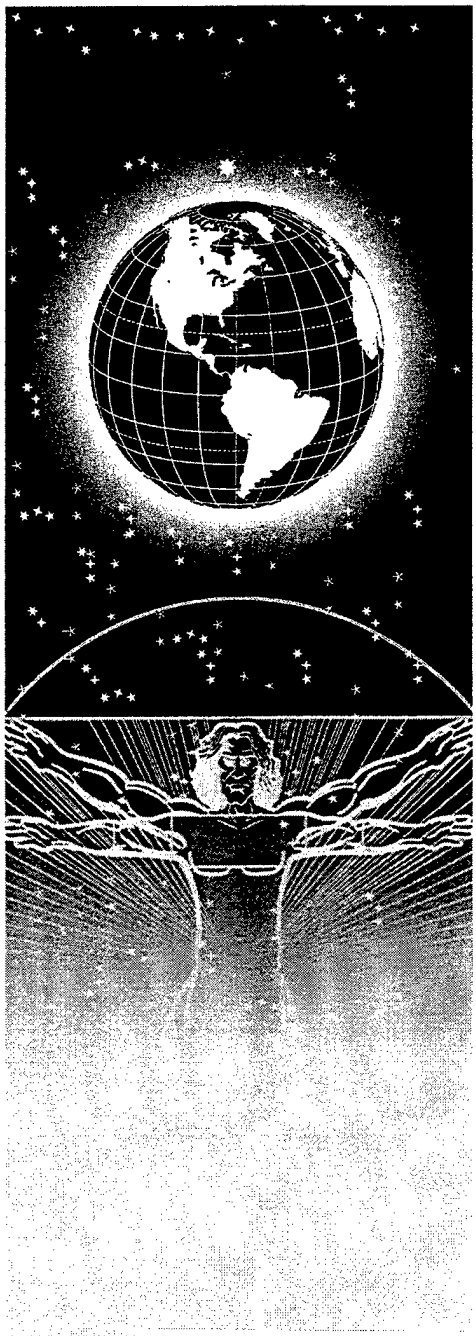

UNITED STATES AIR FORCE RESEARCH LABORATORY

CIVILIAN AMERICAN AND EUROPEAN SURFACE ANTHROPOMETRY RESOURCE (CAESAR) FINAL REPORT, VOLUME I: SUMMARY

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TECHNICAL REVIEW AND APPROVAL

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This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public.

The voluntary informed consent of the subjects used in this research was obtained as required by Air Force Instruction 40-402.

This technical report has been reviewed and is approved for publication.

FOR THE COMMANDER

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Chief, Crew System Interface Division
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13. ABSTRACT *(Maximum 200 words)*

The Civilian American and European Surface Anthropometry Resource (CAESAR) project was a survey of the civilian populations of three countries representing the North Atlantic Treaty Organization (NATO) countries: The United States of America (USA), The Netherlands, and Italy (Robinette et al. 1999, Robinette 2000). One site in Ottawa, Canada was added to the USA sample and it is henceforth referred to as the North American sample. The survey was carried out by the US Air Force, with the help of 1) the contractor, Sytronics, Inc., 2) The Netherlands Organization for Applied Scientific Research (TNO), and 3) a consortium of companies under the umbrella of the Society of Automotive Engineers (SAE). The purpose of this document is to provide a general description of the survey and what data were collected and produced. It has a companion document: Volume II Descriptions, by Blackwell et al. 2002, which contains descriptions of the methods used for the demographics, the measurements (both 3-D and 1-D), and the landmarks.

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PREFACE

The authors would like to thank the other members of the data collection teams whose hard work contributed to this study, especially Sara Kelly, Bridget Bailey, Teresa Crase, Anna Riley, Dennis Allen, Steve Trimble, Koen Tan, Silvia Penna, Roberta Borghesi, Catia Di Ceglia Valeria Brusco, Giorgia Latini, Samantha Castello, Beth Bryant McCrary and Sarah Endicott. We would also like to thank all of the people from the partner companies who contributed time and effort. In particular we would like to thank Kim Bennett from Jantzen Inc., who helped with just about every aspect from scanning garment materials, sizing and production to greeting subjects at the site she arranged through Jantzen, and Laura Blalock who helped with the scanning garment fabrics and the production of the shorts. We also want to thank all the partners who arranged for data collection sites at their companies, including Mari Milosic from Magna Interiors, Joe Koncelik from Georgia Tech., Marc Rioux and the National Research Council of Canada, and especially Linda Urette at NISSAN who provided our first site. We would like to thank Gary Pollak at the Society of Automotive Engineers (SAE) who arranged all of the industry partnerships and organized our bi-annual partner meetings and Sirvart Mellian and the American Society of Testing and Materials (ASTM) D-13.55 Committee who brought us the apparel partners and perspectives and who graciously allowed the SAE to take over all of the industry partnerships to simplify the collaboration. The authors would like to thank all the members of the NATO Advisory Group for Aerospace Research and Development (AGARD), Working Group 20: 3-D Surface Anthropometry for their help in establishing the requirements and capabilities for this effort, and developing the initial survey plan. In particular we would like to thank: 1) Dr. Kenneth Boff of the Air Force Research Laboratory, 2) Prof. Peter R.M. Jones of Loughborough University, 3) Dr. Michael Vannier of the University of Iowa and the National Institutes of Health, 4) Mr. Marc Rioux of the Canadian National Research Council, and 5) Prof. Alex Coblentz and Prof. Régis Mollard of the University of Paris. We would also like to thank Bobbie Mixon and Tiffany Pitts of the Office of Public Affairs (ASC/PA), Wright-Patterson Air Force Base, Ohio for preparing press releases and assisting with advertising to the news media for subject recruitment. Finally, the authors would also like to thank Lee Shibley, Catherine Harrison and Marty Luka for their help in editing this document.

This effort was completed under contract number F33615-C-93-0001 with Sytronics and for which Kathleen Robinette was the contract engineer, as well as under Project Arrangement US-NL AF-98-0001 under the US-NL Technology Research and Development Projects (TRDP) Agreement, and a Cooperative Research and Development Agreement (CRADA) between the U.S. Air Force Research Laboratory and the Society of Automotive Engineers.

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CHAPTER I: INTRODUCTION

The Civilian American and European Surface Anthropometry Resource (CAESAR) project was a survey of the civilian populations of three countries representing the North Atlantic Treaty Organization (NATO) countries: the United States of America (USA), The Netherlands, and Italy (Robinette et al. 1999, Robinette 2000). One site in Ottawa, Canada was added to the USA sample and it is henceforth referred to as the North American sample. The survey was carried out by the U.S. Air Force, with the help of 1) the contractor, Sytronics Inc., 2) The Netherlands Organization for Applied Scientific Research (TNO), 3) the subcontractor D'Appolonia in Italy, and 4) a consortium of companies under the umbrella of the Society of Automotive Engineers (SAE).

Typically the principal product from an anthropometric survey has been a document with summary statistics for a population, and often this included only means, standard deviations and percentiles. For engineering applications this information is generally not suitable nor sufficient. The population of interest is often a subset of the survey population, such as a particular age group. Also, the measurement of interest for a design may be different from those reported. For example, the stomach depth seated might be of interest for an automobile, but it isn't in the list of dimensions extracted. These things can be obtained from the raw data but not the summary statistics. This is particularly true for 3-D data which cannot be summarized into anything meaningful using means, standard deviations and percentiles. Therefore, the product of this survey is the raw data, including for the first time ever complete 3-D models of all subjects.

The development of a plan for this survey was an interative process which was initiated with the formation of a NATO working group in 1993, the Advisory Group for Aerospace Research and Development (AGARD), Working Group 20: 3-D Surface Anthropometry. This group, consisting of representatives from six countries with a variety of technical expertise from physics to medicine, explored the use of the new technology for the purpose of conducting a NATO survey. NATO has a long history of anthropometric surveys of military populations (Hertzberg et al. 1963). However, unlike the previous surveys, CAESAR is the first NATO survey of civilians and the first 3-D whole-body surface anthropometry survey. The working group reviewed the 3-D Surface Anthropometry technology (Robinette et al. 1997) and developed a draft plan which became the starting point for the CAESAR project.

At the same time, two industry organizations were also making plans to conduct traditional type anthropometric surveys, the Society of Automotive Engineers' (SAE) G-13 Committee and the American Society of Testing and Materials (ASTM) D-13 Committee. The former consisted of representatives for the automotive and aerospace industries and the latter for the apparel industry. These groups had formed a list of critical variables for their needs and had begun to discuss working together on such an effort. CAESAR brought all of these groups together under one umbrella.

The purpose of this document is to provide a general description of the survey and what data were collected and produced. This is intended for use by people interested in acquiring the data

to determine its suitability for their needs. It is also intended for use by those who have acquired the survey as background information for reference. It includes a description of the sampling strategy, result, and quality control and editing procedures used in Chapter II, and a brief description of the data products from the survey in Chapter III. This description includes a listing and visual indexes of the 3-D poses, the 3-D landmarks, and the traditional style measurements taken with traditional tools or extracted from scans.

This report also has a companion document, Volume II: Descriptions, by Blackwell et al. 2002, which contains detailed descriptions of the methods used for the demographics, the measurements (both 3-D and 1-D), and the landmarks.

CHAPTER II: EXPERIMENTAL DESIGN

The civilian populations of three countries were sampled in an effort to characterize the population of NATO countries as a whole. The United States was chosen because it has the largest and the most diverse population in NATO. The Netherlands was chosen because it has the tallest population in NATO, and Italy was chosen because it has one of the shortest populations in NATO. This chapter outlines the sampling strategy, the sampling result, and the quality control and editing measures used.

Sampling Strategy

The populations were sampled by age, race, and gender. A stratified sampling plan was used with equal sample size in each cell according to the recommendations of ISO/DIS 15535. The strata consist of:

In North America

3 Age Strata: 18-29, 30-44, 45-65
2 Gender Strata: Male and Female
3 Ethnic Group Strata: White, Black, and Other
Total 3*2*3=18

In The Netherlands

3 Age Strata: 18-29, 30-44, 45-65
2 Gender Strata: Male and Female
2 Ethnic Strata: White*, and Other
Total 3*2*2=12

In Italy

3 Age Strata: 18-29, 30-44, 45-65
2 Gender Strata: Male and Female
2 Ethnic Strata: White*, and Other
Total 3*2*2=12

The overall total number of sampling cells is 42.

*In The Netherlands and Italy the 'white' group was defined as those subjects for whom both parents were born in the country. All remaining subjects were in the 'other' group. In Italy it is against the law to ask race and in The Netherlands this manner of asking this question is in correspondence with the Statistics Netherlands data.

It must also be noted that the ethnic group Hispanic was not used for the sampling strata because the most recent guidance from the National Center for Health Statistics and experts from the

Hispanic community indicated that, while it is a minority population, it is a multi-racial group composed of Native Americans, African-Americans, and European Americans. However, during data collection the subjects had the option to identify themselves as Hispanic if desired. The reason for using race as a strata was to try to ensure that all racial groups' body sizes and shapes are adequately represented. In fact, all groups are considered to be equally important. Since the Hispanic group is really composed of many other groups it was presumed to be adequately accommodated if the other groups are accommodated.

The minimum sample size for each cell was calculated using the following formula:

$$\frac{\left|\overline{X} - \upsilon\right| * \sqrt{n_i}}{\sigma} \geq \zeta$$

where

ζ = eccentricity (1.96 for 5% two-sided probability of occurrence)
σ = standard deviation
n_i = sample size
υ = true mean of the subgroup
$\overline{X}$ = sample mean of the subgroup
$\left|\overline{X} - \upsilon\right|$ = desired within cell accuracy

The total number target for the sample in one country was the sum of the sample sizes in the subgroups. The measurement used to estimate the sample size was stature. It was determined that stature would give us the most conservative estimate (the estimate that would indicate the most subjects per cell and hence the smallest chance for error). A review of within age group standard deviations measured around the world indicates that 70 mm is a reasonable within cell standard deviation estimate for stature. The desired within cell accuracy was set at 10 mm.

The calculation of within cell sample size becomes:

$$\frac{\left|10\right| * \sqrt{n_i}}{70} \geq 1.96 \quad \text{or}$$

$$n_i = \left(\frac{1.96}{10} * 70\right)^2 = 188$$

This value was then set as the target number of subjects per cell and it represents the number that should provide a sample mean value that is within 10 mm of the true population mean with 95% confidence. The number of subjects per cell, and per country is illustrated in Tables 1 and 2 below.

Of course it was expected that obtaining these numbers for the minority populations would be especially difficult just due to the fact that there are fewer people in those groups and we would have to reach and attract a much larger proportion of their population. For these groups a minimum target was also set at 30 subjects per cell, particularly for North America where the diversity of NATO is supposed to be represented. If you enter 30 into the formula, it indicates that 30 should provide a 95% confidence level for being within 25 mm (or about one inch) of the true mean for the cell. In addition, extra effort was made to try to meet the target numbers of subjects in cells that were made of minority populations, including placing ads in other languages such as Chinese and Vietnamese.

Table 1. Target Number of Subjects, North America

		Female					Male		
Age	**18-29**	**30-44**	**45-65**	**Sum**		**18-29**	**30-44**	**45-64**	**Sum**
White	**188**	**188**	**188**	**564**		**188**	**188**	**188**	**564**
Black	**188**	**188**	**188**	**564**		**188**	**188**	**188**	**564**
Other	**188**	**188**	**188**	**564**		**188**	**188**	**188**	**564**
Sum	**564**	**564**	**564**	**1692**		**564**	**564**	**564**	**1692**
Minimum Total					**3384**				

Table 2. Target Numbers of Subjects for Each of the Other Two Countries

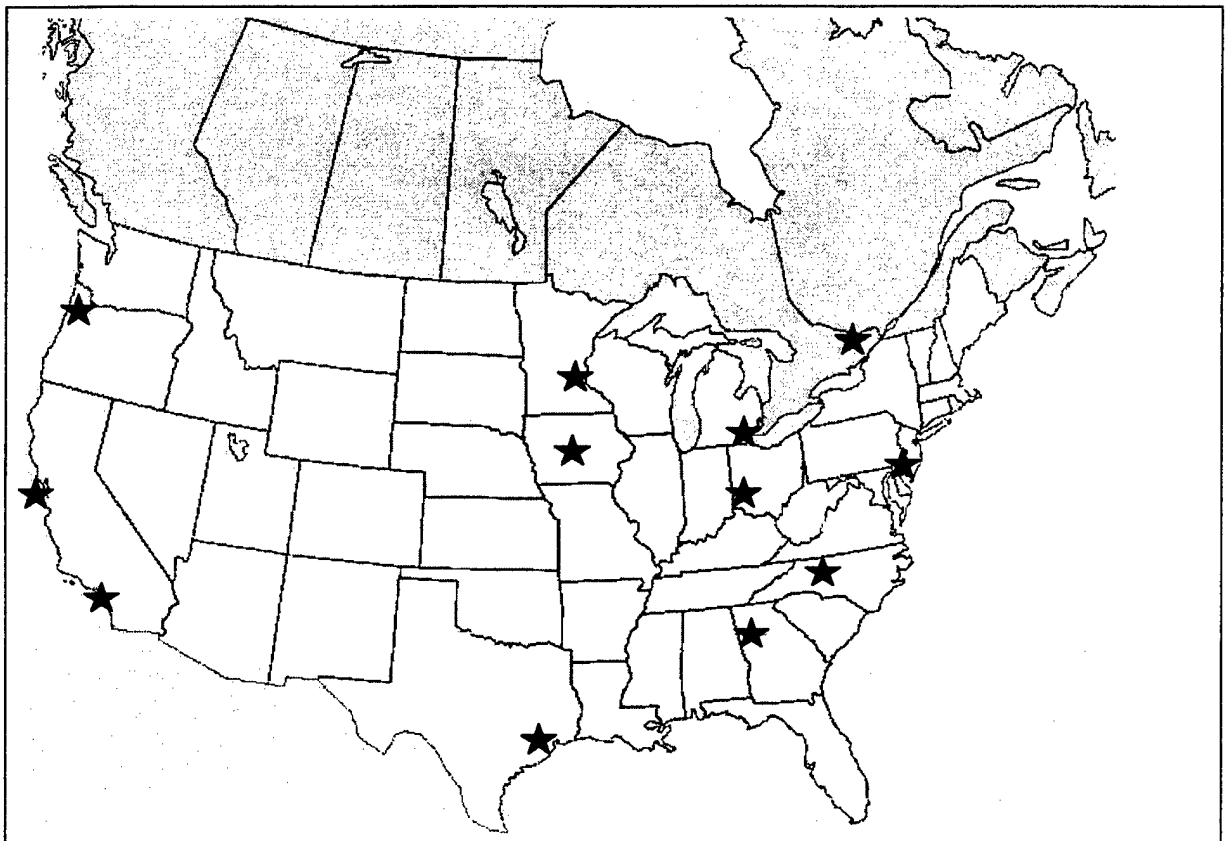
		Female				Male			
Age	**18-29**	**30-44**	**45-65**	**SUM**		**18-29**	**30-44**	**45-65**	**SUM**
White	**188**	**188**	**188**	**564**		**188**	**188**	**188**	**564**
Other	**188**	**188**	**188**	**564**		**188**	**188**	**188**	**564**
Sum	**376**	**376**	**376**	**1128**		**376**	**376**	**376**	**1128**
Minimum Total					**2256**				

The overall country margin of error is, of course, much smaller than the within cell margin. For North America the overall country margin of error with a sample size of 188 in each cell can be as low as 2.4 mm, and for The Netherlands and Italy 2.9 mm. These values are within the measurement error range and it is doubtful that a better margin of error can be achieved even with additional subjects.

In addition to the above strata, height, weight, education and within country geographic region were also monitored to ensure that the volunteers were roughly matched to the civilian populations as measured in recent census studies in the three countries. In North America the study used to monitor height and weight was the United States National Health and Nutritional Examination Study III (NHANES III), (Anonymous, 1994). In The Netherlands reference was made to data of Statistics Netherlands (1999). In Italy reference data were available from ISTAT in Rome (www.istat.it). This was done in an attempt to minimize the bias due to the fact that the subjects were all volunteers.

Sampling Result

In North America data collection was done at 12 different locations. These locations were selected to obtain subjects roughly in proportion to the proportion of the population in each of 4 regions at the time of the 1990 US Census. A map and list of the locations is shown below in Figure 1. The Netherlands and Italy are both much smaller geographically and just one location was used in each, Soesterberg in The Netherlands and Genova in Italy.



Locations:

Ames, IA	**Atlanta, GA**	**Detroit, MI**
Greensboro, NC	**Houston, TX**	**Los Angeles, CA**
Marlton, NJ	**Minneapolis, MN**	**Ottawa, Ontario, Canada**
Portland, OR	**San Francisco, CA**	**Wright-Patterson AFB, OH**

Figure 1. North American Data Collection Sites.

The actual number of subjects obtained by cell is shown in Tables 3-5 below.

Table 3. Actual Number of Subjects in Each Strata, North America

Females

Age	White	Black	Other	Total*
18-29	188	61	58	307
30-44	373	48	56	477
45-65	394	38	37	469
Total*	957	147	151	1255

Males

Age	White	Black	Other	Total*
18-29	191	39	51	281
30-44	353	52	56	461
45-65	320	25	30	375
Total*	867	116	137	1120

* Note: totals include subjects who had missing data or were outside the age ranges.

Table 4. Number of Subjects in Each Strata, The Netherlands

Females

Ages	Dutch	Other	Total
18-29	167	41	208
30-44	200	48	248
45-65	177	58	235
Total	544	147	691

Males

Ages	Dutch	Other	Total
18-29	156	29	185
30-44	152	23	175
45-65	172	32	204
Total	480	84	564

Table 5. Number of Subjects in Each Strata, Italy

Females

Ages	Italian	Other	Total
18-29	252	5	257
30-44	67	4	74
45-65	57	1	58
Total	376	10	386

Males

Ages	Italian	Other	Total
18-29	235	14	249
30-44	103	7	110
45-65	50	1	51
Total	388	22	410

Totals: North America = 2375; The Netherlands = 1255; Italy = 801; All = 4431

In North America all of the "White" cells achieved the target of 188 each, and all but one of the "Other" cells has the minimum of 30 and it was close at 25. In The Netherlands one cell reached

the target of 188 subjects, and all but 2 achieved the minimum of 30 and these were close (29 and 23). In Italy the Italian 18-29 age groups achieved the target and the other 2 Italian age groups had more than the minimum of 30. However, the "Other" groups had very few subjects. Since the purpose of including Italy in the sample was not to get ethnic diversity but to get a representative sample from one of the shorter NATO countries, this was not deemed to be a serious problem. North America was selected to obtain diversity in the sample and an adequate sample was obtained there.

The stature and weight obtained for each cell is provided in Tables 6-8. Included in these tables are the standard error of the mean estimates which, when multiplied by the eccentricity (or Z value) for the level of confidence, indicates the level of accuracy of the means. Table 9 shows the level of accuracy for two confidence ranges, 90% and 95%, for all the sample sizes of 23 or more. (95% is the level used to arrive at the sample size estimates.) As you can see, all of the overall country sample sizes provide means well within the 10 mm desired and all of the within cell mean estimates are close to or better than the desired minimum accuracy of 25 mm. A comparison of the means within cells reveals that the Dutch samples are consistently the tallest and the Italian "Italy" cells are consistently the smallest, just as was expected. The Italian "Other" cells are not always the smallest of the 3 countries, but the sample sizes in those cells are extremely small. Also, the largest sub-population of people born outside Italy comes from Africa; therefore this group is probably more like the "Black" sample from North America than the "Other" sample. In The Netherlands most people born outside the country are from Indonesia, and in North America most people in the "Other" category are Asian.

Because of the stratified sampling strategy, the overall mean values do not accurately reflect an accurate mean for a given country. In order to achieve a representative sample for a country, the data have to be weighted. This was done for the United States in another report by Harrison and Robinette (2002).

Quality Control and Editing

Quality control checking was done throughout data collection and analysis. During data collection all demographic and traditional measurement information was recorded both on a paper form as well as entered into the computer. When entered the computer indicated with a beep if the number appeared to be an outlier to alert the investigator about any potential error. The range for outliers was determined by minimums and maximums from previous studies, such as the Army ANSUR survey. At the final data collection station, the 3-D scanner, all of the flat file data were electronically checked to ensure they were complete and for the correct subject.

For 3-D scan data, the exact number of stickers for the landmarks were pre-cut from the roll for each subject to ensure that all of them were placed prior to scanning. In addition all scans in North America and Italy were viewed within 1 minute of scanning and checked to ensure that they were of good quality and with visible landmarks. The scans were re-taken if not. This was not done for all scans for the scanner used in The Netherlands because it did not have previewing software. That scanner also had no color camera initially and when first installed it was not properly aligned, so the scans came out just red and black. As a result about 110 subjects from The Netherlands have no 3-D landmarks.

Table 6. North American Sample Stature And Weight By Strata

FEMALES		Stature (mm)			Weight (kgs)	
	N	Mean	Std.Dev.	Se Mean	Mean	Std.Dev.
18-29 White	188	1655	68	5	64	13.4
18-29 Black	61	1632	70	9	72	16.9
18-29 Other	58	1595	61	8	57.9	9.9
30-44 White	373	1660	74	4	68.8	16.9
30-44 Black	48	1648	86	12	82.5	22.3
30-44 Other	56	1595	67	9	63.3	16.7
45-65 White	394	1637	67	3	70.7	17.6
45-65 Black	38	1612	60	10	81.2	24
45-65 Other	37	1558	57	9	67.2	19.3
> 65 White	2	1608	81	57	55.3	5.5
> 65 Other	0					
> 65 Black	0					
All Groups	1255	1640	73.3	2	68.9	17.6

MALES		Stature (mm)			Weight (kgs)	
	N	Mean	Std.Dev.	Se Mean	Mean	Std.Dev.
18-29 White	191	1788	75	5	80.9	14.2
18-29 Black	39	1796	81	13	95	22.6
18-29 Other	51	1729	84	12	76.1	14.8
30-44 White	353	1796	76	4	87.6	16.3
30-44 Black	52	1762	71	10	86.7	21.1
30-44 Other	56	1717	79	11	77.4	16
45-65 White	320	1779	73	4	90.5	19.3
45-65 Black	25	1746	71	14	88.4	16.1
45-65 Other	30	1710	85	16	77.9	16.4
> 65 White	3	1734	104	60	82.1	19.5
> 65 Other	0					
> 65 Black	0					
All Groups	1120	1777.6	79.2	2	86.2	17.9

Table 7. Dutch Sample Stature and Weight by Strata

FEMALES		Stature (mm)			Weight (kgs)	
	N	Mean	Std.Dev.	Se Mean	Mean	Std.Dev.
18-29 Dutch	167	1716	71	5	69	14
18-29 Other	41	1649	89	14	63.7	13.7
30-44 Dutch	200	1695	70	5	72.9	14.4
30-44 Other	48	1654	81	12	72.3	17.1
45-65 Dutch	177	1659	60	5	78.5	15.9
45-65 Other	58	1619	63	8	74.6	16.2
All Groups	691	1679	75	3	72.9	15.5

MALES		Stature (mm)			Weight (kgs)	
	N	Mean	Std.Dev.	Se Mean	Mean	Std.Dev.
18-29 Dutch	156	1840	76	6	78.4	12.6
18-29 Other	29	1825	68	13	74	10.6
30-44 Dutch	152	1829	97	8	87.8	18.5
30-44 Other	23	1797	96	20	77.9	10.9
45-65 Dutch	172	1787	82	6	87.6	14.9
45-65 Other	32	1751	111	20	85.2	21
All Groups	564	1813	90	4	83.9	16.2

Table 8. Italian Sample Stature and Weight by Strata

FEMALES		Stature (mm)			Weight (kgs)	
	N	Mean	Std.Dev.	Se Mean	Mean	Std.Dev.
18-29 Italy	252	1619	61	4	55.7	7.44
18-29 Other	5	1612	57	25	54.68	4.94
30-44 Italy	67	1607	61	7	58.53	10.14
30-44 Other	4	1579	35	18	64.17	19.15
45-65 Italy	57	1582	62	8	64	10.38
45-65 Other	1	1659	0		67.2	0
All Groups	386	1611	62	3	57.52	9.05

MALES		Stature (mm)			Weight (kgs)	
	N	Mean	Std.Dev.	Se Mean	Mean	Std.Dev.
18-29 Italy	235	1745	66	4	70.06	9.28
18-29 Other	14	1742	69	18	69.66	11.89
30-44 Italy	103	1730	60	6	77.1	12.83
30-44 Other	7	1723	78	29	72.51	10.45
45-65 Italy	50	1699	73	10	77.22	9.31
45-65 Other	1	1916	0		94.7	0
All Groups	410	1736	67	3	72.78	10.93

Table 9. Accuracy Confidence Levels (mm)

N	Se Mean	Z 90	Z95	90%	95%
1255	2	1.645	1.96	3	4
1120	2	1.645	1.96	4	5
691	3	1.645	1.96	5	6
564	4	1.645	1.96	6	7
410	3	1.645	1.96	5	6
394	3	1.645	1.96	6	7
386	3	1.645	1.96	5	6
373	4	1.645	1.96	6	8
353	4	1.645	1.96	7	8
320	4	1.645	1.96	7	8
252	4	1.645	1.96	6	8
235	4	1.645	1.96	7	8
200	5	1.645	1.96	8	10
191	5	1.645	1.96	8	10
188	5	1.645	1.96	8	10
177	5	1.645	1.96	8	10
172	6	1.645	1.96	10	12
167	5	1.645	1.96	8	10
156	6	1.645	1.96	10	12
152	8	1.645	1.96	13	15
103	6	1.645	1.96	10	12
67	7	1.645	1.96	12	15
61	9	1.645	1.96	15	18
58	8	1.645	1.96	13	16
58	8	1.645	1.96	13	16
57	8	1.645	1.96	14	16
56	9	1.645	1.96	15	18
56	11	1.645	1.96	17	21
52	10	1.645	1.96	16	19
51	12	1.645	1.96	19	23
50	10	1.645	1.96	17	20
48	12	1.645	1.96	20	24
48	12	1.645	1.96	20	24
41	14	1.645	1.96	23	27
39	13	1.645	1.96	21	25
38	10	1.645	1.96	16	19
37	9	1.645	1.96	15	18
32	20	1.645	1.96	32	38
30	16	1.645	1.96	26	30
29	13	1.645	1.96	21	25
25	14	1.645	1.96	23	27
23	20	1.645	1.96	33	39

For quality control checking and editing during data analysis, the data recorded on the paper forms was compared against the data entered electronically and a correction was made of any discrepancies. Also, the 3-D landmarking process (Burnsides et al 2001) included an automated heuristic check for identifying landmarks which appeared out of place or mis-named. These were then checked by an operator and corrected as necessary.

Then a final check of all traditional style measurements (includes scan extracted measurements) was done using a regression outlier analysis. This process had several steps. First correlations between measurements were used and the regression models that had the highest correlations selected. Next the residuals (predicted value versus actual) were examined and any that were more than 4.5 standard errors were checked. Checking involved examining the paper forms, examining other related measurement sizes, and viewing the 3-D scans and 3-D landmarks. In some cases, an alternate measurement was taken from a 3-D scan to verify the accuracy or inaccuracy of a measurement. This information was used to correct or delete clear errors. This process is described in detail in Goodyear and Robinette (in press).

All anomalies and data corrections were recorded in electronic documents by subject number. This included odd subject characteristics noted during data collection.

CHAPTER III: PRODUCTS

The products from this survey consisted of raw data files and documentation. This included:

1. demographic data for each subject
2. 3-D models for each of 3 postures for each subject
3. 3-D landmarks for two postures
4. traditional style measurements of three types:
    a. those taken with traditional tools
    b. those calculated from the 3-D landmarks from the standing pose
    c. those calculated from the 3-D landmarks from the seated pose
5. text files with notes about any subject anomalies or corrections made
6. summary reports with sample, variable, measurement and landmark descriptions

Each of these products is described below. The description includes: 1) the format of the data provided; 2) a list of measurements; and 3) a visual index where appropriate.

Demographic Variables

The demographic variables collected are shown in Table 10 below. These data are in flat file form, in both ASCII text and Excel® spreadsheet formats. The data file name is also listed in the table.

Table 10. Demographic Variables

CAESAR Name	**Data file Name**
Country of Data Collection	Country
Site of Data Collection	Site
Date of Data Collection	Date
Time of Day of Data Collection	Time
Civilian or Military	Civilian
Date of Birth	Date of Birth
Age in Years	Age (years)
Birth State	Birth State
Occupation	Occupation
Education Level	Education
Number of Children	Number of Children
Fitness Level	Fitness
Car Make	Car Make
Car Year	Car Year
Car Model	Car Model
Gender	Gender
Race	Race
Reported Height	Reported Height
Reported Weight	Reported Weight
Subgroup Number	Subgroup Number
Marital Status	Marital Status
Family Income	Family Income
Shoe Size	Shoe Size

Jacket Size	Jacket Size
Pants Size Waist	Pants Size Waist
Pants Size Inseam	Pants Size Inseam
Blouse Size	Blouse Size
Pants Size Woman	Pants Size Woman
Bra Size	Bra Size

The demographic data forms are provided in Appendix A. These list the questions and the possible responses.

3-D Scan Data

Two different scanners were used to collect the 3-D data, the WB4 scanner built by Cyberware for the United States Air Force (the first one ever built) and a scanner built by Vitronic for The Netherlands Organization for Applied Scientific Reseach (TNO). The Cyberware scanner was used in North America and Italy and the Vitronic scanner in The Netherlands.

Each subject was scanned in three different postures for the CAESAR Survey. Pose A is a standing posture. Pose B is a seated posture in which the subject assumes a "comfortable working posture," and Pose C is a second seated posture in which the subject raises his or her arms and head to provide the greatest possible scan coverage.

Pose A: Standing posture

The subject placed his or her feet on foot outlines positioned ten centimeters apart at the inside of the heel. The subject's heel was lined up with the back of the foot outline and the second toe lined up with the line drawn through the long axis of the foot on the foot outlines. The footprints were positioned on the scanner platform at a 30° angle (see Figure 2 below). The investigator instructed the subject to stand up straight and look straight ahead. The investigator then used a dowel (20 centimeters in length) to adjust the subject's arm position so the hands were 20 centimeters away from the lateral-most point of the hip/thigh area. For individuals with "hips," the dowel was placed at the widest protrusion of the hips (as viewed from the front). For individuals without a pronounced hip (more commonly males than females), the dowel was placed at the wrist. The arms and wrists were kept straight and the palms of the hands faced the body, with the fingers spread. Pose A is shown in Figure 3.

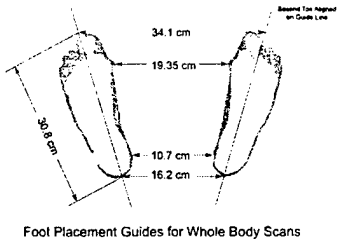


Figure 2. Footprints

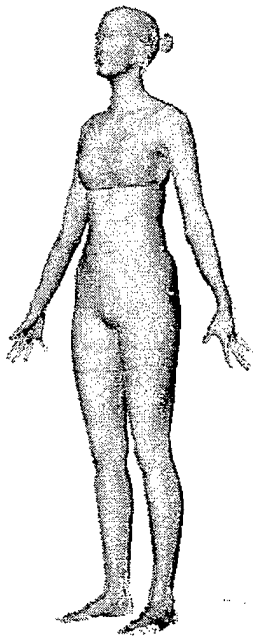


Figure 3. Scan Image in Standing Posture

Pose B: Seated comfortable working posture

The goal of the seated comfortable working posture was to capture the natural, comfortable, seated working position. The subject sat on the modified stool and the investigator adjusted the seat to a height that provided a comfortable working position as indicated by the subject. The subject was allowed to sit anywhere on the seat; however, both feet had to be flat on the platform. The investigator asked the subject to sit up straight, look straight ahead, and place the hands on the thighs. Next, the investigator asked the subject to keep the hands on the thighs and relax the postural rigidity until the subject had assumed a comfortable working position. The hands were placed at mid-thigh to prevent the medial and lateral femoral epicondyles from being blocked by the hands and fingers in the scan. The investigator placed a small block, marked with a reference landmark, behind the subject on the flat seat surface (at the surface level), in contact with the center of the subject's buttocks. Pose B is shown in Figure 4.

Pose C: Seated coverage posture

The seated coverage posture was designed to expose hard-to-see areas underneath the arms, between the thighs, and under the chin (Figure 5). The subject placed his or her feet on foot outlines positioned on the scanner platform for this seated posture. The investigator instructed the subject to sit up straight and look straight ahead. The subject sat on a modified stool that had a flat surface and a pneumatic height adjustment. The investigator adjusted the seat to a height at which the knee angle was slightly greater than 90° with the calf almost perpendicular to the scanner platform. Keeping the feet on the foot outlines, the legs were spread slightly to allow coverage between the thighs. The subject held his or her hands over the head in the coronal plane and the subject's shoulders and elbows formed right angles. The subject closed his or her

right hand around a one-inch diameter dowel and spread the fingers of the left hand. The left hand was in line with the arm, with the hand flat and palm facing forward (away from the body). The head was tilted backward slightly so that the chin/neck angle was greater than 90° to expose the shaded area under the chin. The investigator placed a small block, marked with a reference landmark, behind the subject on the flat seat surface (at the surface level), in contact with the center of the subject's buttocks.

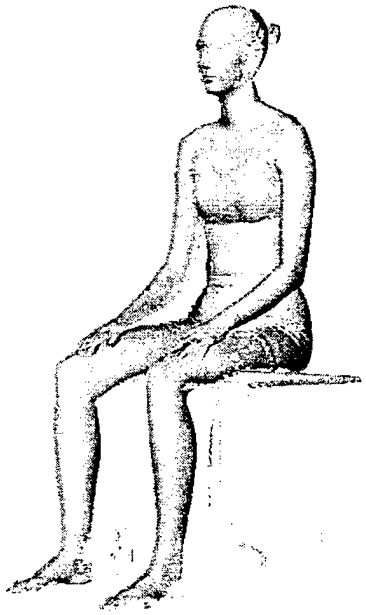


Figure 4. Scan Image in Seated Comfortable Working Posture

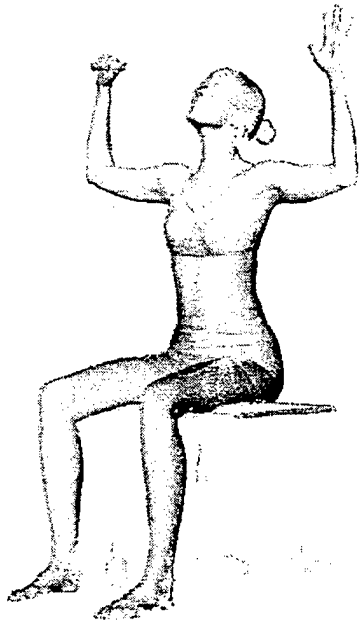


Figure 5. Scan Image in Seated Coverage Posture

Poses A and B were used for the scan-extracted dimensions and investigators should be careful to note that the B pose is not the same pose as the standard traditional measurement pose. Therefore, similar measurements taken with traditional tools, such as acromion height, sitting, will not result in the same values. Detailed descriptions of the calculations are in the companion volume by Blackwell et al. (2002).

The 3-D scans were processed to combine the information from the different scan heads within a scan into one object. This results in one complete model for each pose. For North America and Italy they were combined using software that comes with the Cyberware scanner, called CyPie. The accuracy of this process was documented in two studies by Daanen and others. (Daanen et al. 1997a and Daanen et al. 1997b). For The Netherlands the scanner did not come with any such software and, because of the different camera configuration of the Vitronic scanner, the CyPie software could not be used. Therefore, the images from the different cameras were combined using the third-party software called Polyworks®, made by Innovmetric. The 3-D models were delivered in the Cyberware PLY data format for all countries. The file names contain the subject number and pose. For example, for North America and Italy, the file called csr4000a.ply is the 3-D scan for subject number 4000 in the A pose and for Dutch 3-D scans the file is called nl_4000a.ply.

3-D Landmark Data

Prior to scanning, 72 landmarks were marked on the body with stickers for later identification. Twelve of the stickers were 3-D stickers and were actually off-the-shelf bumpers produced by 3M. They are truncated square pyramids in shape. The rest were white paper stickers, 12 mm in diameter. A picture of the stickers is shown below in Figure 6.

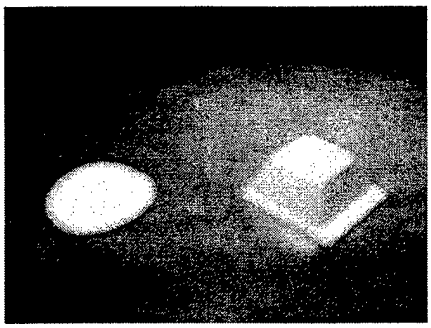


Figure 6. Photograph of the Stickers Used

For the seated poses the block placed against the buttocks also had a sticker. This was an additional landmark used for identifying the location of the subject with respect to the seat.

The 3-D scans were then interrogated using a semi-automated process to extract the 3-D location of the landmarks for the A and B poses. The process and its accuracy, speed and reliability are described in Burnsides et al. (2001). An alphabetical list of the landmarks is shown in Table 11, followed by the same list in a visual index. The only landmark not shown in the visual index is the crotch landmark. This one was calculated using the crotch height value from the traditional measurements for the vertical value and the midpoint of the two trochanterion landmarks (right and left) for the other two dimensions. The visual index is divided into two sections by pose: Pose A is shown in Figures 7-14, Pose B in Figures 15-17.

The landmarks are described in detail in volume II by Blackwell et al. (2002). They are provided as one flat file in ASCII text per subject. The file name contains the subject number.

Table 11. List of 3-D Landmarks

	CAESAR Name	ISO Name	Data File Name
Z1	SELLION	Nasion; Sellion	Sellion
Z2	INFRAORBITALE, RIGHT		Rt. Infraorbitale
Z3	INFRAORBITALE, LEFT		Lt. Infraorbitale
Z4	SUPRAMENTON		Supramenton
Z5	TRAGION, RIGHT	Tragion	Rt. Tragion
Z6	GONION, RIGHT		Rt. Gonion
Z7	TRAGION, LEFT	Tragion	Lt. Tragion
Z8	GONION, LEFT		Lt. Gonion
Z9	NUCHALE		Nuchale
Z10	CLAVICALE, RIGHT		Rt. Clavicale
Z11	SUPRASTERNALE		Suprasternale
Z12	CLAVICALE, LEFT		Lt. Clavicale
Z13	THELION/BUSTPOINT, RIGHT		Rt. Thelion/Bustpoint
Z14	THELION/BUSTPOINT, LEFT		Lt. Thelion/Bustpoint
Z15	SUBSTERNALE		Substernale
Z16	TENTH RIB, RIGHT		Rt. 10th Rib
Z17	ILIAC SPINE, ANTERIOR, SUPERIOR; RIGHT		Rt. ASIS
Z18	TENTH RIB, LEFT		Lt. 10th Rib
Z19	ILIAC SPINE, ANTERIOR, SUPERIOR; LEFT		Lt. ASIS
Z20	ILIOCRISTALE, RIGHT		Rt. Iliocristale
Z21	TROCHANTERION, RIGHT		Rt. Trochanterion
Z22	ILIOCRISTALE, LEFT		Lt. Iliocristale
Z23	TROCHANTERION, LEFT		Lt. Trochanterion
Z24	CERVICALE	Cervicale	Cervicale
Z25	TENTH RIB, MIDSPINE		10th Rib Midspine
Z26	ILIAC SPINE, POSTERIOR, SUPERIOR; RIGHT		Rt. PSIS
Z27	ILIAC SPINE, POSTERIOR, SUPERIOR; LEFT		Lt. PSIS
Z28	WAIST, PREFERRED, POSTERIOR		Waist, Preferred, Post.
Z29	ACROMION, RIGHT	Acromion	Rt. Acromion
Z30	AXILLA POINT, ANTERIOR; RIGHT		Rt. Axilla, Ant
Z31	RADIAL STYLOID, RIGHT		Rt. Radial Styloid
Z32	AXILLA POINT, POSTERIOR; RIGHT		Rt. Axilla, Post.
Z33	OLECRANON, RIGHT		Rt. Olecranon
Z34	HUMERAL EPICONDYLE, LATERAL; RIGHT		Rt. Humeral Lateral Epicn
Z35	HUMERAL EPICONDYLE, MEDIAL; RIGHT		Rt. Humeral Medial Epicn
Z36	RADIALE, RIGHT		Rt. Radiale
Z37	METACARPAL-PHALANGEAL II, RIGHT		Rt. Metacarpal Phal. II
Z38	DACTYLION, RIGHT		Rt. Dactylion
Z39	ULNAR STYLOID, RIGHT		Rt. Ulnar Styloid
Z40	METACARPAL-PHALANGEAL V, RIGHT		Rt. Metacarpal-Phal. V
Z41	ACROMION, LEFT	Acromion	Lt. Acromion
Z42	AXILLA POINT, ANTERIOR; LEFT		Lt. Axilla, Ant
Z43	RADIAL STYLOID, LEFT		Lt. Radial Styloid
Z44	AXILLA POINT, POSTERIOR; LEFT		Lt. Axilla, Post.

	CAESAR Name	ISO Name	Data File Name
Z45	OLECRANON, LEFT		Lt. Olecranon
Z46	HUMERAL EPICONDYLE, LATERAL; LEFT		Lt. Humeral Lateral Epicn
Z47	HUMERAL EPICONDYLE, MEDIAL; LEFT		Lt. Humeral Medial Epicn
Z48	RADIALE, LEFT		Lt. Radiale
Z49	METACARPAL-PHALANGEAL II, LEFT		Lt. Metacarpal-Phal. II
Z50	DACTYLION, LEFT		Lt. Dactylion
Z51	ULNAR STYLOID, LEFT		Lt. Ulnar Styloid
Z52	METACARPAL-PHALANGEAL V, LEFT		Lt. Metacarpal-Phal. V
Z53	KNEE CREASE, RIGHT		Rt. Knee Crease
Z54	FEMORAL EPICONDYLE, LATERAL; RIGHT		Rt. Femoral Lateral Epicn
Z55	FEMORAL EPICONDYLE, MEDIAL; RIGHT		Rt. Femoral Medial Epicn
Z56	METATARSAL-PHALANGEAL V, RIGHT		Rt. Metatarsal-Phal. V
Z57	MALLEOLUS, LATERAL; RIGHT		Rt. Lateral Malleolus
Z58	MALLEOLUS, MEDIAL; RIGHT		Rt. Medial Malleolus
Z59	SPHYRION, RIGHT		Rt. Sphyrion
Z60	METATARSAL-PHALANGEAL I, RIGHT		Rt. Metatarsal-Phal. I
Z61	CALCANEUS, POSTERIOR; RIGHT		Rt. Calcaneous, Post.
Z62	DIGIT II, RIGHT		Rt. Digit II
Z63	KNEE CREASE, LEFT		Lt. Knee Crease
Z64	FEMORAL EPICONDYLE, LATERAL; LEFT		Lt. Femoral Lateral Epicn
Z65	FEMORAL EPICONDYLE, MEDIAL; LEFT		Lt. Femoral Medial Epicn
Z66	METATARSAL-PHALANGEAL V, LEFT		Lt. Metatarsal-Phal. V
Z67	MALLEOLUS, LATERAL; LEFT		Lt. Lateral Malleolus
Z68	MALLEOLUS, MEDIAL; LEFT		Lt. Medial Malleolus
Z69	SPHYRION, LEFT		Lt. Sphyrion
Z70	METATARSAL-PHALANGEAL I, LEFT		Lt. Metatarsal-Phal. I
Z71	CALCANEUS, POSTERIOR; LEFT		Lt. Calcaneous, Post.
Z72	DIGIT II, LEFT		Lt. Digit II
Z73	CROTCH *(Calculated Point only)*		Crotch
Z74	BUTT BLOCK		Functional Butt Block

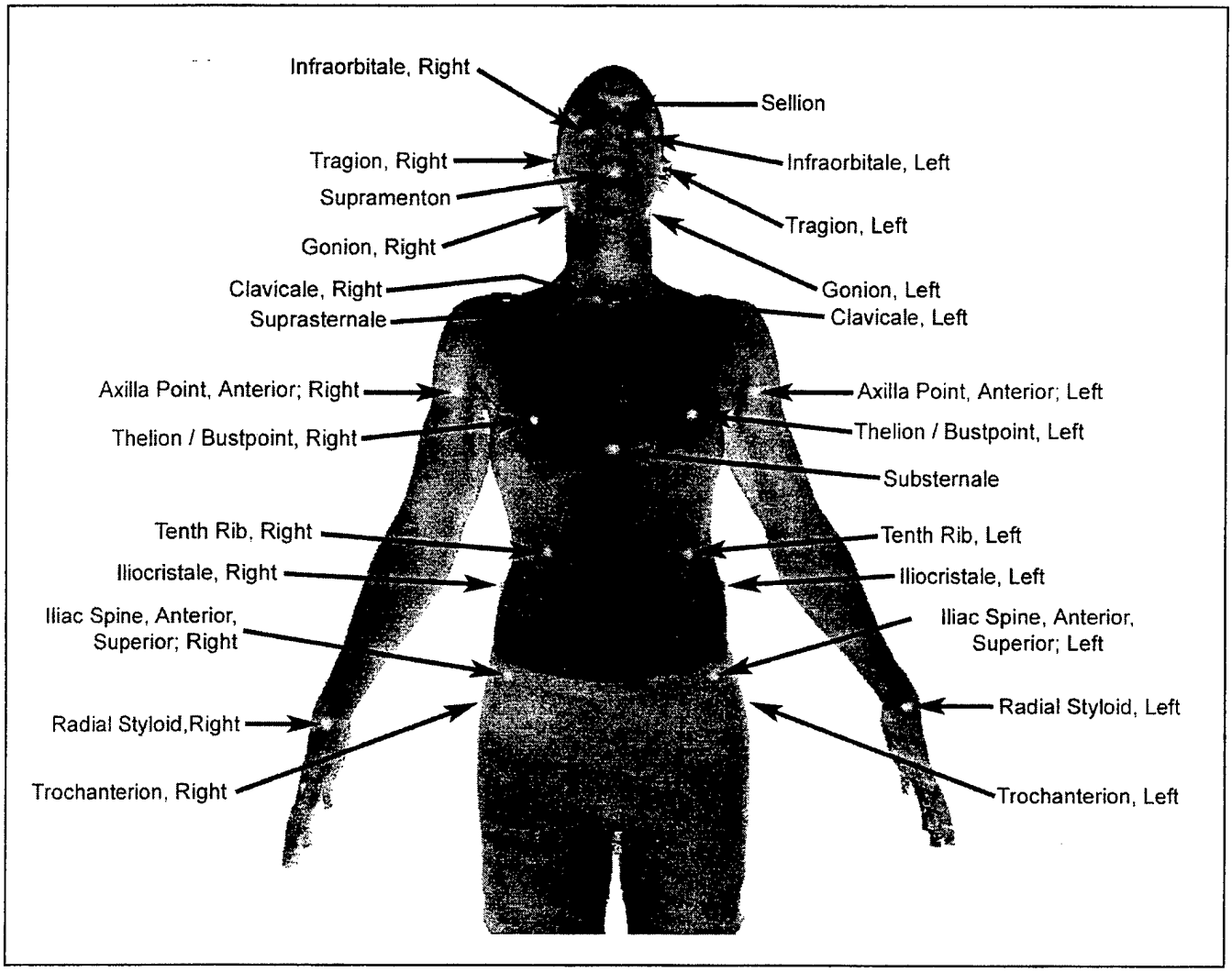


Figure 7. Visual Index of the 3-D Landmarks, Pose A, Upper Body, Front View

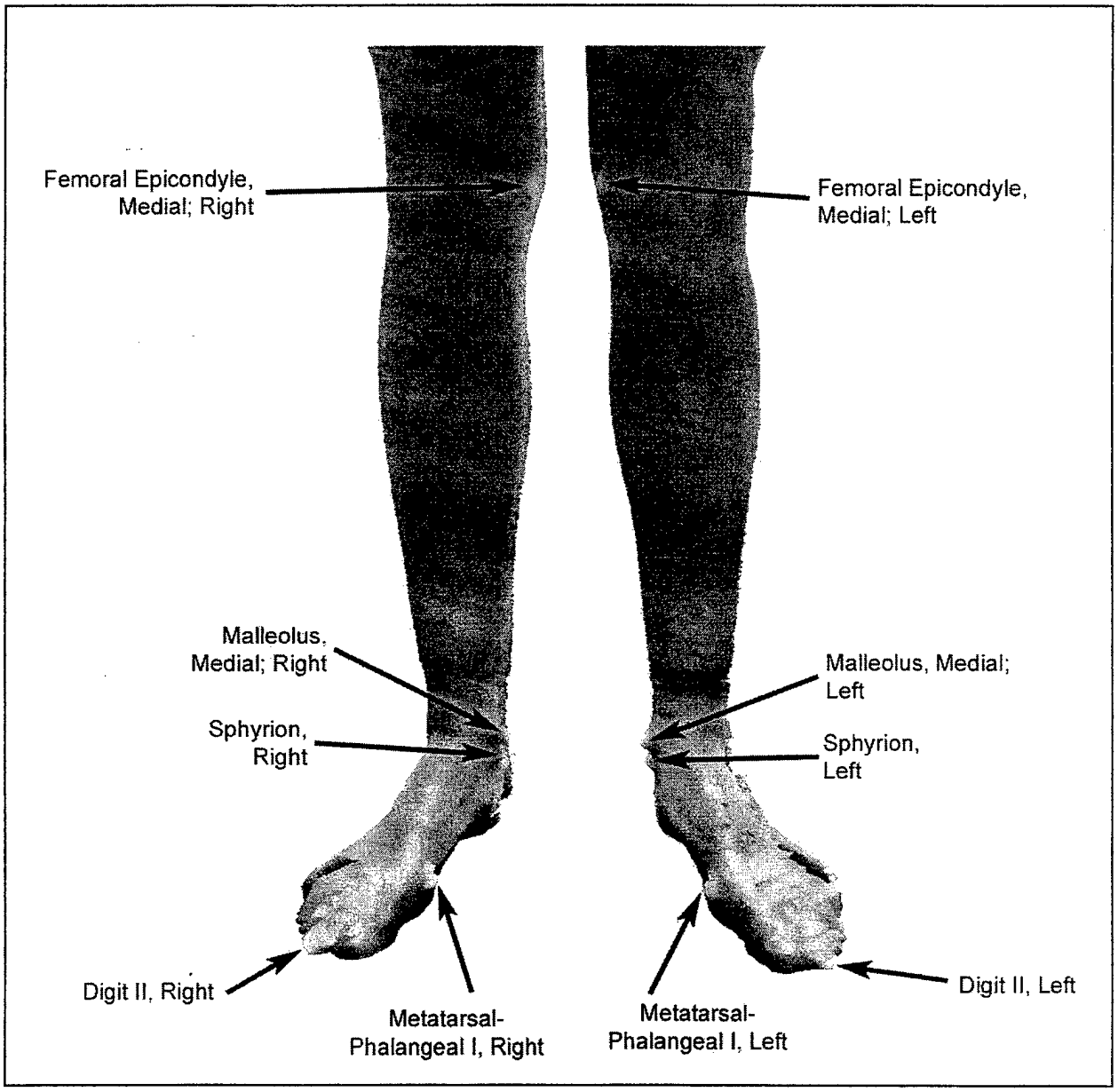


Figure 8. Visual Index of the 3-D Landmarks, Pose A, Lower Body, Front View

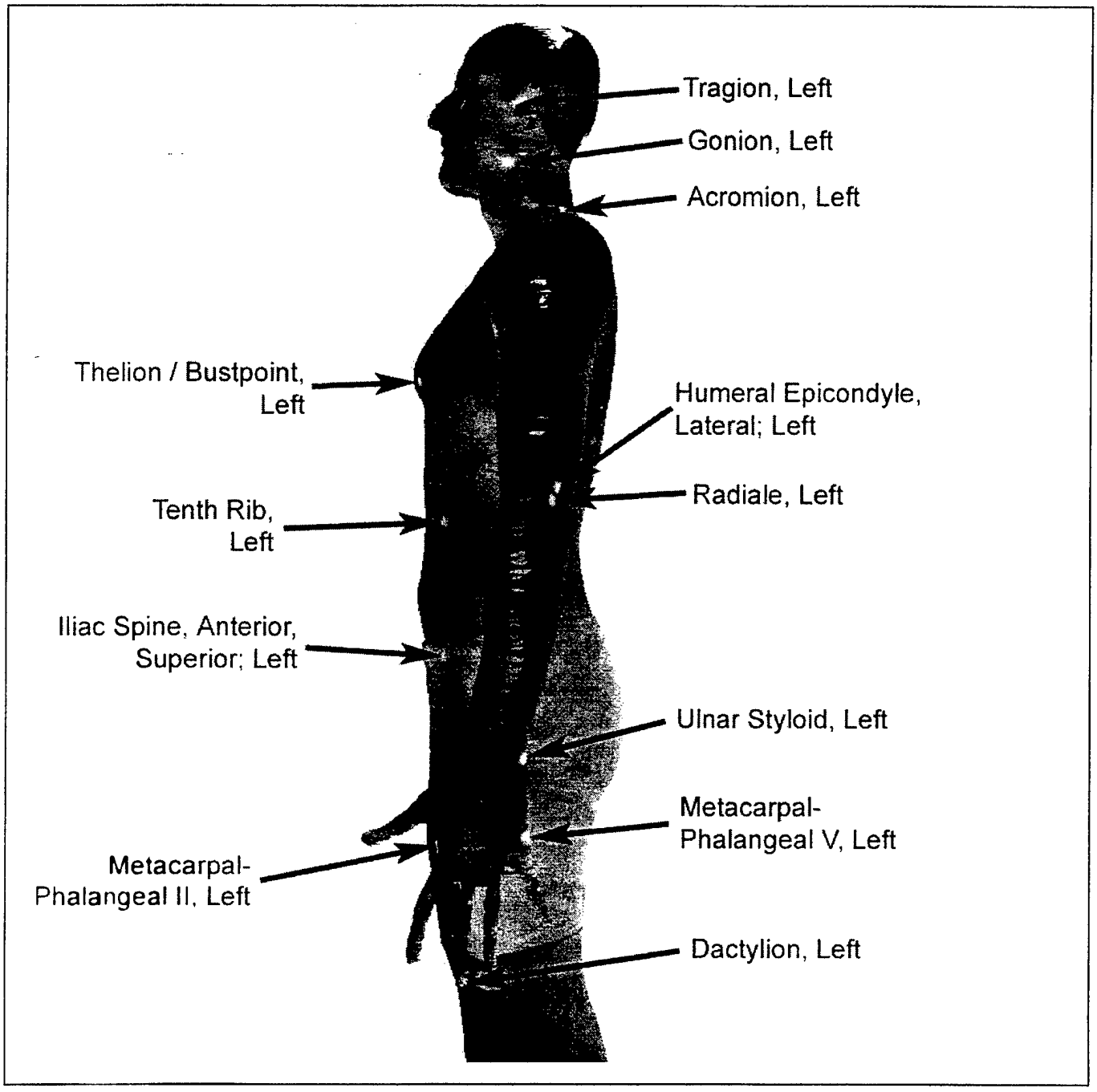


Figure 9. Visual Index of the 3-D Landmarks, Pose A, Upper Body, Left Side View

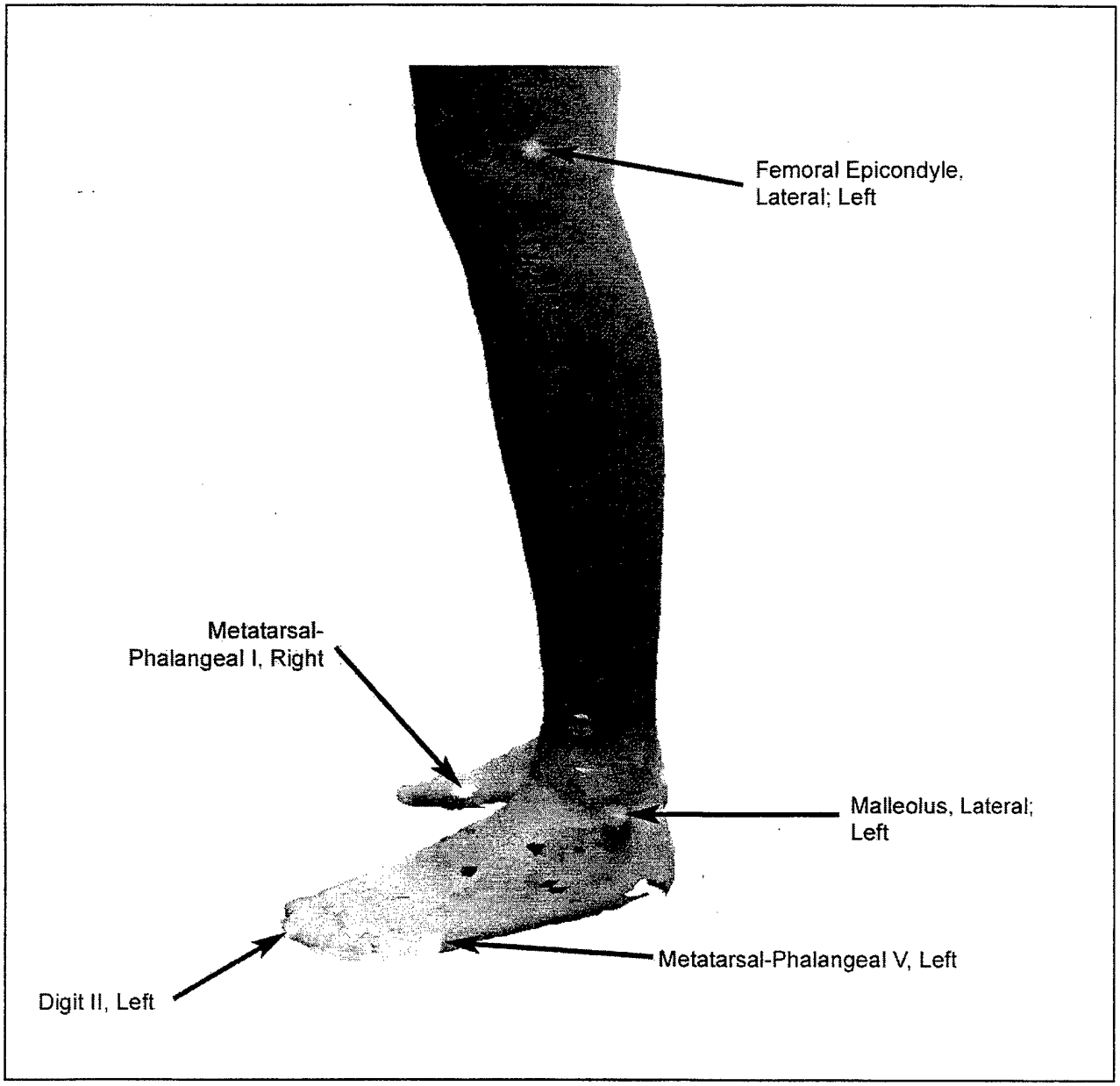


Figure 10. Visual Index of the 3-D Landmarks, Pose A, Lower Body, Left Side View

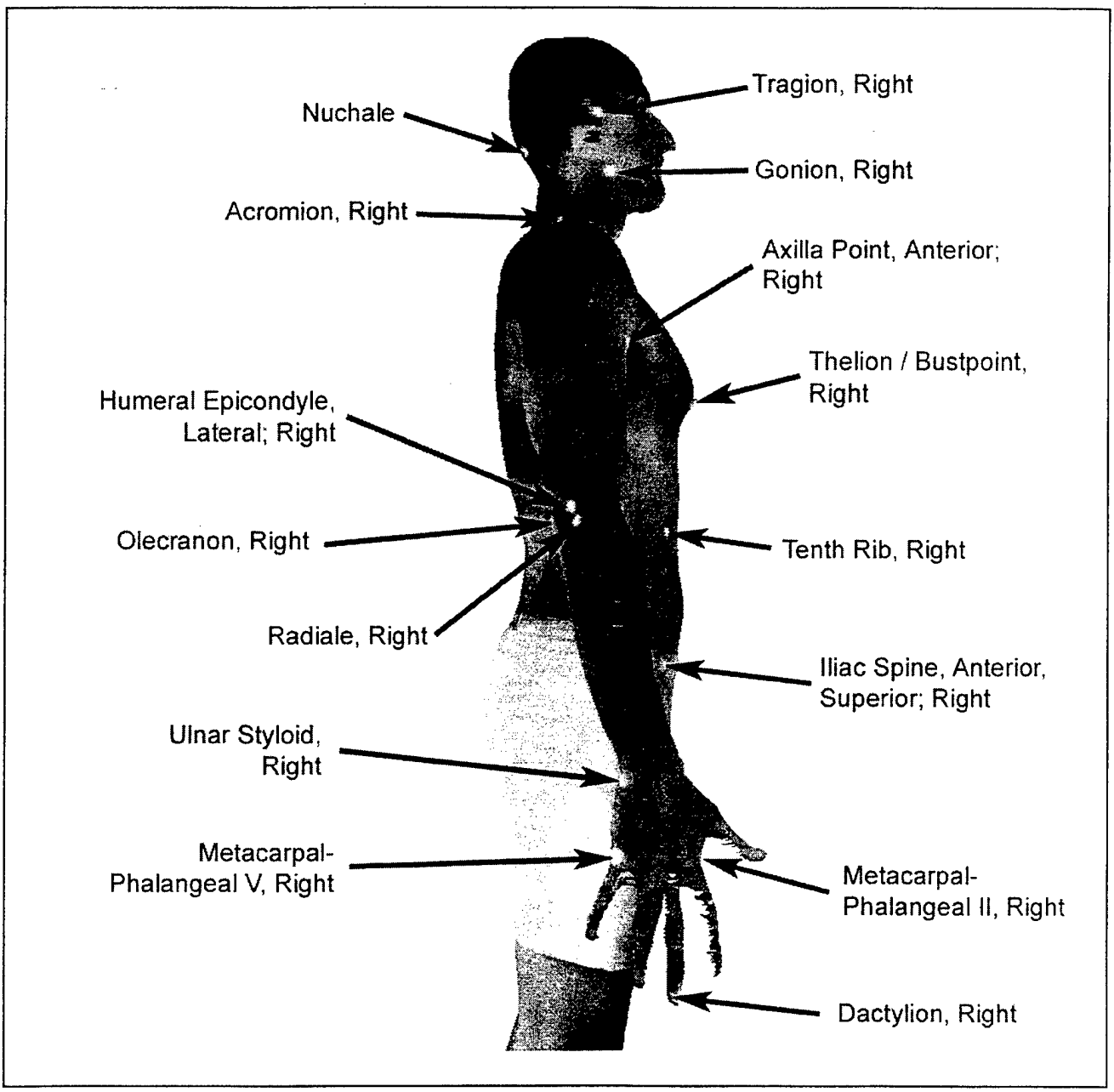


Figure 11. Visual Index of the 3-D Landmarks, Pose A, Upper Body, Right Side View

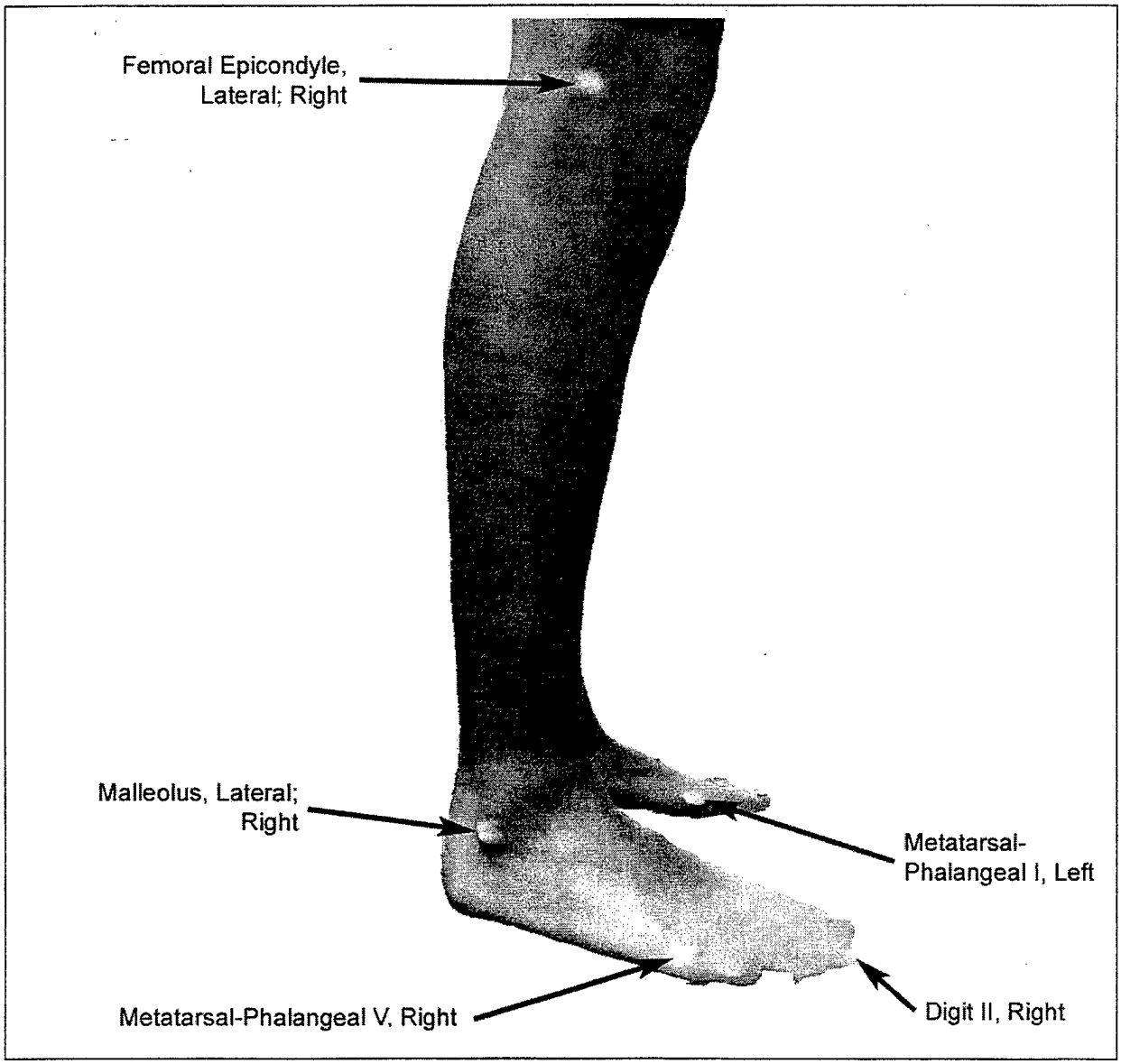


Figure 12. Visual Index of the 3-D Landmarks, Pose A, Lower Body, Right Side View

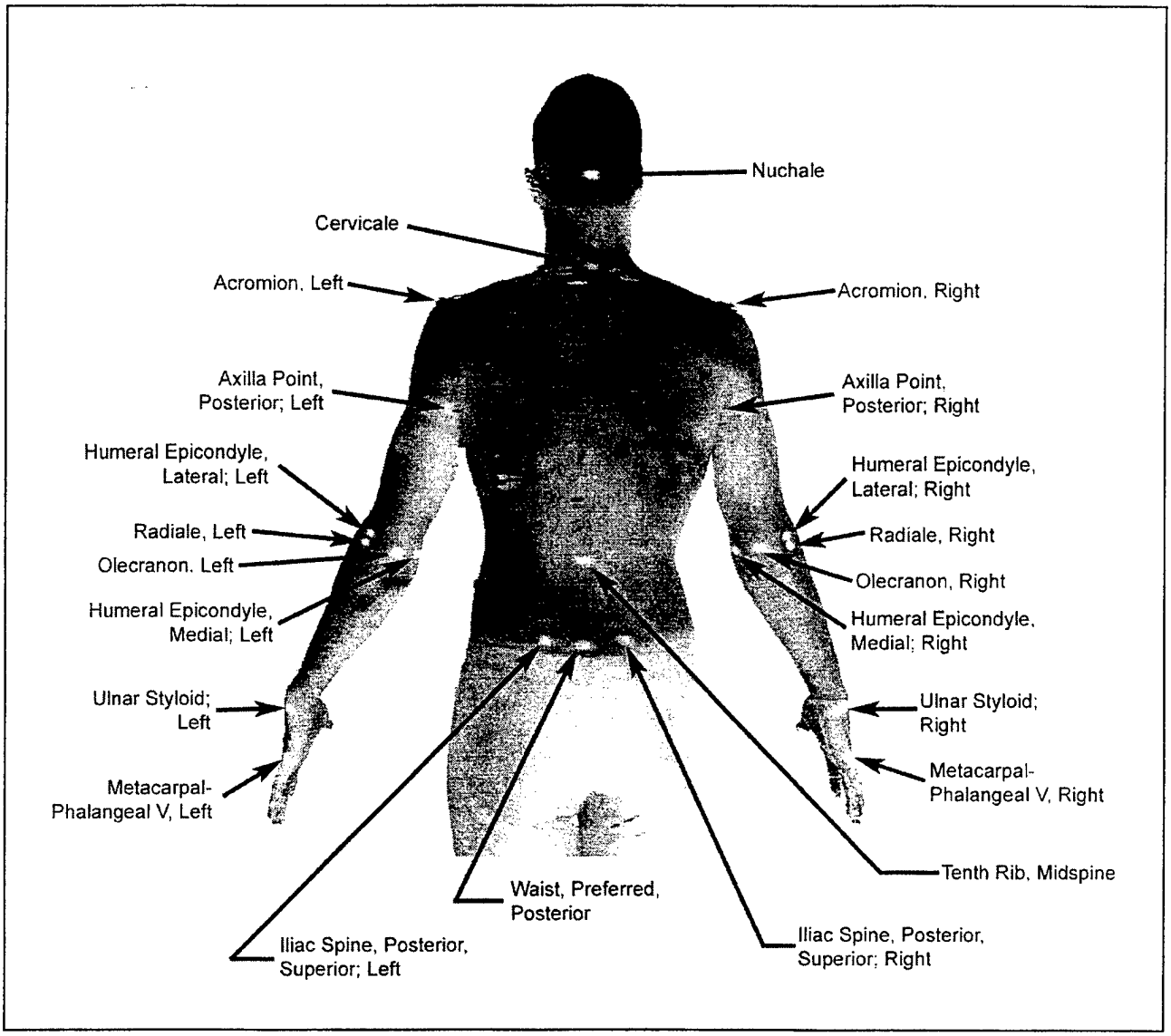


Figure 13. Visual Index of the 3-D Landmarks, Pose A, Upper Body, Back View

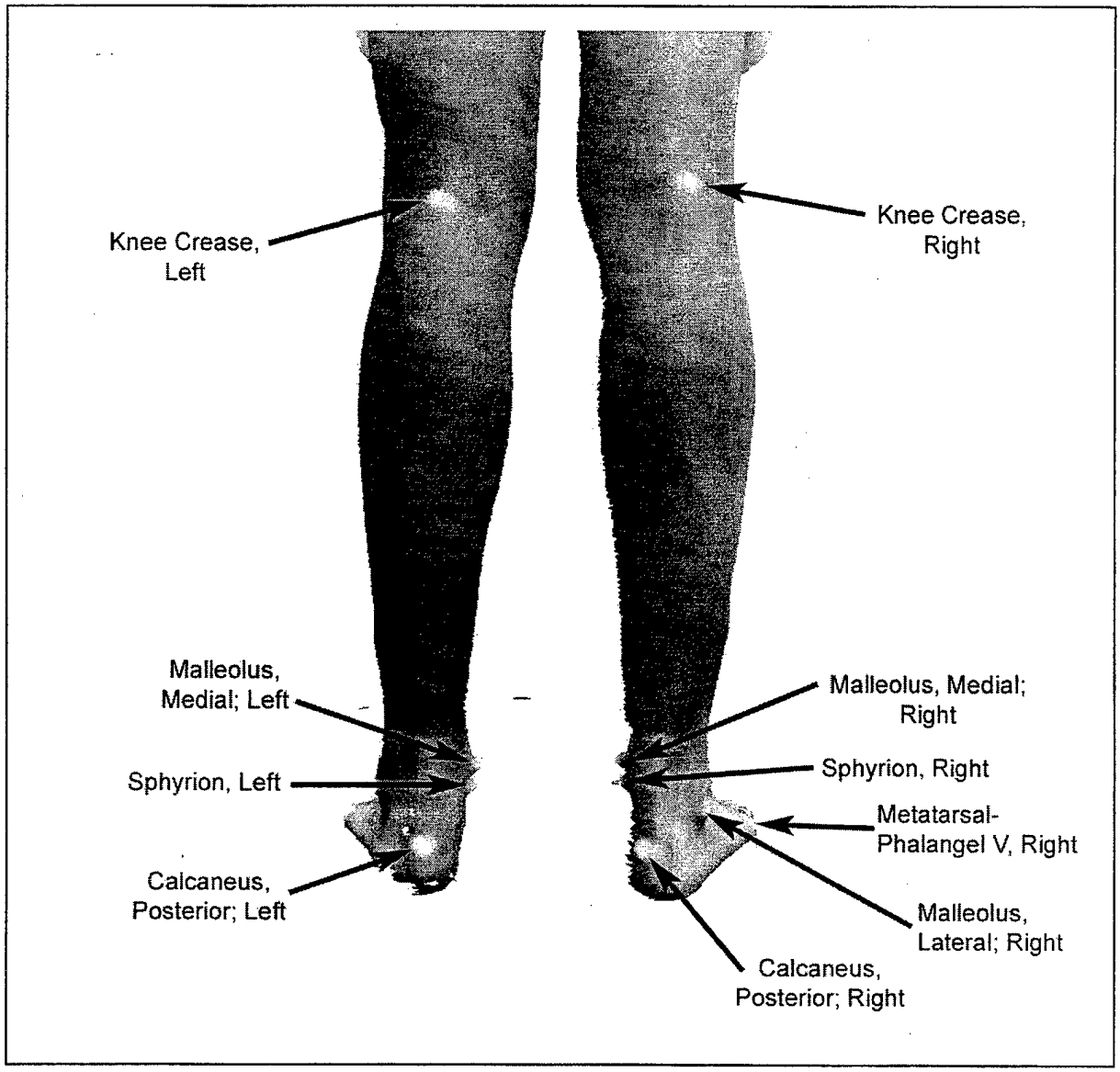


Figure 14. Visual Index of the 3-D Landmarks, Pose A, Lower Body, Back View

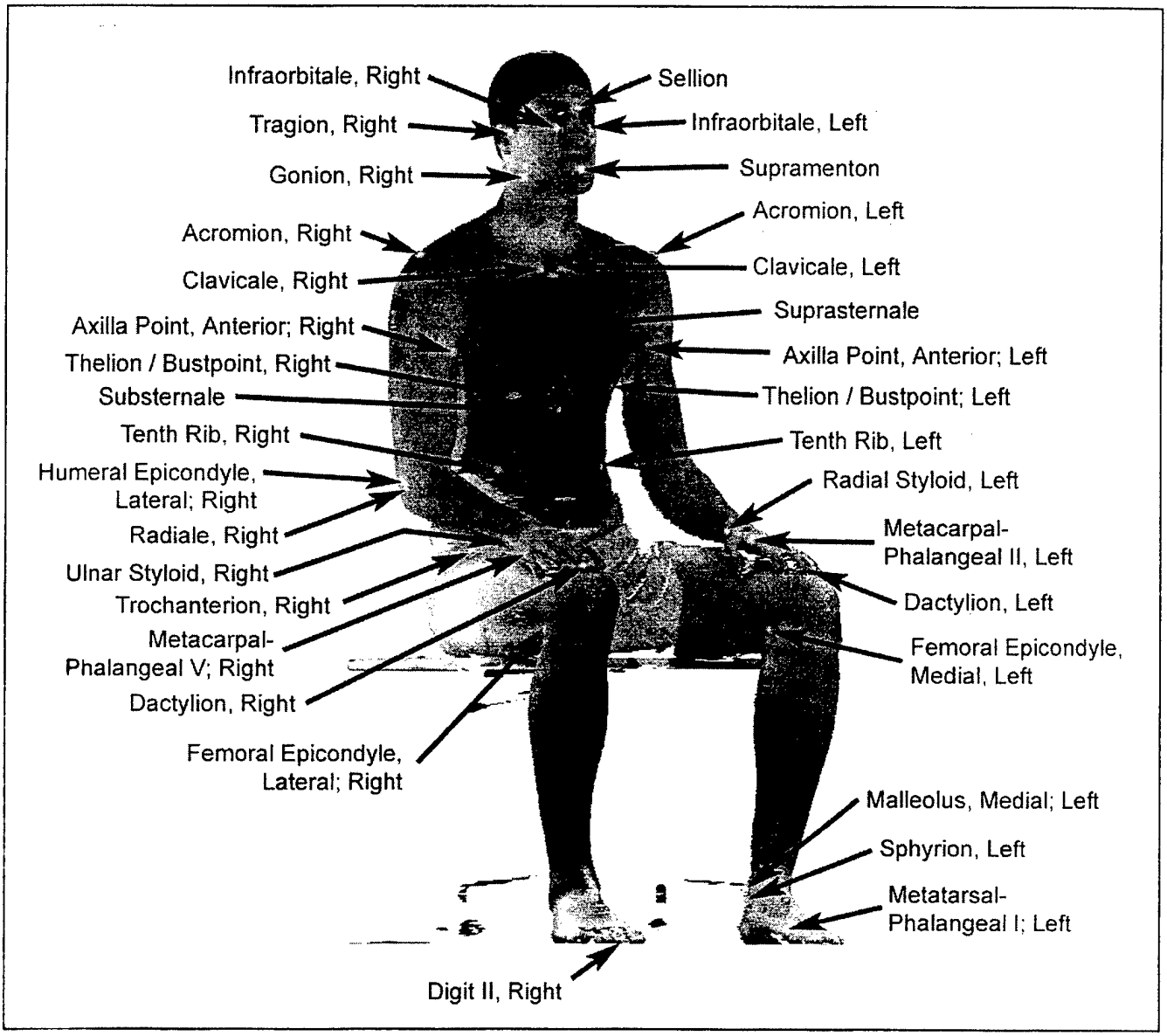


Figure 15. Visual Index of the 3-D Landmarks, Pose B, Upper Body, Right View

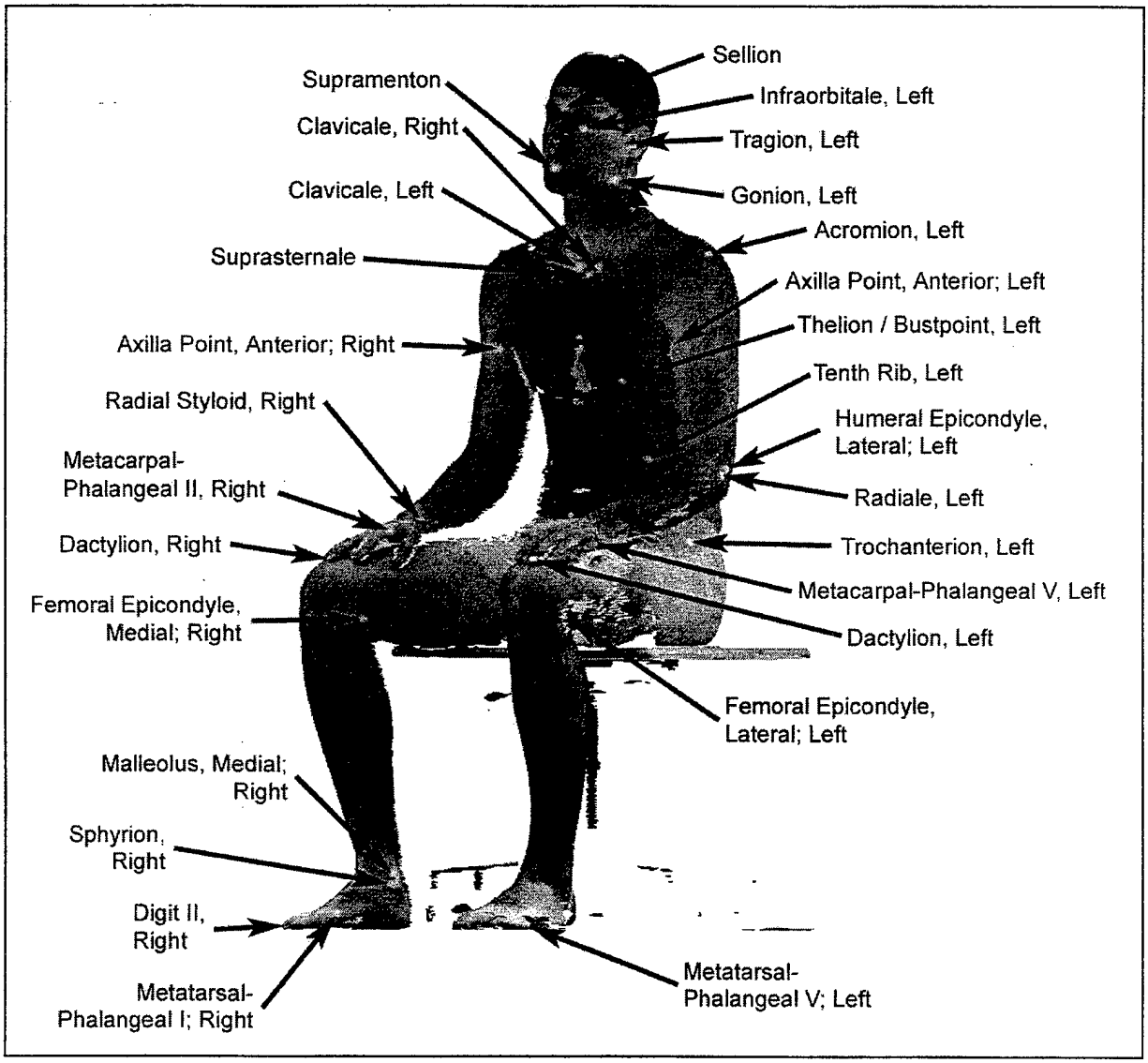


Figure 16. Visual Index of the 3-D Landmarks, Pose B, Left View

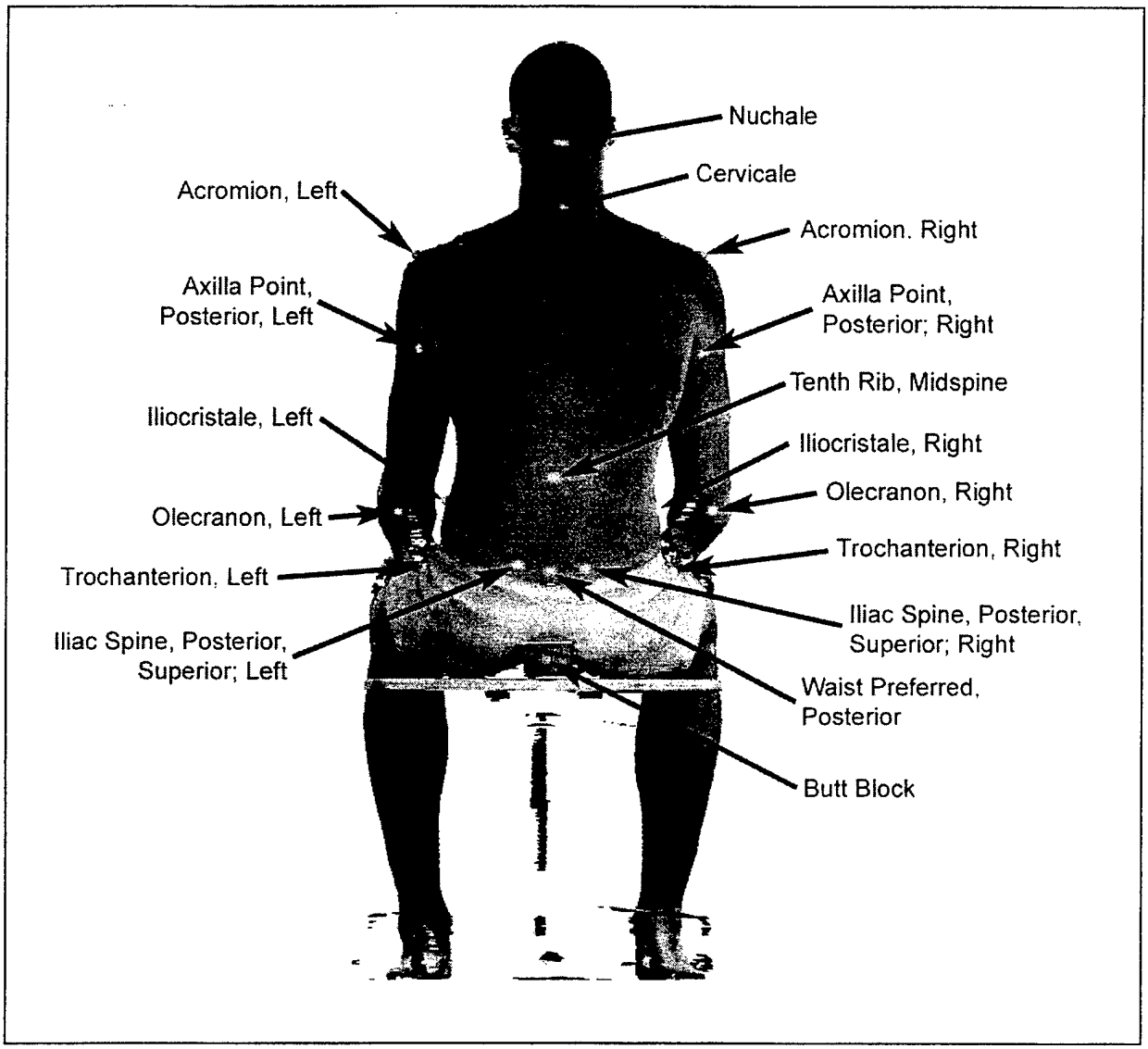


Figure 17. Visual Index of the 3-D Landmarks, Pose B, Back View.

Traditional Style Measurements

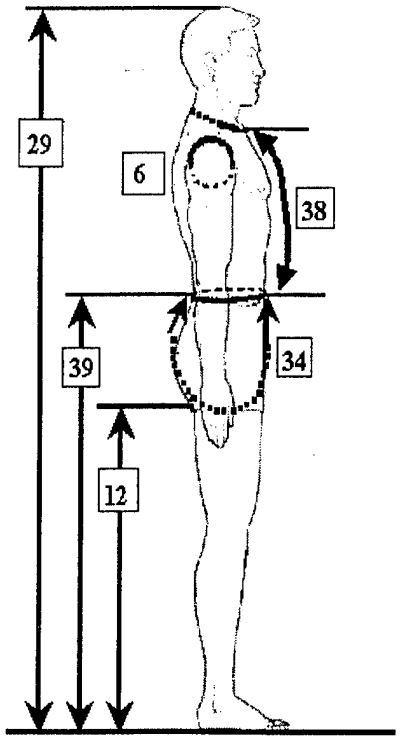
Table 12 lists the traditional style measurements. Those taken with traditional tools are measurement numbers 1-40, those calculated from the 3-D landmarks from the standing pose are those numbered 41-83, and those calculated from the 3-D landmarks from the seated pose are those numberd 84-99. They are in alphabetical order within each section according to the CAESAR name. The CAESAR name uses consistent naming rules. The body part or point is listed first, followed by the type of measurement, followed by the pose if necessary, followed by the side of the body if applicable when both were measured. It was felt that this name was the best suited for alphabetical listing. Also included in the table are the ISO names when appropriate, and the name used in the raw data file provided. The data were provided as both ASCII text and EXCEL® spreadsheet files. The visual index follows this table in figures 18 through 29. The paper data sheet used is provided in Appendix B.

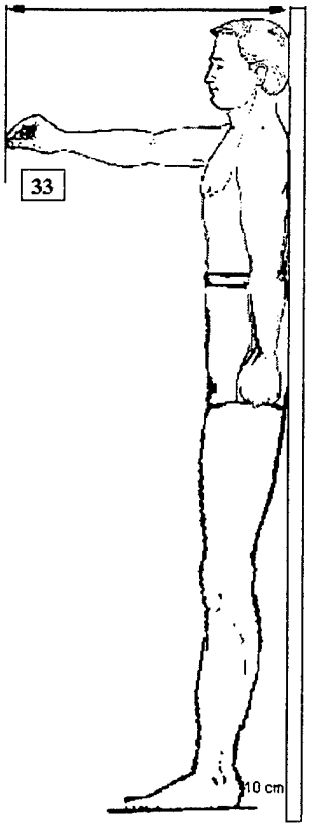
Table 12. Traditional Style Measurements

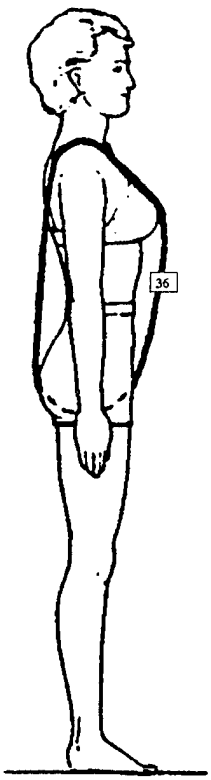
No.	CAESAR Name	ISO Name	Data File Name
1	ACROMIAL HEIGHT, SITTING	Shoulder Height, Sitting	Acromial Height, Sitting
2	ANKLE CIRCUMFERENCE		Ankle Circumference
3	ARM LENGTH (SHOULDER-ELBOW)		Arm Length (Shoulder to Elbow)
4	ARM LENGTH (SHOULDER-WRIST)		Arm Length (Shoulder to Wrist)
5	ARM LENGTH (SPINE-WRIST)		Arm Length (Spine to Wrist)
6	ARMSCYE CIRCUMFERENCE. (SCYE CIRCUMFERENCE OVER ACROMION)		Armscye Circumference (Scye Circ Over Acromion)
7	BIZYGOMATIC BREADTH		Bizygomatic Breadth
8	BUST/CHEST CIRCUMFERENCE	Chest Circumference	Chest Circumference
9	BUST/CHEST CIRCUMFERENCE UNDER BUST		Bust/Chest Circumference Under Bust
10	BUTTOCK-KNEE LENGTH, RIGHT	Buttock-Knee Length	Buttock-Knee Length
11	CHEST GIRTH (CHEST CIRCUMFERENCE AT SCYE)		Chest Girth at Scye (Chest Circumference at Scye)
12	CROTCH HEIGHT		Crotch Height
13	ELBOW HEIGHT, SITTING, RIGHT	Elbow Height, Sitting	Elbow Height, Sitting
14	EYE HEIGHT, SITTING, RIGHT	Eye Height, Sitting	Eye Height, Sitting
15	FACE LENGTH (MENTON-SELLION LENGTH)	Face Length (Nasion-Menton)	Face Length
16	FOOT LENGTH, RIGHT	Foot Length	Foot Length
17	HAND CIRCUMFERENCE, RIGHT		Hand Circumference
18	HAND LENGTH, RIGHT	Hand Length	Hand Length
19	HEAD BREADTH		Head Breadth
20	HEAD CIRCUMFERENCE		Head Circumference
21	HEAD LENGTH		Head Length
22	HIP BREADTH, SITTING		Hip Breadth, Sitting
23	HIP CIRCUMFERENCE, MAXIMUM		Hip Circumference, Maximum
24	HIP CIRCUMFERENCE, MAXIMUM, HEIGHT		Hip Circ Max Height
25	KNEE HEIGHT, SITTING, RIGHT	Knee Height	Knee Height

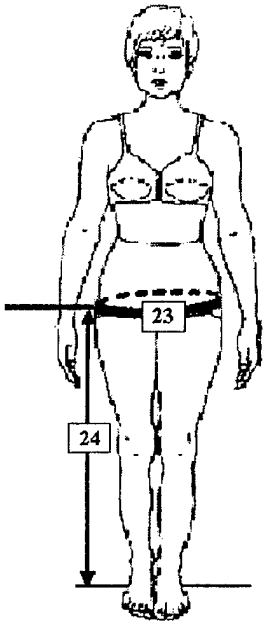
No.	CAESAR Name	ISO Name	Data File Name
26	NECK BASE CIRCUMFERENCE		Neck Base Circumference
27	SHOULDER BREADTH (BIDELTOID)	Shoulder (Bideltoid) Breadth	Shoulder Breadth
28	SITTING HEIGHT	Sitting Height (Erect)	Sitting Height
29	STATURE	Body Height	Stature
30	SUBSCAPULAR SKINFOLD, RIGHT		Subscapular Skinfold
31	THIGH CIRCUMFERENCE, MAXIMUM, RIGHT		Thigh Circumference
32	THIGH CIRCUMFERENCE, MAXIMUM, SITTING, RIGHT		Thigh Circumference Max Sitting
33	THUMB TIP REACH, RIGHT		Thumb Tip Reach
34	TOTAL CROTCH LENGTH		Total Crotch Length (Crotch Length)
35	TRICEPS SKINFOLD		Triceps Skinfold
36	VERTICAL TRUNK CIRCUMFERENCE, RIGHT		Vertical Trunk Circumference
37	WAIST CIRCUMFERENCE, PREFERRED		Waist Circumference, Pref
38	WAIST FRONT LENGTH		Waist Front Length
39	WAIST HEIGHT, PREFERRED		Waist Height, Preferred
40	WEIGHT (MASS)		Weight
41	ACROMIAL HEIGHT, STANDING, LEFT	Shoulder Height	Acromial Ht Stand Lt
42	ACROMIAL HEIGHT, STANDING, RIGHT	Shoulder Height	Acromial Ht Stand Rt
43	ACROMION-RADIALE LENGTH, LEFT	Shoulder-Elbow Length	Acromion-Radiale Len Lt
44	ACROMION-RADIALE LENGTH, RIGHT	Shoulder-Elbow Length	Acromion-Radiale Len Rt
45	ARM INSEAM, LEFT		Arm Inseam Lt
46	ARM INSEAM, RIGHT		Arm Inseam Rt
47	AXILLA HEIGHT, LEFT		Axilla Ht Lt
48	AXILLA HEIGHT, RIGHT		Axilla Ht Rt
49	BIACROMIAL BREADTH	Shoulder (Biacromial) Breadth	Biacromial Brth
50	BI-CRISTALE BREADTH		Bicristale Brth
51	BI-SPINOUS BREADTH		Bispinous Brth
52	BIGONIAL BREADTH		Bigonial Brth
53	BITRAGION BREADTH		Bitragion Brth
54	BI-TROCHANTERIC BREADTH, STANDING		Bitrochanteric Brth Stand
55	BUSTPOINT-BUSTPOINT BREADTH		Bustpoint Brth
56	CERVICALE HEIGHT		Cervicale Ht
57	CHEST HEIGHT		Chest Ht Stand
58	ELBOW HEIGHT, STANDING, LEFT	Elbow Height	Elbow Ht Stand Lt
59	ELBOW HEIGHT, STANDING, RIGHT	Elbow Height	Elbow Ht Stand Rt
60	FOOT BREADTH, LEFT	Foot Breadth	Foot Brth Lt
61	FOOT BREADTH, RIGHT	Foot Breadth	Foot Brth Rt
62	INFRAORBITALE HEIGHT, STANDING, LEFT		Infraorbitale Ht Lt Stand
63	INFRAORBITALE HEIGHT, STANDING, RIGHT		Infraorbitale Ht Rt Stand
64	INTER-PUPILLARY DISTANCE		Inter-pupillary Dst
65	INTERSCYE DISTANCE		Interscye Dst Stand
66	KNEE HEIGHT, STANDING, LEFT		Knee Ht Stand Lt
67	KNEE HEIGHT, STANDING, RIGHT		Knee Ht Stand Rt
68	MALLEOLUS HEIGHT, LATERAL, LEFT		Ankle Ht Lt (Malleolus, Lateral)

No.	CAESAR Name	ISO Name	Data File Name
69	MALLEOLUS HEIGHT, LATERAL, RIGHT		Ankle Ht Rt (Malleolus, Lateral)
70	MALLEOLUS HEIGHT, MEDIAL, LEFT		Malleolus Med Lt
71	MALLEOLUS HEIGHT, MEDIAL, RIGHT		Malleolus Med Rt
72	NECK HEIGHT		Neck Ht
73	RADIALE-STYLION LENGTH, LEFT		Radiale-Stylion Len Lt
74	RADIALE-STYLION LENGTH, RIGHT		Radiale-Stylion Len Rt
75	SELLION-SUPRAMENTON LENGTH		Sellion Supramenton
76	SLEEVE OUTSEAM LENGTH, LEFT		Sleeve Outseam Len Lt
77	SLEEVE OUTSEAM LENGTH, RIGHT		Sleeve Outseam Len Rt
78	SPHYRION HEIGHT, LEFT		Sphyrion Ht Lt
79	SPHYRION HEIGHT, RIGHT		Sphyrion Ht Rt
80	SUPRASTERNALE HEIGHT		Suprasternale Ht
81	TROCHANTER HEIGHT, LEFT		Trochanterion Ht Lt
82	TROCHANTER HEIGHT, RIGHT		Trochanterion Ht Rt
83	WAIST BACK (CERVICALE TO WAIST) LENGTH		Waist Back
84	ACROMIAL HEIGHT, SITTING (COMFORTABLE), LEFT		Acromial Ht Sit Lt
85	ACROMIAL HEIGHT, SITTING (COMFORTABLE), RIGHT		Acromial Ht Sit Rt
86	BI-LATERAL FEMORAL EPICONDYLE BREADTH, SITTING (COMFORTABLE)		Bi-lateral Femoral Epicondyle Brth Sit
87	BI-LATERAL HUMERAL EPICONDYLE BREADTH, SITTING (COMFORTABLE)		Bi-lateral Humeral Epicondyle Brth Sit
88	BI-TROCHANTERIC BREADTH, SITTING (COMFORTABLE)		Bitrochanteric Brth Sit
89	BUTTOCK TO TROCHANTER LENGTH (COMFORTABLE)		Buttock to Trochanter Lth
90	ELBOW HEIGHT, SITTING (COMFORTABLE), LEFT		Elbow Ht Sit Lt
91	ELBOW HEIGHT, SITTING (COMFORTABLE), RIGHT		Elbow Ht Sit Rt
92	FEMORAL EPICONDYLE, LATERAL, LEFT TO MALLEOLUS, LATERAL (COMFORTABLE), LEFT		Femoral Epicondyle Lat to Malleolus Lat Lt
93	FEMORAL EPICONDYLE, LATERAL, RIGHT TO MALLEOLUS, LATERAL (COMFORTABLE), RIGHT		Femoral Epicondyle Lat to Malleolus Lat Rt
94	INFRAORBITALE HEIGHT, SITTING (COMFORTABLE), LEFT		Infraorbitale Ht Sit Lt
95	INFRAORBITALE HEIGHT, SITTING (COMFORTABLE), RIGHT		Infroarbitale Ht Sit Rt
96	TROCHANTER TO FEMORAL EPICONDYLE, LATERAL (COMFORTABLE), LEFT		Trochanter to Femoral Epicondyle Lat Lt
97	TROCHANTER TO FEMORAL EPICONDYLE, LATERAL (COMFORTABLE), RIGHT		Trochanter to Femoral Epicondyle Lat Rt
98	TROCHANTER TO SEATED SURFACE (COMFORTABLE), LEFT		Trochanter to Seated Surface Lt
99	TROCHANTER TO SEATED SURFACE (COMFORTABLE), RIGHT		Trochanter to Seated Surface Rt



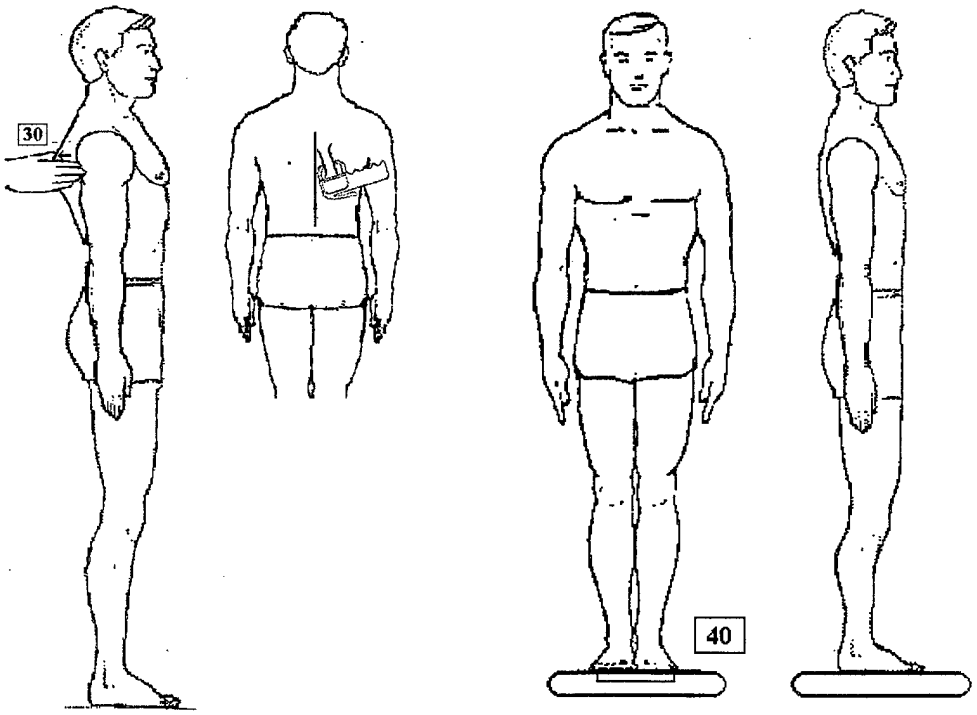


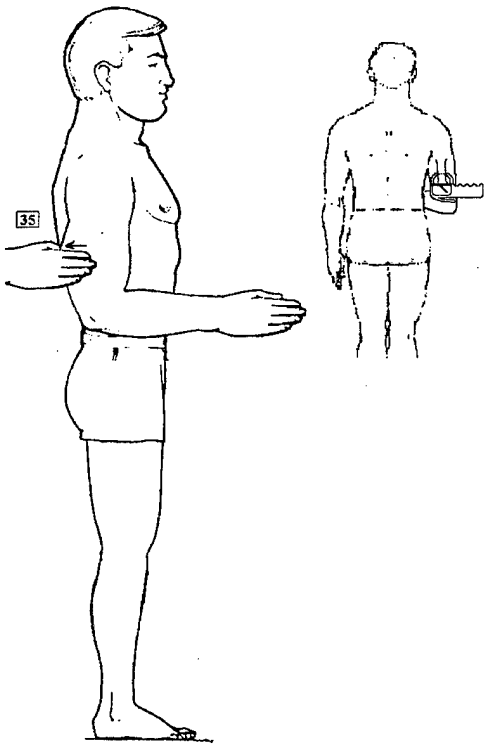




6. Armscye Circumference (Scye Circumference over Acromion)
12. Crotch Height
23. Hip Circumference, Maximum
24. Hip Circumference, Maximum, Height
29. Stature (Body Height)
33. Thumb Tip Reach, Right
34. Total Crotch Length
36. Vertical Truck Circumference, Right
38. Waist Front Length
39. Waist Height, Preferred

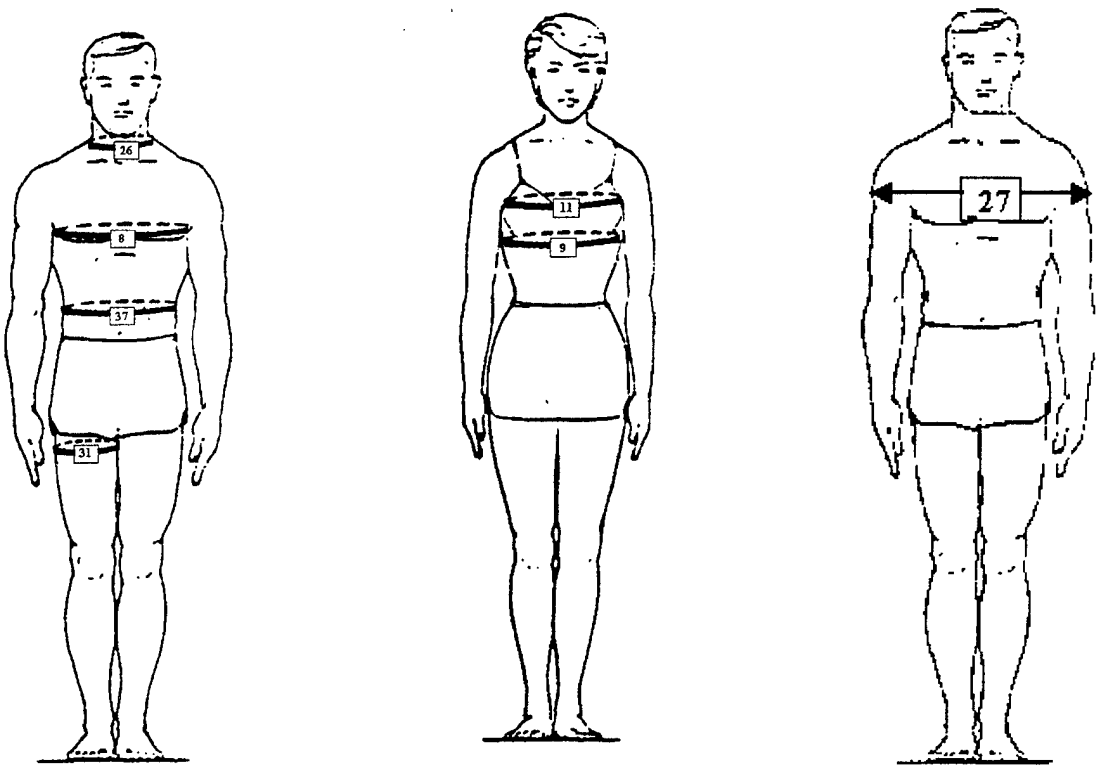
Figure 18. Visual Index of Traditional Style Measurements, Part 1.

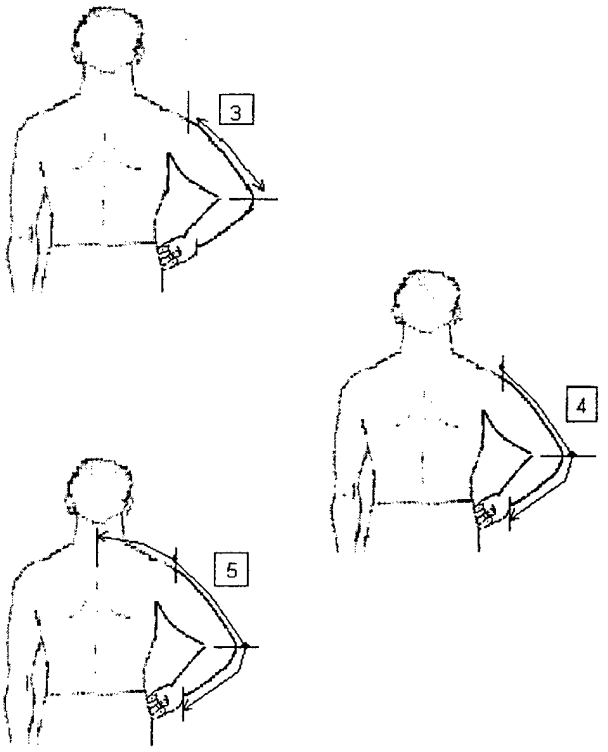




30. Subscapular Skinfold, Right
35. Triceps Skinfold
40. Weight (Mass)

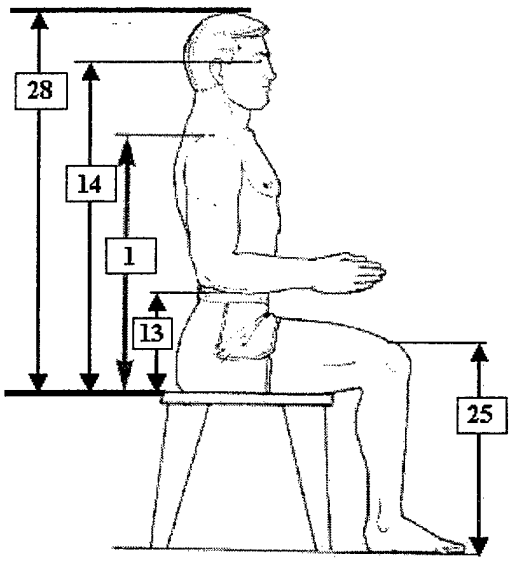
Figure 19. Visual Index of Traditional Style Measurements, Part 2.

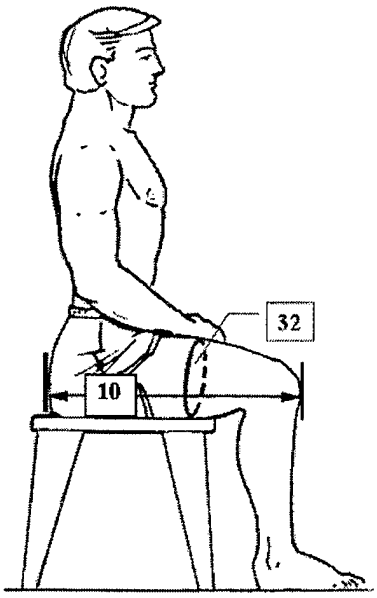


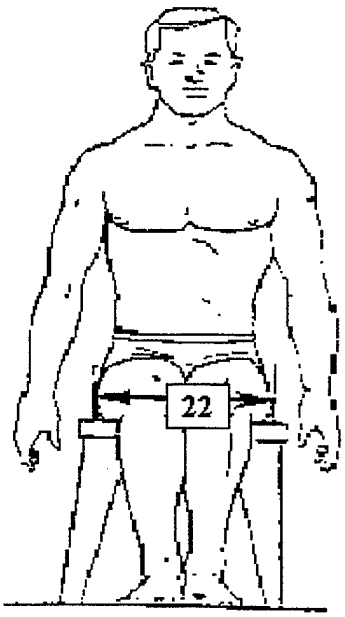


3. Arm Length (Shoulder-Elbow)
4. Arm Length (Shoulder-Wrist)
5. Arm Length (Spine-Wrist)
8. Bust/Chest Circumference
9. Bust/Chest Circumference Under Bust
11. Chest Girth (Chest Circumference at Scye)
26. Neck Base Circumference
27. Shoulder Breadth (Bideltoid)
31. Thigh Circumference, Maximum, Right
37. Waist Circumference, Preferred

Figure 20. Visual Index of Traditional Style Measurements, Part 3.

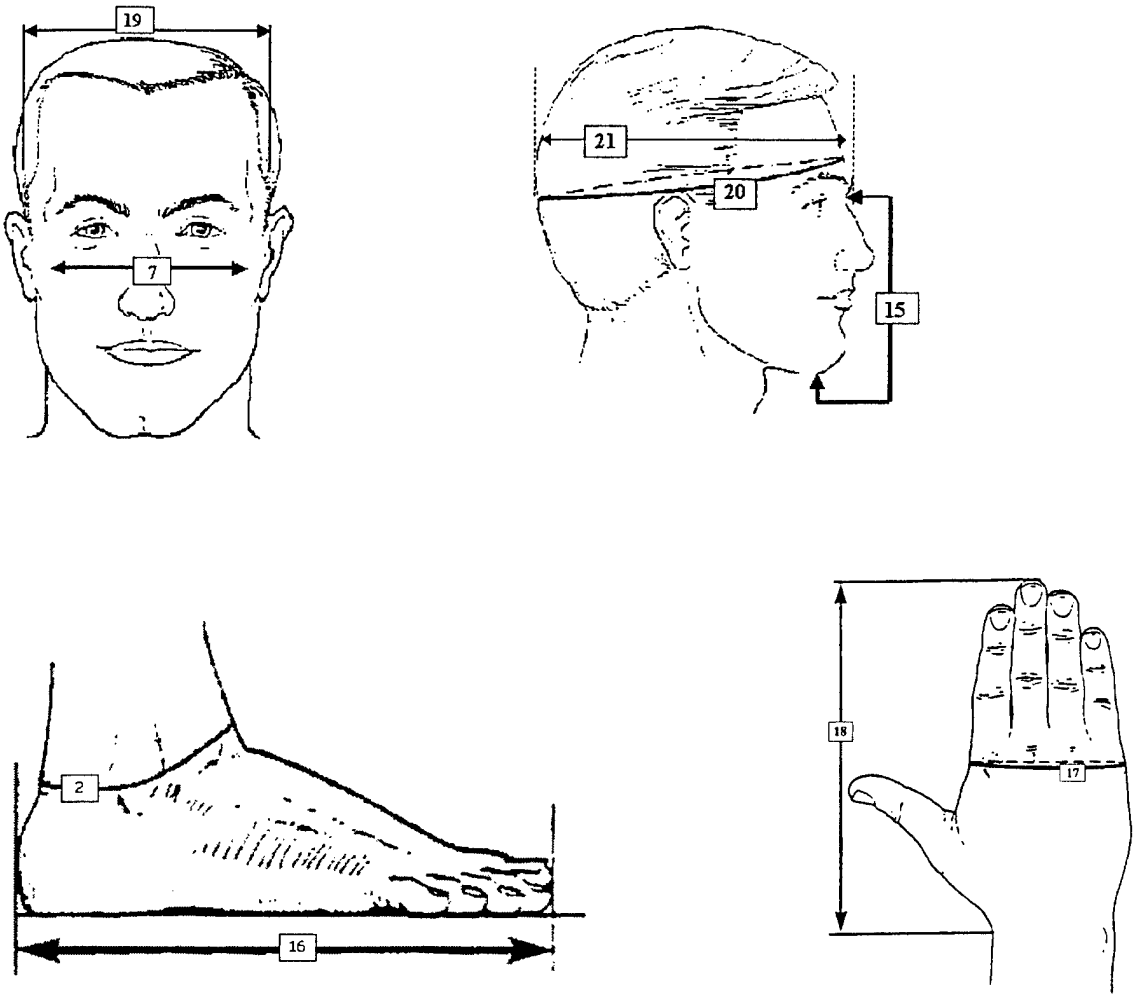






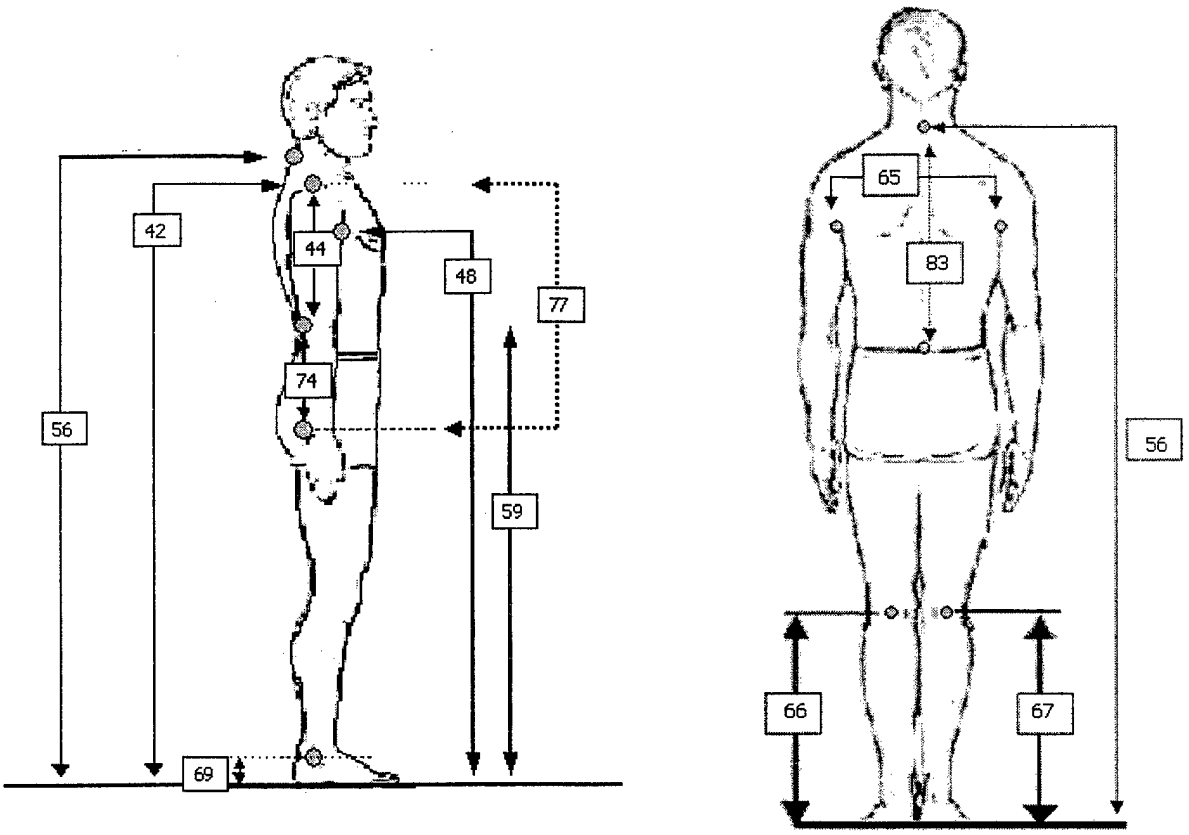
1. Acromial Height, Sitting
10. Buttock-Knee Length, Right
13. Elbow Height, Sitting, Right
14. Eye Height, Sitting, Right
22. Hip Breadth, Sitting
25. Knee Height, Sitting, Right
28. Sitting Height
32. Thigh Circumference, Maximum, Sitting, Right

Figure 21. Visual Index of Traditional Style Measurements, Part 4.



2. Ankle Circumference
7. Bizygomatic Breadth
15. Face Length (Menton-Sellion Length)
16. Foot Length, Right
17. Hand Circumference, Right
18. Hand Length, Right
19. Head Breadth
20. Head Circumference
21. Head Length

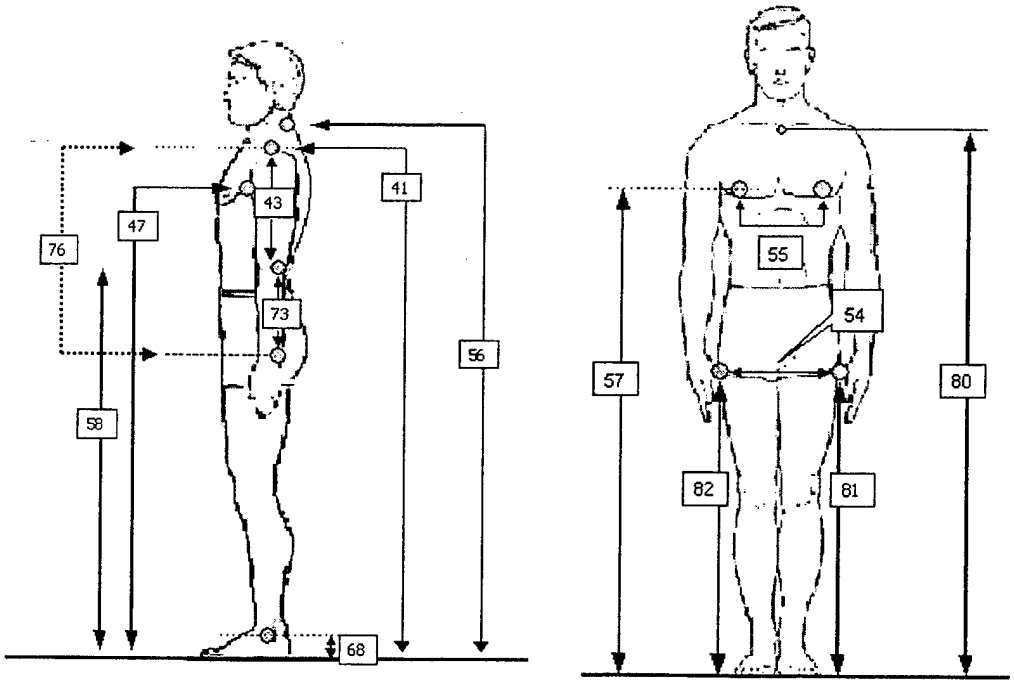
Figure 22. Visual Index of Traditional Style Measurements, Part 5.



42. Acromial Height, Standing, Right
44. Acromion-Radiale Length, Right
48. Axilla Height, Right
56. Cervicale Height
59. Elbow Height, Standing, Right
69. Malleolus Height, Lateral, Right
74. Radiale-Stylion Length, Right
77. Sleeve Outseam Length, Right

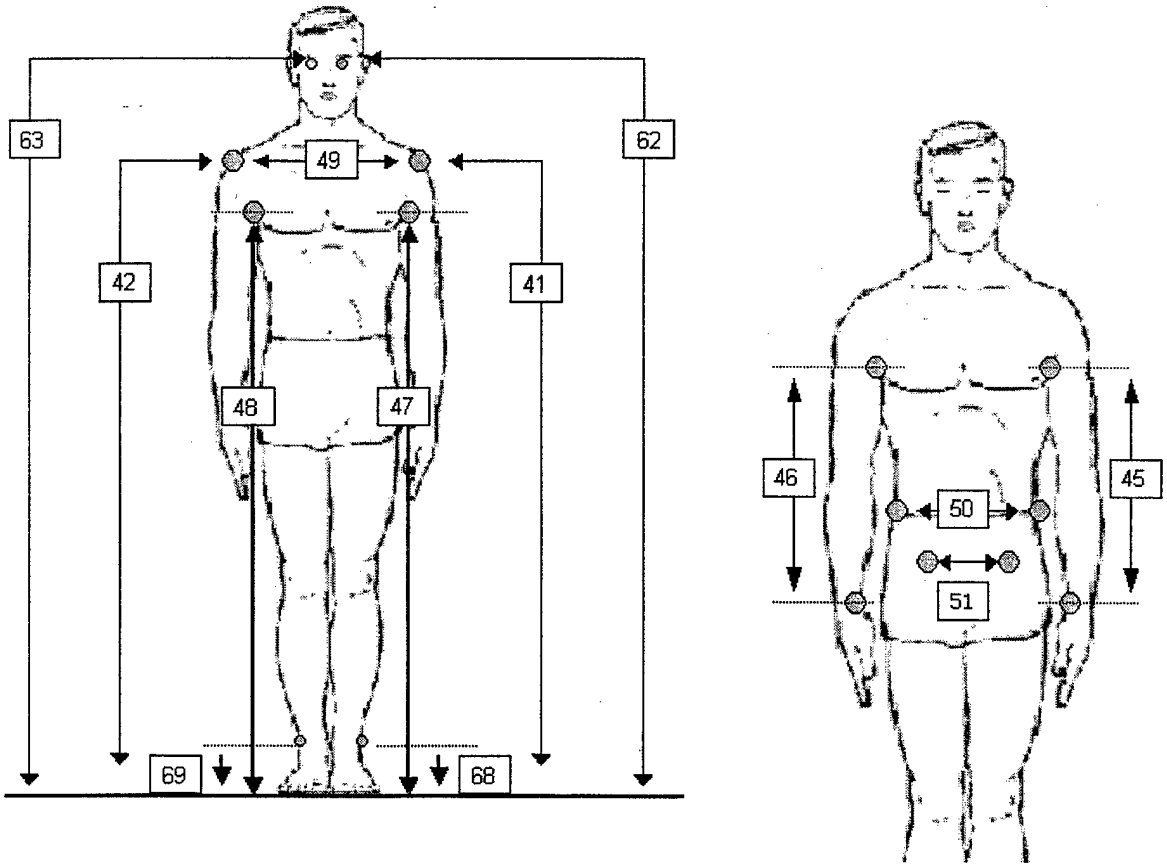
56. Cervicale Height
65. Interscye Distance
66. Knee Height, Standing, Left
67. Knee Height, Standing, Right
83. Waist Back (Cervicale to Waist) Length

Figure 23. Visual Index of Traditional Style Measurements, Part 6.



41. Acromial Height, Standing, Left
43. Acromion-Radiale Length, Left
47. Axilla Height, Left
56. Cervicale Height
58. Elbow Height, Standing, Left
68. Malleolus Height, Lateral, Left
73. Radiale-Stylion Length, Left
76. Sleeve Outseam Length, Left
54. Bi-Trochanteric Breadth, Standing
55. Bustpoint-Bustpoint Breadth
57. Chest Height
80. Suprasternale Height
81. Trochanter Height, Left
82. Trochanter Height, Right

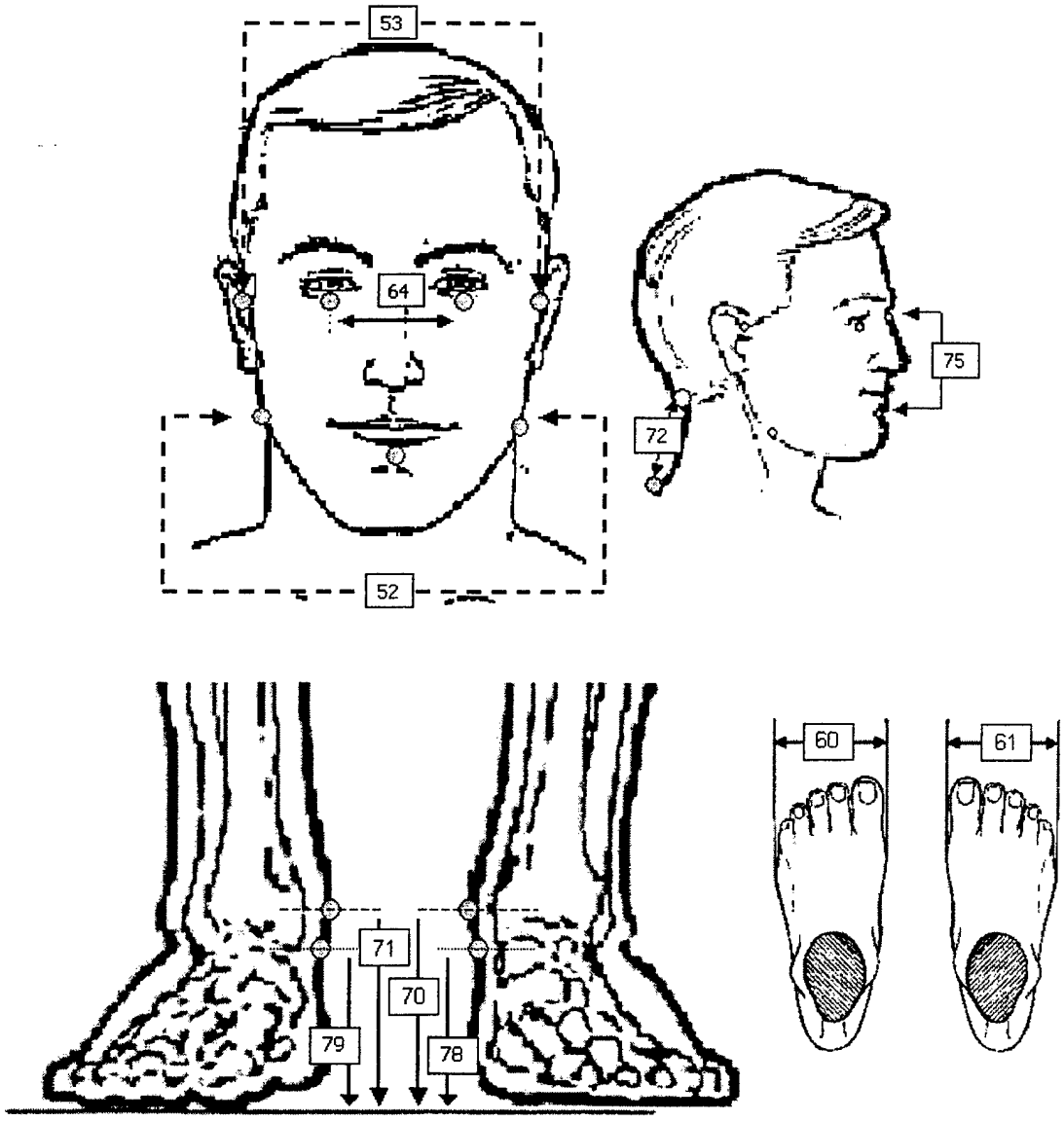
Figure 24. Visual Index of Traditional Style Measurements, Part 7.



41. Acromial Height, Standing, Left
42. Acromial Height, Standing, Right
47. Axilla Height, Left
48. Axilla Height, Right
49. Biacromial Breadth
62. Infraorbitale Height, Standing, Left
63. Infraorbitale Height, Standing, Right
68. Malleolus Height, Lateral, Left
69. Malleolus Height, Lateral, Right

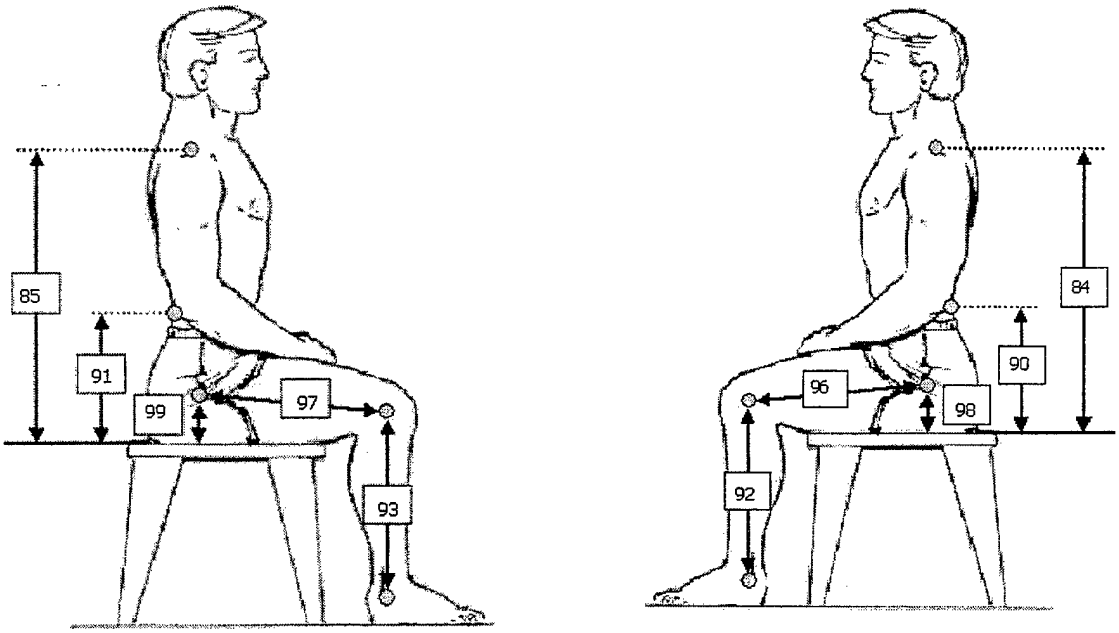
45. Arm Inseam, Left
46. Arm Inseam, Right
50. Bi-Cristale Breadth
51. Bi-Spinous Breadth

Figure 25. Visual Index of Traditional Style Measurements, Part 8.



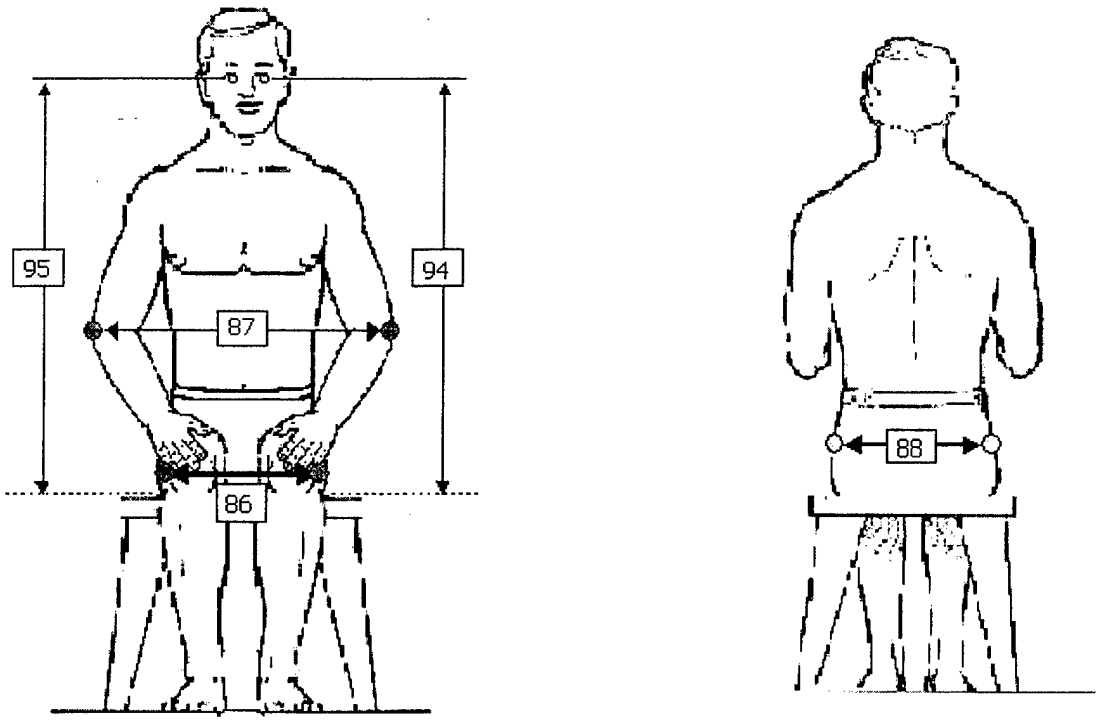
52. Bigonial Breadth
53. Bitragion Breadth
60. Foot Breadth, Left
61. Foot Breadth, Right
64. Inter-pupillary Distance
70. Malleolus Height, Medial, Left
71. Malleolus Height, Medial, Right
72. Neck Height
75. Sellion-Supramention Length
78. Sphyrion Height, Left
79. Sphyrion Height, Right

Figure 26. Visual Index of Traditional Style Measurements, Part 9.



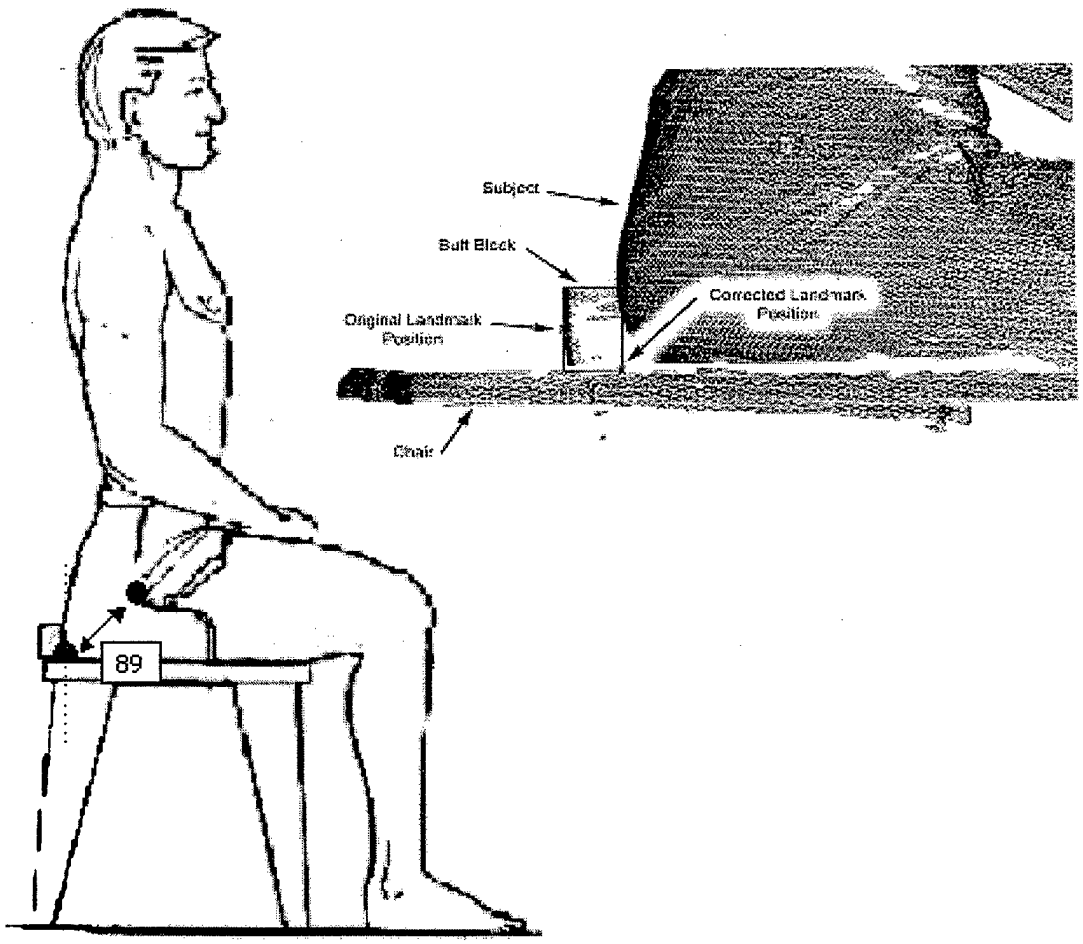
84. Acromial Height, Sitting (Comfortable), Left
85. Acromial Height, Sitting (Comfortable), Right
90. Elbow Height, Sitting (Comfortable), Left
91. Elbow Height, Sitting (Comfortable), Right
92. Femoral Epicondyle, Lateral, Left to Malleolus, Lateral (Comfortable), Left
93. Femoral Epicondyle, Lateral, Right to Malleolus, Lateral (Comfortable), Right
96. Trochanter to Femoral Epicondyle, Lateral (Comfortable), Left
97. Trochanter to Femoral Epicondyle, Lateral (Comfortable), Right
98. Trochanter to Seated Surface (Comfortable), Left
99. Trochanter to Seated Surface (Comfortable), Right

Figure 27. Visual Index of Traditional Style Measurements, Part 10.



86. Bi-lateral Femoral Epicondyle Breadth, Sitting (Comfortable)
87. Bi-lateral Humeral Epicondyle Breadth, Sitting (Comfortable)
88. Bi-Trochanteric Breadth, Sitting (Comfortable)
94. Infraorbitale Height, Sitting (Comfortable), Left
95. Infraorbitale Height, Sitting (Comfortable), Right

Figure 28. Visual Index of Traditional Style Measurements, Part 11.



89. Buttock to Trochanter Length (Comfortable)

Figure 29. Visual Index of Traditional Style Measurements, Part 12.

Miscellaneous Other Deliverables

During the course of data collection and analysis several logs were kept, including:
1) Demographics Notes: a log of anything unusual in a subject's demographic data file including missing data;
2) Measurements Notes: a log of anything unusual in a subject's traditional measurement data;
3) Scan Evaluations: a log documenting information about scans and subjects such as subject hair color, unusual skin marks like tattoos, unusual subject conditions that created unusual postures, unusual missing sections of a scan etc.;
4) Verification: a log documenting any subject anomalies noted and changes made after the manual paper versus electronic check; and
5) Regressions: a log documenting any subject anomalies, notes, and changes made after the linear regression quality control check.

There was also a text file that described the information about the landmark files format, the scan files format, and the codes for the variables, such as family income. All of this was provided in text and spreadsheet files (ASCII text and EXCEL® spreadsheets).

Finally there were four reports describing the survey and results; 1) Final Report Volume I: Summary (this document), 2) Final Report Volume II: Descriptions (Blackwell et. al 2002), 3) CAESAR: Summary Statistics for the Adult Population (Ages 18-65) of the United States of America (Harrison and Robinette 2002), and 4) CAESAR: The Dutch data set, (Daanen and Robinette 2001). These were (or are in progress of being) published as paper documents.

Summary of Deliverables

There were three types of deliverables; 1) published reports, 2) flat data files, and 3) 3D scan files. The published reports are listed in the paragraph above. Reports 1, 2, and 3 in that paragraph were published by the Air Force Research Laboratory (AFRL) and the Society of Automotive Engineers jointly. Report number 4 was published by The Netherlands Organization for Applied Scientific Research (TNO).

The flat data files consisted of: 1) demographic data, 2) traditional and scan extracted measurements, 3) 3-D landmark files, and 4) the notes and log files. The 3-D landmark files were provided as a single ASCII file with the ending ".lnd" for each subject. The other flat data files were provided in two forms; 1) ASCII text (with the ending .txt) and 2) as an EXCEL® spreadsheet file (with the ending .xls). For these files the information from all subjects for each country was provided in a single file.

The 3-D scan files were provided in the polygonal mesh format called PLY (.ply ending). One 3-D scan file for each pose for each subject was provided. The only editing done to these files was the merging of the scan views to make one file for each scan.

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HERTZBERG, H.T. E., CHURCHILL, E., DUPERTIUS, C. W., WHITE, R. M., AND DAMON, A., *Anthropometric Survey of Turkey, Greece, and Italy.* AGARDograph 73. Pergamon Press, Oxford. 1963.

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Technical Committee ISO/TC 159, Ergonomics, Subcommittee SC3, Anthropometry and biomechanics prepared the International Standardization ISO/DIS 15535. *General requirements for establishing an anthropometric database*, International Standard, ISO/DIS 15535.

APPENDIX A: DEMOGRAPHIC QUESTIONNAIRE

DEMOGRAPHIC INPUT QUESTIONS
(North American)

SITE INFORMATION

What is the data collection site (circle answer):
U.S.A. Netherlands Italy

Please circle the U.S. data collection site:

Los Angeles, CA	Detroit, MI	Dayton, OH	Ames, IA	Greensboro, NC
Marlton, NJ	Ottawa, Ontario	Minneapolis, MN	Houston, TX	Portland, OR
San Francisco, CA	Atlanta, GA			

SAMPLING CRITERIA

What is your gender (circle one):
Male Female

What is your height without shoes?
_____ in.

What is your weight without clothes on?
_____ lbs.

MONITORED SAMPLING

What is your date of birth (MM/DD/YR):
_____/_____/_____

What is your race?

Black or African American *Caucasian or White* *Native American or Native Alaskan*

Spanish/Hispanic
Cuban Mexican American Puerto Rican
Other

Asian/Pacific Islander

Asian Indian	Chinese	Filipino	Guamian or Chamorro
Japanese	Korean	Native Hawaiian	Samoan
Vietnamese	Other		

Other
Mixed Race Not Listed Above

No Response

PERSONAL INFORMATION

Are you an active member of the Armed Forces?
No Yes

PERSONAL INFORMATION (Continued)

What is your current occupation?

Administrative Support	Health Diagnosing Occupation	Sales/Marketing
Administrator	Health Non-Diagnosing Occupation	Scientist
Armed Services	Homemaker	Service Occupation
Attorney or Judge	Machine Operator	Student
Classroom Teacher	Management	Supervisor
Computer Programmer/Software Engineer	Material Handler	Technician
Construction	Mechanic	Training/Continuing Education
Degreed Engineer	Other Legal/Judicial Occupation	Transportation Occupation
Farm Occupation	Other Specialty Occupation	Unemployed
Forestry or Fishing Occupation	Retired	No Response

What is your marital status (circle one)?

Single Married Divorced Widowed No Response

How many hours per week do you engage in some form of structured exercise?

0-1 2-3 4-6 6-10 More than 10 No Response

What is the highest level of education you have completed?

High School	Some College	Technical Training	Associates
Bachelor	Masters	Doctorate/PhD	Post-Doctoral Studies
None of the above	No Response		

Where were you born?
If in the United States:

Alabama	Alaska	Arizona	Arkansas	California
Colorado	Connecticut	Delaware	Florida	Georgia
Hawaii	Idaho	Illinois	Indiana	Iowa
Kansas	Kentucky	Louisiana	Maine	Maryland
Massachusetts	Michigan	Minnesota	Mississippi	Missouri
Montana	Nebraska	Nevada	New Hampshire	New Jersey
New Mexico	New York	North Carolina	North Dakota	Ohio
Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina
South Dakota	Tennessee	Texas	Utah	Vermont
Virginia	Washington	Washington DC	West Virginia	Wisconsin
Wyoming	U.S. Territory	Not born in the U.S.	Do not know	No Response

PERSONAL INFORMATION (Continued)

If Netherlands, what area of the country => North South

If Italy, what area of the country => North South

What is your net family income?

Less than 10,000	10,000-14,999	15,000-19,999	20,000-29,999	30,000-44,999
45,000-59,999	60,000-79,999	80,000-100,000	Over 100,000	Do Not Know
No Response				

How many children do you have?

0 1 2 3 4 5 6 7 or more No Response

CAR INFORMATION

What is the model year of the car you drive most?
19___

What is the make of your car (circle one)?

Acura	Audi	BMW	Buick	Cadillac	Chevrolet
Chrysler	Dodge	Eagle	Ford	GMC	Honda
Hyundai	Infiniti	Isuzu	Jeep	Lexus	Lincoln
Mazda	Mercedes-Benz	Mercury	Mitsubishi	Nissan	Oldsmobile
Plymouth	Pontiac	Porsche	Saab	Saturn	Subaru
Suzuki	Toyota	Volkswagen	Volvo	Other	Do Not Know
No Response					

What is your car's model type (circle one)?

Economy	Compact	Intermediate	Full size 2-Dr	Full size 4-Dr	Luxury	Minivan
Van	Sports Car	Station Wagon	SUV	Truck	Other	Do Not Know
No Response						

SIZING INFORMATION

What is your most common shoe size?

5 or Smaller	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5
11	11.5	12	12.5	13	13.5	14 or Larger	Do Not Know		No Response		

SIZING INFORMATION (Continued)

What is your most common waist size of your pants (in inches)? ***(MALES ONLY)***

28 or Smaller 29 30 31 32 33 34 36 38 40 42 44
46 or Larger Do Not Know No Response

What is your most common inseam of your pants (in inches)? ***(MALES ONLY)***

28 or Smaller 29 30 31 32 33 34 36 38 40 or Larger
Do Not Know No Response

What is your most common jacket size? ***(MALES ONLY)***

30 or Smaller 32 34 36 38 40 42 44 46 48 or Larger
Do Not Know No Response

What is your most common blouse size? ***(FEMALES ONLY)***

4 or Smaller 6 7 8 9 10 11 12 13 14 15 16
18 20 22 or Larger Do Not Know No Response

What is your most common bra size? ***(FEMALES ONLY)***

30 or Smaller 32 a b c d 34 a b c d 36 a b c d dd 38 a b c d dd 40 a b c d dd
42 a b c d dd 44 a b c d dd 46 a b c d dd 48 or Larger Do Not Know No Response

What is your most common pants size? ***(FEMALES ONLY)***

2 or Smaller 4 5 6 7 8 9 10 11 12 13 14
15 16 18 20 or Larger Do Not Know No Response

Questionnaire – answer options
(Dutch)

State or Birth Province (see map)

GR – Groningen
FR – Friesland
DR – Drente
OV – Overijssel
GL – Gelderland
UT – Utrecht
NH – Noord Holland
ZH – Zuid Holland
ZE – Zeeland
NB – Noord Brabant
LI – Limburg
FL – Flevoland
Other codes are ISO country codes

Sex

M - Male
V – Femaile

Education (highest achieved)

Geen	– None
BO	– only primary school
MO	– only high school
LBO	– lower school for profession (e.g. carpenter)
MBO	– intermediate school for profession (e.g. administration)
HBO	– higher school for profession (e.g. physiotherapist)
UNIV	– university

Father born/Mother born

ISO country code for country where father/mother is born (see Volume II, Appendix E)

Sector (in which the subject is working)

landbouw/visserij	- agriculture and fishery
defensie	- defense
industrie	- industry
vervoer - opslag en communicatie	- transport, storage and communcation
onderwijs	- education
bouwnijverheid	- construction
horeca	- hotels and restaurants
financiele instellingen	- financial institutions
gezondheidszorg en welzijnszorg	- health and wellbeing
handel	- trade
delfstofwinning	- mining
openbare voorzienings bedrijven	- public service
zakelijke dienstverlening	- business support
openbaar bestuur	- government
cultuur en recreatie	- culture and recreation

Sector (in which the subject is working) (cont)

in dienst van huishouden	- in service of family
zonder werk	- no work
overig	- other
geen antwoord	- no answer

Work posture

meest zittend	- predominantly sitting
merendeels staand	- predominantly standing
meest lopen of fietsen	- predominantly walking or cycling
sjouwen en tillen	- carrying and lifting
Geen antwoord	- no answer

Work hours

1 – 80	- number of hours of work
Onbekend	- unknown
Geen antwoord	- no answer

Car make

Alfa Romeo	Audi	BMW	Chevrolet
Chrysler	Citroen	Daewoo	Daf
Daihatsu	Fiat	Ford	FSO
Honda	Hyundai	Iveco	Man
Mazda	Mercedes	Mitsubihi	Nissan
Opel	Peugeot	Renault	Rover
Saab	Scania	Seat	Skoda
Subaru	Suzuki	Toyota	Volkswagen
Volvo			

Overig	- other
Onbekend	- unknown
Geen antwoord	- no answer

Car year

1930 – 2000	- year of car manufacturing
Onbekend	- unknown
Geen antwoord	- no answer

Car type

Personenauto klein	- compact car
Personenauto middenklasse	- middle class car
Personenauto luxe	- luxury car
Sportauto	- sports car
Stationwagen	- station car
Minivan – busje	- minivan
Vrachtauto	- truck
Terreinwagen	- off-road
MPV	- multi-purpose van
Bus	- bus
Bestelauto	- small truck

Car type (cont)

Pick-up	- pick-up
Overig	- other
Onbekend	- unknown
Geen antwoord	- no answer

Shoe size

30 – 49	- shoe size
onbekend	- unknown
geen antwoord	- no answer

Pants (waist) circumference

28 – 46	- waist circumference
Onbekend	- unknown
Geen antwoord	- no answer

Pants length

28 – 40	- pants length
Onbekend	- unknown
Geen antwoord	- no answer

Jacket size (only men)

34 – 62	- jacket size
Onbekend	- unknown
Geen antwoord	- no answer

Blouse size (only women)

34 – 62	- blouse size
Onbekend	- unknown
Geen antwoord	- no answer

Cup size

AA	
A	
B	
C	
D	
E(=DD)	
Onbekend	- unknown
Geen antwoord	- no answer

Chest circumference under bust

50 – 100	- chest circumference under bust
onbekend	- unknown
geen antwoord	- no answer

Size underwear

Free entry (number or S, M, L, etc) - size	
Onbekend	- unknown
geen antwoord	- no answer

Marital status

Alleenstaand	- single
Verloofd	- engaged
Gehuwd	- married
Gescheiden	- divorced
weduwe of weduwnaar	- widow(er)
samenwonend	- living together
gereg. partner.	- registered partnership
geen antwoord	- no answer

Exercise (number of hours a week)

0 - 1	
2 - 3	
4 - 6	
6 - 10	
meer dan 10	- over 10
geen antwoord	- no answer

Salary (before tax) in thousand guilders

< 20	
20 - 30	
30 - 40	
40 - 60	
60 - 90	
90 - 120	
120 - 160	
160 - 200	
> 200	
onbekend	- unknown
geen antwoord	- no answer

Children (number of)

0	
1	
2	
3	
4	
5	
6	
7 of meer	- 7 or more
geen antwoord	- no answer

Weight gain

sterk afgenomen	- strong decrease
ongeveer gelijk gebleven	- about the same
sterk toegenomen	- strong increase

INFORMAZIONI DEMOGRAFICHE
(Italian)

INFORMAZIONI SUL LUOGO

In quale nazione e' il punto della collezione dei dati? (mettere un cerchio):

U.S.A. Netherlands Italy

Per favore, indicare il posto di collezione:

Los Angeles, CA	Detroit, MI	Dayton, OH	Ames, IA	Greensboro, NC
Marlton, NJ	Ottawa, Ontario	Minneapolis, MN	Houston, TX	Portland, OR
San Francisco, CA	Atlanta, GA	Genova, Italia		

DATI DEI VOLONTARI

Sesso :

Maschio Femmina

Altezza senza scarpe :

_____ cm.

Peso senza vestiario

_____ kg.

CONTROLLO DEI DATI

Data di nascita (mese – giorno – anno):

_____/_____/_____

Razza:

Italiana Altra Non risponde

INFORMAZIONI GENERALI

Siete arruolati nelle Forze Armate?

NO SI

INFORMAZIONI PERSONALI (CONTINUA)

LA PROFESSIONE ATTUALE:

Impiegato/a	Infermiere/a	Vendita/Marketing
Amministratore	Aiuto infermiera o simile	Scienziato
Servizi Leva	Casalinga	Servizi pubblici
Avvocato/Giudice	Operatore macchine	Studente
Insegnante	Direttore aziendale	Capo reparto
Programmatore computer/software	Portatore di materiale industriale	Tecnico
Costruttore edile	Meccanico	Tirocinio/Istituto professionale
Ingegnere	Altro lavoro legale/giudiziario	Trasportatore
Contadino	Altra specializzazione	Disoccupato
Guardia forestale o pescatore	Pensionato	Non risponde

STATO CIVILE:

Celibe Sposato/a Divorziato/a Vedovo/a Non risponde

Quante ore settimanali dedica a un esercizio fisico strutturato?

0-1 2-3 4-6 6-10 Piu' di 10 Non risponde

QUAL'E" IL LIVELLO SCOLASTICO PIU' ALTO CHE HA OTTENUTO?

Scuola superiore	Iscritto all'universita'	Scuole tecniche	Mini laurea
Bachelor	Masters	Dottorato/PhD	Studi post-dottarato
Scuola elementare	Scuola media	Nessuna	Non risponde

E'IN QUALE REGIONE E' NATO?

Abruzzo	Puglie	Basilicata	Calabria	Campania
Emilia Romagna	Friuli-Venezia Giulia	Lazio	Liguria	Lombardia
Marche	Molise	Piemonte	Sardegna	Sicilia
Trentino-Alto Adige	Toscana	Umbria	Val D'aosta	Veneto
Non so	Non risponde			

QUAL'E' IL REDDITO NETTO ANNUALE DELLA FAMIGLIA?

Meno di 10 milioni	Da 10 a 14,9	Da 15 a 19,9	Da 20 a 29,9	Da 30 a 44,9
Da 45 a 59,9	Da 60 a 79,9	Da 80 a 99,9	Da 100 a 150	Piu' di 150
Non so	Non risponde			

INFORMAZIONI PERSONALI (CONTINUA)

QUANTI SONO I FIGLI ?

0 1 2 3 4 5 6 7 o piu' Non risponde

INFORMAZIONI SU AUTOMOBILI:

DI CHE ANNO E' LA SUA AUTO ?

Del 19___ or 20____

DI CHE MARCA E' LA SUA AUTO?

Acura	Audi	BMW	Buick	Cadillac	Chevrolet
Chrysler	Dodge	Eagle	Ford	GMC	Honda
Hyundai	Infiniti	Isuzu	Jeep	Lexus	Lincoln
Mazda	Mercedes-Benz	Mercury	Mitsubishi	Nissan	Oldsmobile
Plymouth	Pontiac	Porsche	Saab	Saturn	Subaru
Suzuki	Toyota	Volkswagen	Volvo	Altra	Non so
Non risponde	Fiat	Alfa Romeo	Lancia	Ferrari	Maserati

DI CHE MODELLO E' LA VOSTRA AUTO?

Economica	Compact	Intermediate	Full size 2-prt	Full size 4-prt	Lusso	Minivan
Van	Sportiva	Station Wagon	SUV	Camion	Motorino/scooter	Altra
Non so	Non risponde					

INFORMAZIONI SULLE TAGLIE

TAGLIE/MISURE

Qual'e' la misura piu' abituale delle vostre calzature?

35 o meno 35.5 36 36.5 37 37.5 38 38.5 39 39.5 40 40.5
41 41.5 42 42.5 43 43.5 44 o piu' Non so Non risponde

SOLO UOMINI : Qual'e' la circonferenza di vita piu' abituale, in centimetri ?

75 o menor 80 85 90 95 100 105 110 115 120 125
130 135 140 145 150 155 160 o piu'
Non so Non risponde

INFORMAZIONI SULLE TAGLIE (CONTINUA)

SOLO UOMINI : Qual'e' la lunghezza dei pantaloni piu' abituale ?

66 o meno 68.5 71 73.5 76 78.5 81 83.5 86 88.5 91
93.5 96 o piu Non so Non risponde

SOLO UOMINI : Qual'e' la taglia piu' abituale della giacca (da abito) ?

46 o menor 48 50 52 54 56 58 o piu'
Non so Non risponde

SOLO DONNE: Che taglia porta di camicetta o top?

XSMALL SM MED LG XL XXL
Non so Non risponde

SOLO DONNE: Qual'e' la misura del reggiseno?

30 o meno 32 a b c d 34 a b c d 36 a b c d dd 38 a b c d dd 40 a b c d dd
42 a b c d dd 44 a b c d dd 46 a b c d dd 48 o piu' Non so Non risponde

SOLO DONNE: Che taglia porta di pantaloni ?

36 o meno 38 40 42 44 46 48 50 52 54 56 58
60 o piu' Non so Non risponde

APPENDIX B: TRADITIONAL MEASUREMENT FORM

NAME _____ DATE _____/_____/_____

MALE ____ FEMALE ____

(Measurement Values in cm)

	Dimension	Value		Dimension	Value
1	Weight (Mass)				
			21	Thigh Circ. Max.	
2	Stature				
			22	Ankle Circ.	
3	Crotch Height				
			23	Foot Length	
4	Thumb Tip Reach - 1				
	Thumb Tip Reach - 2		24	Shoulder (Bideltoid) Breadth	
	Thumb Tip Reach - 3				
			25	Sitting Height	
5	Subscapular Skinfold	mm			
			26	Eye Height Sitting	
6	Triceps Skinfold	mm			
			27	Acromial Ht. Sitting	
7	Arm Length (Spine-Shoulder)				
			28	Elbow Height, Sitting (Rt.)	
8	Arm Length (Spine-Elbow)				
			29	Knee Height Sitting	
9	Arm Length (Spine-Wrist)				
			30	Thigh Circ. Max Sitting	
10	Armscye Circ (Scye Circ/Acrom.)				
			31	Hand Circ.	
11	Chest Girth (Chest Circ at Scye)				
			32	Head Circ.	
12	Bust/Chest Circ.				
			33	Head Length	
13	Bust/Chest Circ. Under Bust				
			34	Bizygomatic Breadth	
14	Waist Circ., Preferred				
			35	Head Breadth	
15	Waist Height, Preferred (Rt)				
			36	Hip Breadth Sitting	
16	Waist Front Length				
			37	Buttock-Knee Length	
17	Total Crotch Length				
			38	Face Length	
18	Vertical Trunk Circ.				
			39	Hand Length	
19	Hip Circ., Maximum				
			40	Neck Base Circ.	
20	*Hip Circ., Maximum* Ht.				

Meetgegevens handmetingen

Nummer (Subject Number): _____ Datum (Date): _____

Gemeten door:

(Measurement Values in cm)

	Dimension (Dutch)		Dimension (North American/Italy)	Value
1	Lichaamslengte	2	Stature	
2	Hoofdomvang	32	Head Circ.	
3	Armlengte wervel-schouder	7	Arm Length [Spine-Shoulder]	
4	Armlengte wervel-elleboog	8	Arm Length [Spine-Elbow]	
5	Armlengte wervel-pols	9	Arm Length [Spine-Wrist]	
6	Handomvang	31	Hand Circ.	
7	Armomvang bij oksel	10	Armscye Circ. [Scye Circ./Acrom.]	
8	Borstomvang bij oksel	11	Chest Girth [Chest Circ. At Scye]	
9	Borstomvang	12	Bust/Chest Circ.	
10	Onderbusteomvang	13	Bust/Chest Circ. Under Bust	
11	Tailleomvang	14	Waist Circ., Preferred	
12	Romplengte voor	16	Waist Front Lengt	
13	Onderlichaamomvang	17	Total Crotch Length	
14	Rompomvang	18	Vertical Trunk Circ.	
15	Heupomvang	19	Hip Circ. Maximum	
16	Dijbeenomvang	21	Thigh Circ. Maximum	
17	Enkelomvang	22	Ankle Circ.	
18	Halsomvang	40	Neck Base Circ.	
19	Jukbeenbreedte	34	Bizygomatic Breadth	
20	Gezichtslengte	38	Face Length	
21	Hoofdlengte	33	Head Length	
22	Dijbeenomvang zittend	30	Thigh Circ., Max., Sitting	
23	Heupbreedte zittend	36	Hip Breadth, Sitting	
24	Hoofdbreedte	35	Head Breadth	
25	Schouderbreedte (delt)	24	Shoulder [Bideltoid] Breadth	
26	Handlengte	39	Hand Length	
27	Voetlengte	23	Foot Length	
28	Huidplooi schouderblad	5	Subscapular Skinfold	
29	Huidplooi triceps	6	Triceps Skinfold	
30	Taillehoogte	15	Waist Height, Preferred	
31	Heuphoogte	20	Hip Circ., Maximum Height	
32	Zithoogte	25	Sitting Height	
33	Ooghoogte zittend	26	Eye Height Sitting	
34	Acromionhoogte zittend	27	Acromial Height, Sitting	
35	Ellebooghoogte zittend	28	Elbow Height, Sitting	
36	Duim-reikafstand 1	4	Thumb Tip Reach - 1	
	Duim-reikafstand 2		Thumb Tip Reach - 2	
	Duim-reikafstand 3		Thumb Tip Reach - 3	
37	Kniehoogte zittend	29	Knee Height, Sitting	
38	Bil-knieschijfdiepte	37	Buttock-Knee Length	
39	Binnenbeenlengte	3	Crotch Height	
40	Gewicht	1	Weight	

NOME _____ DATA ____/____/____

MASCHIO ____ FEMMINA ____

(Misure in CM)

	Dimensioni	Misura		Dimensioni	Misura
1	Peso				
			21	Circ. Max. Coscia	
2	Statura				
			22	Circ. Caviglia	
3	Alt. Cavallo				
			23	Lung. Piede	
4	Portata Di Mano - 1				
	Portata Di Mano - 2		24	Larg. Spalle (Bideltoide)	
	Portata Di Mano - 3				
			25	Statura Da Seduti	
5	Calcolo Grasso Sottoscapolare	mm			
			26	Alt. Occhi, Seduti	
6	Calcolo Grasso Tricipide	mm			
			27	Alt. Spalla (Acromio), Seduti	
7	Lung. Braccio (Spina Dorsale-Spalla)				
			28	Alt. Gomito, Seduti (Destra)	
8	L.B. (Spina Dorsale-Gomito)				
			29	Alt. Ginocchio, Seduti	
9	L.B. (Spina Dorsale-Polso)				
			30	Max. Circ. Coscia, Seduti	
10	Circ. Manica (Acromio)				
			31	Circ. Mano	
11	Circ. Busto (Sotto Ascelle)				
			32	Circ. Testa	
12	Circ. Petto				
			33	Lung. Testa	
13	Circ. Sotto-Seno (Donne)				
			34	Larg. Zigomi	
14	Circ. Vita Preferita				
			35	Larg. Testa	
15	Alt. Circ. Vita Pref. (Destra)				
			36	Larg. Fianchi, Seduti	
16	Lung. Vita Davanti				
			37	Lung. Natica-Ginocchio	
17	Lung. Totale Cavallo				
			38	Lung. Viso	
18	Circ. Torso Verticale				
			39	Lung. Mano	
19	Circ. Max. Fianchi				
			40	Circ. Base Collo	
20	Alt. Max. Circ. Fianchi				

Misuratore_____

Annotatore _____